BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 481/2023

IN THE MATTER OF:

Balbir Sandhu & Ors. ...Applicant

Versus

State of U.P. & Anr. ...Respondent(s)

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Date: 19.04.2024
Place: New Delhi

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REPORT OF THE SECOND JOINT COMMITTEE CONSTITUTED BY HON'BLE NATIONAL GREEN TRIBUNAL, PRINCIPAL BENCH IN OA NO. 481/2023 IN THE MATTER OF BALBIR SANDHU & ORS. VS. STATE OF UTTAR PRADESH & ANR. (In compliance of Para 9 of order dated-04.08.2023)

1. Introduction:

Balbir Sandhu and others have sent the present letter petition by post, which has been treated and registered as Original Application No. 481/2023, complaining about illegal mining in District Saharanpur, Uttar Pradesh and District Yamunanagar, Haryana. The petitioner alleged the following:

a. Grievances regarding illegal mining in District Saharanpur, Uttar Pradesh.

b. Grievances of illegal mining in District Yamunanagar, Haryana.

2. Hon'ble NGT vide its order, dated 04.08.2023 in the matter of O.A. No. 481/2023 Balbir Sandhu & Ors. Vs. State of U.P. & Anr., constituted a Joint Committee. Hon'ble NGT in its order, dated 04.08.2023 observed "Sediment in the river and along the banks of the river are brought by the flow of the river stream which originate in the upstream which could be a mountain or a ground water source. These sediments follow the course of the river and deposit at different locations based on flow velocity of the river and terrain of the river bed. These sediments consist of boulders, stones, pebbles, sand, gravel, clay, etc. The sediments play an important role in maintaining the hydro-geology of river stream and also the aquatic ecosystem. The sediments along the river bank prevent flooding and erosion of the banks. In the river bed, these sediments act as substrata for biological growth such as aquatic flora and fauna on which the fish and other animals depend upon. There has been rampant mining of these sediments consisting of sand, pebble and stone for construction and other development activities. The mining has been going on indiscriminately along the river at various stretches right from the place of origin till it meets the final destination at sea. On account of such mining, there has been reports of river bank erosions, flooding, destruction of aquatic habitat, depletion of ground water, etc. This adverse impact not only effects the river system but also the farming and marginal communities who depend on the river for irrigation and other farm related activities. Given the above grave situation along River Yamuna, it will be appropriate that a holistic and comprehensive study be carried out"**.**

3. The Hon'ble NGT vide its order dated 04.08.2023 directed to carry out the study regarding the following aspects: -

i. *The source of sediment brought in by River Yamuna from the upstream;*
ii. *The amount / quantity of sediments brought by River Yamuna annually;*
iii. *Deposition of the sediments at various locations and the quantity annually;*

iv. *Mining activities being undertaken along the River Yamuna and the quantity (legally and illegally) along with geo-coordinates of the mining area on annual basis;*

v. *Impact of such mining on the hydro-geology and environment of the river by undertaking holistic and cumulative impact of such mining on river ecosystem and river dynamics including the surrounding floodplain and the habitation.*

vi. *To suggest remedial and methods to identity suitable locations to permit mining of the minerals with minimum adverse impact;*

vii. *To suggest the mechanism to monitor the transportation of the minerals by utilizing information technology including drone to monitor the mining activities;*

viii. *To suggest erosion control mechanisms and flood control mechanisms in the river to protect people and property;*

ix. *To suggest suitable methods to appropriately utilize the flood plain by undertaking agro based activities, fish culture activates, etc. without harming the riverine eco-system, and*

x. *To suggest mechanisms or guidelines for utilization of environment compensation recovered from such violators for restoration of mining are.*

4. In compliance to the Hon'ble NGT order dated 04.08.2023, a letter dated 07.11.2023 was issued by Ministry of Environment, Forest & Climate Change to Uttar Pradesh Pollution Control Board, Haryana State Pollution Control Board, Directorate of Geology & Mining Department, Uttar Pradesh, Mines and Geology Department, Haryana, Delhi Pollution Control Committee, Government of National Capital Territory of Delhi, National Mission for Clean Ganga, National Institute of Hydrology, Roorkee, Central Water Commission, Bhaskaracharya National Institute for Space Applications and Geo-informatics, Gandhinagar, National Institute of Technology, Kurukshetra, Indian Institute of Technology, Roorkee, Department of Space, Space Applications Centre, ISRO, Ahmedabad, G.B. Pant National Institute of Himalayan Environment (NIHE) Almora, Uttarakhand to nominate a representative to assist the Joint Committee for the study. The G. B. Pant National Institute of Himalayan Environment was designated as a nodal agency for co-ordination and compilation of the report.

5. In compliance to the Hon'ble NGT order dated 04.08.2023 (Para 9) and the Hon'ble NGT order dated 26.09.2023 (Para 6), the nominations received from concerned Institutes/Organisations. The Ministry of Environment, Forest and Climate Change constituted a Joint Committee under the Chairmanship of Chairman, Central Pollution Control Board comprising of the following Departments/individuals:

i. The Chairman, Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110 032- Chairman

ii. Dr. Bimal Kumar Bhattacharya, Department of Space, ISRO, Space Applications Centre, Jodhpur Tekra, Ambawadi Vistar, Ahmedabad- 380 015

iii. Prof. N.K. Goel, Indian Institute of Technology Roorkee, Roorkee - 247 667

iv. Dr. K.K.Singh, National Institute of Technology, Kurukshetra, Kurukshetra - 136 119
v. Representative of Uttar Pradesh Pollution Control Board, Building No. TC-12V Vibhuti Khand, Gomti Nagar, Lucknow-226 010
vi. Representative of Haryana State Pollution Control Board, C-11, Sector-6, Panchkula-134 109
vii. Representative of Directorate of Geology & Mining Department, Khanij Bhawan 27/8, Raja Ram Mohan Rai Marg, Lucknow-226 001
viii. Representative of Mines and Geology Department, Haryana Second Floor, DHL Square, Plot No. 9, Sector-22 IT Park, Panchkula, Haryana
ix. Representative of Delhi Pollution Control Committee, 6th floor, C wing, Delhi Secretariat, I P Estate, Delhi-110 002
x. Representative of Government of National Capital Territory of Delhi, 3rd level, Delhi Secretariat, I.P. Estate, Department of Mines and Hydrology, New Delhi-110 002
xi. Dr. Anu Chetal, National Mission for Clean Ganga, 1st Floor, Major Dhyan Chand National Stadium, India Gate, Delhi - 110 002
xii. Dr. Anupma Sharma / Dr. J.P. Patra / Dr. Sumant Kumar, National Institute of Hydrology, Roorkee- 247 667
xiii. Representative of Central Water Commission, 3rd Floor (South), Sewa Bhawan, R.K. Puram, Sector-1, New Delhi – 110 066
xiv. Dr. J. C. Kuniyal, G.B. Pant National Institute of Himalayan Environment (NIHE), Kosi Katarmal, Almora -263 643
xv. Representative of Bhaskaracharya National Institute for Space Applications and Geo-informatics, near CH 'O' Circle, Indulal Yagnik Marg, Gandhinagar-Ahmedabad Highway, Gandhinagar-382 007
xvi. Shri Ajit Vidyarthi, Scientist ‘F’/ Shri Nazimuddin, Scientist 'F', Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110 032
xvii. Dr. S. R. Wate, Ex-Director, NEERI, 148/149, Nagar Vikas Society, Narendra Nagar, Nagpur- 440 015
xviii. Shri. Avijit Ghosh, Member (EAC NCM) Marg, A- 604 Shahadeo Tower, P.P. Compound, Ranchi- 834 001
xix. Shri Pankaj Verma, Scientist 'E', Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jorbagh Road, New Delhi -110 003 – Member Secretary

6. Policies/ Rules/ Guidelines with regard to Sand/River Bed Material (RBM) Mining:

6.1 Mines and Minerals (Development and Regulation) (MMDR) Act, 1957

The Sand mining is regulated in terms of the Mines and Minerals (Development and Regulation) Act, 1957 [MMDR Act] and the Mineral Concession Rules (MCR) framed by the concerned State Governments. The Section 15 of the MMDR Act 1957 empowers the State Government to formulate rules for minor minerals. The State Government is

empowered to formulate the rules for preventing illegal mining, transportation and storage of minerals by exercising the powers conferred by section 23(C) of the MMDR Act.

A copy of Mines and Minerals (Development and Regulation) (MMDR) Act, 1957 is marked and annexed herein as **ANNEXURE-1.**

6.2 Applicability of Environment Impact Assessment (EIA) Notification 2006 and its subsequent amendments with regard to Sand/RBM Mining

A prior Environmental Clearance (EC) is mandatory for mining of Sand/RBM in accordance with EIA Notification 2006 and its subsequent amendments. The Ministry vide amendment notification S.O. 1886 (E), dated 20.04.2022, has delegated the power to State Level Environment Impact Assessment Authority (SEIAA) to issue EC for all minor minerals irrespective of mine lease area.

A copy of the Environment Impact Assessment (EIA) Notification 2006 and Notification S.O. No. 1886 (E), dated 20.04.2022 is marked and annexed herein as **ANNEXURE-2.**

6.3 Sustainable Sand Management Guidelines (SSMG), 2016 and "Enforcement & Monitoring Guidelines for Sand Mining" (EMGSM), 2020

Ministry of Environment, Forest and Climate Change (MoEF&CC) has issued "Enforcement & Monitoring Guidelines for Sand Mining" (EMGSM), 2020 supplemental to the existing guidelines, i.e., Sustainable Sand Management Guidelines (SSMG), 2016, which focuses on the effective monitoring of the sand mining, from the identification of sand mineral sources to its dispatch and end-use by consumers and the general public. These guidelines also highlight the essential infrastructural requirements necessary for effective monitoring for Sustainable Sand Mining and to control illegal sand mining through the use of IT, night surveillance through Unmanned Aerial Vehicle (UAV)/Drone, etc.

A copy of the Sustainable Sand Management Guidelines (SSMG), 2016 is marked and annexed herein as **ANNEXURE-3** and A copy of the "Enforcement & Monitoring Guidelines for Sand Mining" (EMGSM), 2020 is marked and annexed herein as **ANNEXURE-4**

6.4 Exemptions from Prior Environmental Clearance under Environment Impact Assessment (EIA) Notification 2006 and its subsequent amendments:

Ministry vide Notification S.O.1224(E), dated 28.03.2020 exempts certain cases from being considered as mining for the purposes of requirement of Environmental Clearance, i.e., Removal of sand deposits on agricultural field after flood by farmers, and excavation of ordinary earth or clay for plugging of any breach caused in canal, nallah, drain, water body, etc. and to deal with any disaster or flood like situation upon orders of the District Collector or District Magistrate or any other Competent Authority.

A copy of the Notification S.O. No. 1224(E), dated 28.03.2020 is marked and annexed herein as **ANNEXURE-5.**

6.5 Sand Mining Framework

Sand Mining Framework, 2018 was released by the Ministry of Mines. The framework emphasizes on better sustainability, availability, affordability and transparency in sand mining.

A copy of the Sand Mining Framework is marked and annexed herein as **ANNEXURE-6.**

6.6 National Framework for Sediment Management

Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation (DoWR, RD & GR) has formulated a National Framework for Sediment Management, 2022 for managing sediments in a holistic manner. The framework has been prepared after extensive discussion and consultation with the State Governments / Union Territories and stake holding Ministries / Departments and mandates the environmental safeguards with regards to reservoirs, weirs, barrages, river and canals.

A copy of the National Framework for Sediment Management is marked and annexed herein as **ANNEXURE-7.**

6.7 Haryana State Policy for mining of minor minerals

The State of Haryana awards contracts for mining of minor minerals in river bed areas of River Yamuna and other rivers/tributaries in the State. The Department of Mines and Geology has formulated specific conditions for river bed mining after detailed consultation with the Irrigation department and the same has been incorporated in the Haryana Minor Mineral Concession, Stocking and Transportation of Minerals and Prevention of Illegal Mining Rules, 2012.

Monitoring mechanism in the Haryana State

i. Seven check posts have been installed throughout the major routes of District Yamunanagar to strictly monitor the transportation of illegally mined minerals. Officials of mining and police department check the e-way bill of each vehicle. Since September 2022, 765 (till February, 2024) number of vehicles seized, vehicles involved in illegal mining were 271. Total fine recovered Rs. 3,14,24,500/-

ii. Independent teams of mining and police department also keep regular check on illegal mining through surprise visits either during day or night time. Regular monthly meeting of District Level Task Force Committee headed by Chairman cum

Deputy Commissioner, Yamunanagar, is held to review the status of legal and illegal mining in District Yamunanagar.

iii. CCTV Cameras and Weighbridge linked with HMGIS Portal installed at Mining contractor / lease.

iv. It is mandatory to all the vehicles to obtain mineral transport permit (MTP) for transporting minerals in the state. The transportation of minerals from one place to another are done only after the procurement of valid transit pass i.e. e-Rawaana from the source.

v. Further, independent teams of CM Flying Squads, mining and police department also keep regular check on illegal mining through surprise visits either during day or night time.

vi. Regular monthly meeting of District Level Task Force Committee headed by Chairman cum Deputy Commissioner, Yamunanagar is held to review the status of legal mines and illegal mining in the district. Similarly, State Level Task Force Committee (SLTFC) meetings are held quarterly under Chairmanship of Secretary of Haryana.

vii. Recently, the State Government form Haryana State Enforcement Bureau to curb the incidence of illegal mining/transportation.

6.8 Uttar Pradesh State Policy for mining of minor minerals

The Uttar Pradesh Minor Minerals (Concession) Rules, 2021 apply to the entire state of Uttar Pradesh. These rules cover mining operations for minor minerals such as ordinary sand, morum, gravel, building stones, and ordinary clay.

a) Mining leases are granted by the District Magistrate of the concerned district, except for limestone marble and dimensional granite.
b) Mining leases for sand, morum, *bajri*, or boulder found in the river bed are granted for a maximum period of five years.
c) Mining leases for other minor minerals are granted for a period not less than five years and not more than ten.
d) The State Government may grant a mining lease for any period longer than 10 years, but not exceeding 15 years.

Monitoring Mechanism in the State of Uttar Pradesh

(1) Status of CCTV Cameras installation at mining points verify the amount of sand extracted and materials transported.

(a) Rule-36(2) of Uttar Pradesh Minor Mineral Regulations, 1963 provides that the mining lease holder whose mining lease area is more than 5 hectares, shall construct check-post / gate and install 4 CCTV cameras capable of recording at 360° visibilities at his own expense for monitoring under the supervision of the D.M.

(b) The same is also controlled by Central Command Surveillance Centre located at Headquarters, Lucknow.

(ii) Status of regular patrolling by the Task force inspect mining operations

For effective control over illegal mining and transportation of minerals, local task force comprising of District Revenue Department, District Mining Department and Police level officers act as task force which constantly monitor the activities.

(iii) Setting up of dedicated institutional mechanism for monitoring of conditions of Environmental Clearance as granted under ELA Notification, 2006 in respect of sand and gravel mining under the supervision of the DMs. The PCBs and departmental officers adhere to the compliance of the Environmental Clearance Certificate.

(iv) Control of Mines and Transportation using latest technology such as:

(a) The Department has established a Command Centre at the Directorate of Geology and Mines at Lucknow from where they operate the Integrated Mines Surveillance System for the entire State.

(b) Artificial Intelligence based software and taking the help of Drones and Cloud Services for monitoring mining activity in the State are used for controlling illegal acts by violators.

(c) Drone videography /coverage are done in sensitive districts.

(d) CCTV Cameras and check-gates and Radio Frequency Identification (RFID) tags are used to monitor the movement of vehicles.

(v) Punishment is imposed for illegal Acts are as follow:

(a) State has made a provision in the Rules to blacklist a person for up to 2 years if found guilty of illegal mining/illegal transportation.

(b) The Rules have been amended to allow storage of minerals only beyond 5 km radius from the river bed in order to prevent illegal mining from river bed under the excuse/name of storage.

(c) Vehicle Tracking System to check the misuse of Transport Pass and Overloading has been introduced and under full scale implementation.

(d) Any new areas identified are based on survey conducted according to Sustainable Mining Guidelines, Mineral Exploration and then included in the District Survey Report (DSR).

(e) Instead of Physical Mineral Dispatch Permits, electronic permits (called MM11) with security features have been introduced which are controlled by OTP validation from online servers.

(f) In District Saharanpur, five Check Gates, i.e., Biharigarh, Shahjahanpur, Deoband, Chilkana and Kalsiahave have been implemented to control illegal transportation. Inter State Transport Permits (ISTP) have been implemented to validate the legality of cross border transportation.

(g) From April, 2022 to February, 2024, 656 vehicles involved in illegal transportation which have been caught through UP mines digital support system electronic check gates. In the District Saharanpur, the revenue collected due to illegal transportation from seized vehicle stood to be Rs. 592.06 crore, 7 FIRs lodged and 24 complaints registered.

(h) For control of illegal mining and transportation, District Task Force has been constituted comprising District Magistrate, SSP, DFO, SDM, C.O., RTO and Mines Officers.

(i) Under the supervision of SDM, Behat and Circle Officer, Police, Behat, Saharanpur, continuous monitoring of the illegal mining and regular action are being taken. Four check posts are installed in Tehsil Behat and 01 Section PAC, Civil Police and Revenue officials are deputed on these check posts.

In view of the above, Committee observed that monitoring through Drones having high resolution cameras can definitely help in surveillance/monitoring. Registration numbers of machinery/vehicles involved in illegal mining/illegal transportation of minerals can be easily traced by high resolution cameras along with the site. This activity can further be productive by installation of CCTVs in highly sensitive areas which are prone to illegal mining. The Drones and CCTV's are not only helpful to the mining department but would also be helpful to the revenue department as well as police and irrigation departments.

6.9 Sand mining and its impacts on river morphology, hydrology and aquatic habitat

Sand 'resources' (including gravel and crushed stone) are the second most exploited natural resources in the world after water. Sand and gravel have long been used as a construction material. With all increased construction and developmental activities, the demand for these

materials have continued to rise. In-stream sand mining is a common practice because of locations being near the markets or in the transportation route, reducing transportation costs.

Sand mining (removal of sand from the river bed) has river management issues in addition to environmental impacts. Sand serves as an aquifer as well as a natural carpet on the bottom of the river. The removal of this layer causes erosion resulting into changes such as morphology, hydrology and ecology in bed channel; both upstream and downstream. A summary of impacts different environmental components and others due to sand mining is given in Table 1.

Table 1: Summary of impacts of sand mining

Impacts on different components	**Description**
Biodiversity	Impacts on related ecosystem (e,g., fisheries)
Land losses	Through river bank erosion (both inland and coastal)
Hydrological	Degradation, change in water flow, flood regulation and marine currents
Water supply	Reduces water retention removes sand filtration, lowering of water table and increases pollution
Infrastructure	Damage to bridges, river embankments and coastal infrastructures
Climate	Climate directly through transport emissions, indirectly through cement production
Landscape	Coastal / Bank erosion changes in deltaic structures, quarries, pollution of rivers
Extreme events	Decline of protection against extreme events (i.e., flood, drought, storm surge)

7. Environmental impacts of illegal mining

The unauthorized extraction of sand from river has specific environmental repercussions that endangers its ecology. The act of extracting sand, without environmental safeguards, may cause permanent damage to the river environment, leading to instability, reduction in groundwater levels, and disturbance of habitats for many species. It has potential to cause the devastation of ecosystems and wildlife habitats, resulting in a negative impact on biodiversity. The absence of environmental controls in illegal mining worsens these problems, resulting in enduring harm to the natural ecosystem. In addition, illegal mining activities can lead to the exhaustion of valuable metals and minerals, causing adverse effects on natural resources.

8. Meeting / Site Visit:

Vide letter, dated 08.01.2024, the Ministry sought comments from the Institutes/Departments/Individuals with regard to order of the Hon'ble NGT and requested them to provide the necessary information with regard to sand/RBM mining in Yamunanagar and Saharanpur Districts. Based on the preliminary information obtained from the District authorities, the Joint Committee undertook a site visit to Yamunanagar and Saharanpur on 5th February 2024 followed by the first meeting at Saharanpur, Uttar Pradesh. The Joint Committee had four meetings and one site visit as given in Table 2 as under:

Table 2: Field visit/Meeting details by the Joint Committee

Sr. No.	Date	Meeting/Site Visit	Brief description of activities
A.	05.02.2024	Site Visit and First Meeting	The Joint Committee undertook a site visit to Yamunanagar and Saharanpur on 5th February, 2024. The members of the committee visited the Regional Office of Haryana Pollution Control Board located at Yamunanagar District and had a preliminary discussion with the State officials from Mining Department, Local Administration and State Pollution Control Board prior to the site visit. During the preliminary discussion, the brief history of sand mining along with the existing regulatory frameworks and their implementation was discussed. The discussion stretched from identification of lease to production, from production to dispatch and from dispatch to end use by the users. The Joint committee visited the sites in District Saharanpur, Uttar Pradesh and District Yamunanagar,

			Haryana on the same day followed by the first meeting at Saharanpur, Uttar Pradesh.
B.	19.02.2024	Second Meeting	Reviewed the progress made so far with regard to the recommendations made in the first meeting.
C.	13.03.2024	Third Meeting	Held discussion and first revision made on Draft Report by the Committee members.
D.	15.03.2024	Fourth Meeting	Held discussion and second revision of Draft Report by the Committee members.
E.	18.03.2024	Fifth Meeting	Finalization of the Report.

A copy of the Record of discussions are annexed and marked herewith as **ANNEXURE-8, ANNEXURE-9, ANNEXURE-10 and ANNEXURE-11**

9.0 Study area and datasets used

The area identified in Hon'ble NGT order covers the River Yamuna and its bank area falling in the Districts of Saharanpur, Uttar Pradesh and Yamunanagar, Haryana. The course of the River Yamuna in this region demarcates the boundary of both the States. The length of the river along these two districts is approximately 110 km. As per the satellite image, maximum mining activities are concentrated over the areas upto approximately 3.0 kilometre (km) on either side of the river, which comprises the study area under the present case.

9.1 Geological Profile of the Area

The master slope of the Yamunanagar District is oriented towards the south direction. From a geological perspective, a significant portion of the Yamunanagar District consists of relatively young landforms that formed during the Holocene to Upper Pleistocene epochs. These landforms have been shaped by the deposition of fresh sediments carried by rivers originating from the Himalayas (Pandey et al., 2004). The area can be categorized into six major geomorphic units based on local topography, slope, texture, surficial materials, and arrangement of landform features. These units include the alluvial plain, floodplain, palaeochannel, piedmont alluvium, river terrace, and structural hills (Sachdev et al., 1995). The beds of the temporary channels that originate from hills with a defined structure in the northern region serve as extensive deposits of large rocks, small rocks, gravel, sand, and clay that can be used for construction purposes. The Yamunanagar District falls under sub-tropical monsoon, followed by moderate and dry winters, hot summers, and a sub-humid climate.

The Saharanpur District is in close proximity to the Shivalik hill range and is located within the upper Ganga-Yamuna Doab region of the northern India (Malyan et al., 2014). The Saharanpur District has an average elevation of approximately 269 metres above mean sea level and receives an annual average rainfall of around 1150 millimetres, according to IMD (2017).

9.2 Satellite image acquisitions and interpretation of study area under mining activities

Satellite data are very useful source of information for monitoring various features on the Earth's surface. Availability of multi-timeframe satellite data also helps in analysing changes over time. Here, the study area has been analysed thoroughly with available multi-spectral image having 5.8m spatial resolution acquired during April 2023 from LISS-IV camera on-board Indian Remote Sensing (IRS) satellite. The preliminary analysis provides evidence of sand mining and stone crushing activities in and around both the sides of River Yamuna within the study area. Further analysis was carried out using the high resolution (sub-meter) pictures on Google Earth platform. The evidences visible on satellite images indicate the active sand/stone mining from river bed and also the crushing activity along the sides of River Yamuna (**Figure-1**). Detailed observations from further image interpretation are given below:

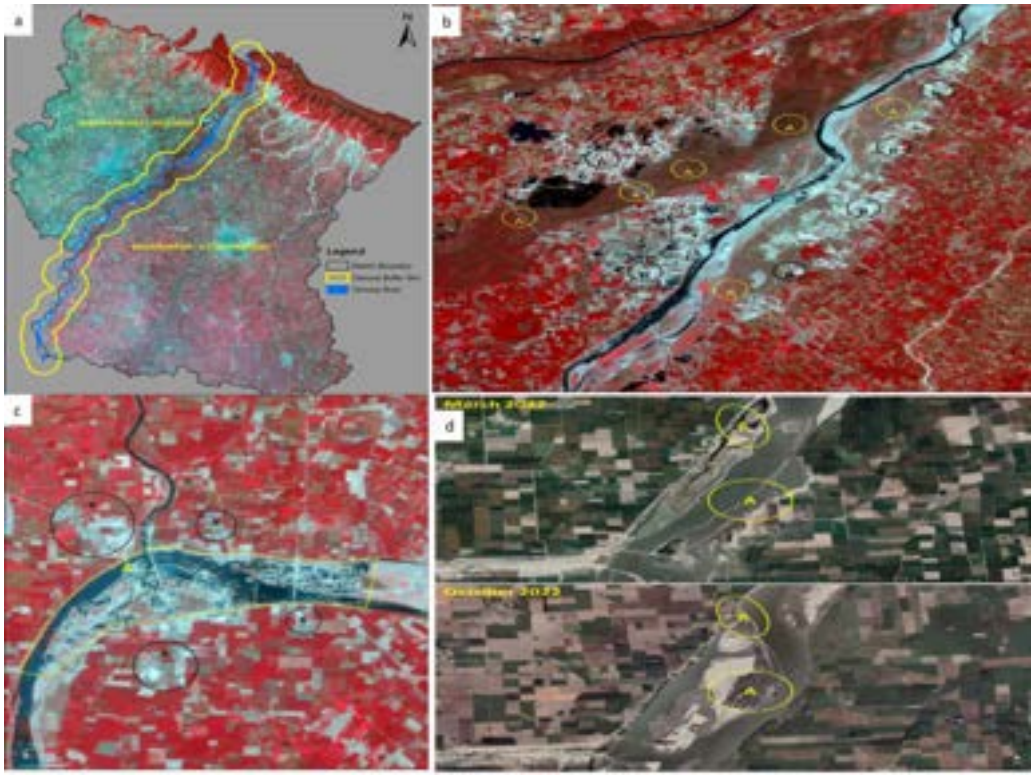


Figure 1: Examples of satellite images showing mining/crushing site locations. Yellow colour line in 1a shows the study area boundary. 1a, 1b, 1c represent False Colour Composites (FCCs) from LISS-IV data of April 2023 where (red colour indicates vegetation, dark blue indicates water, and sky blue indicates structure, settlements or bare fallows and black coloured circles indicate mining sites through visual image interpretation technique. Figure 1d presents Natural Colour Composite (NCC) extracted from Google

Earth images at sub-meter spatial resolution. Here, yellow circle represents changing shape of river flow due to sediment deposition during a period from May to October 2022.

9.3. Reconnaissance in Saharanpur and Yamunanagar districts

In view of conducting reconnaissance, the committee visited to the Sand/RBM mining leases located in Belgarh North YNR B1 (river bed), Belgarh South block YNR B2 (river bed) and Malikpur khaddar block YNR B28 (agriculture plot) of Yamunanagar District. During the visit, the mining was not in operation. Dump of Sand and RBM were observed during the visit (**Figure-2**).

In Haryana, RBM mostly consists of Boulder, Gravel and Sand (BGS).

	
A view of broken approach roads	Riverbed mining site, Belgarh, Yamunanagar, Haryana

	
Legacy mined out agricultural land filled with rain water	Mining on agricultural land in Yamunanagar Haryana



Existing dump of Sand / *Bajri* on agricultural mining lease



Hathinikund Barrage



Boundary Pillar of M/s Star Mines

	
Plantation undertaken by M/s Star Mines	Committee members visiting the mine lease area of M/s Star Mines

Figure-2: Site Reconnaissance photographs

10. Response on the directions issued by the Hon'ble NGT:

Based on the data and information gathered through geological profile, satellite-based multi-spectral images and interpretation, reconnaissance survey at the sites in two districts, mining and ancillary data shared by concerned states and available published literatures. The response of the committee to the directives given by the Hon'ble NGT are listed as under.

i. The source of sediment brought in by Yamuna from the upstream

The River Yamuna carries sediment from various upstream sources as it flows through its watershed. The major sources of sediment brought in by the River Yamuna from its upstream areas include:

Himalayan Rivers: The River Yamuna originates from the Yamunotri Glacier in the Himalaya. As it flows downstream, it receives sediment from tributaries originating from other glaciers and mountainous regions in the Himalaya. These tributaries, such as, Tons, Giri, and Supin, contribute sediment to the flow of River Yamuna.

Erosion of Mountainous Terrain: The Himalayan region is characterized by steep slopes and rugged terrain, leading to significant erosion processes. Weathering, mass wasting, and fluvial erosion contribute to the generation of sediment in the upstream reaches of the River Yamuna.

Landslides and Mass Movements: The Himalayan region is prone to landslides and mass movements, particularly during the monsoon season. These events can mobilize large volumes of sediment, which are then transported by rivers like the River Yamuna during high-flow periods.

Glacial Processes: Glacial erosion and melting contribute to the sediment load of rivers originating from glacier-fed sources. Glacial abrasion and plucking result in the production of rock flour and other sediments, which are carried downstream by meltwater streams and rivers.

Bank Erosion: Along its course, the River Yamuna undergoes natural bank erosion processes, where the force of the river water erodes the banks, contributing sediment to the river flow. This bank erosion can be significant, especially during periods of high flow and flooding.

Land use Changes and Human Activities: Human activities such as deforestation, agriculture, urbanization, and infrastructure development in the upstream areas can accelerate erosion processes and increase sediment delivery to the River Yamuna. Poor land management practices, such as, improper soil conservation measures, can exacerbate erosion rates and sedimentation.

Presence of Hydraulic structures in the River: Hydraulic structures such as barrage, weirs and dams affect the sediment deposition in the downstream reaches.

The Committee suggested that understanding the sources of sediment in the River Yamuna is essential for assessing sediment dynamics, sediment budget analysis, and watershed management strategies. By identifying the main contributors to sediment load, stakeholders can implement measures to mitigate erosion, improve land management practices, and reduce sedimentation in the river system.

ii. The amount/quantity of sediment brought by river Yamuna annually:

As per the DSR of Saharanpur District the quantity of Sand/RBM was available 7,17,625 Cubic meters for Sand and 9,07,789 Cubic meters of RBM based on an assumption of 3m deposition.

As per the DSR of Yamunanagar District, the quantity based on an assumption of 3m deposition. Latest DSR reveals that, about 25-30 lakh M.T. would be excavated from various parts of river bed areas.

The sediments in the River Yamuna are mainly composed of very fine sand, silt, clay, small, medium and large size round shaped boulders, derived from catchment in Himalayan region indicating the geological origin of the sediment. The maximum mass transfer in the river occurs during the monsoon season, influencing the sediment dynamics and transport processes within the river system annually (M. Singh, 2001).

The Committee suggested that the annual quantity of sediment transported by the River Yamuna can be estimated by several methods with each of the methods having its accuracy and the errors associated. The methods are summarised as follows:

Sediment Transport Measurement:

Field measurements of sediment transport involve directly measuring the sediment load at various points along the river. Techniques include sediment sampling, sediment traps, or acoustic Doppler instruments to measure suspended sediment concentrations and sediment transport rates and specific replenishment studies. These measurements form the basis of generation of DSR which includes estimate of quantity available for mineral mining. Actual data collection at the site through quantitative measurements, by conducting actual field surveys, and cross verification through study of pre and post monsoon remote sensing imageries having highest vertical accuracy, and drone surveys will give the quantities to a reasonable accuracy.

It is necessary to conduct study in the area during specified time periods and locations in order to capture fluctuations in sediment transport over the course of the year.

- Identification of potential area of aggradation due to deposition in entire course of River Yamuna is needed in the district. Mining lease for Sand / RBM mining have to be granted in these identifies areas.
- Replenishment study has to be carried out for every identified potential Resource Area such as River Reaches.
- Mining Area within every potential area has to be finalized based on consideration of guidelines given EMGSM, 2020.

Hydrological Modelling:

Hydrological models, such as, sediment transport models, can simulate the movement of sediments within the river system based on the observed data of river discharge, sediment rate, river cross-sections at close intervals and sediment characteristics. The hydrological models vary from simple black box model to complex physically based models. These hydrological models are based on calibration of the model parameters and the performance of these models vary in calibration and validation periods. The prerequisite to the application of these models is the collection of observed discharge, sediment and river cross-section details at close interval.

Remote Sensing and Geographic Information System (RS&GIS):

RS & GIS technologies, including satellite imagery and aerial photography, can be used to monitor changes in river morphology and sediment transport patterns over large spatial scales. GIS techniques can be employed to analyze satellite data and estimate sediment transport rates based on changes in river channel geometry and sediment deposition.

Sediment Rating Curves:

Sediment rating curves relate sediment transport rates to river discharge, providing a relationship between flow conditions and sediment transport. By establishing sediment

rating curves based on field measurements and historical data, the annual sediment transport can be estimated by integrating flow data over the course of a year.

Historical Records and Trends:

Historical data on sediment transport, such as, long-term monitoring records, sedimentation rates, and sediment core analysis, can provide insights into annual sediment transport patterns and trends over time. Analyzing historical data allow for the identification of seasonal variations, trends, and potential impacts of anthropogenic activities on sediment transport dynamics.

The Committee was of the opinion that employing these methodologies and approaches, stakeholders can estimate the annual quantity of sediment transported by the River Yamuna to gather valuable information for river management, sediment budget analysis, and environmental assessments.

iii. Deposition of the sediments at various locations and the quantity annually

Annual quantity of sediment brought by river varies from section to section and from time to time. In general, the sediment quantities vary in X, Y and Z directions and in time. Large variations in the sediment quantities have been observed in the past. Extreme flood events, glacial lake outburst floods, glacial burst floods, landslide lake outburst floods bring extreme quantities of sediments also. Several software like HEC-RAS, and MIKE family, etc. are available for discharge and sediment estimation. Some of these models are available in public domain and some others are commercial software. The accuracy of hydrological modelling software depends upon the availability of past observed data, methods and software used. These softwares perform poorly in the estimation of extreme floods and sediments. The empirical methods available in literature are based on very limited data base. Hence, it is utmost important to improve our observation data networks. To proceed further in the direction of reliable quantities of sediment on different sections, the following approach is suggested:

i. The conventional method is based on the pre- and post-monsoon field visits by the staff of Department of mines and geology and its cross verification by the supervisory staff. There is a need to further crosscheck it using the high resolution remote sensing images and also through the pre-monsoon and post-monsoon drone surveys.
ii. Sediment balance study should be carried out to arrive at the reliable estimates. The sediment balance study requires the fixation of the boundary of identified zone and the time-period.

As per the available information in DSR, various locations and quantity available at these locations is delineated as under:

a. At present, there are 10 operational mining leases in the district of Yamunanagar. The combined production capacity of these 10 leases stands at 185.16 lakh tonne and total area involved is 553.45 ha. Besides, 8 new leases with combined area of 1166.91 ha has been auctioned. While, 5 numbers of sand mine leases have been suspended (in mine lease area 116.36 ha).
b. In Saharanpur District, there are 3 numbers of working leases having a capacity of 17.98 lakh cubic meter. Here, mineral consists of sand, *bajri*, boulder and moram in the mine lease area of 92.83 ha. The remaining 14 numbers of mine are pending for Environmental Clearance from respective State Environment Impact Assessment Authority (SEIAA). While 5 numbers are pending for Consent to Operate (CTO) with total production capacity of 65.10 lakh cubic meter with mine lease area of 325.605 ha.

The Committee suggested that the deposition of sediment and its quantity is a dynamic process, therefore, this activity requires continuous monitoring. Deposition of sediments along the River Yamuna and estimating its quantity annually would typically involve a combination of field surveys including drone surveys, remote sensing techniques, and hydrological modelling. The data collection using these techniques is detailed as under:

Field Surveys: Regular field surveys conducted by government agencies or research organizations can measure sediment deposition at various locations along the River Yamuna. These surveys may involve sediment sampling, bathymetric surveys (measuring water depth), and sediment transport measurements. By comparing survey data over time, changes in sediment deposition rates can be assessed.

RS and GIS: Remote sensing and GIS technologies, including satellite imagery and aerial photography, can be used to monitor changes in river morphology and sediment deposition patterns. Satellite data can provide spatial information on sediment distribution, allowing for the analysis of sediment accumulation over large areas. Additionally, GIS techniques can be used to map sediment deposition hotspots and quantify sediment volumes.

Hydrological Modelling: Hydrological models, such as those based on the sediment transport equations, can simulate sediment transport and deposition processes along the River Yamuna. These models take into account factors such as river flow velocity, sediment particle size distribution, and channel morphology to predict sediment deposition rates. Calibrating these models with field data can improve their accuracy in estimating annual sediment deposition quantities.

Sediment Budget Analysis: Sediment budget analysis involves assessing the balance between sediment inputs (e.g., erosion, sedimentation) and outputs (e.g., sediment transport, deposition) within a river system. By quantifying sediment sources and sinks along the River Yamuna, sediment budgets can provide insights into the annual quantity of sediment deposited at various locations. This approach often combines field measurements, remote sensing data, and modelling techniques.

Historical Data and Trends: Historical data on sediment deposition along the River Yamuna, such as long-term monitoring records and sedimentation rates derived from sediment cores, can provide valuable insights into sediment dynamics and trends over time. Analyzing historical data can help identify patterns of sediment deposition and assess changes in sedimentation rates on an annual basis.

iv. Mining activities being undertaken along the River Yamuna and the quantity (legally and illegally) along with geo-coordinates of the mining area on annual basis

The information submitted by District Authorities are given as under: -

In Saharanpur

a) At present, 3 mining leases of total 92.83-hectare area are operational in River Yamuna in Saharanpur District. These have obtained Environment Clearance and CTO. Further, 100 short period mining permits in agricultural field in floodplain of total area approximately 173.36 hectare were issued in Saharanpur District during 2023 for mining 2 m depth. This was based on SO. No. 1224 (E), dated 28.03.2020 of MoEF&CC regarding exemption from obtaining Environment Clearance.

b) Out of total 186 stone crushers, 113 stone crushers are in operational in Saharanpur District and all are having CTO. Besides, there are 73 other closed stone crushers, which were mostly self-closed.

c) Mining lease wise replenishment assessment study for mining projects in river has been carried out by a district level committee in Saharanpur District.

In Yamunanagar

a) At present, 10 mining leases of total 553.45 hectare area are operational in Yamunanagar District. These include 07 in River Yamuna and 03 agricultural land, and they have obtained Environment Clearance and Consent to Operate. The mining in agricultural field is being allowed up to 9 m depth.

b) Out of total 204 stone crushers, 174 stone crushers are operational in Yamunanagar District having Consent to operate. Besides, there are 30 other closed stone crushers, either self-closed or closed by SPCB.

Details of legally and illegally mining area along with geo-coordinates are annexed and marked herein as **ANNEXURE-13**

Observations by ISRO using IRS LISS-IV and Google Earth Images:

ISRO acquired remotely sensed satellite-based imageries having spatial resolutions varying from 5.8 m to sub-metre. These are interpreted with analysis for various components such as mining sites, water bodies, land use land cover and the current

activities being undertaken for mining for crushing minerals and materials. The details are as under:

The spatial distribution of active sites can be seen as shown in Figure-3. It is made clear from the image that majority of these activities are located in the upper part of the study area, approximately upto 30 km down the River Yamuna from Hathni Kund Barrage. It is also observed that agricultural fields near the river area are being converted into these mining and stone crushing activities (Figure-3).



A section of river as seen on Google Earth images, in two different time-frame, March 2022 and October 2022. It is seen in the images that during October 2022, new sand bar deposition area was formed. In October 2022 image, (A) the vehicles used for river sand mining area were clearly visible; and (B) a newly prepared dirt track can also be seen in the image.



Agriculture area converted into mining activities, as soon on the Google Earth images of November 2018 and October 2022

Figure 3 (a) shows sand bar deposition and vehicles used for sand mining as seen on high-resolution (sub-metre) satellite images during March to October 2022 from Google Earth platform, and Figure 3 (b) images show evidence of conversion of agricultural area into mining activities during November 2018 to October 2022.

Following points emerged for further analysis:

1. There are evidences visible on satellite images, indicating the active sand/stone mining from river bed and also the crushing activity along the sides of River Yamuna. Representation of the study area is given in Figure-4, Figure -5, Figure -6 and Figure-7.
2. An approximate assessment towards number of active mining/stone crushing sites is carried out. Analysis reveals that there were a total of detectable 50 small size

sites (1-2 crusher) and 43 large size sites (more than 2 crushers) during year 2023. The spatial distribution of active sites can be seen in Figure -7. It is made clear from the image that majority of these activities are located in the upper part of the study area, approximately upto 30 km down the River Yamuna from Hathni Kund Barrage.

3. There are different sizes of active mining/crushing sites and pictorial representation is given in Figure-8.
4. It is also observed that agricultural fields near the river area are being converted into the mining and stone crushing activities. One such case is shown in Figure-9 and Figure-10.
5. Furthermore, quantification of these mining activities is very difficult using satellite data because of various limitations. The area of individual mining site is also relatively very small and river bed is highly dynamic which changes very frequently within months.
6. The source of sediments brought by River Yamuna for this study area is upper catchment area falling in Uttarakhand State as well as the catchment area from Haryana and Uttar Pradesh.

ISRO recommends that such data should be collected annually and generation of updated information on mining activities, Environmental damages, change in land use land cover, ecological damages sediment deposits and change in hydro-geology and morphology by using remote sensing imageries in cloud free conditions with appropriate resolution supported by ground truthing studies are needed on long-term basis. Such studies can be carried out through reputed institutions in the area of hydrology, ecology and environment for sustainable mining in this region.

An operational Web-GIS based monitoring system should be developed for sustainable mining at respective State Remote Sensing Centres such as HARSAC for Haryana and RSAC-UP for Uttar Pradesh. Here, respective line departments can help by sharing the ground-truth data. State Remote Sensing Centres should use very high resolution satellite data under clear sky before and after south-west monsoon.

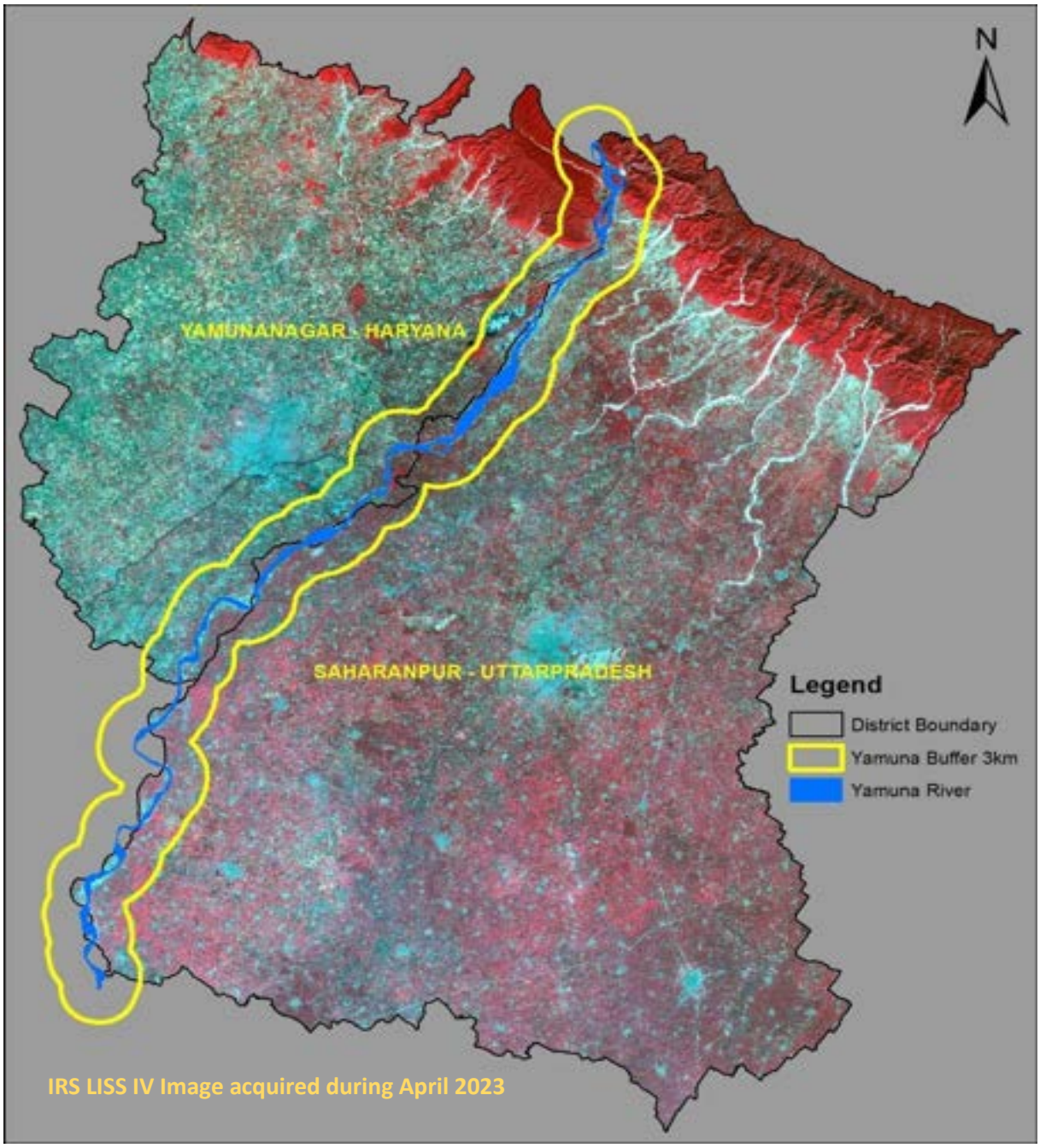
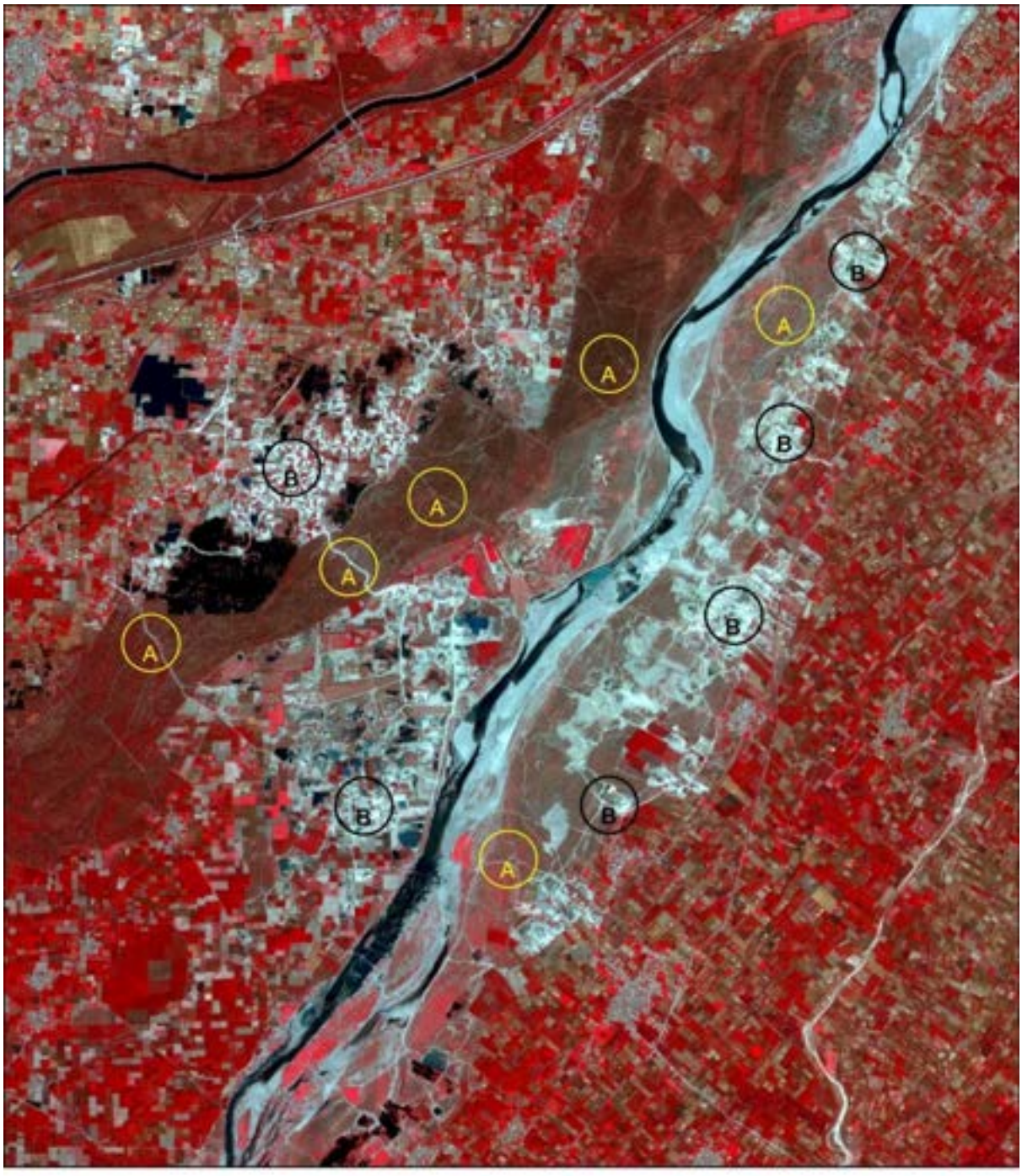


Figure-4 Yellow color line shows the Study Area



A - Dirt tracks on both side of the river, giving evidences for movement of heavy vehicles for carrying material from river bed

B - Active stone crushing sites on both sides of the river

Figure-5 Evidences of mining/crushing activities in different locations



A - Part of river bed after sand excavation, filled with river water

B - Active stone crushing sites on both sides of the river

Figure-6 Evidences of mining/crushing activities at different locations





A section of river as seen on Google Earth images, in two different time-frame, March 2022 and October 2022. It is seen in the images that during October 2022, new sand bar deposition area was formed. In October 2022 image, (A) the vehicles used for river sand mining area were clearly visible; and (B) a newly prepared dirt track can also be seen in the image.

Figure-7 Crushing sites as seen on satellite data

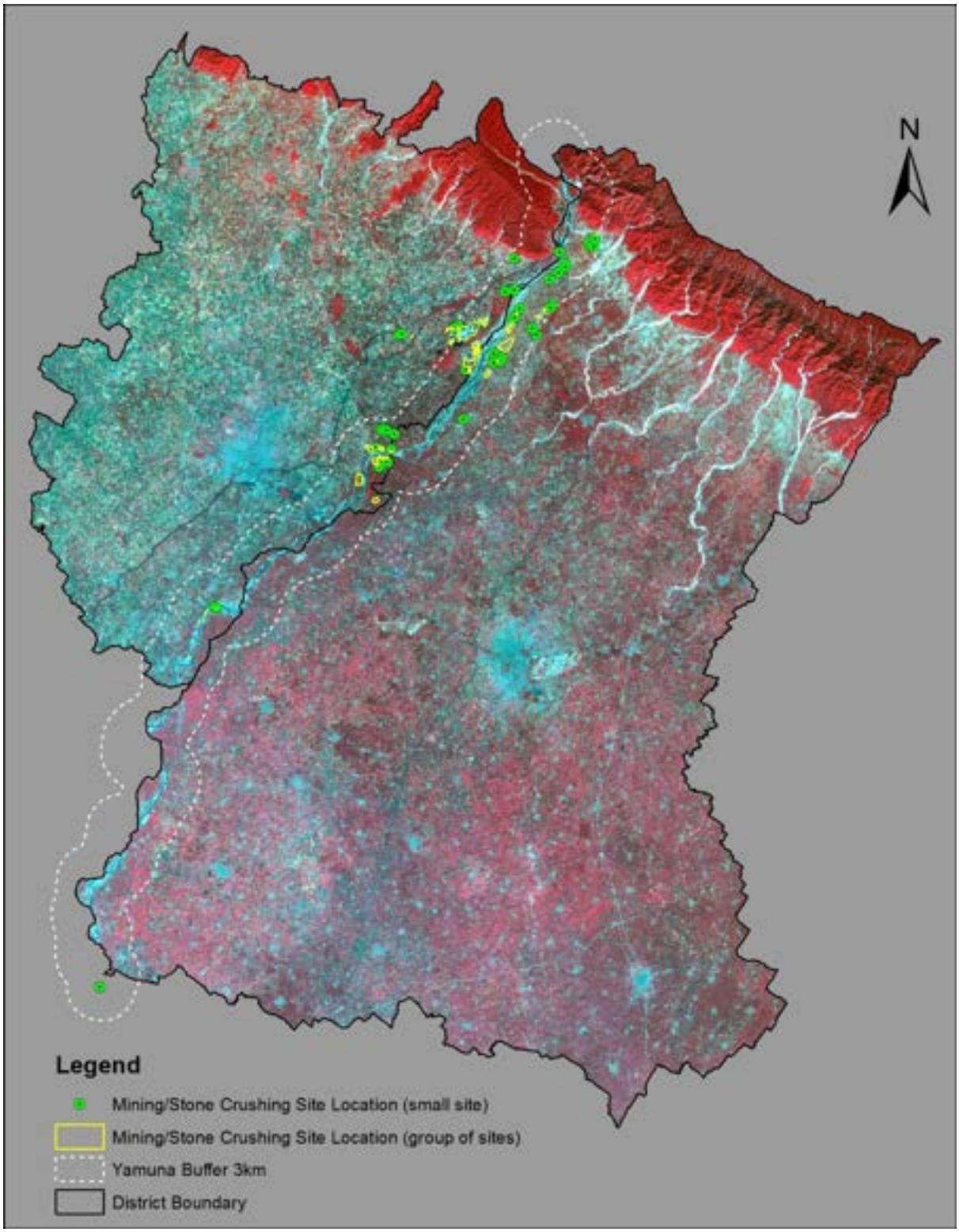


Figure-8 Distribution of mining/crushing sites

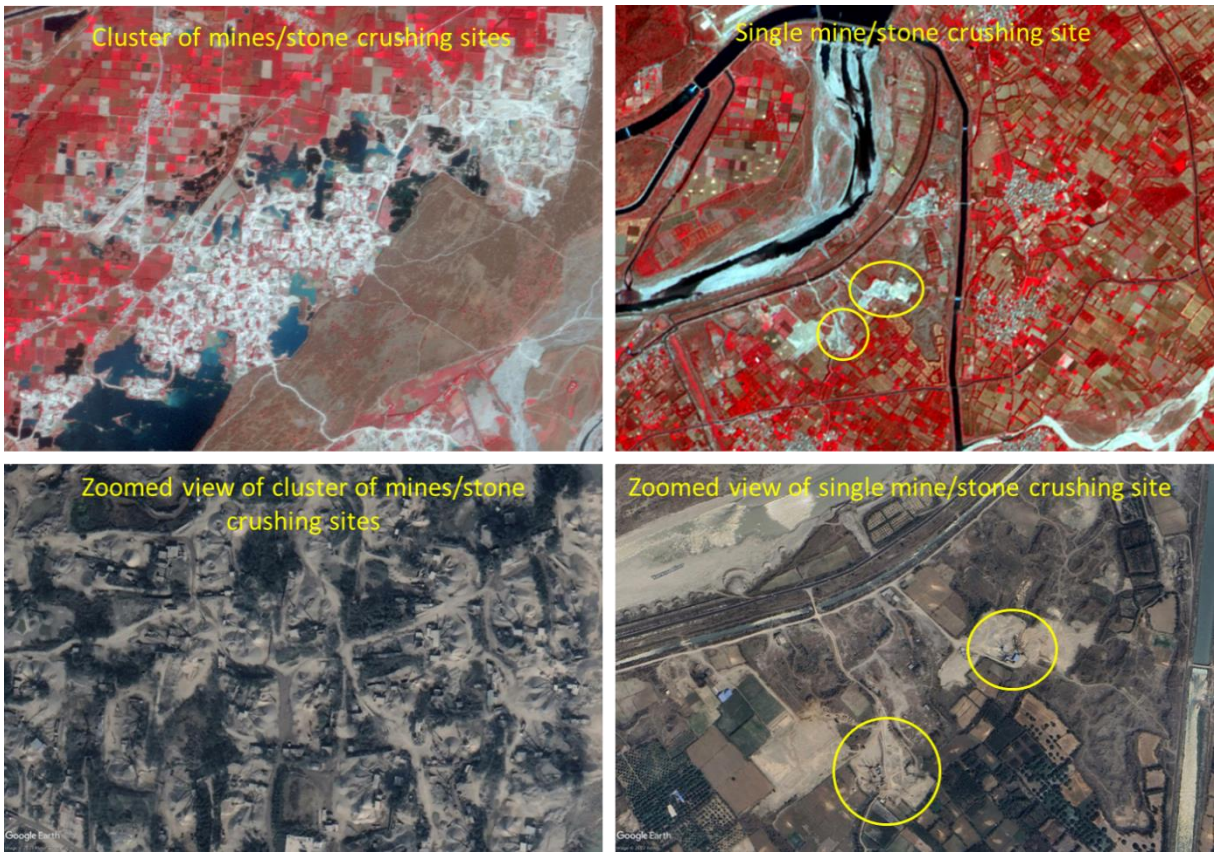
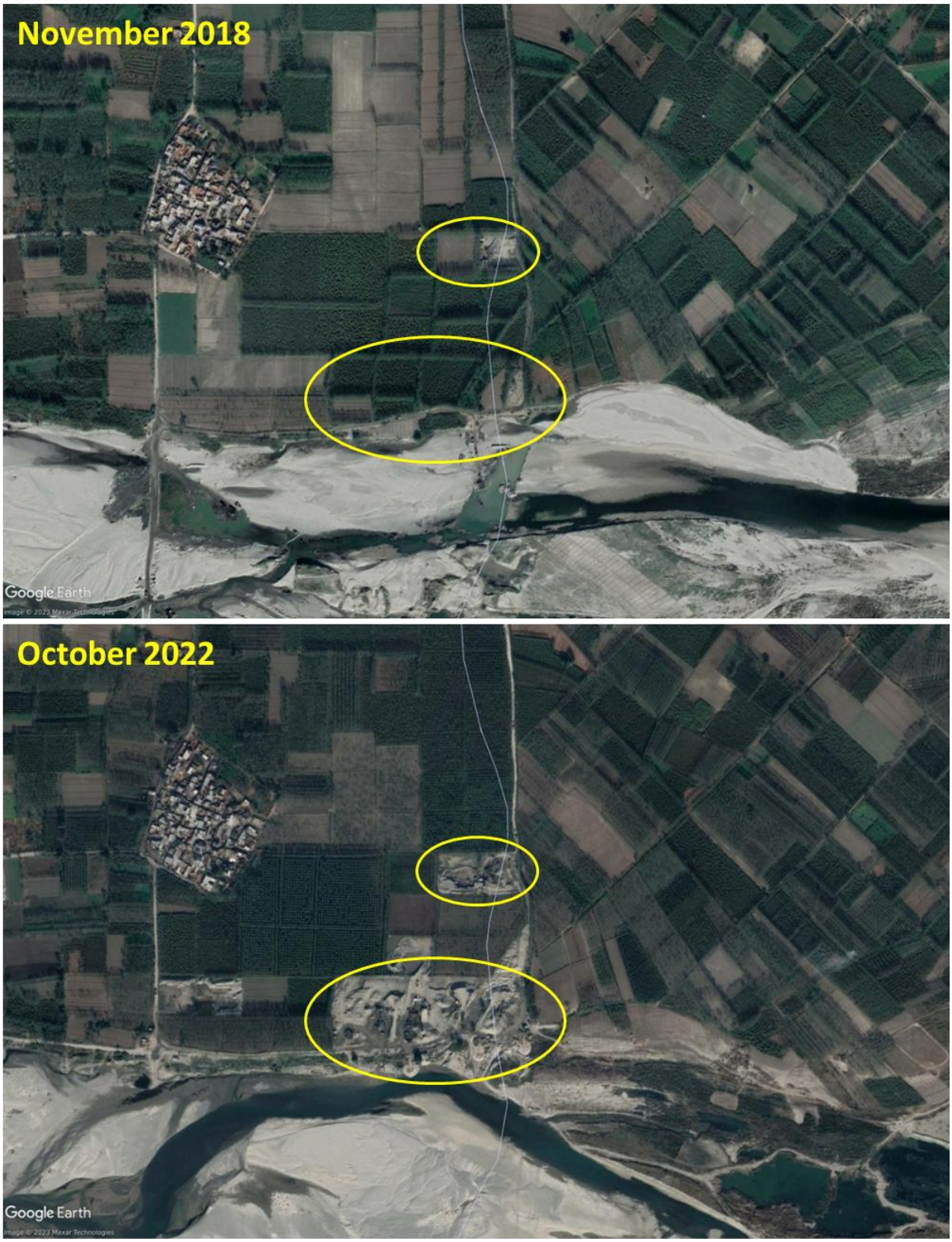


Figure-9 Crushing sites as seen on satellite data



Agriculture area converted into mining activities, as soon on the Google Earth images of November 2018 and October 2022

Figure-10 Evidence of conversion of agricultural area into mining activities

v. Impact of such mining on the hydro-geology and environment of the river by undertaking holistic and cumulative impact of such mining on river ecosystem and river dynamics including the surrounding floodplain and the habitation

Sand mining can have significant impacts on hydro-geology, the environment, and river ecosystems. This affects both the physical characteristics of the river and its surrounding floodplain, as well as the habitats of organisms that rely on these areas. Here is an overview of the potential impacts:

Hydro-geological Impacts:

Alteration of riverbed morphology: Sand mining can change the shape and depth of the riverbed, affecting water flow pattern and sediment transport.
Reduction of riverbed elevation: Excessive sand mining can lower the elevation of the riverbed, leading to changes in groundwater recharge and discharge patterns.
Increased bank erosion: Removal of sand can destabilize riverbanks, leading to increased erosion and sedimentation downstream.
Changes in groundwater levels: Alterations to the riverbed can affect groundwater levels, potentially impacting nearby wells and aquifers.

Environmental Impacts:

Habitat destruction: Sand mining can directly destroy habitats for aquatic organisms, such as, fish spawning grounds and benthic communities.
Disruption of food chains: Changes to the river ecosystem can disrupt food chains and lead to decline in biodiversity, affecting both aquatic and terrestrial species.
Water quality degradation: Sediment stirred up by mining activities can degrade water quality, affecting aquatic life and human uses such as drinking water supply and agriculture.
Loss of vegetation: Mining operations may require the removal of riparian vegetation, leading to habitat loss and reduced bank stability.
Increased flood risk: Changes in river morphology and sediment transport can increase the risk of flooding, particularly in areas downstream of mining sites.

Cumulative Impacts:

Multiple mining operations: Cumulative impacts can result in combined effects of multiple sand mining operations along a river, exacerbating the environmental and hydrological changes as described above.
Synergistic effects: The simultaneous occurrence of sand mining with other anthropogenic activities such as deforestation, agriculture, and urbanization can amplify the impacts on river ecosystems and surrounding habitats.
Long-term effects: Cumulative impacts may not be immediately apparent but can accumulate over time, leading to irreversible changes in river dynamics and ecosystem function.

Social Impacts:

Displacement of communities: Sand mining activities may require the relocation of communities living along riverbanks, leading to social disruption and loss of livelihoods.
Conflicts over resources: Competition for access to sand resources can lead to conflicts between different user groups, such as miners, local communities, and conservationists.

Economic impacts:

Although there may be short-term economic benefits from sand mining, these could be outweighed in the long run by the costs of environmental degradation and the loss of ecosystem services.

Impacts as stated in the Sustainable Sand Mining Management Guidelines (SSMG), 2016 and Enforcement & Monitoring Guidelines for Sand Mining (EMGSM), 2020:

(1) The effects of sand and gravel mining are as follows:

a. Extraction of bed material in excess of replenishment by transport from upstream causes the bed to lower or degrade upstream and downstream of the site of removal.
b. In-stream habitat is impacted by increase in river gradient, suspended load, sediment transport and sediment deposition. Excessive sediment deposition for replenishment increases turbidity which prevents penetration of light required for photosynthesis and reduces food availability of aquatic fauna.
c. Riparian habitat including vegetative cover adjacent to the river banks, controls erosion, provides nutrient inputs into the stream and prevents intrusion of pollutants in the stream through runoff. Bank erosion and change of morphology of the river can destroy the riparian vegetative cover.
d. Bed degradation is responsible for channel shifting, causing loss of properties and degradation of landscape. It can also undermine bridge supports, pipe lines or other structures.
e. Degradation may change the morphology of the river bed, which constitutes one aspect of the aquatic habitat.
f. Degradation can deplete the entire depth of gravelly bed material, exposing other substrates that may underlie the gravel, which could in turn affect the quality of aquatic habitat.
g. Lowering of ground water table in the flood plain because of lowering of riverbed level as well as river water level take place because of extraction and draining out of excessive ground water from the adjacent areas. So, if a floodplain aquifer drains to the stream, groundwater levels can be lowered as a result of bed degradation. Lowering of the water table can destroy riparian vegetation.
h. Excessive pumping of ground water in the process of mining in abandoned channels depletes ground water causing scarcity of irrigation and drinking

water. In extreme cases, it may create ground fissures and subsidence in adjacent areas.

i. Flooding is reduced as bed elevations and flood heights decrease, reducing hazard for human occupancy of floodplains and the possibility of damage to engineering works.
j. The supply of overbank sediments to floodplains is reduced as flood heights decrease.
k. An un-scientific and unregulated sand and gravel mining tends to increase channel bank scouring and erosion. This causes a large degree of meandering of rivers and sometimes it could be in kilometres.
l. Rapid bed degradation may induce bank collapse and erosion by increasing the heights of banks.
m. Polluting ground water may be reduced by reducing the thickness of the filter material especially if mining is taking place at top of recharge fissures.
n. Choking of sand layer acts as filter for ingress of ground water from river by dumping of finer material, and compaction of filter zone due to movement of heavy vehicles. It also reduces the permeability and porosity of the filter material.
o. Removal of gravel from bars may cause downstream bars to erode if they subsequently receive less bed material than is carried downstream from them by fluvial transport.
p. Mining activity if not under control may have ecological effects on bird nesting, fish migration, angling, etc.
q. Indiscrete mining activities lead to increased concentration of suspended sediment in the river which in turn causes siltation of water resources projects.
r. Unscientific and unregulated sand, and gravel mining lead to the severe health hazards like air quality degradation and dust fog.
s. Direct destruction from heavy equipment operation discharges from equipment and refuelling.
t. Biosecurity and pest risks are other associated environmental problems.

2) The other deleterious impacts of indiscrete mining include as follows: -

a. Loss of riparian habitat resulting from direct removal of vegetation along the stream bank facilitate the use of a dragline or through the process of lowering the water table, bank undercutting, and channel incision. The physical composition and stability of substrates are altered as a result of in-stream mining and most of these physical effects may exacerbate sediment entrainment in the channel.
b. Furthermore, the process of in-stream mining and gravel washing produce fine sediments under all flow conditions, resulting in a deposition of fine sediment in riffles as well as other habitats at low discharge. Excess sediment is considered to be the greatest pollutant in water and constitutes one of the major environmental factors in the degradation of stream fisheries.

c. However, in-stream mining may contribute additional sediment to downstream reaches due to the disruption of substrate stability. Once sediment enters the stream, it is the best to let natural geomorphological and hydrological processes reach to a dynamic equilibrium, rather than further exacerbating the situation by additional disturbance.

3) All other things being equal:
   a. Extracting gravel from an excavation that does not penetrate the water table and is located away from an active stream channel should cause little or no change to the natural hydrological processes unless the stream captures the pit during periods of flooding.
   b. In-stream extraction of gravel from below the water level of a stream generally causes more changes to the natural hydrologic processes than limiting extraction to a reference point above the water level.
   c. In-stream extraction of gravel below the deepest part of the channel (the thalweg doctrine) generally causes more changes to the natural hydrological processes than limiting extraction to a reference point above the thalweg.
   d. Excavating sand and gravel from a small straight channel with a narrow floodplain generally will have a greater impact on the natural hydrological processes than excavations on a braided channel with a wide floodplain.
   e. Extracting sand and gravel from a large river or stream will generally create less impact than extracting the same amount of material from a smaller river or stream.
   f. Over-extraction of gravel can destabilise channels and banks, and/or affect the ecological functioning of rivers particularly if undertaken at the wrong time, or in the wrong place, or in a way that damages the river bed or margins.

In view of addressing these impacts, the Committee suggests that holistic management approaches are needed, including comprehensive environmental assessments, stakeholders' engagement, and the implementation of sustainable sand mining practices to minimize adverse effects on river ecosystems and surrounding habitats. This may involve regulatory measures, enforcement of environmental laws, and the promotion of alternative materials and technologies for construction and infrastructure development. Additionally, restoration and rehabilitation efforts can help mitigate the damage caused by past mining activities and restore the health and resilience of the river ecosystems.

vi. To suggest remedial and methods to identify suitable locations to permit mining of the minerals with minimum adverse impact

To suggest remedial methods and identify suitable locations for mineral mining with minimum adverse impact, it is crucial to prioritize environmental conservation and sustainable resource management.

Environmental Impact Assessments (EIAs):

Conducting comprehensive EIAs before permitting any mining activities are required. EIAs evaluate the potential environmental, social, and economic impacts of mining operations. EIAs should consider factors such as water quality, habitat destruction, air pollution, and impacts on local communities. Using the findings of EIAs to guide decision-making processes and to minimize adverse impacts through mitigation measures need to be top priority.

Site Selection Criteria:

It is imperative to establish standards for determining appropriate sites for mining operations that take into account factors such as ecological sensitivity, biodiversity value, and potential effects on water supplies. Other crucial actions include giving priority to regions with lower ecological significance and less danger of habitat damage or water contamination. While choosing locations, it would be prudent to take the combined effects of several mining operations into account.

Remote Sensing and GIS:

Remote sensing technologies and GIS tools are the modern techniques to assess landscape characteristics, land use land cover, and hydrological features. Identifying areas with lower environmental sensitivity, such as degraded lands or areas with limited ecological value, for potential mining activities are the important steps. Analyzing spatial data to avoid environmentally sensitive areas, protected areas, and critical habitats are also important to reach at definite conclusions.

Sustainable Mining Practices:

Reducing environmental consequences and ensuring responsible resource exploitation are the hallmarks of sustainable mining methods. To implement measures such as progressive rehabilitation of mined areas, afforestation, and soil conservation would restore ecosystems during post-mining. Adoption of technologies for reducing air and water pollution, such as dust suppression systems and water treatment facilities could be the sustainable mining practices.

Stakeholders' Engagement and Consultation:

Engaging local communities, indigenous groups, and other stakeholders in the decision-making process are needed. It is necessary to include community viewpoints and traditional knowledge in the planning and site selection processes. Addressing the issues and concerns of the impacted communities requires open communication and active participation.

Regulatory Framework and Enforcement:

It is necessary to strengthen the regulatory frameworks governing environmental compliance and mining permits. Enforcing stringent restrictions to deter illicit mining activities and guarantee compliance with environmental requirements may

be one approach. Implementing monitoring and enforcement mechanisms will track mining operations and enforce compliance with mitigation measures.

Research and Innovation:

It is worth to invest in research and to develop innovation for sustainable mining technologies and practices. There is a need to explore alternative mining methods, such as low-impact extraction techniques and recycling/recovery of minerals from waste materials. There is a need to support research initiatives focused on minimizing environmental impacts and maximizing resource efficiency.

Methods for identifying suitable locations for mining as per SSMG, 2016 and EMGSM, 2020.

In view of identifying suitable locations for sand mining in the area, environmental impact assessment studies need to be conducted to evaluate the effects of sand mining on the river ecosystem and surrounding areas. These include assessing impacts on water quality, groundwater reserves, river equilibrium, and ecological systems. Sand mining activities should not disturb the equilibrium of river by applying sediment transport principles to determine suitable locations, periods, and quantities for extraction. This helps maintenance stability of the riverbed and preventing aggradation or degradation downstream. High resolution satellite imagery could be used to identify areas with sand deposits and assess the quantity available for sustainable mining. This technology will aid in selecting appropriate locations for sand extraction while minimizing adverse impacts on the river ecosystem. Further, factors like geological studies, climatic factors like rainfall intensity and temperature variation, and lithology of the catchment area should be also considered while identifying suitable locations for sand mining. In view of ensuring minimal environmental impacts, following remedial measures are suggested:

1. The preparation of DSR and following the underpinned guidelines in it is an important initial step to minimise the adverse impact.
2. It is crucial to prepare a survey document mapping the state of sand sources in a district after the DSR preparation procedures.
3. This survey should be conducted and report be prepared accordingly, for each district. Though this is fact that rivers cut across districts and states and every river is an ecosystem in itself. However, planning and monitoring for this type of survey can be efficiently ensured because the district is the most established administrative unit at this level. It is proposed that each district prepare this document including additional sources of sand inside the district while treating the river stretch as an ecological unit.
4. The natural resources must be utilized in environment friendly manner in scientific and systematic way. Based on the objective of sustainable development policy on the subject, there should be provisions for protection of

environment and ecology. District level accounting is the most effective way to account for these factors.

5. The sustainable mining plan needs to be dynamic.
6. In addition, the following points to be considered while selecting the river / stream for mining:
   (a) A stable river is able to constantly transport the flow of sediments produced by watershed such that it's dimensions (width and depth) pattern and vertical profile are maintained without aggrading (building up) or degrading (scouring down).
   (b) The amount of boulders, cobbles, pebbles, and sand deposited in river bed equals to the amount delivered to the river from catchment area and from bank erosion minus amount transported downstream each year.
   (c) It is compulsive nature of river to meander in their beds. Therefore, they will have access with adequate corridor for meandering without hindrance. Any attempt to diminish the width of the corridor (floodway) and curb the freedom to meander would prove counter-productive.
   (d) Erosion and deposition are natural laws. The river stream has to complete its geomorphological cycles from youth, mature to old age.
   (e) River capturing is unavoidable.
   (f) Fundamentally, the lowest point of any stream is fixed by average mean sea level (AMSL).
   (g) A survey document should be prepared in the district based on direct and indirect benefits of mining and identification of the potential threats to the river / stream beds in the district.
   (h) It has to provide for environmentally safe depth of mining and safeguards of banks by prescribing safe distance from banks.

The Committee suggested that mining operations should be carried out in accordance with the order of the Hon'ble Supreme Court, dated 4th August, 2006, 26.04.2023 and 28.04.2023 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No.202 of 1995 and dated 21st April, 2014, in the matter of Goa Foundation Vs. UOI in W.P.(C) No.435 of 2012.

vii. To suggest the mechanism to monitor the transportation of the minerals by utilizing information technology including drone to monitor the mining activities

To monitor the transportation of the minerals by using drones for safety monitoring, surveying, inspection, mineral exploration, and environmental monitoring in riverine mining activities, it is essential to enhance safety measures, optimize resource management, comply with regulations, and improve overall operational efficiency while minimizing degradations to the river ecosystem. Drones could be used with high-resolution cameras for quick and accurate surveying of mining areas to create precise maps. This will aid in planning, designing, and examining regions,

recognizing potential hazards, tracking landscape changes, and enhancing operational efficiency. Drones can also inspect equipment, infrastructure like pipelines, power lines, and tailings dams by capturing high-definition visuals, videos, and thermal information to identify deterioration, leaks, and ensure structural stability. They could be also used to evaluate the impact of mining activities on the environment by capturing data on flora, water quality, and air quality. This aids in complying with environmental regulations and minimizing ecological footprints.

Transportation monitoring:

1) To monitor the transportation of the minerals, state governments has introduced the Transport Permits (T.P.), printing of Transport Permits on security paper, invisible ink mark, fugitive ink background, VOID pantograph and Unique Barcode backed by suitable software and dedicated websites with security certifications at different levels. Every truck should pass through weighbridge which should be manned by State Government Employee.
2) The system proposed is that States should issue Transport Permit (T.P.). Bar code on the T.P. when scanned using the system, will generate a unique invoice number. The bidder has to enter destination, distance between plot and destination, vehicle number, etc. in the system. After scanning, unique bar code number; invoice date and time and validity date and time is sent to the bidder, which need to be written on T.P. Validity of T.P. is calculated based on distance between plot and destination. After validity time is over, the T.P. stands invalid. The officers involved in monitoring should be provided with the android application using which the T.P. can be checked anywhere on road. As soon as the bar code on T.P. gets scanned through using android application, all details of T.P. such as plot details, vehicle details, validity time, etc. should get fetched from server. This means, if anything is re-written on T.P. and attempt is made to reuse the same, it can be traced immediately. Registering of T.P. on server can be done using website, using android application (smartphone with internet) or even through SMS (smartphone without internet). This implies that T.P. can be registered on server even if only mobile phone range is available on a plot. Various reports can be generated using the system showing daily lifting reports and user performance report. This way the vehicles carrying sand can be tracked from source to destination.
3) IT and IT enabled services for effective monitoring of the quantity of mined out material and transportation along with process re-engineering has been made as a part of the Guidelines.
4) Transportation of minerals should be through registered tippers with GPS facility. The route of transportation must be clearly established to allow for simple monitoring, including control over tipper overloading, mineral spill management, etc.
5) Mandatory e-pass/ e-permit should be made available at reach level for transportation of any sand by any GPS enabled vehicle. This must have the

provision of entering the vehicle number of the sand carrying vehicle and expected delivery address and customer name / mobile number.

6) At the stockyard, the stock supervisor should verify the authenticity of online payment receipt before issuing the transit pass. The loading of sand should be monitored electronically and all transporting vehicles should pass through an electronically monitored weighbridge.
7) Real-time data capture for transportation is again important steps.
8) All the sand carrying vehicles (tractors / trucks) should be registered with the department. GPS equipment should be installed in all the sand carrying vehicles. Weighbridges with CCTV should be installed at all the stockyards, active reaches to ascertain the exact quantity of sand being transported in the vehicle. Check posts with CCTV cameras should be established near all major consumption centres to check if all the transporting vehicles are carrying a valid transport permit. The transport permit generated should contain the security features.
9) Indirect monitoring can be done by determining sand consumption through the quantum of cement sales in the State. As the sale of cement is quite organized, data is easily available at the State as well as district levels for the same. From district-wise cement consumption, the further trend of sand consumption can be derived. Any anomalies in the sand consumption/demand can be analyzed further.
10) Use of latest remote surveillance and IT services help in effective monitoring of the sand mining activity and also assist the government in controlling the illegal mining activity in the country.

The Committee suggested that the State Government should define the transportation route from the Mining lease. Since the size of the mining leases determines the placement of the mines, this approach should take into account the maximum production from the mines. The quantity of mineral that can be mined safely should be available with the state government. It is suggested that the transportation route should be selected in such a way that the movement of truck, tippers, tractors from the villages having habitation should be avoided.

Further, the transportation of mineral should be planned in such a way that it avoids ecologically sensitive area, densely populated areas, river bank in close vicinity of bank and route should be continuously monitored for line source emission such as particulate matter and gaseous pollutants in ambient air must be monitored for assessment and control of pollution. Proper covered vehicles should be used to avoid increase in air pollutants.

viii. To suggest erosion control mechanisms and flood control mechanisms in the river to protect people and property

Planting native plants or locally available species along riverbanks helps stabilize the soil, limit erosion, and prevent sediment runoff into the river. Sediment management devices such as straw rolls, silt fences, and gravel bags assist trap sediment and keep it from entering the river, thereby lowering erosion. Bank stabilization with riprap or gabions along riverbanks can prevent erosion and keep banks from collapsing due to sand mining activities. Riverbed restoration is one flood control strategy that improves water flow and reduces the risk of flooding caused by altered river courses as a result of sand mining activities. Combining these erosion control and flood control measures allow us to lessen the negative effects of sand mining in rivers, protect people and property from erosion, and lower the risk of floods in the impacted areas. These procedures are critical for preserving the biological balance of rivers affected by sand mining operations.

Flood capacity in the river should be maintained in the areas where there are significant flood hazards to existing structures or infrastructure. Floodplain Pits should be Restored to Wetland Habitat or Reclaimed for Agriculture. The key to successful restoration or reclamation is to conserve or import adequate material to re-fill the pit, while ensuring that pit margins are graded to allow for development of significant wetland and emergent vegetation. A river / stream can be divided into two zones, which in-turn is dynamic, i.e., the zone of erosion and zone of deposition. These zones of deposition and erosion are extended in different patches in the river.

Any mining lease granted in larger tract can cover both the zones, and mining activity in zone of erosion can further aggravate the problem of erosion and as such the mining activity can be allowed only in the zone of the deposition. The mining leases of larger areas in rivers are neither in the interest of environment nor in the interest of mineral conservation. In the Himalayan states, the rivers and wasteland have been mostly classed as forest land. Mining on these land requires diversion of forest land and payment of compensatory afforestation and Net Present Value (NPV), etc. The land in river beds in the hilly tracts and many small rivers at any one site seldom exceed 5 hectares, so does not allow sand mining leases on river beds that further aggravates the situation. So the size of mining lease for river sand mining should be determined by the State as per the local situation.

Following considerations that will control the erosion should be kept in mind for sand / gravel mining:

1) First, parts of the river reach that experience deposition or aggradation shall be identified. The Lease holder/ Environmental Clearance holder may be allowed to extract the sand and gravel deposit in these locations to manage aggradation problem.
2) The distance between sites for sand and gravel mining shall depend on the replenishment rate of the river. Sediment rating curve for the potential sites shall be developed and checked against the extracted volumes of sand and gravel.
3) Sand and gravel may be extracted across the entire active channel during the dry season.

4) Abandoned stream channels on terrace and inactive floodplains be preferred rather than active channels and their deltas and flood plains. Stream should not be diverted to form inactive channel.
5) Layers of sand and gravel which could be removed from the river bed shall depend on the width of the river and replenishment rate of the river.
6) Sand and gravel shall not be allowed to be extracted where erosion may occur, such as at the concave bank. Segments of braided river system should be used preferably falling within the lateral migration area of the river regime that enhances the feasibility of sediment replenishment.
7) Sand and gravel shall not be extracted within 200 to 500 metre from any crucial hydraulic structure such as pumping station, water intakes, and bridges. The exact distance should be ascertained by the local authorities based on local situation. The cross-section survey should cover a minimum distance of 1.0 km upstream and 1.0 km downstream of the potential reach for extraction. The sediment sampling should include the bed material and bed material load before, during and after extraction period. Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross section. Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume. Calculation is must for the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.
8) Sand and gravel could be extracted from the downstream of the sand bar at river bends. Retaining the upstream one to two thirds of the bar and riparian vegetation is accepted as a method to promote channel stability.
9) Flood discharge capacity of the river could be maintained in areas where there are significant flood hazard to existing structures or infrastructure. Sand and gravel mining may be allowed to maintain the natural flow capacity based on surveyed cross section history.
10) Alternatively, off-channel or floodplain extraction is recommended to allow rivers to replenish the quantity taken out during mining.
11) The Piedmont Zone (Bhabhar area) particularly in the Himalayan foothills, where riverbed material is mined, this sandy-gravelly track constitutes excellent conduits and holds the greater potential for ground water recharge. Mining in such areas should be preferred in locations selected away from the channel bank stretches.
12) Mining depth should be restricted to 3 meters and distance from the bank should be ¼th of river width and should not be less than 7.5 meters.
13) The borrow area should preferably be located on the river side of the proposed embankment, because they get silted up in course of time. For low embankment less than 6 m in height, borrow area should not be selected within 25 m from the toe/heel of the embankment. In case of higher embankment, the distance should not be less than 50 m. In order to obviate development of flow parallel to embankment, cross bars of width eight times the depth of borrow pits spaced 50 to 60 metres centre-to-centre should be left in the borrow pits.
14) Demarcation of mining area with pillars and geo-referencing should be done prior to start of mining.

ix. To suggest suitable methods to appropriately utilize the flood plain by undertaking agro based activities, fish culture activities, etc. without harming the riverine ecosystem

Planting trees along the riverbanks can help control agricultural runoff, which often contains fertilizers and pesticides, by absorbing contaminants and stabilizing the soil. Further, implementing cost-effective water treatment technologies to remove pollutants from the river water can help maintain water quality for agricultural and fish culture activities. Improving water distribution through water control structures can enhance agricultural productivity while minimizing erosion and water logging risks. Introducing improved crop varieties suited for flood-based farming systems can also be used to enhance productivity while maintaining the ecological balance of the riverine ecosystem.

As per the SSMG 2016, the stability of a stream relates to the distribution and density of vegetation present in a river stretch. In general, streams with a balanced gravel supply are indicated by vegetated gravel bars or densely packed gravel. Streams with excessive gravel generally have gravel bars with little or no vegetation, and are surfaced with loosely packed gravel.

x. To suggest mechanisms or guidelines for utilization of environment compensation recovered from such violators for restoration of mining area.

Following mechanism and practices are suggested to be implemented by the State for utilization of environment compensation funds recovered from violators for restoration of mining area:

i. Carrying out periodic (at least once in a year) monitoring of river hydrology, morphology and aquatic environments, and river mapping (cross section surveys and river gradient studies).
ii. Collection of data on livelihood in the impact zone, protection of riparian rights, measures taken for Eco-corridor development.
iii. States shall develop infrastructure (as suggested in the sand mining guidelines) such as laboratories, equipment for deployment in the field for facilitating data collection suggested at (i) & (ii) using the funds collected from violators. States can identify nodal agency for facilitating such studies.
iv. Also, there is a need to follow the suggestions of the report on ‘Ecological Damage Assessment and Eco restoration Plan in the report in 2017’.
v. Hon’ble NGT can constitute a committee for review of the monitoring and restoration plan being implemented by the state.

Guidelines available are given as follows:

The projects or activities which require prior environmental clearance under the Environmental Impact Assessment (EIA) Notification, 2006 from the concerned Regulatory Authority but are brought for environmental clearance after starting the construction work, or have undertaken expansion, modernization, and change in product-mix without prior environmental clearance, such projects are treated as cases of violations as per sop for violation dated 7th July, 2021. The objective of this notification is to protect and improve the quality of environment and abate environmental pollution and bring all such violation cases under compliance within the environmental laws in an expedient manner. The notification has established a process for appraisal of such cases of violation for prescribing adequate environmental safeguards to all such entities and the process provides for a deterrent to all such violations under the Environment Impact Assessment Notification, 2006 and also the pecuniary benefit of violation and damage to environment.

The Expert Appraisal Committees (EACs/SEACs) constituted at the Central and the State level appraise all such violation projects for grant of EC. The Expert Appraisal Committees prescribe specific Terms of Reference for such projects on assessment of ecological damage, remediation plan and natural and community resource augmentation plan and it shall be prepared as an independent chapter in the Environment Impact Assessment report by the accredited consultants.

The EACs/SEACs on due diligence recommended the quantum of damage assessment equivalent to the amount of remediation plan and Natural and Community Resource Augmentation Plan. The same has to be submitted as a bank guarantee with the State Pollution Control Board prior to the grant of environmental clearance. This will be released after successful implementation of the remediation plan and Natural and Community Resource Augmentation Plan, and after the recommendation by regional office of the Ministry, Expert Appraisal Committee and approval of the Regulatory Authority.

The Hon'ble Supreme Court vide its order dated 02.01.2024 in Writ Petition(s) (Civil) No(s). 1394/2023 in the matter of Vanashakti versus Union of India directed that "Until further orders, there shall be stay of operation of the Office Memoranda, dated 7th July, 2021 and 28th January, 2022 issued by the Ministry of Environment, Forest and Climate Change". The Ministry also issued an Office Memorandum dated 08.01.2024 regarding the stay imposed by the Hon'ble Supreme Court with reference to the SOP dated 7th July, 2021 and OM dated 28.01.2022.

Further, to effectively utilize environment compensation recovered from violators for the restoration of river-side sand mining areas, implementation of restoration projects are recommended in the affected sand mining areas to rehabilitate the ecosystem, including re-vegetation, habitat restoration, and

erosion control measures. Further, stabilizing riverbanks with vegetation cover, implementing sediment control methods, and using bank stabilization techniques are recommended to prevent further degradation of the riverbed. Investment in projects aimed at improving water quality through measures such as wetland creation, water treatment technologies, and pollution control will be also helpful to restore the health of the river ecosystem. Involvement of the local communities is highly recommended in restoration efforts to raise awareness, promote sustainable practices, and ensure long-term maintenance of restored areas.

11. Suggested Digital framework for regulation of sand mining in riverbed:

The committee in the matter of Balbir Sandhu & others. Vs. State of Uttar Pradesh & Anr (O.A no.481/2023) met on a periodical basis and finally met on 18.03.24 under the chairmanship of Chairman, CPCB. In the final meeting, a sub-group was constituted to prepare the "Digital framework for regulation of sand mining in riverbed". The sub-group consisted the members from IIT Roorkee, NIH Roorkee, NIT Kurukshetra, CPCB, G.B. Pant National Institute of Himalayan Environment and Space Application Centre, ISRO, Ahmedabad. The sub-group has submitted the "Digital framework for regulation of sand mining in riverbed" and the same is annexed as **Annexure-14.**

12. Reference Documents:

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- Enforcement & Monitoring Guidelines for Sand Mining" (EMGSM), 2020.
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- Subramanian, V., 1993, Sediment load of Indian rivers. Current Science, 64(11/12), 928–930.
- Ecological Damage Assessment and Eco restoration Plan in the report in 2017.

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THE MINES AND MINERALS (DEVELOPMENT AND REGULATION) ACT, 1957

ARRANGEMENT OF SECTIONS

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THE MINES AND MINERALS (DEVELOPMENT AND REGULATION) ACT, 1957

ACT NO. 67 OF 1957

[28*th December*, 1957.]

An Act to provide for the [1][development and regulation of mines and minerals] under the control of the Union.

BE it enacted by Parliament in the Eighth Year of the Republic of India as follows:—

CHAPTER I

PRELIMINARY

1. Short title, extent and commencement.—(*1*) This Act may be called the Mines and Minerals [2][(Development and Regulation)] Act, 1957.

(*2*) It extends to the whole of India.

(*3*) It shall come into force on such date[3]as the Central Government may, by notification in the Official Gazette, appoint.

2. Declaration as to expediency of Union Control.—It is hereby declared that it is expedient in the public interest that the Union should take under its control the regulation of mines and the development of minerals to the extent hereinafter provided.

3. Definitions.—In this Act, unless the context otherwise requires,—

[4][(*a*) "composite licence" means the prospecting licence-cum-mining lease which is a two stage concession granted for the purpose of undertaking prospecting operations followed by mining operations in a seamless manner;

(*aa*) "dispatch" means the removal of minerals or mineral products from the leased area and includes the consumption of minerals and mineral products within such leased area;

[5][(*aaa*) "exploration licence" means a licence granted for undertaking reconnaissance operations or prospecting operations or both in respect of minerals specified in the Seventh Schedule;]

(*ab*) "Government company" shall have the same meaning as assigned to it in clause (45) of section 2 of the Companies Act, 2013 (18 of 2013);

(*ac*) "leased area" means the area specified in the mining lease within which the mining operations can be undertaken and includes the non- mineralized area required and approved for the activities falling under the definition of "mine" as referred to in clause (*i*);

(*ad*) "minerals" includes all minerals except minerals oils;

(*ae*) "minerals concession" means either a reconnaissance permit, prospecting licence, minig lease, composite licence [5][,exploration licence] or a combination of any of these and the expression "concession" shall be construed accordingly;]

(*b*) "mineral oils" includes natural gas and petroleum;

(*c*) "mining lease" means a lease granted for the purpose of undertaking mining operations, and includes a sub-lease granted for such purpose;

(*d*) "mining operations" means any operations undertaken for the purpose of winning any mineral;

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1. Subs. by Act 38 of 1999, s. 2, for "regulation of mines and the development of minerals" (w.e.f. 18-12-1999).
2. Subs. by s. 3, *ibid*., for "(Regulation and Development)" (w.e.f. 18-12-1999).
3. 1st June, 1958, *vide* notification No. G.S.R. 432, dated 29th May, 1958, *see* Gazette of India, Extraordinary, Part II, sec. 3(*i*).
4. Subs. by Act 16 of 2021, s. 3, for clause (*a*) and (*aa*) (w.e.f. 28-3-2021).
5. Ins. by Act 16 of 2023, s. 2 (w.e.f. 17-8-2023).

(*e*) "minor minerals" means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central Government may, by notification in the Official Gazette, declare to be a minor mineral;

[1][(*ea*)"notified minerals" means any mineral specified in the Fourth Schedule;]

(*f*) "prescribed" means prescribed by rules made under this Act;

[2][(*fa*) "production" or any derivative of the word "production" means the winning or raising of mineral within the leased area for the purpose of processing or dispatch;]

(*g*) "prospecting licence" means a licence granted for the purpose of undertaking prospecting operations;

[3]* * * * *

(*h*) "prospecting operations" means any operations undertaken for the purpose of exploring, locating or proving mineral deposit ; [4]***

[5][(*ha*) "reconnaissance operations" means any operations undertaken for preliminary prospecting of a mineral through regional, aerial, geophysical or geochemical surveys and geological mapping, include pitting, trenching, drilling and sub-surface excavation;]

(*hb*) "reconnaissance permit" means a permit granted for the purpose of undertaking reconnaissance operations; [4]***]

[2][(*hba*) "Schedule" means the Schedules appended to the Act;]

[1][(*hc*) "Special Court" means a Court of Session designated as Special Court under sub-section (*1*) of section 30B; and]

(*i*) the expressions, "mine" and "owner", have the meaning assigned to them in the Mines Act, 1952 (35 of 1952).

[2][*Explanation*.—For the purpose of this clause, —

(*i*) a mine continues to be a mine till exhaustion of its mineable mineral reserve and a mine may have different owners during different times from the grant of first mining lease till exhaustion of such mineable mineral reserve;

(*ii*) the expression "mineral reserve" means the economically minearble part of a measured and indicated mineral resource.]

CHAPTER II

GENERAL RESTRICTIONS ON UNDERTAKING PROSPECTING AND MINING OPERATIONS

4. Prospecting or mining operations to be under licence or lease.—(*1*) [6][No person shall undertake any reconnaissance, prospecting or mining operations in any area, except under and in accordance with the terms and conditions of a reconnaissance permit or of a prospecting licence [7][or of a exploration licence] or, as the case may be, of a mining lease, granted under this Act and the rules made thereunder]:

Provided that nothing in this sub-section shall affect any prospecting or mining operations undertaken in any area in accordance with terms and conditions of a prospecting licence [9][or of a exploration licence], mining lease granted before the commencement of this Act which is in force at such commencement:

1. Ins. by Act 10 of 2015, s. 2 (w.e.f. 12-1-2015).
2. Ins. by Act 16 of 2021, s. 3 (w.e.f. 28-3-2021).
3. Clause (*ga*) omitted by Act 16 of 2021, s. 3 (w.e.f. 28-3-2021).
4. The word "and" omitted by Act 10 of 2015, s. 2 (w.e.f. 12-1-2015)
5. Subs. by Act 16 of 2023, s. 2, for clause (*ha*) (w.e.f. 17-8-2023).
6. Subs. by Act 38 of 1999, s. 5, for certain words (w.e.f. 18-12-1999).
7. Ins. by Act 16 of 2023, s. 3 (w.e.f. 17-8-2023).

[1][Provided further that nothing in this sub-section shall apply to any prospecting operations undertaken by the Geological Survey of India, the Indian Bureau of Mines, [2][the Atomic Minerals Directorate for Exploration and Research] of the Department of Atomic Energy of the Central Government, the Directorates of Mining and Geology of any State Government (by whatever name called), and the Mineral Exploration Corporation Limited., a Government company within the meaning of [3][clause (*45*) of section 2 of the Companies Act, 2013 (18 of 2013), and any [4][other entities including private entities that may be notified for this purpose, subject to such conditions as may be specified by the Central Government]]:]

[5][Provided also that nothing in this sub-section shall apply to any mining lease (whether called mining lease mining concession or by any other name) in force immediately before the commencement of this Act in the Union territory of Goa, Daman and Diu.]

[6][(*1A*) No person shall transport or store or cause to be transported or stored any mineral otherwise than in accordance with the provisions of this Act and the rules made thereunder.]

(*2*) [7][No [8][mineral concession]] shall be granted otherwise than in accordance with the provisions of this Act and the rules made thereunder.

[5][(*3*)Any State Government may, after prior consultation with the Central Government and in accordance with the rule made under section 18, [9][undertake reconnaissance, prospecting or mining operations with respect to any mineral specified in the First Schedule in any area within that State which is not already held under any [11][mineral concession]].]

[10][11][4A.Termination of prospecting licences, exploration licences or mining leases.]—(*1*) Where the Central Government, after consultation with the State Government, is of opinion that it is expedient in the interest of regulation of mines and mineral development, preservation of natural environment, control of floods, prevention of pollution, or to avoid danger to public health or communications or to ensure safety of buildings, monuments or other structures or for conservation of mineral resources or for maintaining safety in the mines or for such other purposes, as the Central Government may deem fit, it may request the State Government to make a premature termination of a [12][prospecting licence or exploration licence] or mining lease in respect of any mineral other than a minor mineral in any area or part thereof, and, on receipt of such request, the State Government shall make an order making a premature termination of such [12][prospecting licence or exploration licence] or mining lease with respect to the area or any part thereof.

(*2*) Where the State Government [13]*** is of opinion that it is expedient in the interest of regulation of mines and mineral development, preservation of natural environment, control of floods, prevention of pollution or to avoid danger to public health or communications or to ensure safety of buildings, monuments or other structures or for such other purposes, as the State Government may deem fit, it may, by an order, in respect of any minor mineral, make premature termination of prospecting licence or mining lease with respect to the area or any part thereof covered by such licence or lease.

[14][* * * * *]

1. Ins. by Act 37 of 1986, s. 2 (w.e.f. 10-2-1987).
2. Subs. by Act 38 of 1999, s. 5, for "the Atomic Minerals Division" (w.e.f. 18-12-1999).
3. Subs. by Act 10 of 2015, s. 3, for "section 617 of the Companies Act, 1956 (1 of 1956)" (w.e.f. 12-1-2015).
4. Subs. by Act 16 of 2021, s. 4, for certain words (w.e.f. 28-3-2021).
5. Ins. by Act 16 of 1987, s. 14 (w.e.f. 1-10-1963).
6. Ins. by Act 38 of 1999, s. 5 (w.e.f. 18-12-1999).
7. Subs. by s. 5, *ibid*., "No prospecting licence or mining lease" (w.e.f. 18-12-1999).
8. Subs. by Act 16 of 2021, s. 2, for "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
9. Subs. by Act 38 of 1999, s. 5, for certain words (w.e.f. 18-12-1999).
10. Subs. by Act 37 of 1986, s. 3, for section 4A (w.e.f. 10-2-1987).
11. Subs. by Act 16 of 2023, s. 4, for the marginal heading (w.e.f. 17-8-2023).
12. Subs. by s. 4, *ibid*., for "prospecting license" (w.e.f. 17-8-2023).
13. The words ", after consultation with the Central Government," omitted by Act 25 of 1994, s. 2 (w.e.f. 25-1-1994).
14. Proviso omitted by Act 38 of 1999, s. 6 (w.e.f. 18-12-1999).

(*3*) No order making a premature termination of a prospecting licence [1][or exploration licence] or mining lease shall be, made except after giving the holder of the licence or lease a reasonable opportunity of being heard.

(*4*) Where the holder of a mining lease fails to undertake [2][production and dispatch] for a period of [3][two years] after the date of execution of the lease or having commenced [2][production and dispatch], has discontinued the same for a period of [3][two years], the lease shall lapse on the expiry of the period of [3][two years] from the date of execution of the lease or, as the case may be, discontinuance of the [2][production and dispatch]:

[4][Provided that the State Government may, on an application made by the holder of such lease before it lapses and on being satisfied that it shall not be possible for the holder of the lease to undertake production and dispatch or to continue such production and dispatch for reasons beyond his control, make an order, within a period of three months from the date of receipt of such application, to extend the period of two years by a further period not exceeding one year and such extension shall not be granted for more than once during the entire period of lease:

Provided further that such lease shall lapse on failure to undertake production and dispatch or having commenced the production and dispatch fails to continue the same before the end of such extended period.]

[5]**[4B. Conditions for efficiency in production.** Notwithstanding anything contained in section 4A, the Central Government may, in the interest of maintaining sustained production of minerals in the country, prescribe such conditions as may be necessary for commencement and continuation of production by the holders of mining leases who have acquired rights, approvals, clearances and the like under section 8B.]

[6][[7][**5. Restrictions on the grant of mineral concession**.]—[8][(*1*) A State Government shall not grant a [9][mineral concession] to any person unless such person—

(*a*) is an Indian national, or company as defined in [10][clause (*20*) of section 2 of the Companies Act, 2013 (18 of 2013)]; and

(*b*) satisfies such conditions as may be prescribed:

[11][Provided that in respect of any mineral specified in Part A and Part B of the First Schedule, no reconnaissance permit, prospecting licence or mining lease shall be granted except with the previous approval of the Central Government.]

[12][Provided further that the previous approval of the Central Government shall not be required for grant of [9][mineral concession] in respect of the minerals specified in Part A of the First Schedule, where,—

(*i*) an allocation order has been issued by the Central Government under section 11A; or

(*ii*) a notification of reservation of area has been issued by the Central Government or the State Government under sub-section (1A) or sub-section (*2*) of section 17A; or

(*iii*) a vesting order or an allotment order has been issued by the Central Government under the provisions of the Coal Mines (Special Provisions) Act, 2015 (11 of 2015).]

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1. Ins. by Act 16 of 2023, s. 4 (w.e.f. 17-8-2023).
2. Subs. by Act 16 of 2021, s. 5, for "mining operations" (w.e.f. 28-3-2021).
3. Subs. by Act 25 of 1994, s. 2, for "one year" (w.e.f. 25-1-1994).
4. The provisos first, second, third and fourth subs. by Act 16 of 2021, s. 5 (w.e.f. 28-3-2021).
5. Ins. by Act 2 of 2020, s. 2 (w.e.f. 10-1-2020).
6. Subs. by Act 37 of 1986, s. 4, for section 5 (w.e.f. 10-2-1987).
7. Subs. by Act 16 of 2023, s. 5, for the marginal heading (w.e.f. 17-8-2023).
8. Subs. by Act 25 of 1994, s. 3, for sub-section (*1*) (w.e.f. 25-1-1994).
9. Subs. by Act 16 of 2021, s. 2, "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
10. Subs. by Act 10 of 2015, s. 5, for "sub-section (*1*) of section 3 of the Companies Act, 1956 (1 of 1956)" (w.e.f. 12-1-2015).
11. Subs. by s. 5, *ibid*., for the proviso (w.e.f. 12-1-2015).
12. Ins. by Act 2 of 2020, s. 3 (w.e.f. 10-1-2020).

Explanation.—For the purposes of this sub-section, a person shall be deemed to be an Indian national,—

(*a*) in the case of a firm or other association of individuals, only if all the members of the firm or members of the association are citizens of India; and

(*b*) in the case of an individual, only if he is a citizen of India.]

[1][Provided also that the composite licence or mining lease shall not be granted for an area to any person other than the Government, Government company or corporation, in respect of any minerals specified in Part B of the First Schedule where the grade of such mineral in such area is equal to or above such threshold value as may be notified by the Central Government.]

(*2*) No mining lease shall be granted by the State Government unless it is satisfied that—

[2][(*a*) there is evidence to show the existence of mineral contents in the area for which the application for a mining lease has been made in accordance with such parameters as may be prescribed for this purpose by the Central Government;]

(*b*) there is a mining plan duly approved by the Central Government, or by the State Government, in respect of such category of mines as may be specified by the Central Government, for the development of mineral deposits in the area concerned:]

[3][Provided that a mining lease may be granted upon the filing of a mining plan in accordance with a system established by the State Government for preparation, certification, and monitoring of such plan, with the approval of the Central Government.]

[4][6. Maximum area for which mineral concession may be granted.]—[5][(*1*) No person shall acquire [6]*** in respect of any mineral or prescribed group of associated minerals [7][in a State]—

(*a*) one or more prospecting licences covering a total area of more than twenty-five square kilometres; or

[7][(*aa*) one or more reconnaissance permit covering a total area often thousand square kilometres:

Provided that the area granted under a single reconnaissance permit shall not exceed five thousand square kilometers; or]

[8][(*ab*) one or more exploration licences covering a total area of more than five thousand square kilometres:

Provided that the area granted under a single exploration licence shall not exceed one thousand square kilometres;]

(*b*) one or more mining leases covering a total area of more than ten square kilometres:

[9][Provided that if the Central Government is of the opinion that in the interest of the development of any mineral or industry, it is necessary so to do, it may, for reasons to be recorded in writing, increase the aforesaid area limits in respect of prospecting licence or mining lease, in so far as it pertains to any particular mineral, or to any specified category of deposits of such mineral, or to any particular mineral located in any particular area.]]

[10][(*c*) any [11][mineral concession] in respect of any area which is not compact or contiguous:

Provided that if the State Government is of opinion that in the interests of the development of any mineral, it is necessary so to do, it may, for reasons to be recorded in writing, permit any person to acquire a [11][mineral concession] in relation to any area which is not compact or contiguous.]

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1. Ins. by Act 16 of 2021, s. 6 (w.e.f. 28-3-2021).
2. Subs. by Act 10 of 2015, s. 5, for clause (*a*) (w.e.f. 12-1-2015).
3. Ins. by s. 5, *ibid*. (w.e.f. 12-1-2015).
4. Subs by Act 16 of 2023, s. 6, for the marginal headin. (w.e.f. 17-8-2023).
5. Subs. by Act 56 of 1972, s. 3, for sub-section (*1*) (w.e.f. 12-9-1972).
6. The words "in any one State" omitted by Act 37 of 1986, s. 5 (w.e.f. 10-2-1987).
7. Ins. by Act 38 of 1999, s. 8 (w.e.f. 18-12-1999).
8. Ins. by Act 16 of 2023, s. 6 (w.e.f. 17-8-2023).
9. Subs. by Act 10 of 2015, s. 6, for the proviso (w.e.f. 12-1-2015).
10. Subs. by Act 38 of 1999, s. 8, for clause (*c*) (w.e.f. 18-12-1999).
11. Subs. by Act 16 of 2023, s. 6, for "reconnaissance permit, mining lease or prospecting licence" (w.e.f. 17-8-2023).

(*2*) For the purposes of this section, a person acquiring by, or in the name of, another person a [1][mineral concession] which is intended for himself shall be deemed to be acquiring it himself.

[2][(*3*) For the purposes of determining the total area referred to in sub-section (*1*), the area held under a [1][mineral concession] by a person as a member of a co-operative society, company or other corporation or a Hindu undivided family or a partner of a firm, shall be deducted from the area referred to in sub-section (*1*) so that the sum total of the area held by such person, under a [1][mineral concession], whether as such member or partner, or individually, may not, in any case, exceed the total area specified in sub-section (*1*).]

[3][**7. Periods for which prospecting licences may be granted or renewed**.—(*1*) The period for which [4][a reconnaissance permit or prospecting licence] may be granted shall not exceed three years.

(*2*) A prospecting licence shall, if the State Government is satisfied that a longer period is required to enable the licensee to complete prospecting operations be renewed for such period or periods as that Government may specify:

Provided that the total period for which a prospecting licence is granted does not exceed five years:

Provided further that no prospecting licence granted in respect of [5][a mineral included in Part A and Part B to] the First Schedule shall be renewed except with the previous approval of the Central Government.]

[6]**[8. Periods for which mining leases may be granted or renewed**.—(*1*) The provisions of this section shall apply to minerals specified in Part A of the First Schedule.

(*2*) The maximum period for which a mining lease may be granted shall not exceed thirty years:

Provided that the minimum period for which any such mining lease may be granted shall not be less than twenty years.

(*3*) A mining lease may be renewed for a period not exceeding twenty years with the previous approval of the Central Government.]

[7][(*4*) Notwithstanding anything contained in this section, in case of Government companies or corporations, the period of mining leases including the existing mining leases, shall be such as may be prescribed by the Central Government:

Provided that the period of mining leases, other than the mining leases granted through auction, shall be extended on payment of such additional amount as specified in the Fifth Schedule:

Provided further that the Central Government may, by notification in the Official Gazette and for reasons to be recorded in writing, amend the Fifth Schedule so as to modify the entries mentioned therein in the said Schedule with effect from such date as may be specified in the said notification.

(*5*) Any lessee may, where coal or lignite is used for captive purpose, sell such coal or lignite up to fifty per cent. of the total coal or lignite produced in a year after meeting the requirement of the end use plant linked with the mine in such manner as may be prescribed by the Central Government and on payment of such additional amount as specified in the Sixth Schedule:

Provided that the Central Government may, by notification in the Official Gazette and for the reasons to be recorded in writing, increase the said percentage of coal or lignite that may be sold by a Government company or corporation:

1. Subs. by Act 16 of 2021, s. 2, "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
2. Ins. by Act 56 of 1972, s. 3 (w.e.f. 12-9-1972).
3. Subs. by Act 25 of 1994, s. 4, for section 7 (w.e.f. 25-1-1994).
4. Subs. by Act 38 of 1999, s. 9, for "a prospecting licence" (w.e.f. 18-12-1999).
5. Subs. by s. 9, *ibid*., for "a mineral included in" (w.e.f. 18-12-1999).
6. Subs. by Act 10 of 2015, s. 7, for section 8 (w.e.f. 12-1-2015).
7. Ins. by Act 16 of 2021, s. 7 (w.e.f. 28-3-2021).

Provided further that the sale of coal shall not be allowed from the coal mines allotted to a company or corporation that has been awarded a power project on the basis of competitive bid for tariff (including Ultra Mega Power Projects):

Provided also that the Central Government may, by notification in the Official Gazette and for reasons to be recorded in writing, amend the Sixth Schedule so as to modify the entries mentioned therein with effect from such date as may be specified inthe said notification.]

[1]**[8A. Period of grant of a mining lease for minerals other than coal, lignite and atomic minerals**.—(*1*) The provisions of this section shall apply to minerals other than those specified in Part A and Part B of the First Schedule.

(*2*) On and from the date of the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 (10 of 2015), all mining leases shall be granted for the period of fifty years.

(*3*) All mining leases granted before the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 (10 of 2015) shall be deemed to have been granted for a period of fifty years.

(*4*) On the expiry of the lease period, the lease shall be put up for auction as per the procedure specified in this Act.

[2][Provided that nothing contained in this section shall prevent the State Governments from taking an advance action for auction of the mining lease before the expiry of the lease period.]

(*5*) Notwithstanding anything contained in sub-sections (*2*), (*3*) and sub-section (*4*), the period of lease granted before the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 (10 of 2015), where mineral is used for captive purpose, shall be extended and be deemed to have been extended up to a period ending on the 31st March, 2030 with effect from the date of expiry of the period of renewal last made or till the completion of renewal period, if any, or a period of fifty years from the date of grant of such lease, whichever is later, subject to the condition that all the terms and conditions of the lease have been complied with.

(*6*) Notwithstanding anything contained in sub-sections (*2*), (*3*) and sub-section (*4*), the period of lease granted before the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 (10 of 2015), where mineral is used for other than captive purpose, shall be extended and be deemed to have been extended up to a period ending on the 31st March, 2020 with effect from the date of expiry of the period of renewal last made or till the completion of renewal period, if any, or a period of fifty years from the date of grant of such lease, whichever is later, subject to the condition that all the terms and conditions of the lease have been complied with.

(*7*) Any holder of a lease granted, where mineral is used for captive purpose, shall have the right of first refusal at the time of auction held for such lease after the expiry of the lease period.

[3][(*7A*) Any lessee may, where mineral is used for captive purpose, sell mineral up to fifty per cent. of the total mineral produced in a year after meetingthe requirement of the end use plant linked with the mine in such manner as may be prescribed by the Central Government and on payment of such additional amount as specified in the Sixth Schedule:

Provided that the Central Government may, by notification in the OfficialGazette and for the reasons to be recorded in writing, increase the said percentageof mineral that may be sold by a Government company or corporation:

Provided further that the Central Government may, by notification in the Official Gazette and for reasons to be recorded in writing, amend the Sixth Schedule so as to modify the entries mentioned therein with effect from such date as may be specified in the said notification.]

1. Ins. by Act 10 of 2015, s. 8 (w.e.f. 12-1-2015).
2. Ins. by Act 2 of 2020, s. 4 (w.e.f. 10-1-2020).
3. Ins. by Act 16 of 2021, s. 8 (w.e.f. 28-3-2021).

(*8*) Notwithstanding anything contained in this section, the period of mining leases, including existing mining leases, of Government companies or corporations shall be such as may be prescribed by the Central Government.

[1][Provided that the period of mining leases, other than the mining leases granted through auction, shall be extended on payment of such additional amount as specified in the Fifth Schedule:

Provided further that the Central Government may, by notification in the Official Gazette and for reasons to be recorded in writing, amend the Fifth Schedule so as to modify the entries mentioned therein with effect from such date as maybe specified in the said notification.

Explanation.—For the removal of doubts, it is hereby clarified that all such Government companies or corporations whose mining lease has been extended after the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 (10 of 2015), shall also pay such additional amount as specified in the Fifth Schedule for the mineral produced after the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2021.]

(*9*) The provisions of this section, notwithstanding anything contained therein, shall not apply to a mining lease granted before the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 (10 of 2015), for which renewal has been rejected, or which has been determined, or lapsed.]

[2][**8B. Provisions for period and transfer of statutory clearances.—**(*1*) Notwithstanding anything contained in this Act or any other law for the time being in force, all valid rights, approvals, clearances, licences and the like granted to a lessee in respect of a mine (other than those granted under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and the rules made thereunder) shall continue to be valid even after expiry or termination of lease and such rights, approvals, clearances, licences and the like shall be transferred to, and vested; subject to the conditions provided under such laws; in the successful bidder of the mining lease selected through auction under this Act:

Provided that where on the expiry of such lease period, mining lease has not been executed pursuant to an auction under provisions of sub-section (*4*) of section 8A, or lease executed pursuant to such auction has been terminated within aperiod of one year from such auction, the State Government may, with the previous approval of the Central Government, grant lease to a Government company or corporation for a period not exceeding ten years or till selection of new lessee through auction, whichever is earlier and such Government company or corporation shall be deemed to have acquired all valid rights, approvals, clearances, licences and the like vested with the previous lessee:

Provided further that the provisions of sub-section (*1*) of section 6 shall not apply where such mining lease is granted to a Government company or corporation under the first proviso:

Provided also that in case of atomic minerals having grade equal to or above thethreshold value, all valid rights, approvals, clearances, licences and the like in respect of expired or terminated mining leases shall be deemed to have been transferred to, and vested in the Government company or corporation that has been subsequently granted the mining lease for the said mine.

(*2*) Notwithstanding anything contained in any other law for the time being in force, it shall be lawful for the new lessee to continue mining operations on the land till expiry or termination of mining lease granted to it, in which mining operations were being carried out by the previous lessee.]

9. Royalties in respect of mining leases.—(*1*) The holder of a mining lease granted before the commencement of this Act shall, notwithstanding anything contained in the instrument of lease or in any law in force at such commencement, pay royalty in respect of any [3][mineral removed or consumed by him or by his agent, manager, employee, contractor or sub-lessee] from the leased area after such commencement, at the rate for the time being specified in the Second Schedule in respect of that mineral.

(*2*) The holder of a mining lease granted on or after the commencement of this Act shall pay royalty in respect of any [3][mineral removed or consumed by him or by his agent, manager, employee, contractor or sub-lessee] from the leased area at the rate for the time being specified in the Second Schedule in respect of that mineral.

1. Ins. by Act 16 of 2021, s. 8 (w.e.f. 28-3-2021).
2. Ins. by s. 9, *ibid.*, (w.e.f. 28-3-2021).
3. Subs. by Act 56 of 1972, s. 4, for "mineral removed by him" (w.e.f. 12-9-1972).

[1][(*2A*) The holder of a mining lease, whether granted before or after the commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1972 (56 of 1972) shall not be liable to pay any royalty in respect of any coal consumed by a workman engaged in a colliery provided that such consumption by the workman does not exceed one-third of a tonne per month.]

(*3*) The Central Government may, by notification in the Official Gazette, amend the Second Schedule so as to enhance or reduce the rate at which royalty shall be payable in respect of any mineral with effect from such date as may be specified in the notification:

[2][Provided that the Central Government shall not enhance the rate of royalty in respect of any mineral more than once during any period of [3][three years].]

[4]**[9A. Dead rent to be paid by the lessee**.—(*1*) The holder of a mining lease, whether granted before or after the commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1972, shall notwithstanding anything contained in the instrument of lease or in any other law for the lime being in force, pay to the State Government, every year, dead rent at such rate, as may be specified, for the time being, in the Third Schedule, for all the areas included in the instrument of lease:

Provided that where the holder of such mining lease becomes liable, under section 9, to pay royalty for any mineral removed or consumed by him or by his agent, manager, employee, contractor or sub-lessee from the leased area, he shall be liable to pay either such royalty, or the dead rent in respect of that area, whichever is greater.

(*2*) The Central Government may, by notification in the Official Gazette, amend the Third Schedule so as to enhance or reduce the rate at which the dead rent shall be payable in respect of any area covered by a mining lease and such enhancement or reduction shall take effect from such date as may be specified in the notification:

Provided that the Central Government shall not enhance the rate of the dead rent in respect of any such area more than once during any period of [5][three years].]

[6]**[9B. District Mineral Foundation**.—(*1*) In any district affected by mining related operations, the State Government shall, by notification, establish a trust, as a non-profit body, to be called the District Mineral Foundation.

(*2*) The object of the District Mineral Foundation shall be to work for the interest and benefit of persons, and areas affected by mining related operations in such manner as may be prescribed by the State Government.

(*3*) The composition and functions of the District Mineral Foundation shall be such as may be prescribed by the State Government.

[7][Provided that the Central Government may give directions regarding composition and utilisation of fund by the District Mineral Foundation.]

(*4*) The State Government while making rules under sub-sections (*2*) and (*3*) shall be guided by the provisions contained in article 244 read with Fifth and Sixth Schedules to the Constitution relating to administration of the Scheduled Areas and Tribal Areas and the Provisions of the Panchayats (Extension

1. Ins. by Act 56 of 1972, s. 4 (w.e.f. 12-9-1972).
2. Subs. by Act 56 of 1972, s. 4, for the proviso (w.e.f. 12-9-1972).
3. Subs. by Act 37 of 1986, s. 8, for "four years" (w.e.f. 10-2-1987).
4. Ins. by Act 56 of 1972, s. 5 (w.e.f. 12-9-1972).
5. Subs. by Act 37 of 1986, s. 9, for "four years" (w.e.f. 10-2-1987).
6. Ins. by Act 10 of 2015, s. 9 (w.e.f. 12-1-2015).
7. Ins. by Act 16 of 2021, s. 10 (w.e.f. 28-3-2021).

to the Scheduled Areas) Act, 1996 (40 of 1996) and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (2 of 2007).

(*5*) The holder of a mining lease or a [1][composite licence] granted on or after the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 [2][, other than those covered under the provisions of sub-section (*2*) of section 10A], shall, in addition to the royalty, pay to the District Mineral Foundation of the district in which the mining operations are carried on, an amount which is equivalent to such percentage of the royalty paid in terms of the Second Schedule, not exceeding one-third of such royalty, as may be prescribed by the Central Government.

(*6*) The holder of a mining lease granted before the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 [3][other than those covered under the provisions of sub-section (*2*) of section 10A], shall, in addition to the royalty, pay to the District Mineral Foundation of the district in which the mining operations are carried on, an amount not exceeding the royalty paid in terms of the Second Schedule in such manner and subject to the categorisation of the mining leases and the amounts payable by the various categories of lease holders, as may be prescribed by the Central Government.

9C. National Mineral Exploration Trust.—(*1*) The Central Government shall, by notification, establish a Trust, as a [4][non-profit autonomous body], to be called the National Mineral Exploration Trust.

(*2*) The object of the Trust shall be to use the funds accrued to the Trust for the purposes of regional and detailed exploration in such manner as may be prescribed by the Central Government.

(*3*) The composition and functions of the Trust shall be such as may be prescribed by the Central Government.

(*4*) The holder of a mining lease or a [5][mineral concession] shall pay to the Trust, a sum equivalent to two per cent. of the royalty paid in terms of the Second Schedule, in such manner as may be prescribed by the Central Government.]

[6][(*5*) The entities specified and notified under sub-section (*1*) of section 4 shall be eligible for funding under the National Mineral Exploration Trust.]

CHAPTER III

[7][PROCEDURE FOR OBTAINING MINERAL CONCESSION IN RESPECT OF LAND IN WHICH THE MINERALS VEST IN THE GOVERNMENT]

10. [8][Application for mineral concession.]—(*1*) An application for [9][a [5][mineral concession]] in respect of any land in which the minerals vest in the Government shall be made to the State Government concerned in the prescribed form and shall be accompanied by the prescribed fee.

(*2*) Where an application is received under sub-section (*1*), there shall be sent to the applicant an acknowledgment of its receipt within the prescribed time and in the prescribed form.

1. Subs. by Act 16 of 2021, s. 2, for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).
2. Ins. by s. 10, *ibid.* (w.e.f. 28-3-2021).
3. Ins. by Act 16 of 2021, s. 10 (w.e.f. 28-3-2021).
4. Subs. by s. 11, *ibid.*, for "non-profit body" (w.e.f. 28-3-2021).
5. Subs. by Act 16 of 2021, s. 2, "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
6. Ins. by Act 16 of 2021, s. 11 (w.e.f. 28-3-2021).
7. Subs. by Act 16 of 2023, s. 7, for Chapter Heading (w.e.f. 17-8-2023).
8. Subs. by s. 8, *ibid.*, for the marginal heading (w.e.f. 17-8-2023).
9. Subs. by Act 38 of 1999, s. 11, for "a prospecting licence or a mining lease" (w.e.f. 18-12-1999).

(*3*) On receipt of an application under this section, the State Government may, having regard to the provisions of this Act and any rules made thereunder, grant or refuse to grant the [1][permit, licence or lease].

[2][(*4*) Notwithstanding anything contained in this section, no person shall be eligible to make an application under this section unless—

(*a*) he has been selected in accordance with the procedure specified under [3][sections 10B, 10BA, 11, 11A, 11B or 11D];

(*b*) he has been selected under the Coal Mines (Special) Provisions Act, 2015 (11 of 2015); or

(*c*) an area has been reserved in his favour under section 17A.]

[4]**[10A. Rights of existing concession holders and applicants**.—(*1*) All applications received prior to the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015, shall become ineligible.

(*2*) Without prejudice to sub-section (*1*), the following shall remain eligible on and from the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015:—

(*a*) applications received under section 11A of this Act;

(*b*) where before the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 a reconnaissance permit or prospecting licence has been granted in respect of any land for any mineral, the permit holder or the licensee shall have a right for obtaining a prospecting licence followed by a mining lease, or a mining lease, as the case may be, in respect of that mineral in that land, if the State Government is satisfied that the permit holder or the licensee, as the case may be,—

(*i*) has undertaken reconnaissance operations or prospecting operations, as the case may be, to establish the existence of mineral contents in such land in accordance with such parameters as may be prescribed by the Central Government;

(*ii*) has not committed any breach of the terms and conditions of the reconnaissance permit or the prospecting licence;

(*iii*) has not become ineligible under the provisions of this Act; and

(*iv*) has not failed to apply for grant of prospecting licence or mining lease, as the case may be, within a period of three months after the expiry of reconnaissance permit or prospecting licence, as the case may be, or within such further period not exceeding six months as may be extended by the State Government;

[5][Provided that for the cases covered under this clause including the pending cases, the right to obtain a prospecting licence followed by a mining lease or a mining lease, as the case may be, shall lapse on the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2021:

Provided further that the holder of a reconnaissance permit or prospecting licence whose rights lapsed under the first proviso, shall be reimbursed the expenditure incurred towards reconnaissance or prospecting operations in such manner as may be prescribed by the Central Government.]

1. Subs. by Act 38 of 1999, s. 11, for "licence or lease" (w.e.f. 18-12-1999).
2. Ins. by Act 16 of 2021, s. 12 (w.e.f. 28-3-2021).
3. Subs. by Act 16 of 2023, s. 8, for the words figures and letters "sections 10B, 11, 11A or the rules made under section 11B" (w.e.f. 17-8-2023).
4. Ins. by Act 10 of 2015, s. 10 (w.e.f. 12-1-2015).
5. Ins. by Act 16 of 2021, s. 13 (w.e.f. 28-3-2021).

(*c*) where the Central Government has communicated previous approval as required under sub-section (*1*) of section 5 for grant of a mining lease, or if a letter of intent (by whatever name called) has been issued by the State Government to grant a mining lease, before the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015, the mining lease shall be granted subject to fulfilment of the conditions of the previous approval or of the letter of intent within a period of two years from the date of commencement of the said Act:

Provided that in respect of any mineral specified in the First Schedule, no prospecting licence or mining lease shall be granted under clause (*b*) of this subsection except with the previous approval of the Central Government.

[1][(*d*) in cases where right to obtain licence or lease has lapsed under, clauses (*b*) and (*c*), such areas shall be put up for auction as per the provisions of this Act.

Provided that in respect of the minerals specified in Part B of the First Schedule where the grade of atomic mineral is equal to or greater than the threshold value, the mineral concession for such areas shall be granted in accordance with the rules made under section 11B.]

10B. Grant of mining lease in respect of notified minerals through auction.—[2][(*1*) The provisions of this section shall not apply to the,—

(*a*) cases falling under section 17A;

(*b*) minerals specified in Part A of the First Schedule;

(*c*) minerals specified in Part B of the First Schedule where the grade of atomic mineral is equal to or greater than such threshold value as may be notified by the Central Government from time to time; or

(*d*) land in respect of which the minerals do not vest in the Government.]

(*2*) Where there is inadequate evidence to show the existence of mineral contents of any notified mineral in respect of any area, a State Government may, after obtaining the previous approval of the Central Government, grant a [3][composite licence] for the said notified mineral in such area in accordance with the procedure laid down in section 11.

(*3*) In areas where the existence of mineral contents of any notified mineral is established in the manner prescribed by the Central Government, the State Government shall notify such areas for grant of mining leases for such notified mineral, the terms and conditions subject to which such mining leases shall be granted, and any other relevant conditions, in such manner as may be prescribed by the Central Government.

[4][Provided that where the State Government has not notified such area for grant of mining lease after establishment of existence of mineral contents of any mineral (whether notified mineral or otherwise), the Central Government may require the State Government to notify such area within a period to be fixed in consultation with the State Government and in cases where the notification is not issued within such period, the Central Government may notify such area for grant of mining lease after the expiry of the period so specified.]

(*4*) For the purpose of granting a mining lease in respect of any notified mineral in such notified area, the State Government shall select, through auction by a method of competitive bidding, including e-auction, an applicant who fulfils the eligibility conditions as specified in this Act.

[4][Provided that—

(*a*) where the State Government has not successfully completed auction for the purpose of granting a mining lease in respect of any mineral (whether notified mineral or otherwise) in such notified area; or

1. Ins. by Act 16 of 2021, s. 13 (w.e.f. 28-3-2021).
2. Subs. by s. 14, ibid., for sub-section (*1*) (w.e.f. 28-3-2021).
3. Subs. by s. 2, *ibid*., for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).
4. Ins. by s. 14, *ibid*. (w.e.f. 28-3-2021).

(*b*) upon completion of such auction, the mining lease or letter of intent for grant of mining lease has been terminated or lapsed for any reason whatsoever,

the Central Government may require the State Government to conduct and complete the auction or re-auction process, as the case may be, within a period to be fixed in consultation with the State Government and in cases where such auction or re-auction process is not completed within such period, the Central Government may conduct auction for grant of mining lease for such area after the expiry of the period so specified:

Provided further that upon successful completion of the auction, the Central Government shall intimate the details of the preferred bidder in the auction to the State Government and the State Government shall grant mining lease for such area to such preferred bidder in such manner as may be prescribed by the Central Government.]

(*5*) The Central Government shall prescribe the terms and conditions, and procedure, subject to which the auction shall be conducted, including the bidding parameters for the selection, which may include a share in the production of the mineral, or any payment linked to the royalty payable, or any other relevant parameter, or any combination or modification of them.

(*6*) Without prejudice to the generality of sub-section (*5*), the Central Government shall, if it is of the opinion that it is necessary and expedient to do so, prescribe terms and conditions, procedure and bidding parameters in respect of categories of minerals, size and area of mineral deposits and a State or States, subject to which the auction shall be conducted:

[1][Provided that no mine shall be reserved for captive purpose in the auction.]

(*7*) The State Government shall grant a mining lease to an applicant selected in accordance with the procedure laid down in this section in respect of such notified mineral in any notified area.

[2][**10BA. Grant of exploration licence for minerals specified in Seventh Schedule through auction.**—(*1*) The provisions of this section shall not apply to—

(*a*) the areas covered under section 17A;

(*b*) the minerals specified in Part A of the First Schedule;

(*c*) the minerals specified in Part B of the First Schedule where the grade of atomic mineral is equal to or greater than such threshold value as may be notified by the Central Government from time to time;

(*d*) any land in respect of which the minerals do not vest in the Government.

(*2*) Notwithstanding anything contained in sections 10B and 11, an exploration licence may be granted in any area by the State Government for the purpose of undertaking reconnaissance or prospecting operations or both in respect of any mineral specified in the Seventh Schedule.

(*3*) The Central Government may, by notification in the Official Gazette, and for reasons to be recorded in writing, amend the Seventh Schedule so as to modify the entries therein with effect from such date as may be specified in the said notification.

(*4*) The State Government shall, after obtaining the previous approval of the Central Government, and in such manner as may be prescribed by the Central Government, notify the areas in which exploration licence shall be granted, subject to such terms and conditions as may be specified in the notification.

(*5*) The Central Government may require the State Government to notify the area for grant of exploration licence within such period as may be fixed in consultation with the State Government, and in case the State Government does not notify the area within such period, the Central Government may, after the expiry of the period so fixed, notify the area for grant of exploration licence.

(*6*) The State Government shall, for the purpose of granting exploration licence through auction by method of competitive bidding, including e-auction, select an applicant who fulfils the eligibility conditions as specified in this Act and grant exploration licence to such applicant.

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1. Subs. by Act 16 of 2021, s. 14, for the proviso (w.e.f. 28-3-2021).
2. Ins. by Act 16 of 2023, s. 9 (w.e.f. 17-8-2023).

(*7*) Where—

(*a*) the State Government has not successfully completed auction for the grant of exploration licence; or

(*b*) after completion of auction, the exploration licence or letter of intent for grant of exploration licence has been terminated or lapsed for any reason whatsoever,

the Central Government may require the State Government to conduct and complete the auction or re-auction process, as the case may be, within such period as may be fixed in consultation with the State Government, and in cases where such auction or re-auction process is not completed within such period, the Central Government may, after the expiry of the period so fixed, conduct auction for the grant of exploration licence for such area:

Provided that upon successful completion of the auction, the Central Government shall intimate the details of the preferred bidder in the auction to the State Government and the State Government shall grant exploration licence for such area to such preferred bidder in such manner as may be prescribed by the Central Government.

(*8*) The holder of exploration licence shall be entitled to a share of applicable amount quoted in the auction of ining leases payable by the lessee to the State Government in respect of the area granted in mining lease pursuant to the prospecting operations undertaken by the holder of such exploration licence:

Provided that the share in applicable amount payable to the holder of exploration licence by the lessee of such area shall be allowed only in respect of the minerals specified in the Seventh Schedule.

(*9*) The Central Government shall by rules provide for the manner of conducting auction for grant of exploration licence, including its terms and conditions, the bidding parameters for selection, share payable to the holder of exploration licence from out of the applicable amount quoted in auction of mining leases payable by the lessee of such area, the period for such payment and such other conditions as may be necessary.

(*10*) Notwithstanding anything contained in section 7,—

(*a*) the exploration licence shall be granted for a period of five years from the date of execution of the exploration licence;

(*b*) if, after three years from the date of execution of exploration licence, but before the date of its expiry, the holder of the exploration licence makes an application for the extension of the period of that licence, the State Government may, on being satisfied that within the period of five years, it shall not be possible for the holder of such licence to complete the reconnaissance or prospecting operations for reasons beyond his control, extend the said period to a further period not exceeding two years.

(*11*) After three years from the date of execution of the exploration licence, the holder of such licence may retain an area not exceeding twenty-five per cent. of the total area covered under that licence for the purpose of continuing reconnaissance or prospecting operations and shall surrender the remaining area after submitting a report to the State Government stating the reasons for retention of the area proposed to be retained by him and the boundaries of that area.

(*12*) The holder of the exploration licence shall, within three months of the completion of the operations for which licence has been granted, or of the date of expiry of the exploration licence, whichever is earlier, submit a geological report to the State Government explaining the result of the reconnaissance and prospecting operations, in such manner as may be prescribed.

(*13*) If the holder of the exploration licence fails to complete the reconnaissance and prospecting operations before expiry of the exploration licence, or fails to submit the geological report within the period specified in sub-section (*12*), the State Government may take such action as it deems fit, including imposition of penalty.

(*14*) Within six months from the date of receipt of the geological report from the holder of the exploration licence, the Central Government or the State Government shall initiate the auction process for grant of one or more separate mining leases under section 10B or section 11 or section 11D, as the case may be, in respect of the area where existence of mineral content is established and shall select the preferred bidder for grant of such mining leases within one year from the date of receipt of the geological report:

Provided that in case the preferred bidder is not selected within the period so specified, the State Government shall pay to the person who was the holder of exploration licence such amount, and in such manner, as may be prescribed.]

10C. [*Grant of non-exclusive reconnaissance permits*.] *Omitted by the Mines and Minerals* (*Development and Regulation*) *Amendment Act*, 2021, *s*. 16 (*w.e.f.* 28-3-2021).

[1]**[11. Grant of [2][composite licence] through auction in respect of minerals other than notified minerals.—**[3][(*1*) The provisions of this section shall not apply to the,—

(*a*) cases falling under section 17A;

(*b*) minerals specified in Part A of the First Schedule;

(*c*) minerals specified in Part B of the First Schedule where the grade of atomic mineral is equal to or greater than such threshold value as may be notified by the Central Government from time to time; or

(*d*) land in respect of which the minerals do not vest in the Government.]

(*2*) In areas where there is evidence to show the existence of mineral contents as required by clause (*a*) of sub-section (*2*) of section 5, the State Government shall grant a mining lease for minerals other than notified minerals following the procedure laid down in section 10B.

(*3*) In areas where there is inadequate evidence to show the existence of mineral contents as required under clause (*a*) of sub-section (*2*) of section 5, the State Government shall grant a [2][composite licence] for minerals other than notified minerals in accordance with the procedure laid down in this section.

(*4*) The State Government shall notify the areas in which [2][composite licence] shall be granted for any minerals other than notified minerals, the terms and conditions subject to which such [2][composite licence] shall be granted, and any other relevant conditions, in such manner as may be prescribed by the Central Government.

[4][Provided that where the State Government has not notified such area for grant of mining lease after establishment of existence of mineral contents of any mineral (whether notified mineral or otherwise), the Central Government may require the State Government to notify such area within a period to be fixed in consultation with the State Government and in cases where the notification is not issued within such period, the Central Government may notify such area for grant of mining lease after the expiry of the period so specified.]

(*5*) For the purpose of granting [2][composite licence], the State Government shall select, through auction by method of competitive bidding, including e-auction, an applicant who fulfils the eligibility conditions as specified in this Act.

[4][Provided that—

(*a*) where the State Government has not successfully completed auction for the purpose of granting a composite licence in respect of any mineral (whether notified mineral or otherwise) in such notified area; or

(*b*) upon completion of such auction, the composite licence or letter of intent for grant of composite licence has been terminated or lapsed for any reason whatsoever,

the Central Government may require the State Government to conduct and complete the auction or re-auction process, as the case may be, within a period to be fixed in consultation with the State Government and in cases where such auction or re-auction process is not completed within such period, the Central Government may conduct auction for grant of composite licence for such area after the expiry of the period so specified:

Provided further that upon successful completion of the auction, the Central Government shall intimate the details of the preferred bidder in the auction to the State Government and the State Government shall grant composite licence for such area to such preferred bidder in such manner as may be prescribed by the Central Government.]

(*6*) The Central Government shall prescribe the terms and conditions, and procedure, subject to which the auction shall be conducted, including the bidding parameters for the selection, which may

1. Subs. by Act 10 of 2015, s. 11, for section 11 (w.e.f. 12-1-2015).
2. Subs. by Act 16 of 2021, s. 2, for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).
3. Subs. by s. 16, *ibid.*, for sub-section (*1*) (w.e.f. 28-3-2021).
4. Ins. by s. 16, *ibid.* (w.e.f. 28-3-2021).

include a share in the production of the mineral, or any payment linked to the royalty payable, or any other relevant parameter, or any combination or modification of them.

(*7*) Without prejudice to the generality of sub-section (*6*), the Central Government shall, if it is of the opinion that it is necessary and expedient to do so, prescribe terms and conditions, procedure and bidding parameters in respect of categories of minerals, size and area of mineral deposits and a State or States, subject to which the auction shall be conducted.

(*8*) The State Government shall grant a [1][composite licence] to an applicant selected in accordance with the procedure laid down in this section.

(*9*) The holder of a [1][composite licence] shall be required to complete, within the period laid down in section 7, the prospecting operations satisfactorily as specified in the notice inviting applications.

[2][(*10*) On completion of the prospecting operations, the holder of the composite licence shall submit the result of the prospecting operations in the form of a geological report to the State Government specifying the area required for mining lease and the State Government shall grant mining lease for such area, to the holder of the composite licence in such manner as may be prescribed by the Central Government.]]

[3][**11A. Granting of [1][mineral concession] [4][or [5][composite licence] in respect of coal or lignite].—(***1*) Notwithstanding anything contained in this Act, the Central Government may, for the purpose of granting [1][mineral concession] [6][or [5][composite licence] in respect of coal or lignite] select any of the following companies through auction by competitive bidding, on such terms and conditions as may be prescribed, namely: —

(*a*) a Government company or corporation or a joint venture company formed by such company or corporation or between the Central Government or the State Government, as the case may be, or any other company incorporated in India; or

(*b*) a company or a joint venture company formed by two or more companies, [7][to carry on coal or lignite reconnaissance or prospecting or mining operations, for own consumption, sale or for any other purpose as may be determined by the Central Government;]

[8][Provided that the auction by competitive bidding under this section shall not be applicable to coal or lignite—

(*a*) where such area is considered for allotment to a Government company or corporation or a joint venture company formed by such company or corporation or between the Central Government or the State Government, as the case may be, for own consumption, sale or for any other purpose as may be determined by the Central Government;

(*b*) where such area is considered for allotment to a company or corporation that has been awarded a power project on the basis of competitive bid for tariff (including Ultra Mega Power Projects);]

(*2*) The Central Government may, with a view to rationalise coal and lignite mines referred to in sub-section (*1*), so as to ensure the coordinated and scientific development and utilisation of resources consistent with the growing requirements of the country, from time to time, prescribe—

1. Subs. by Act 16 of 2021, s. 2, "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
2. Subs. by s. 16, *ibid.*, for sub-section (*10*) (w.e.f. 28-3-2021).
3. Subs. by Act 11 of 2015, s. 28 and the Fourth Schedule, for section 11A (w.e.f. 21-10-2014).
4. Ins. by Act 2 of 2020, s. 7 (w.e.f. 10-1-2020).
5. Subs. by Act 16 of 2021, s. 2, for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).
6. Subs. by Act 2 of 2020, s. 7, for "in respect of any area containing coal or lignite" (w.e.f. 10-1-2020).
7. Subs. by s. 7, *ibid.*, for the long line (w.e.f. 10-1-2020).
8. Ins. by s. 7, *ibid*. (w.e.f. 10-1-2020).

(*i*) the details of mines and their location;

(*ii*) the minimum size of such mines;

(*iii*) such other conditions,

which in the opinion of that Government may be necessary for the purpose of mining operations or mining for sale by a company.

(*3*) The State Government shall grant such [1][mineral concession] [2][or [3][composite licence]] in respect of any area containing coal or lignite to such company as selected through auction by [4][competitive bidding or through allotment] under this section:

Provided that the auction by competitive bidding under this section shall not be applicable to an area containing coal or lignite—

(*a*) where such area is considered for allocation to a Government company or corporation or a joint venture company formed by such company or corporation or between the Central Government or the State Government, as the case may be;

(*b*) where such area is considered for allocation to a company or corporation or that has been awarded a power project on the basis of competitive bids for tariff (including Ultra Mega Power Projects).

Explanation.—For the purposes of this section, "company" means a company as defined in clause (20) of section 2 of the Companies Act, 2013 (18 of 2013).]

[5]**[11B. Power of Central Government to make rules for regulating atomic minerals specified under Part B of First Schedule.—**The Central Government may, by notification in the Official Gazette, make rules for regulating the grant of mining leases or other mineral concessions in respect of minerals specified in Part B of the First Schedule and for purposes connected therewith, and the State Government shall grant a [1][mineral concession] in respect of any such mineral in accordance with such rules.

11C. Power of Central Government to amend First Schedule and Fourth Schedule.—The Central Government may, by notification in the Official Gazette, amend the First Schedule and the Fourth Schedule so as to add or delete any mineral as may be specified in the notification.]

[6]**[11D.Central Government to conduct auction for grant of mining lease or composite licence in respect of minerals specified in Part D of First Schedule.**—(*1*) Notwithstanding anything contained in this Act, the Central Government shall, for the purpose of granting mining lease or composite licence in any area in respect of any mineral specified in the Part D of the First Schedule, select, through auction by method of competitive bidding, including e-auction, a preferred bidder who fulfils the eligibility conditions as specified in section 5, on such terms and conditions, and in such manner, as may be prescribed.

(*2*) Upon successful completion of the auction, the Central Government shall intimate the details of the preferred bidder in the auction to the State Government and the State Government shall grant mining lease or composite licence for such area, to such preferred bidder, in such manner, as may be prescribed by the Central Government.

1. Subs. by Act 16 of 2021, s. 2, "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
2. Ins. by Act 2 of 2020, s. 7 (w.e.f. 10-1-2020).
3. Subs. by Act 16 of 2021, s. 2, for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).
4. Subs. by s. 7, *ibid*., for "competitive bidding or otherwise" (w.e.f. 10-1-2020).
5. Ins. by Act 10 of 2015, s. 12 (w.e.f. 12-1-2015).
6. Ins. by Act 16 of 2023, s. 10 (w.e.f. 17-8-2023).

(*3*) The royalty, dead rent, applicable amount quoted in the auction and any other statutory payment in relation to the mining lease or composite licence auctioned by the Central Government shall accrue to the State Government or concerned authorities, as the case may be, as if the auction has been conducted by the State Government.]

12. [1]**[Registers of mineral concession.]—**(*1*) The State Government shall cause to be maintained in the prescribed form—

(*a*) a register of applications for prospecting licences;

(*b*) a register of prospecting licensees;

[2][(*c*) a register of applications for mining leases;

(*d*) a register of mining lessees;

(*e*) a register of applications for reconnaissance permits; [3]***

(*f*) a register of reconnaissance permits,]

[4][(*g*) a register of applications for exploration licences; and

(*h*) a register of exploration licence,]

in each of which shall be entered such particulars as may be prescribed.

(*2*) Every such register shall be open to inspection by any person on payment of such fee as the State Government may fix.

[5]**[12A. Transfer of mineral concessions.—**(*1*) The provisions of this section shall not apply to minerals specified in Part A or Part B of the First Schedule.

(*2*) A holder of a mining lease or a [6][composite licence [7][or exploration licence]] granted in accordance with the procedure laid down in [8][this Act] may, with the previous approval of the State Government, transfer his mining lease or [6][composite licence [7][or exploration licence]], as the case may be, in such manner as may be prescribed by the Central Government, to any person eligible to hold such mining lease or [6][composite licence [7][or exploration licence]] in accordance with the provisions of this Act and the rules made thereunder.

[9][Provided that the transferee of mining lease shall not be required to pay the amount or transfer charges referred to in sub-section (*6*), as it stood prior to the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2021, after such commencement but no refund shall be made of the charges already paid.]

1. Subs. by Act 16 of 2023, s. 11 for the marginal heading (w.e.f. 17-8-2023).
2. Subs. by Act 38 of 1999, s. 13, for clauses (*c*) and (*d*) (w.e.f. 18-12-1999).
3. The word "and" omitted by Act 16 of 2023, s. 11 (w.e.f. 17-8-2023).
4. Ins. by Act 16 of 2023, s. 11 (w.e.f. 17-8-2023).
5. Ins. by Act 10 of 2015, s. 13 (w.e.f. 12-1-2015).
6. Subs. by Act 16 of 2021, s. 2, for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).
7. Ins. by Act 16 of 2023, s. 12 (w.e.f. 17-8-2023).
8. Subs. by s. 17, *ibid*., for "section 10B or section 11" (w.e.f. 28-3-2021).
9. Ins. by s. 17, *ibid.* (w.e.f. 28-3-2021).

(*3*) If the State Government does not convey its previous approval for transfer of such mining lease or [1][composite licence [2][or exploration licence]], as the case may be, within a period of ninety days from the date of receiving such notice, it shall be construed that the State Government has no objection to such transfer:

Provided that the holder of the original mining lease or [1][composite licence [2][or exploration licence]], shall intimate to the State Government the consideration payable by the successor-in-interest for the transfer, including the consideration in respect of the prospecting operations already undertaken and the reports and data generated during the operations.

(*4*) No such transfer of a mining lease or [1][composite licence [2][or exploration licence]], referred to in sub-section (*2*), shall take place if the State Government, within the notice period and for reasons to be communicated in writing, disapproves the transfer on the ground that the transferee is not eligible as per the provisions of this Act:

Provided that no such transfer of a mining lease [3][or composite licence], shall be made in contravention of any condition subject to which the mining lease or the [1][composite licence [2][or exploration licence]], was granted.

(*5*) All transfers effected under this section shall be subject to the condition that the transferee has accepted all the conditions and liabilities under any law for the time being in force which the transferor was subject to in respect of such a mining lease or [1][composite licence [2][or exploration licence]], as the case may be.

[4]* * * * *

[5][Provided that where a mining lease has been granted otherwise than through auction ad where mineral from such mining lease is being used for captive purpose, such mining lease may be permitted to be transferred subject to compliance of such terms and conditions and payment of such amount or such amount or transfer charges as may be prescribed.

Explanation.—For the purposes of this proviso, the expression "used for captive purpose" shall mean the use of the entire quantity of mineral extracted from the mining lease in a manufacturing unit owned by the lessee.]

CHAPTER IV

[6][RULES FOR REGULATING THE GRANT OF MINERAL CONCESSIONS]

13. Power of Central Government to make rules in respect of minerals.—(*1*) The Central Government may, by notification in the Official Gazette, make rules for regulating the grant of [7][mineral concession] in respect of minerals and for purposes connected therewith.

(*2*) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

(*a*) the person by whom, and the manner in which, applications for [8][mineral concession] in respect of land in which the minerals vest in the Government may be made and the fees to be paid therefor;

[9][(*aa*) the conditions as may be necessary for commencement and continuation of production by the holders of mining leases, under section 4B;

1. Subs. by Act 16 of 2021, s. 2, for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).
2. Ins. by Act 16 of 2023, s. 12 (w.e.f. 17-8-2023).
3. Subs. by s. 12, *ibid.*, for "or of a composite licence" (w.e.f. 17-8-2023).
4. Sub-section (*6*) omitted by Act 16 of 2021, s. 17 (w.e.f. 28-3-2021).
5. Ins. by Act 25 of 2016, s. 3 (w.e.f. 6-5-2016).
6. Subs. by Act 16 of 2023, s. 13, for Chapter heading (w.e.f. 17-8-2023).
7. Subs. by Act 16 of 2021, s. 18, for "prospecting licences and mining leases" (w.e.f. 28-3-2021).
8. Subs. by s. 18, *ibid.*, for "reconnaissance permits, prospecting licences and mining leases" (w.e.f. 28-3-2021).
9. Ins. by Act 2 of 2020, s. 8 (w.e.f. 10-1-2020).

(*ab*) the conditions to be fulfilled by the new lessee for obtaining all necessary rights, approvals, clearances, licences and the like under the proviso to sub-section (*2*) of section 8B;

[1]* * * * *]

(*b*) the time within which, and the form in which, acknowledgement of the receipt of any such application may be sent;

(*c*) the matters which may be considered where applications in respect of the same land are received on the same day;

[2][(*d*) the terms, conditions and process of auction by competitive bidding and allotment in respect of coal or lignite;

(*da*) the regulation of grant of [3][mineral concession] or [4][composite licence] in respect of coal or lignite;

(*db*) the details of mines and their location, the minimum size of such mines and such other conditions which may be necessary for the purpose of coal or lignite reconnaissance, prospecting or mining operations;

(*dc*) utilisation of coal or lignite including mining for sale by a company]

(*e*) the authority by which [3][mineral concession] in respect of land in which the minerals vest in the Government may be granted;

(*f*) the procedure for obtaining [5][a [3][mineral concession] in respect of any land in which the minerals vest in a person other than the Government and the terms on which, and the conditions subject to which, such [6][a permit, licence or lease] may be granted or renewed;

(*g*) the terms on which, and the conditions subject to which, may other [1][mineral concession] may be granted or renewed;

(*h*) the facilities to be afforded by holders of mining leases to persons deputed by the Government for the purpose of undertaking research or training in matters relating to mining operations;

[7][(*i*) the fixing and collection of fees for [3][mineral concession] surface rent, security deposit, fines, other fees or charges and the time within which and the manner in which the dead rent or royalty shall be payable;]

(*j*) the manner in which rights of third parties may be protected (whether by payment of compensation or otherwise) in cases where any such party may be prejudicially affected by reason of any [3][mineral concession];

[8][(*jj*) parameters of existence of mineral contents under clause (*a*) of sub-section (*2*) of section 5;]

(*k*) the grouping of associated minerals for the purposes of section 6;

(*l*) the manner in which, and the conditions subject to which, [9][a [3][mineral concession]] may be transferred;

1. The clause (ac) omitted by Act 16 of 2023, s. 14 (w.e.f. 17-8-2023).
2. Subs. by Act 2 of 2020, s. 8, for clause (*d*) (w.e.f. 10-1-2020).
3. Subs. by Act 16 of 2021, s. 2, for "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
4. Subs. by s. 2, *ibid.*, for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).
5. Subs. by Act 38 of 1999, s. 14, for "a prospecting licence or a mining lease" (w.e.f. 18-12-1999).
6. Subs. by s. 14, *ibid*., for "a licence or lease" (w.e.f. 18-12-1999).
7. Subs. by Act 37 of 1986, s. 11, for clause (*i*) (w.e.f. 10-2-1987).
8. Ins. by Act 10 of 2015, s. 14 (w.e.f. 12-1-2015).
9. Subs. by Act 38 of 1999, s.14, for "a prospecting licence or a mining lease" (w.e.f. 18-12-1999).

(*m*) the construction, maintenance and use of roads, power transmission lines, tramways, railways, aerial ropeways, pipelines and the making of passages for water for mining purposes on any land comprised in a mining lease;

(*n*) the form of registers to be maintained under this Act;

[1]* * * * *

(*p*) the reports and statements to be submitted by holders of [2][mineral concession] or owners of mines and the authority to which such reports and statements shall be submitted;

(*q*) the period within which applications for revision of any order passed by a State Government or other authority in exercise of any power conferred by or under this Act, may be made [3][the fees to be paid therefore and the documents which shall accompany such applications] and the manner in which such applications shall be disposed of; and

[3][(*qq*) the manner in which rehabilitation of flora and other vegetation, such as trees, shrubs and the like destroyed by reason of any prospecting or mining operations shall be made in the same area or in any other area selected by the Central Government (whether by way of reimbursement of the cost of rehabilitation or otherwise) by the person holding the prospecting licence or mining lease;] [4]***

[5][(*qqa*) the amount of payment to be made to the District Mineral Foundation under sub-sections (*5*) and (*6*) of section 9B;

(*qqb*) the manner of usage of funds accrued to the National Mineral Exploration Trust under sub-section (*2*) of section 9C;

(*qqc*) the composition and functions of the National Mineral Exploration Trust under sub-section (*3*) of section 9C;

(*qqd*) the manner of payment of amount to the National Mineral Exploration Trust under sub-section (*4*) of section 9C;

(*qqe*) the terms and conditions subject to which mining leases shall be granted under sub-section (*3*) of section 10B;

(*qqf*) the terms and conditions, and procedure, subject to which the auction shall be conducted including the bidding parameters for the selection under sub-section (*5*) of section 10B;

(*qqg*) the time limits for various stages in processing applications for grant of [6][mineral concession under section 10B, 10BA, 11, 11A, 11B, 11D], and section 17A, and their renewals;

[7]* * * * *

(*qqi*) the terms and conditions for grant of [8][composite licence] under sub-section (*4*) of section 11;

(*qqj*) the terms and conditions, and procedure, including the bidding parameters for the selection under sub-section (*6*) of section 11;

1. Omitted by Act 37 of 1986, s. 11 (w.e.f. 10-2-1987).
2. Subs. by Act 16 of 2021, s. 2, for "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
3. Ins. by Act 37 of 1986, s. 11 (w.e.f. 10-2-1987).
4. The word "and" omitted by Act 10 of 2015, s. 14 (w.e.f. 12-1-2015).
5. Ins. by s. 14, *ibid*. (w.e.f. 12-1-2015).
6. Subs. by Act 16 of 2023, s. 14, for the words, figures and letters "mining lease or composite licence under section 10B, 11, 11A, 11B" (w.e.f. 17-8-2023).
7. Clause (*qqh*) omitted by Act 16 of 2021, s. 18 (w.e.f. 28-3-2021).
8. Subs. by Act 16 of 2021, s. 2, for "prospecting licence-cum-mining lease" (w.e.f. 28-3-2021).

[1][(*qqja*) the terms and conditions and amount or transfer charges under the proviso to sub-section (*6*) of section 12A;]

[2]* * * * *

[3][(*r*) the period of mining lease under sub-section (*4*) of section 8;

(*s*) the manner of sale of mineral by the holder of a mining lease under sub-section (*5*) of section 8;

(*t*) the manner of sale of mineral under sub-section (*7A*) of section 8A;

(*u*) the manner for reimbursement of expenditure towards reconnaissance permits or prospecting operations under the second proviso to clause (*b*) of sub-section (*2*) of section 10A;

(*v*) the manner of granting mining lease to the preferred bidder under the second proviso to sub-section (*4*) of section 10B;

[4][(*va*) the manner of notifying the areas for grant of exploration licence under sub-section (*4*) of section 10BA;

(*vb*) the manner of granting exploration licence to the preferred bidder under the proviso to sub-section (*7*) of section 10BA;

(*vc*) the manner of conducting auction for grant of exploration licence, the terms and conditions thereof, the bidding parameters for selection, the share payable to the holder, the period for payment and other conditions under sub-section (*9*) of section 10BA;

(*vd*) the manner of submitting geological report under sub-section (*12*) of section 10BA;

(*ve*) the amount to be paid and the manner of payment under the proviso to sub-section (*14*) of section 10BA;]

(*w*) the manner of granting composite licence to the preferred bidder under the second proviso to sub-section (*5*) of section 11;

(*x*) the manner of granting mining lease by the State Government to the holder of the composite licence under sub-section (*10*) of section 11;

[1][(*xa*) the terms and conditions and the manner of selecting a preferred bidder under sub-section (*1*) of section 11D;

(*xb*) the manner of granting a mining lease or composite licence to a preferred bidder under sub-section (*2*) of section 11D;]

(*y*) any other matter which is to be, or may be prescribed, under this Act.]

[5][**13A. Power of Central Government to make rules for the grant of prospecting licences or mining leases in respect of territorial waters or continental shelf of India**.—(*1*) The Central Government may, by notification in the Official Gazette, make rules for the grant of prospecting licences or mining leases in respect of any minerals underlying the ocean within the territorial waters or the continental shelf of India.

(*2*) Without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

(*a*) the conditions, limitations and restrictions subject to which such prospecting licences or mining leases may be granted;

(*b*) regulation of exploration and exploitation of minerals within the territorial waters or the continental shelf of India;

1. Ins. by Act 25 of 2016, s. 4 (w.e.f. 6-5-2016).
2. Clause (*qqk*) omitted by Act 16 of 2021, s. 18 (w.e.f. 28-3-2021).
3. Subs. by s. 18, *ibid*., for clause (*r*) (w.e.f. 28-3-2021).
4. Ins. by Act 16 of 2023, s. 14 (w.e.f. 17-8-2023).
5. Ins. by Act 56 of 1972, s. 6 (w.e.f. 12-9-1972).

(*c*) ensuring that such exploration or exploitation does not interfere with navigation and

(*d*) any other matter which is required to be, or may be, prescribed.]

14. [1][Sections 5 to 13] not to apply to minor minerals.—The provisions of [1][sections 5 to 13] (inclusive) shall not apply to [2][quarry leases, mining leases or other mineral concessions] in respect of minor minerals.

15. Power of State Governments to make rules in respect of minor minerals.—(*1*) The State Government may, by notification in the Official Gazette, make rules for, regulating the grant of [3][quarry leases, mining leases or other mineral concessions] in respect of minor minerals and for purposes connected therewith.

[4][(*1A*) In particular and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

(*a*) the person by whom and the manner in which, applications for quarry leases, mining leases or other mineral concessions may be made and the fees to be paid therefor;

(*b*) the time within which, and the form in which, acknowledgement of the receipt of any such applications may be sent;

(*c*) the matters which may be considered where applications in respect of the same land are received within the same day;

(*d*) the terms on which, and the conditions subject to which and the authority by which quarry leases, mining leases or other mineral concessions may be granted or renewed;

(*e*) the procedure for obtaining quarry leases, mining leases or other mineral concessions;

(*f*) the facilities to be afforded by holders of quarry leases, mining leases or other mineral concessions to persons deputed by the Government for the purpose of undertaking research or training in matters relating to mining operations;

(*g*) the fixing and collection of rent, royalty, fees, dead rent, fines or other charges and the time within which and the manner in which these shall be payable;

(*h*) the manner in which rights of third parties may be protected (whether by way of payment of compensation or otherwise) in cases where any such party is prejudicially affected by reason of any prospecting or mining operations;

(*i*) the manner in which rehabilitation of flora and other vegetation such as trees, shrubs and the like destroyed by reason of any quarrying or mining operations shall be made in the same area or in any other area selected by the State Government (whether by way of reimbursement of the cost of rehabilitation or otherwise) by the person holding the quarrying or mining lease;

(*j*) the manner in which and the conditions subject to which, a quarry lease, mining lease or other mineral concession may be transferred;

(*k*) the construction, maintenance and use of roads power transmission lines, tramways, railways, serial rope ways, pipelines and the making of passage for water for mining purposes on any land comprised in a quarry or mining lease or other mineral concession;

(*l*) the form of registers to be maintained under this Act;

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1. Subs. by Act 37 of 1986, s. 12, for "sections 4 to 13" (w.e.f. 10-2-1987).
2. Subs. by Act 56 of 1972, s. 7, for "prospecting licences and mining leases" (w.e.f. 12-9-1972).
3. Subs. by s. 8, *ibid*., for "prospecting licence and mining leases" (w.e.f. 12-9-1972).
4. Ins. by Act 37 of 1986, s. 13 (w.e.f. 10-2-1987).

(*m*) the reports and statements to be submitted by holders of quarry or mining leases or other mineral concessions and the authority to which such reports and statements shall be submitted;

(*n*) the period within which and the manner in which and the authority to which applications for revision of any order passed by any authority under these rules may be made, the fees to be paid therefore, and the powers of the revisional authority; and

(*o*) any other matter which is to be, or may be, prescribed.]

(*2*) Until rules are made under sub-section (*1*), any rules made by a state Government regulating the grant of [1][quarry leases, mining leases or other mineral concessions] in respect of minor minerals which are in force immediately before the commencement of these Act shall continue in force.

[2][(*3*) The holder of a mining lease or any other mineral concession granted under any rule made under sub-section (*1*) shall pay [3][royalty or dead rent, whichever is more] in respect of minor minerals removed or consumed by him or by his agent, manager, employee, contractor or sub-lessee at the rate prescribed for the time being in the rules framed by the State Government in respect of minor minerals:

Provided that the State Government shall not enhance the rate of [3][royalty or dead rent] in respect of any minor mineral for more than once during any period of [4][three] years.]

[5][(*4*) Without prejudice to sub-sections (*1*), (*2*) and sub-section (*3*), the State Government may, by notification, make rules for regulating the provisions of this Act for the following, namely:—

(*a*) the manner in which the District Mineral Foundation shall work for the interest and benefit of persons and areas affected by mining under sub-section (*2*) of section 9B;

(*b*) the composition and functions of the District Mineral Foundation under sub-section (*3*) of section 9B; and

(*c*) the amount of payment to be made to the District Mineral Foundation by concession holders of minor minerals under section 15A.]

[6]**[15A. Power of State Government to collect funds for District Mineral Foundation in case of minor minerals**.—The State Government may prescribe the payment by all holders of concessions related to minor minerals of amounts to the District Mineral Foundation of the district in which the mining operations are carried on.]

16. Power to modify mining leases granted before 25th October, 1949.—[7][(*1*) (*a*) All mining leases granted before the commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1972 (56 of 1972) [8][if in force at the date of commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1994 (25 of 1994), shall be brought in conformity with the provisions of this Act and the rules made thereunder within two years from the date of the commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1994], or such further time as the Central Government may, by general or special order, specify in this behalf.

(*b*) Where the rights under any mining lease, granted by the proprietor of an estate or tenure before the commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1972 (56 of 1972), have vested, on or after the 25th day of October, 1949, in the State Government in pursuance of the provisions of any Act of any Provincial or State Legislature which provides for the acquisition of estates or tenures or provides for agrarian reform, such mining lease shall be brought into conformity with the provisions of this Act and the rules made thereunder within [9][two years from the commencement of the Mines

1. Subs. by Act 56 of 1972, s. 8, for "prospecting licence and mining leases" (w.e.f. 12-9-1972).
2. Ins. by s. 8, *ibid*. (w.e.f. 12-9-1972).
3. Subs. by Act 37 of 1986, s. 13, for "royalty" (w.e.f. 10-2-1987).
4. Subs. by s. 13, *ibid*., for "four" (w.e.f. 10-2-1987).
5. Ins. by Act 10 of 2015, s. 15 (w.e.f. 12-1-2015).
6. Ins. by s. 16, *ibid.* (w.e.f. 12-1-2015).
7. Subs. by Act 56 of 1972, s. 9, for sub-section (*1*) (w.e.f. 12-9-1972).
8. Subs. by Act 25 of 1994, s. 6, for certain words (w.e.f. 25-1-1994).
9. Subs. by s. 6, *ibid*., for "six months from the commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1972" (w.e.f. 25-1-1994).

and Minerals (Regulation and Development) Amendment Act, 1994 (25 of 1994)], or within such further time as the Central Government may, by general or special order, specify in this behalf.]

[1][(*1A*) Where any action is taken under clause (*a*) or clause (*b*) of sub-section (*1*) to bring the period of any lease in conformity with the provisions of this Act and the rules made thereunder, then notwithstanding anything contained in section 8, the period of such lease shall continue to operate for a period of two years from the date of bringing such lease in conformity with the provisions of this Act.]

(*2*) The Central Government may, by notification in the Official Gazette, make rules for the purpose of giving effect to the provisions of sub-section (*1*) and in particular such rules shall provide—

(*a*) for giving previous notice of the modification or alteration proposed to be made in any existing mining lease to the lessee and where the lessor is not the Central Government, also to the lessor and for affording him an opportunity of showing cause against the proposal;

(*b*) for the payment of compensation to the lessee in respect of the reduction of any area covered by the existing mining lease; and

(*c*) for the principles on which, the manner in which, and the authority by which, the said compensation shall be determined.

CHAPTER V

SPECIAL POWERS OF CENTRAL GOVERNMENT TO UNDERTAKE PROSPECTING OR MINING OPERATIONS IN CERTAIN CASES

17. Special powers of Central Government to undertake prospecting or mining operations in certain lands.—(*1*) The provisions of this section shall apply [2]*** in respect of land in which the minerals vest in the Government of a State [3][or any other person].

(*2*) Notwithstanding anything contained in this Act, the Central Government, after consultation with the State Government, may undertakes [4][mineral concession] in any area not already held under any [4][mineral concession] and where it proposes to do so, it shall, by notification in the Official Gazette—

(*a*) specify the boundaries of such area;

(*b*) state whether [5][reconnaissance, prospecting or mining operations] will be carried out in the area; and

(*c*) specify the mineral or minerals in respect of which such operations will be carried out.

(*3*) Where, in exercise of the powers conferred by sub-section (*2*), the Central Government undertakes [5][reconnaissance, prospecting or mining operations] in any area, the Central Government shall be liable to pay [6][reconnaissance permit fee or prospecting fee] royalty, surface rent or dead rent, as the case may be, at the same rate at which it would have been payable under this Act, if such [5][reconnaissance, prospecting or mining operations] had been undertaken by a private person under a [4][mineral concession].

(*4*) The Central Government, with a view to enabling it to exercise the powers conferred on it by sub-section (*2*) may, after consultation with the State Government, by notification in the Official Gazette, declare that no [4][mineral concession] shall be granted in respect of any land specified in the notification.

[7]**[17A. Reservation of areas for purposes of conservation**.—(*1*) The Central Government, with a view to conserving any mineral and after consultation with the State Government, may reserve any area not already held under any prospecting licence [8][or exploration licence] or mining lease and, where it

1. Ins. by Act 25 of 1994, s. 6 (w.e.f. 25-1-1994).
2. The word "only" omitted by Act 56 of 1972, s. 10 (w.e.f. 12-9-1972).
3. Ins. by s. 10, *ibid.* (w.e.f. 12-9-1972).
4. Subs. by Act 16 of 2021, s. 2, "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
5. Subs. by Act 38 of 1999, s. 15, for "prospecting or mining operations" (w.e.f. 18-12-1999).
6. Subs. by s. 15, *ibid*., for "prospecting fee" (w.e.f. 18-12-1999).
7. Ins. by Act 37 of 1986, s. 14 (w.e.f. 10-2-1987).
8. Ins. by Act 16 of 2023, s. 15 (w.e.f. 17-8-2023).

proposes to do so, it shall, by notification in the Official Gazette, specify the boundaries of such area and the mineral or minerals in respect of which such area will be reserved.

[1][(*1A*) The Central Government may in consultation with the State Government, reserve any area not already held under any prospecting licence [2][or exploration licence] or mining lease, for undertaking prospecting or mining operations through a Government company or corporation owned or controlled by it, and where it proposes to do so, it shall, by notification in the Official Gazette, specify the boundaries of such area and the mineral or minerals in respect of which such area will be reserved.]

(*2*) The State Government may, with the approval of the Central Government, reserve any area not already held under any prospecting licence [2][or exploration licence] or mining lease, for undertaking prospecting or mining operations through a Government company or corporation owned or controlled by it [3]*** and where it proposes to do so, it shall, by notification in the Official Gazette, specify the boundaries of such area and the mineral or minerals in respect of which such areas will be reserved.

[4][(*2A*) Where in exercise of the powers conferred by sub-section (*1A*) or sub-section (*2*), the Central Government or the State Government, as the case may be, reserves any area for undertaking prospecting or mining operations or prospecting operations followed by mining operations, the State Government shall grant prospecting licence, mining lease or composite licence, as the case may be, in respect of such area to such Government company or corporation within the period specified in this section:

Provided that in respect of any mineral specified in Part B of the First Schedule, the State Government shall grant the prospecting licence, mining lease or composite licence, as the case may be, only after obtaining the previous approval of the Central Government.]

(*2B*) Where the Government company or corporation is desirous of carrying out the prospecting operations or mining operations in a joint venture with other persons, the joint venture partner shall be selected through a competitive process, and such Government company or corporation shall hold more than seventy-four per cent. of the paid up share capital in such joint venture.

(*2C*) A mining lease granted to a Government company or corporation, or a joint venture, referred to in sub-sections (*2A*) and (*2B*), shall be granted on payment of such amount as [5][specified in the Fifth Schedule].]

[6][Provided that the Central Government may, by notification in the Official Gazette and for reasons to be recorded in writing, amend the Fifth Schedule so as to modify the entries mentioned therein in the said Schedulewith effect from such date as may be specified in the said notification.

Explanation.—For the removal of doubts, it is hereby clarified that all such Government companies or corporations whose mining lease has been granted after the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015, shall also pay such additional amount as specified in the Fifth Schedule for the mineral produced after the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2021(10 of 2015).

(*3*) [7][Where in exercise of the powers conferred by sub-section (*1A*) or sub-section (*2*) the Central Government or the State Government, as the case may be,] undertakes prospecting or mining operations in any area in which the minerals vest in a private person, it shall be liable to pay prospecting fee, royalty, surface rent or dead rent, as the case may be, from time to time at the same rate at which it would have been payable under this Act if such prospecting or mining operations had been undertaken by a private person under prospecting licence or mining lease.]

1. Ins. by Act 25 of 1994, s. 7 (w.e.f. 25-1-1994).
2. Ins. by Act 16 of 2023, s. 15 (w.e.f. 17-8-2023)
3. The words "or by the Central Government" omitted by s. 7, *ibid*. (w.e.f. 25-1-1994).
4. Subs. by Act 16 of 2021, s. 19, for sub-section (2A) (w.e.f. 28-3-2021).
5. Subs. by s. 19, *ibid*., for "may be prescribed by the Central Government" (w.e.f. 28-3-2021).
6. Ins. by s. 19, *ibid.* (w.e.f. 28-3-2021).
7. Subs. by Act 25 of 1994, s. 7, for "Where in exercise of the powers conferred by sub-section (2) the State Government" (w.e.f. 25-1-1994).

[1][(*4*) The reservation made under this section shall lapse in case no mining lease is granted within a period of five years from the date of such reservation:

Provided that where the period of five years from the date of reservation has expired before the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2021 or expires within a period of one year from the date of commencement of the said Act, the reservation shall lapse in case no mining lease is granted within a period of one year from the date of commencement of the said Act:

Provided further that the State Government may, on an application made by such Government company or corporation or on its own motion, and on being satisfied that it shall not be possible to grant the mining lease within the said period, make an order with reasons in writing, within a period of three months from the date of receipt of such application, to relax such period by a further period not exceeding one year:

Provided also that where the Government company or corporation in whose favour an area has been reserved under this section before the commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2015 (10 of 2015), has commenced production from the reserved area without execution of mining lease, such Government company or corporation shall be deemed to have become lessee of the State Government from the date of commencement of mining operations and such deemed lease shall lapse upon execution of the mining lease in accordance with this sub-section or expiry of period of one year from the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2021, whichever is earlier.

(*5*) The termination or lapse of mining lease shall result in the lapse of the reservation under this section.]

CHAPTER VI

DEVELOPMENT OF MINERALS

18. Mineral development.—(*1*) It shall be the duty of the Central Government to take all such steps as may be necessary [2][for the conservation and systematic development of minerals in India and for the protection of environment by preventing or controlling any pollution which may be caused by prospecting or mining operations] and [3][for such purposes] the Central Government may, by notification in the Official Gazette, make such rules as it thinks fit.

(*2*) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

(*a*) the opening of new mines and the regulation of mining operations in any area;

(*b*) the regulation of the excavation or collection of minerals from any mine;

(*c*) the measures to be taken by owners of mines for the purpose of beneficiation of ores, including the provision of suitable contrivances for such purpose;

(*d*) the development of mineral resources in any area;

(*e*) the notification of all new borings and shaft sinkings and the preservation of bore-hole records, and specimens of cores of alt new bore-holes;

(*f*) the regulation of the arrangements for the storage of minerals and the stocks thereof that may be kept by any person;

(*g*) the submission of samples of minerals from any mine by the owner thereof and the manner in which and the authority to which such samples shall be submitted; and the taking of samples of any minerals from any mine by the State Government or any other authority specified by it in that behalf;

1. Ins. by Act 16 of 2021, s. 19 (w.e.f. 28-3-2021).
2. Subs. by Act 37 of 1986, s. 15, for "for the conservation and development of minerals in India" (w.e.f. 10-2-1987).
3. Subs. by s. 15, *ibid*., for "for that purpose" (w.e.f. 10-2-1987).

(*h*) the submission by owners of mines of such special or periodical returns and reports as may be specified, and the form in which and the authority to which such returns and reports shall be submitted;

[1][(*i*) the regulation of prospecting operations;

(*j*) the employment of qualified geologists or mining engineers to supervise prospecting or mining operations;

(*k*) the disposal or discharge of waste slime or tailings arising from any mining or metallurgical operations carried out in a mine;

(*l*) the manner in which and the authority by which directions may be issued to the owners of any mine to do or refrain from doing certain things in the interest of conservation or systematic development of minerals or for the protection of environment by preventing or controlling pollution which may be caused by prospecting or mining operations;

(*m*) the maintenance and submission of such plans, registers or records as may be specified by the Government;

(*n*) the submission of records or reports by persons carrying on prospecting or mining operations regarding any research in mining or geology carried out by them;

(*o*) the facilities to be afforded by persons carrying out prospecting or mining operations to persons authorised by the Central Government for the purpose of undertaking research or training in matters relating to mining or geology;

(*p*) the procedure for and the manner of imposition of fines for the contravention of any of the rules framed under this section and the authority who may impose such fines; and

(*q*) the authority to which, the period within which, the form and the manner in which applications for revision of any order passed by any authority under this Act and the rules made thereunder may be made, the fee to be paid and the documents which should accompany such applications.]

(*3*) All rules made under this section shall be binding on the Government.

[2]**[18A. Power to authorise Geological Survey of India, etc., to make investigation**.—(*1*) Where the Central Government is of opinion that for the conservation and development of minerals in India, it is necessary to collect as precise information as possible with regard to any mineral available in or under any land in relation to which any prospecting licence [3][or exploration licence] or mining lease has been granted, whether by the State Government or by any other person, the Central Government may authorise the Geological Survey of India, or such other authority or agency as it may specify in this behalf, to carry out such detailed investigations for the purpose of obtaining such information as may be necessary:

Provided that in the cases of prospecting licences [3][or exploration licence] or mining leases granted by a State Government, no such authorisation shall be made except after consultation with the State Government.

(*2*) On the issue of any authorisation under sub-section (*1*), it shall be lawful for the Geological Survey of India or the specified authority or agency, and its servants and workmen—

(*a*) to enter upon such land,

(*b*) to dig or bore into the sub-soil,

(*c*) to do all other acts necessary to determine the extent of any mineral available in or under such land,

1. Ins. by Act 37 of 1986, s. 15 (w.e.f. 10-2-1987).
2. Ins. by Act 56 of 1972, s. 11 (w.e.f. 12-9-1972).
3. Ins. by Act 16 of 2023, s. 16 (w.e.f. 17-8-2023).

(*d*) to set out boundaries of the land in which any mineral is expected to be found,

(*e*) to mark such boundaries and line by placing marks,

(*f*) where otherwise the survey cannot be completed on the boundaries and line marked, to cut down and clear away any part of any standing crop, fence or jungle:

Provided that no such authority or agency shall enter into any building or upon any enclosed court or garden attached to a dwelling-house (except with the consent of the occupier thereof) without previously giving such occupier at least seven days' notice in writing of its intention to do so.

(*3*) Whenever any action of the nature specified in sub-section (*2*) is to be taken, the Central Government shall, before or at the time when such action is taken, pay or tender payment for all necessary damage which is likely to be caused, and in case of dispute as to the sufficiency of the amount so paid or tendered or as to the person to whom it should be paid or tendered, the Central Government shall refer the dispute to the principal civil court of original jurisdiction having jurisdiction over the land in question.

(*4*) The fact that there exists any such dispute as is referred to in sub-section (*3*) shall not be a bar to the taking of any action under sub-section (*2*).

(*5*) After the completion of the investigation, the Geological Survey of India or the specified authority or agency by which the investigation was made shall submit to the Central Government a detailed report indicating therein the extent and nature of any mineral which lies deposited in or under the land.

(*6*) The costs of the investigation made under this section shall be borne by the Central Government:

Provided that where the State Government or other person in whom the minerals are vested or the holder of any prospecting licence [1][or exploration licence] or mining lease applies to the Central Government to furnish to it or him a copy of the report submitted under sub-section (*5*), that State Government or other person or the holder of a prospecting licence [1][or exploration licence] or mining lease, as the case may be, shall bear such reasonable part of the costs of investigation as the Central Government may specify in this behalf and shall, on payment of such part of the costs of investigation, be entitled to receive from the Central Government a true copy of the report submitted to it under sub-section (*5*).]

CHAPTER VII

MISCELLANEOUS

19. [2][Mineral concession to be void if in contravention of Act.]—Any [3][mineral concession] granted, renewed or acquired in contravention of the provisions of this Act or any rules or orders made thereunder shall be void and of no effect.

*Explanation***.—**Where a person has acquired more than one [3][mineral concession] [4]*** and the aggregate area covered by such [5][permits, licences or leases], as the case may be, exceeds the maximum area permissible under section 6, only that [3][mineral concession] the acquisition of which has resulted in such maximum area being exceeded shall be deemed to be void.

20. Act and rules to apply to all renewals of prospecting licences and mining leases.—The provisions of this Act and the rules made thereunder shall apply in relation to the renewal after the commencement of this Act of any prospecting licence or mining lease granted before such commencement as they apply in relation to the renewal of a prospecting licence or mining lease granted after such commencement.

1. Ins. by Act 16 of 2023, s. 16 (w.e.f. 17-8-2023).
2. Subs. by s. 17, *ibid.*, for the marginal heading (w.e.f. 17-8-2023).
3. Subs. by Act 16 of 2021, s. 2, "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).
4. The words "in any State" omitted by Act 25 of 1994, s. 8 (w.e.f. 25-1-1994).
5. Subs. by Act 38 of 1999, s. 16, for "licences or leases" (w.e.f. 18-12-1999).

[1]**[20A. Power of Central Government to issue directions.—**(*1*) Notwithstanding anything contained in this Act, the Central Government may issue such directions to the State Governments, as may be required for the conservation of mineral resources, or on any policy matter in the national interest, and for the scientific and sustainable development and exploitation of mineral resources.

(*2*) In particular, and without prejudice to the generality of the foregoing powers, the Central Government may also issue directions in respect of the following matters, namely:—

(*i*) improvement in procedure for grant of mineral concessions and to ensure co-ordination among agencies entrusted with according statutory clearances;

(*ii*) maintenance of internet-based databases including development and operation of a mining tenement system;

(*iii*) implementation and evaluation of sustainable development frameworks;

(*iv*) reduction in waste generation and related waste management practices and promotion of recycling of materials;

(*v*) minimising and mitigating adverse environmental impacts particularly in respect of ground water, air, ambient noise and land;

(*vi*) ensuring minimal ecological disturbance, in terms of bio-diversity, flora, fauna and habitat;

(*vii*) promoting restoration and reclamation activities so as to make optimal use of mined out land for the benefit of the local communities; and

(*viii*) such other matters as may be necessary for the purposes of implementation of this Act.]

21. Penalties.—[2][(*1*) Whoever contravenes the provisions of sub-section (*1*) or sub-section (*1A*) of section 4 shall be punishable with imprisonment for a term which may extend to five years and with fine which may extend to five lakh rupees per hectare of the area.

(*2*) Any rule made under any provision of this Act may provide that any contravention thereof shall be punishable with imprisonment for a term which may extend to two years or with fine which may extend to five lakh rupees, or with both, and in the case of a continuing contravention, with additional fine which may extend to fifty thousand rupees for every day during which such contravention continues after conviction for the first such contravention.]

(*3*) Where any person trespasses into any land in contravention of the provisions of sub-section (*1*) of section 4, such trespasser may be served with an order of eviction by the State Government or any authority authorised in this behalf by that Government and the State Government or such authorised authority may, if necessary, obtain the help of the police to evict the trespasser from the land.

[3][(*4*) Whenever any person raises, transports or causes to be raised or transported, without any lawful authority, any mineral from any land, and, for that purpose, uses any tool, equipment, vehicle or any other thing, such mineral tool, equipment, vehicle or any other thing shall be liable to be seized by an officer or authority specially empowered in this behalf.

(*4A*) Any mineral, tool, equipment, vehicle or any other thing seized under sub-section (*4*), shall be liable to be confiscated by an order of the court competent to take cognizance of the offence under sub-section (*1*) and shall be disposed of in accordance with the directions of such court.]

(*5*) Whenever any person raises, without any lawful authority, any mineral from any land, the State Government may recover from such person the mineral so raised, or, where such mineral has already been disposed of, the price thereof, and may also recover from such person, rent, royalty or tax, as the case may be, for the period during which the land was occupied by such person without any lawful authority.

1. Ins. by Act 10 of 2015, s. 18 (w.e.f. 12-1-2015).
2. Subs. by Act 10 of 2015, s. 19, for sub-sections (*1*) and (*2*) (w.e.f. 12-1-2015).
3. Subs. by Act 38 of 1999, s. 17, for sub-section (*4*) (w.e.f. 18-12-1999).

[1][(*6*) Notwithstanding anything contained in the Code of Criminal Procedure, 1973 (2 of 1974), an offence under sub-section (*1*) shall be cognizable.]

[2][*Explanation*.—On and from the date of commencement of the Mines and Minerals (Development and Regulation) Amendment Act, 2021, the expression "raising, transporting or causing to raise or transport any mineral without any lawful authority" occurring in this section, shall mean raising, transporting or causing to raise or transport any mineral by a person without prospecting licence, mining lease or composite licence [3][exploration licence] or in contravention of the rules made under section 23C.]

22. Cognizance of offences.—No court shall take cognizance of any offence punishable under this Act or any rules made thereunder except upon complaint in writing made by a person authorised in this behalf by the Central Government or the State Government.

23. Offences by companies.—(*1*) If the person committing an offence under this Act or any rules made thereunder is a company, every person who at the time the offence was committed was in charge of, and was responsible to the company for the conduct of the business of the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly:

Provided that nothing contained in this sub-section shall render any such person liable to any punishment, if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

(*2*) Notwithstanding anything contained in sub-section (*1*), where an offence under this Act has been committed with the consent or connivance of any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

Explanation.—For the purposes of this section,—

(*a*) "company" means any body corporate and includes a firm or other association of individuals;

(*b*) "director" in relation to a firm means a partner in the firm.

[4]**[23A. Compounding of offences**.—(*1*) Any offence punishable under this Act or any rule made thereunder may, either before or after the institution of the prosecution, be compounded by the person authorised under section 22 to make a complaint to the court with respect to that offence, on payment to that person, for credit to the Government, of such sum as that person may specify:

Provided that in the case of an offence punishable with fine only, no such sum shall exceed the maximum amount of fine which may be imposed for that offence.

(*2*) Where an offence is compounded under sub-section (*1*), no proceeding or further proceeding, as the case may be, shall be taken against the offender in respect of the offence so compounded, and the offender, if in custody, shall be released forthwith.]

[5]**[23B. Power to search.—**If any gazetted officer of the Central or a State Government authorised by the Central Government [6][or a State Government, as the case may be,] in this behalf by genera! or special order has reason to believe that any mineral has been raised in contravention of the provisions of this Act or rules made thereunder or any document or thing in relation to such mineral is secreted in any place [3][or vehicle], he may search for such mineral, document or thing and the provisions of section 100 of the Code of Criminal Procedure, 1973 (2 of 1974), shall apply to every such search.]

[7]**[23C. Power of State Government to make rules for preventing illegal mining, transportation and storage of minerals**.—(*1*) The State Government may, by notification in the Official Gazette, make

1. Ins. by Act 37 of 1986, s. 16 (w.e.f. 10-2-1987).
2. Ins. by Act 16 of 2021, s. 20 (w.e.f. 28-3-2021).
3. Ins. by Act 16 of 2023, s. 18 (w.e.f. 17-8-2023).
4. Ins. by Act 56 of 1972, s. 13 (w.e.f. 12-9-1972).
5. Ins. by Act 25 of 1994, s. 9 (w.e.f. 25-1-1994).
6. Ins. by Act 38 of 1999, s. 18 (w.e.f. 18-12-1999).
7. Ins. by s. 19, *ibid*. (w.e.f. 18-12-1999).

rules for preventing illegal mining, transportation and storage of minerals and for the purposes connected therewith.

(*2*) In particular and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

(*a*) establishment of check-posts for checking of minerals under transit;

(*b*) establishment of weigh-bridges to measure the quantity of mineral being transported;

(*c*) regulation of mineral being transported from the area granted under a prospecting licence or a mining lease or a quarrying licence or a permit, in whatever name the permission to excavate minerals, has been given;

(*d*) inspection, checking and search of minerals at the place of excavation or storage or during transit;

(*e*) maintenance of registers and forms for the purposes of these rules;

(*f*) the period within which and the authority to which applications for revision of any order passed by any authority be preferred under any rule made under this section and the fees to be paid thereforand powers of such authority for disposing of such applications; and

(*g*) any other matter which is required to be, or may be, prescribed for the purpose of prevention of illegal mining, transportation and storage of minerals.

(*3*) Notwithstanding anything contained in section 30, the Central Government shall have no power to revise any order passed by a State Government or any of its authorised officers or any authority under the rules made under sub-sections (*1*) and (*2*).]

24. Power of entry and inspection.—(*1*) For the purpose of ascertaining the position of the working, actual or prospective, of any mine or abandoned mine or for any other purpose connected with this Act or the rules made thereunder, any person authorised by the [1][Central Government or a State Government] in this behalf, by general [2]*** order, may—

(*a*) enter and inspect any mine;

(*b*) survey and take measurements in any such mine;

(*c*) weigh, measure or take measurements of the stocks of minerals lying at any mine;

(*d*) examine any document, book, register, or record in the possession or power of any person having the control of, or connected with, any mine and place marks of identification thereon, and take extracts from or make copies of such document, book, register or record;

(*e*) order the production of any such document, book, register, record, as is referred to in clause (*d*); and

(*f*) examine any person having the control of, or connected with, any mine.

(*2*) Every person authorised by the [1][Central Government or a State Government] under sub-section (*1*) shall be deemed to be a public servant within the meaning of section 21 of the Indian Penal Code, and every person to whom an order or summons is issued by virtue of the powers conferred by clause (*e*) or clause (*f*) of that sub-section shall be legally bound to comply with such order or summons, as the case may be.

[3]**[24A. [4][Rights and liabilities of a holder of mineral concession.]—**(*1*) On the issue of a [5][mineral concession] under this Act and the rules made thereunder, it shall be lawful for the [6][holder of such

1. Subs. by s. 20, *ibid.*, for "Central Government" (w.e.f. 18-12-1999).
2. The words "or special" omitted by s. 20, *ibid.* (w.e.f. 18-12-1999).
3. Ins. by Act 37 of 1986, s. 17 (w.e.f. 10-2-1987).
4. Subs. by Act 16 of 2023, s. 19, for the marginal heading (w.e.f. 17-8-2023).
5. Subs. by Act 16 of 2021, s. 2, for " reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-3021).
6. Subs. by Act 38 of 1999, s. 21, for "holder of such licence or lease" (w.e.f. 18-12-1999).

permit, licence or lease], his agents or his servants or workmen to enter the lands over which [1][such permit, lease or licence had been granted] at all times during its currency and carry out all such [2][reconnaissance, prospecting or mining operations] as may be prescribed:

Provided that no person shall enter into any building or upon an enclosed court or garden attached to a dwelling-house (except with the consent of the occupier thereof) without previously giving such occupier at least seven days' notice in writing of his intention to do so.

(*2*) The holder of a [3][mineral concession] referred to in sub-section (*1*) shall be liable to pay compensation in such manner as may be prescribed to the occupier of the surface of the land granted under [4][such permit, licence or lease] for any loss or damage which is likely to arise or has arisen from or in consequence of the [5][reconnaissance, mining or prospecting operations].

(*3*) The amount of compensation payable under sub-section (*2*) shall be determined by the State Government in the manner prescribed.]

25. Recovery of certain sums as arrears of land revenue.—[6][(*1*)] Any rent, royally, tax, fee or other sum due to the Government under this Act or the rules made thereunder or under the terms and conditions of any [1][mineral concession] may, on a certificate of such officer as may be specified by the State Government in this behalf by general or special order, be recovered in the same manner as an arrear of land revenue.

[7][(*2*) Any rent, royalty, tax, fee or other sum due to the Government either under this Act or any rule made thereunder or under the terms and conditions of any [1][mineral concession] may, on a certificate of such officer as may be specified by the State Government in this behalf by general or special order, be recovered in the same manner as if it were an arrear of land revenue and every such sum which becomes due to the Government after the commencement of the Mines and Minerals (Regulation and Development) Amendment Act, 1972 (56 of 1972), together with the interest due thereon shall be a first charge on the assets of the holder of the [1][mineral concession], as the case may be.]

26. Delegation of powers.—(*1*) The Central Government may, by notification in the Official Gazette, direct that any power exercisable by it under this Act may, in relation to such matters and subject to such conditions, if any, as may be specified in the notification be exercisable also by—

(*a*) such officer or authority subordinate to the Central Government; or

(*b*) such State Government or such officer or authority subordinate to a State Government, as may be specified in the notification.

(*2*) The State Government may, by notification in the Official Gazette, direct that any power exercisable by it under this Act may, in relation to such matters and subject to such conditions, if any, as may be specified in the notification, be exercisable also by such officer or authority subordinate to the State Government as may be specified in the notification.

(*3*) Any rules made by the Central Government under this Act may confer powers and impose duties or authorise the conferring of powers and imposition of duties upon any State Government or any officer or authority subordinate thereto.

27. Protection of action taken in good faith.—No suit, prosecution or other legal proceedings shall lie against any person for anything which is in good faith done or intended to be done under this Act.

1. Subs. by s. 21, *ibid*., for "such lease or licence had been granted" (w.e.f. 18-12-1999).
2. Subs. by s. 21, *ibid*., for "prospecting or mining operations" (w.e.f. 18-12-1999).
3. Subs. by Act 16 of 2021, s. 2, for " reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-3021).
4. Subs. by s. 21, *ibid*., for "such licence or lease" (w.e.f. 18-12-1999).
5. Subs. by s. 21, *ibid*., for "mining or prospecting operations" (w.e.f. 18-12-1999).
6. Section 25 re-numbered as sub-section (*1*) thereof by Act 56 of 1972, s. 14 (w.e.f. 12-9-1972).
7. Ins. by Act 56 of 1972, s. 14 (w.e.f. 12-9-1972).

28. Rules and notifications to be laid before Parliament and certain rules to be approved by Parliament.—[1][(*1*) Every rule and every notification made by the Central Government under this Act shall be laid, as soon as may be after it is made, before each House of Parliament while it is in session for a total period of thirty days which may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses agree in making any modification in the rule or notification or both Houses agree that the rule or notification should not be made, the rule or notification shall thereafter have effect only in such modified form or be of no effect, as the case may be; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule or notification.]

(*2*) Without prejudice to the generality of the rule making power vested in the Central Government, no rules made with reference to clause (*c*) of sub-section (*2*) of section 16 shall come into force until they have been approved, whether with or without modifications, by each House of Parliament.

[2][(*3*) Every rule and every notification made by the State Government under this Act shall be laid, as soon as may be after it is made, before each House of the State Legislature where it consists of two Houses, or where such Legislature consists one House, before that House.]

29. Existing rules to continue.—All rules made or purporting to have been made under the Mines and Minerals (Regulation and Development) Act, 1948 (53 of 1948), shall, insofar as they relate to matters for which provision is made in this Act and are not inconsistent therewith, be deemed to have been made under this Act as if this Act had been in force on the date on which such rules were made and shall continue in force unless and until they are superseded by any rules made under this Act.

[3]**[30. Power of revision by Central Government.—**The Central Government may, of its own motion or on an application made within the prescribed time by an aggrieved party,—

(*a*) revise any order made by a State Government or other authority in exercise of the powers conferred on it by or under this Act with respect to any mineral other than a minor mineral; or

(*b*) where no such order has been made by the State Government or other authority in exercise of the powers conferred on it by or under this Act with respect to any mineral other than a minor mineral within the time prescribed therefore, pass such order as it may think fit and appropriate in the circumstances:

Provided that in cases covered by clause (*b*) the Central Government shall, before passing any order under this clause, give an opportunity of being heard or to represent in the matter.]

[4][**30A. Special provisions relating to mining leases for coal granted before 25th October, 1949.—**Notwithstanding anything contained in this Act, the provisions of sub-section (*1*) of section 9 and sub-section (*1*) of section 16 shall not apply to or in relation to mining leases granted before the 25th day of October, 1949, in respect of coal, but the Central Government, if it is satisfied that it is expedient so to do, may, by notification in the Official Gazette, direct that all or any of the said provisions (including any rules made under sections 13 and 18) shall apply to or in relation to such leases subject to such exceptions and modifications, if any, as may be specified in that or in any subsequent notification.]

[5][**30B. Constitution of Special Courts.—**(*1*) The State Government may, for the purposes of providing speedy trial of offences for contravention of the provisions of sub-section (*1*) or sub-section (*1A*) of section 4, constitute, by notification, as many Special Courts as may be necessary for such area or areas, as may be specified in the notification.

(*2*) A Special Court shall consist of a Judge who shall be appointed by the State Government with the concurrence of the High Court.

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1. Subs. by s. 15, *ibid.*, for sub-section (*1*) (w.e.f. 12-9-1972).
2. Ins. by Act 25 of 1994, s. 10 (w.e.f. 25-1-1994).
3. Subs. by s. 20, for section 30 (w.e.f. 12-1-2015).
4. Ins. by Act 15 of 1958, s. 2 (w.e.f. 15-5-1958).
5. Ins. by Act 10 of 2015, s. 21 (w.e.f. 12-1-2015).

(*3*) A person shall not be qualified for appointment as a judge of a Special Court unless he is or has been a District and Sessions Judge.

(*4*) Any person aggrieved by the order of the Special Court may prefer an appeal to the High Court within a period of sixty days from the date of such order.

30C. Special Courts to have powers of Court of Session.—Save as otherwise provided in this Act, the Code of Criminal Procedure, 1973 (2 of 1974), shall apply to the proceedings before the Special Court and for the purpose of the provisions of this Act, the Special Court shall be deemed to be a Court of Session and shall have all powers of a Court of Session and the person conducting a prosecution before the Special Court shall be deemed to be a public prosecutor.]

31. Relaxation of rules in special cases.—The Central Government may, if it is of opinion that in the interests of mineral development it is necessary so to do, by order in writing and for reasons to be recorded, authorise in any case the grant, renewal or transfer of any [1][mineral concession], or the working of any mine for the purpose of searching for or winning any mineral, on terms and conditions different from those laid down in the rules made under section 13.

32. [*Amendments to Act 53 of 1948*]**.—***Rep. by the Repealing and Amending Act*, 1960 (58 *of* 1960), *s*. 2 *and the First Schedule* (*w.e.f*. 26-12-1960).

33. Validation of certain acts and indemnity.—All acts of executive authority done, proceedings taken and sentences passed under the Mines and Minerals (Regulation and Development) Act, 1948 (53 of 1948), with respect to the regulation of mines and the development of minerals during the period commencing on the 26th day of January, 1950, and ending with the date of commencement of this Act by the Government or by any officer of the Government or by any other authority, in the belief or purported belief that the acts, proceedings of sentences were being done, taken or passed under the said Act, shall be as valid and operative as if they had been done, taken or passed in accordance with law, and no suit or other legal proceeding shall be maintained or continued against any person whatsoever, on the ground that any such acts, proceedings or sentences were not done, taken or passed in accordance with law.

1. Subs. by Act 16 of 2021, s. 2, "reconnaissance permit, prospecting licence or mining lease" (w.e.f. 28-3-2021).

[1][THE FIRST SCHEDULE

[*See* sections 4(*3*), 5(*1*), 7(*2*) and [2][8(*1*), 8A(*1*), 10A, 10B(*1*), 10C(*1*), 11(*1*), 11B, 11C, [3][11D]12A(*1*), and 17A(*2A*)]]

SPECIFIED MINERALS

PART A

Hydro carbons/energy minerals

1. Coal and lignite.

[4][*PART B*

Atomic minerals

1. Minerals of the "rare earths" group containing Uranium and Thorium.

2. Phosphorites and other phosphatic ores containing Uranium.

3. Pitchblende and other Uranium ores.

4. Uraniferous allanite, monazite and other thorium minerals.

5. Uranium bearing tailings left over from ores after extraction of copper and gold, ilmenite and other titanium ores.

6. Beach sand minerals, that is, economic heavy minerals found in the teri or beach sands, which include ilmenite, rutile, leucoxene, garnet, monazite, zircon and sillimanite.]

PART C

Metallic and non-metallic minerals

1. Asbestos.

2. Bauxite.

3. Chrome ore.

4. Copper ore.

5. Gold.

6. Iron ore.

7. Lead.

[5]***

9. Manganese ore.

10. Precious stones.

11. Zinc.]

[6][*PART D*

Critical and Strategic Minerals

1. Beryl and other beryllium bearing minerals.

2. Cadmium bearing minerals.

3. Cobalt bearing minerals.

1. Subs. by Act 25 of 1994, s. 12, for the First Schedule (w.e.f. 25-1-1994).
2. Subs. by Act 10 of 2015, s. 22, for "8(*2*)" (w.e.f. 12-1-2015).
3. Ins. by Act 16 of 2023, s. 20 (w.e.f. 17-8-2023).
4. Subs. by s. 20, *ibid*., for Part B (w.e.f. 17-8-2023).
5. Omitted by Act 38 of 1999, s. 24 (w.e.f. 18-12-1999).
6. Ins. by Act 16 of 2023, s. 20 (w.e.f. 17-8-2023).

4. Gallium bearing minerals.
5. Glauconite.
6. Graphite.
7. Indium bearing minerals.
8. Lithium bearing minerals.
9. Molybdenum bearing minerals.
10. Nickel bearing minerals.
11. Niobium bearing minerals.
12. Phosphate (without uranium).
13. Platinum group of elements bearing minerals.
14. Potash.
15. Minerals of the "rare earths" group not containing Uranium and Thorium.
16. Rhenium bearing minerals.
17. Selenium bearing minerals.
18. Tantalum bearing minerals.
19. Tellurium bearing minerals.
20. Tin bearing minerals.
21. Titanium bearing minerals and ores (ilmenite, rutile and leucoxene).
22. Tungsten bearing minerals.
23. Vanadium bearing minerals.
24. Zirconium bearing minerals and ores including zircon.]

[1][SECOND SCHEDULE

(*See* section 9)

RATES OF ROYALTY IN RESPECT OF MINERALS AT ITEMS 1 TO 9, 11 TO 40 AND 42 TO 55

1. Apatite and Rock Phosphate:	
(i) Apatite	Five per cent. of average sale price on *ad valorem* basis.
(ii) Rock Phosphate	Twelve and half per cent. of average sale price on *ad valorem* basis.
(a) Above 25% P2O5	
(b) Upto 25% P2O5	Six per cent. of average sale price on *ad valorem* basis.
2. Asbestos:	
(i) Chrysotile	Eight Hundred and Eighty rupees per tonne.
(ii) Amphibole	Fifteen per cent. of average sale price on *ad valorem* basis.
3. Barytes:	Six and half per cent. of average sale price on *ad valorem* basis.
4. Bauxite and Laterite:	***(a) Metallurgical Grade:***
	Zero point six zero per cent. of London Metal Exchange Aluminium metal price chargeable on the contained aluminium metal in ore produced for those dispatched for use in alumina and aluminium metal extraction.
	(b) Non Metallurgical Grade:
	Twenty five per cent. of average sale price on *ad valorem* basis for those dispatched for use other than alumina andaluminium metal extraction.
5. Brown Ilmenite (Leucoxene), Ilmenite, Rutile and Zircon:	Two per cent. of average sale price on *ad valorem* basis.
6. Cadmium:	Fifteen per cent. of average sale price on *ad valorem* basis.
7. Calcite:	Fifteen per cent. of average sale price on *ad valorem* basis.
8. China clay or Kaolin: (including ball clay and white shale, white clay)	
(i) Crude	Eight per cent. of average sale price on *ad valorem* basis.
(ii) Processed(including washed)	Twelve per cent. of average sale price on *ad valorem* basis.
9. Clay others:	Twenty rupees per tonne.
10. Coal (including Lignite):	*
11. Chromite:	Fifteen per cent. of average sale price on *ad valorem* basis.
12. Columbite-tantalite:	Ten per cent. of average sale price on *ad valorem* basis.

1. Subs. by notification No. G.S.R. 630(E), for the Second Schedule (w.e.f. 1-9-2014).

13. Copper:	Four point six two per cent. of London Metal Exchange Copper metal price chargeable on the contained copper metal in ore produced.
14. Diamond:	Eleven point five per cent. of average sale price on *ad valorem* basis.
15. Dolomite:	Seventy-five rupees per tonne.
16. Dunite:	Thirty rupees per tonne.
17. Felspar:	Fifteen per cent. of average sale price on *ad valorem* basis.
18. Fire Clay: (including plastic, pipe, lithomargic and natural pozzolanic clay)	Twelve per cent. of average sale price on *ad valorem* basis.
19. Fluorspar: (also called fluorite)	Eight per cent. of average sale price on *ad valorem* basis.
20. Garnet:	
(i) Abrasive	Four per cent. of average sale price on *ad valorem* basis.
(ii) Gem	Ten per cent. of average sale price on *ad valorem* basis.
21. Gold: (i) Primary	Four per cent. of London Bullion Market Association Price (commonly referred to as London Price) chargeable on the gold metal in ore produced.
(ii) By-product gold	Three point three per cent. of London Bullion Market Association Price (commonly referred to as London Price) chargeable on the by-product gold metal actually produced.
22. Graphite:	
(i) With 80 per cent. or more fixed carbon	Two hundred and twenty-five rupees per tonne.
(ii) With 40 per cent. or more fixed carbon but less than 80 per cent. fixed carbon	One hundred and fifty rupees per tonne.
(iii) With 20 per cent. or more fixed carbon but less than 40 per cent. fixed carbon	Sixty-five rupees per tonne.
(iv) With less than 20 per cent. fixed carbon	Twenty-five rupees per tonne.
23. Gypsum:	Twenty per cent. of average sale price on *ad valorem* basis.
24. Iron Ore: (CLO, Lumps, fines and concentrates all grades)	Fifteen per cent. of average sale price on *ad valorem* basis.
25. Lead:	(a) Eight point five per cent. of London Metal Exchange Lead metal price chargeable on the contained lead metal in ore produced.

	(b) Fourteen point five per cent. of London Metal Exchange Lead metal price chargeable on the contained lead metal in the concentrate produced.
26. Limestone:	
(i) L. D. Grade (less than 1.5 per cent. silica content)	Ninety rupees per tonne.
(ii) Others	Eighty rupees per tonne.
27. Lime kankar:	Eighty rupees per tonne.
28. Limeshell:	Eighty rupees per tonne.
[1][28A. Lithium:	Three per cent. of London Metal Exchange price chargeable on the Lithium metal in the ore produced.]
29. Magnesite:	Three per cent. of average sale price on *ad valorem* basis.
30. Manganese Ore:	
(i) Ore of all grade	Five per cent. of average sale price on *ad valorem* basis.
(ii) Concentrates	One point seven per cent. of average sale price on *ad valorem* basis.
31. Marl:	Sixty rupees per tonne.
32. Crude Mica, waste mica and scrap mica:	Four per cent. of average sale price on *ad valorem* basis.
33. [2][Monazite occurring in beach sand minerals]:	One hundred and twenty-five rupees per tonne.
34. Nickel:	Zero point one two per cent. of London Metal Exchange Nickel metal price chargeable on the contained nickel metal in ore produced.
[1][34A. Niobium:	
(*i*) Primary (produced from ores other than Columbite-tantalite)	Three per cent. of average sale price of Niobium metal chargeable on the Niobium metal contained in the ore produced.
(*ii*) By-product (produced from ores other than Columbite-tantalite)	Three per cent. of average sale price of Niobium metal chargeable on the by-product Niobium metal contained in the ore produced.]
35. Ochre:	Twenty-four rupees per tonne.
36. Pyrites:	Two per cent. of average sale price on *ad valorem* basis.
37. Pyrophyllite:	Twenty per cent. of average sale price on *ad valorem* basis.
38. Quartz:	Fifteen per cent. of average sale price on *ad valorem* basis.
[1][38A. Rare Earth Elements (produced from ores other than Monazite occurring in beach sand minerals)	One per cent. of average sale price of Rare Earth Oxide (REO) chargeable on the Rare Earth Oxide contained in the ore produced.]

1. Ins. by Notification No. G.S.R. 736(E) (w.e.f. 12-10-2023).
2. Subs. by *ibid.*, for "Monazite" (w.e.f. 12-10-2023).

39. Ruby:	Ten per cent. of average sale price on *ad valorem* basis.
40. Sand (others):	Twenty rupees per tonne.
41. Sand for stowing:	**
42. Shale:	Sixty rupees per tonne.
43. Silica sand and moulding sand and Quartzite:	Ten per cent. of average sale price on *ad valorem* basis.
44. Sillimanite:	Two point five per cent. of average sale price on *ad valorem* basis.
45. Silver:	
(i) By-product	Seven per cent. of London Metal Exchange Price chargeable on by-product silver metal actually produced.
(ii) Primary Silver	Five per cent. of London Metal Exchange Silver Metal Price chargeable on the contained silver metal in ore produced.
46. Slate:	Forty-five rupees per tonne.
47. Talc, Steatite and Soapstone:	Eighteen per cent. of average sale price on *ad valorem* basis.
48. Tin:	Seven point five per cent. of London Metal Exchange Tin metal price chargeable on the contained tin metal in ore produced.
49. Tungsten:	Twenty rupees per unit per cent. of contained WO_3 per tonne of ore and on pro rata basis.
50. Uranium:	Two per cent. of annual compensation amount received by M/s. Uranium Corporation of India Ltd., to be apportioned among the States on the basis of data provided by Department of Atomic Energy.
51. Vanadium:	Twenty per cent. of average sale price on *ad valorem* basis.
52. Vermiculite:	Five per cent. of average sale price on *ad valorem* basis.
53. Wollastonite:	Fifteen per cent. of average sale price on *ad valorem* basis.
54. Zinc:	(a) Nine point five per cent. of London Metal Exchange Zinc metal price on *ad valorem* basis chargeable on contained zinc metal in ore produced. (b) Ten per cent. of London Metal Exchange Zinc metal price on *ad valorem* basis chargeable on contained zinc metal in concentrate produced.
55. All other minerals not herein before specified (Agate, Corundum, Diaspore, Felsite, Fuschite-Quartzite, Jasper, Kyanite, Perlite, Pyroxenite, Rock Salt, Selenite, etc.)	Twelve per cent. of average sale price on *ad valorem* basis.

Notes:—

1. * Rates of royalty in respect of item No. 10 relating to Coal (including Lignite) as revised *vide* notification number G.S.R. 349(E), dated the 10th May, 2012 read with corrigendum G.S.R. 525(E), dated the 14th June, 2012 of the Government of India in the Ministry of Coal shall remain in force until revised through a separate notification by the Ministry of Coal.

2. ** Rates of royalty in respect of item No. 41 relating to Sand for stowing revised *vide* notification number G.S.R. 214(E), dated the 11th April, 1997, will remain in force until revised through a separate notification by the Ministry of Coal.]

[1][THIRD SCHEDULE

(*See* section 9A)

Rates of Dead Rent

1. Rates of dead rent applicable to the leases granted for low value minerals are as under:

RATES OF DEAD RENT IN RUPEES PER HECTARE PER ANNUM

From 2nd Year of Lease	3rd and 4th Year of Lease	5th Year onwards
400	1000	2000

2. Two times the rate specified at paragraph 1 above in case of lease granted for medium value minerals.

3. Three times the rate specified at paragraph 1 above in case of lease granted for high value minerals.

4. Four times the rate specified at paragraph 1 above in case of lease granted for precious metals and stones.

Note:

1. For the purpose of this notification:—

(a) **"precious metals and stones"** means gold, silver, diamond, ruby, sapphire and emerald;

(b) **"high value minerals"** means semi-precious stones (agate, gem garnet), corundum, copper, lead, zinc, and asbestos (chrysotile variety);

(c) **"medium value minerals"** means chromite, manganese ore, kyanite, sillimanite, vermiculite, magnesite, wollastonite, perlite, diaspore, apatite, rock phosphate, fluorite (fluorspar), barytes, and iron ore;

(d) **"low value minerals"** means the minerals other than precious metals and stones, high value minerals and medium value minerals.]

1. Subs. by notification No. G.S.R.631(E), for "Third Schedule" (w.e.f. 1-9-2014).

[1][THE FOURTH SCHEDULE

[See clause (*ea*) of section 3]

Notified Minerals

1. Bauxite.

2. Iron ore.

3. Limestone.

4. Manganese ore.]

1. Ins. by Act 10 of 2015, s. 23 (w.e.f. 12-1-2015).

[1][THE FIFTH SCHEDULE

[*See* sections 8(*4*), 8A(*8*) and 17A(*2C*)]

S. No.	Mineral	Additional amount on grant or extension of mining lease
1.	Iron ore and chromite	Equivalent to one hundred and fifty per cent. of the royalty payable
2.	Copper	Equivalent to fifty per cent. of the royalty payable
3.	Coal and lignite	Equivalent to the royalty payable
4.	Other minerals (other than coal and lignite)	Equivalent to the royalty payable

Explanation.—For the purposes of this Schedule, the additional amount shall be in addition to royalty or payment to the District Mineral Foundation and National Mineral Exploration Trust or any other statutory payment.

1. Ins. by Act 16 of 2021, s. 21 (w.e.f. 28-3-2021).

THE SIXTH SCHEDULE

[*See* sections 8(*5*) and 8A(*7A*)]

(i) For non-auctioned captive mines (other than coal and lignite):

S. No.	**Mineral**	**Additional Amount**
1.	Bauxite	
	(i) Metallurgical Grade	Equivalent to one hundred and fifty per cent. of the royalty payable
	Non-Metallurgical Grade	Equivalent to the royalty payable
2.	Chromite	
	(i) Up to forty per cent. of Cr_2O_3	Equivalent to the royalty payable
	(ii) forty per cent. and more of Cr_2O_3 and concentrates	Equivalent to two hundred per cent. of the royalty payable
3.	Iron ore	
	Lumps, ROM and concentrates	Equivalent to two hundred and fifty per cent. of the royalty payable
	Fines	Equivalent to one hundred and fifty per cent.of the royalty payable
4.	Limestone	
	L.D. Grade (less than 1.5 per cent. silica content)	Equivalent to two hundred per cent. of the
	(ii) Other grades	Equivalent to the royalty payable
5.	Manganese	
	(i) Less than thirty-five per cent. of manganese content	Equivalent to the royalty payable
	(ii) Thirty-five per cent. and above of manganese content	Equivalent to five hundred per cent. of the royalty payable
6.	Other minerals	Equivalent to the royalty payable

(ii) For auctioned captive mines (other than coal and lignite):

S. No.	**Quantity of sale**	**Additional Amount**
1.	Sale of mineral up to twenty-five per cent. of annual production	*Nil*
2.	Sale of mineral more than twenty-five per cent. and up to fifty per cent. of annual production	Equivalent to fifty per cent. of the royalty payable

(iii) For coal and lignite:

S. No	**Type of mine**	**Additional Amount**
1.	(*i*) Captive coal and lignite mines, auctioned for power sector through reverse bidding under the Coal Mines (Special Provisions) Act, 2015 (11 of 2015)	Equivalent to two hundred per cent. of the royalty payable

	(*ii*) Captive coal and lignite mines allocated through allotment route [other than mines covered under item no. (*iv*)]	Equivalent to the royalty payable
	(*iii*) Captive coal and lignite mines allocated through auction route [other than mines covered under item nos. (*i*) and (*iv*)]	Equivalent to the royalty payable
	(*iv*) For captive coal and lignite mines that were auctioned and allotted with condition allowing sale of coal up to twenty-five per cent. of annual production—	
	(*a*) for sale of coal up totwenty-five per cent. of annual production	Additional amount payable as per the condition mentioned in the tender document or allotment document
	(*b*) for sale of coal more than twenty-five per cent.and up to fifty per cent. of annual production	Fifty per cent. of the royalty payable

Explanation.—For the purposes of this Schedule, it is hereby clarified that—

(*a*) the additional amount shall be in addition to royalty or payment to the District Mineral Foundation and National Mineral Exploration Trust or any other statutory payment or payment specified in the tender document or the auction premium (wherever applicable).

(b) Ad valorem royalty for the purpose of calculating the additional amount for coal and lignite shall be based on National Coal Index and Representative Price of coal excluding the taxes, levies and other charges.]

[1][THE SEVENTH SCHEDULE

[*See* sections 3 (*aaa*), 10BA(*2*) and 10BA(*3*)]

Minerals

1. Apatite.
2. Beryl and other beryllium bearing minerals.
3. Cadmium bearing minerals.
4. Cobalt bearing minerals.
5. Copper bearing minerals.
6. Diamond.
7. Gold.
8. Graphite.
9. Indium bearing minerals.
10. Lead bearing minerals.
11. Lithium bearing minerals.
12. Molybdenum bearing minerals.
13. Niobium bearing minerals.
14. Nickel bearing minerals.
15. Potash.
16. Platinum group of elements bearing minerals.
17. Minerals of 'rare earths' group.
18. Rhenium bearing minerals.
19. Rock Phosphate.
20. Selenium.
21. Silver.
22. Tantalum bearing minerals.
23. Tellurium bearing minerals.
24. Tin bearing minerals.
25. Titanium bearing minerals and ores (ilmenite, rutile and leucoxene).
26. Tungsten bearing minerals.
27. Vanadium bearing minerals.
28. Zinc bearing minerals.
29. Zirconium bearing minerals and ores including zircon.]

1. Ins. by Act 16 of 2023, s. 21 (w.e.f. 17-8-2023).

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भारत का राजपत्र
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अधिसूचना

नई दिल्ली, 14 सितम्बर, 2006

का.आ. 1533(अ).—केंद्रीय सरकार या केन्द्रीय सरकार द्वारा राज्य सरकार या संबंधित संघ राज्यक्षेत्र प्रशासन के परामर्श से गठित किए जाने वाले राज्य या संघ राज्यक्षेत्र स्तर पर्यावरण समाघात निर्धारण प्राधिकरण द्वारा इस अधिसूचना के प्रयोजन के लिए पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 की उपधारा (3) के अधीन संघ मंत्रिमंडल द्वारा 18 मई, 2006 को अनुमोदित राष्ट्रीय पर्यावरण नीति और अधिसूचना में विनिर्दिष्ट प्रक्रिया के उद्देश्यों के अनुसार जब तक पूर्व पर्यावरणीय अनापत्ति अभिलिखित नहीं हो जाती है, भारत के किसी भाग में[1], नई परियोजनाओं या क्रियाकलापों पर या इस अधिसूचना की अनुसूची में यथा उपवर्णित उनके सक्षम पर्यावरणीय समाघातों पर विद्यमान परियोजनाओं या क्रियाकलापों के विस्तार या आधुनिकीकरण पर कतिपय निर्बंधन और प्रतिषेध अधिरोपित करने के लिए, पर्यावरण (संरक्षण) नियम, 1986 के नियम 5 के उपनियम (3) के अधीन एक प्रारूप अधिसूचना भारत के राजपत्र, असाधारण, भाग 2, खंड 3, उपखंड (ii) में, का0आ0 सं0 1324(अ), तारीख 15 सितंबर, 2005 द्वारा प्रकाशित की गई थी जिसमें उन सभी व्यक्तियों से, जिनके उनसे प्रभावित होने की संभावना है, उस तारीख से, जिसको उक्त अधिसूचना को अंतर्विष्ट करने वाले राजपत्र की प्रतियां जनता को उपलब्ध करा दी गई थीं, साठ दिन की अवधि के भीतर आक्षेप और सुझाव आमंत्रित किए गए थे ;

और उक्त अधिसूचना की प्रतियां 15 सितंबर, 2005 को जनता को उपलब्ध करा दी गई थीं ;

और ऊपर उल्लिखित प्रारूप अधिसूचना के उत्तर में प्राप्त सभी आपेक्षों और सुझावों पर केन्द्रीय सरकार ने सम्यक् रूप से विचार कर लिया है ।

अतः, अब केंद्रीय सरकार, पर्यावरण (संरक्षण) नियम, 1986 के नियम 5 के उपनियम (3) के खंड (घ) के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 की उपधारा (1) और उपधारा (2) के खंड (v) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, और अधिसूचना सं0 का.आ. 60(अ), तारीख 27 जनवरी, 1994 को उन बातों के सिवाए अधिक्रांत करते हुए, जिन्हें ऐसे अधिक्रमण से पूर्व किया गया है या करने का लोप किया गया है, यह निदेश देती है कि इसके प्रकाशन की तारीख से ही, नई परियोजनाओं या क्रियाकलापों का अपेक्षित संनिर्माण या इस अधिसूचना की अनुसूची में सूचीबद्ध विद्यमान परियोजनाओं या क्रियाकलापों का विस्तार या आधुनिकीकरण प्रक्रिया और या प्रौद्योगिकी में परिवर्तन सहित क्षमता में परिवर्धन करते हुए भारत के किसी भाग में, यथास्थिति, केन्द्रीय सरकार द्वारा या इस अधिसूचना में इसमें इसके पश्चात् विनिर्दिष्ट प्रक्रिया के अनुसार उक्त अधिनियम की धारा 3 के

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[1] भारत का राज्यक्षेत्रीय सागर खंड और अनन्य आर्थिक जोन सम्मिलित है ।

अधीन केन्द्रीय सरकार द्वारा सम्यक् रूप से गठित राज्य स्तर पर्यावरण समाघात निर्धारण प्राधिकरण द्वारा पूर्व पर्यावरण अनापत्ति के पश्चात् ही किया जाएगा ।

2. पूर्व पर्यावरणीय अनापत्ति की अपेक्षाएं (ई.सी.) :-

निम्नलिखित परियोजनाओं या क्रियाकलापों के लिए, परियोजना प्रबंधन द्वारा भूमि को अभिप्राप्त करने के सिवाय, कोई संनिर्माण कार्य या भूमि तैयार करने से पूर्व उक्त अनुसूची में प्रवर्ग 'ख' के अंतर्गत आने वाले विषयों के लिए संबंधित विनियामक प्राधिकरण से, जिसे अनुसूची में 'क' के अंतर्गत आने वाले विषयों के लिए इसमें इसके पश्चात् केन्द्रीय सरकार में पर्यावरण और वन मंत्रालय कहा गया है, और राज्य स्तर पर राज्य पर्यावरण समाघात निर्धारण प्राधिकरण कहा गया है, पूर्व पर्यावरणीय अनापत्ति अपेक्षित होगी जब परियोजना या क्रियाकलाप आरंभ किया जाता है ।

(i) इस अधिसूचना की अनुसूची में सूचीबद्ध सभी नई परियोजनाएं या क्रियाकलाप ;

(ii) इस अधिसूचना की अनुसूची में सूचीबद्ध विद्यमान परियोजनाओं या क्रियाकलापों का, संबंधित क्षेत्र के लिए अर्थात् परियोजनाओं या क्रियाकलापों के लिए जो विस्तार या आधुनिकीकरण के पश्चात् अनुसूची में दी गई अधिकतम सीमाओं को पार कर लेते हैं, क्षमता में परिवर्धन सहित विस्तार या आधुनिकीकरण ;

(iii) विनिर्दिष्ट रेंज से परे अनुसूची में सम्मिलित किसी विद्यमान विनिर्माणकर्ता यूनिट में उत्पाद मिश्रण में कोई परिवर्तन ।

3. राज्य स्तर पर्यावरण समाघात निर्धारण प्राधिकरण :-(1) कोई राज्य स्तर पर्यावरण समाघात निर्धारण प्राधिकरण, जिसे इसमे इसके पश्चात् एसईआईएए कहा गया है, केन्द्रीय सरकार द्वारा पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 की उपधारा (3) के अधीन गठित किया जाएगा जिसमें तीन सदस्य होंगे जिसके अंतर्गत एक अध्यक्ष और एक सदस्य-सचिव, राज्य सरकार या संबंधित संघ राज्यक्षेत्र प्रशासन द्वारा नामनिर्देशित किए जाएंगे ।

(2) सदस्य-सचिव संबंधित राज्य सरकार या संघ राज्यक्षेत्र प्रशासन का सेवारत अधिकारी होगा जो पर्यावरण विधियों से परिचित होगा ।

(3) अन्य दो सदस्य या तो वृत्तिक या विशेषज्ञ होंगे जो इस अधिसूचना के परिशिष्ट VI में दी गई पात्रता कसौटी को पूरा करते हों ।

(4) ऊपर उपपैरा (3) में विनिर्दिष्ट सदस्यों में से एक सदस्य जो पर्यावरण समाघात निर्धारण प्रक्रिया में विशेषज्ञ हो, एसईआईएए का अध्यक्ष होगा ।

(5) राज्य सरकार या संघ राज्यक्षेत्र प्रशासन उपपैरा (3) से उपपैरा (4) में निर्दिष्ट सदस्यों और अध्यक्ष के नामों को केन्द्रीय सरकार को अग्रेषित करेगी और केन्द्रीय सरकार नामों के प्राप्ति की तारीख से तीस दिन के भीतर इस अधिसूचना के प्रयोजनों के लिए एसईआईएए को एक प्राधिकरण के रूप में गठित करेगी ।

(6) गैर पदधारी सदस्य और अध्यक्ष की (प्राधिकरण को केन्द्रीय सरकार द्वारा गठित करने वाली अधिसूचना के प्रकाशन की तारीख से) तीन वर्षों की नियत पदावधि होगी ।

(7) एसईआईएए के सभी विनिश्चय एकमत से होंगे और किसी बैठक में लिए जाएंगे ।

4. परियोजना और क्रियाकलापों का प्रवर्गीकरण :--

(i) सभी परियोजनाएं या क्रियाकलाप मुख्यतः दो प्रवर्गों में प्रवर्गीकृत हैं- प्रवर्ग 'क' और प्रवर्ग 'ख' सक्षम समाघात की स्थानिक सीमा और मानव स्वास्थ्य और प्राकृतिक तथा मानव निर्मित संसाधनों पर आधारित हैं ।

(ii) अनुसूची में प्रवर्ग 'क' के रूप में सम्मिलित सभी परियोजनाओं या क्रियाकलापों, जिसके अंतर्गत विद्यमान परियोजनाओं या क्रियाकलापों का विस्तार और आधुनिकीकरण तथा उत्पाद मिश्रण में परिवर्तन सम्मिलित है, के लिए, इस अधिसूचना के प्रयोजनों के लिए केन्द्रीय सरकार द्वारा गठित की जाने वाली किसी विशेषज्ञ आंकलन समिति की सिफारिशों पर भारत सरकार में पर्यावरण और वन मंत्रालय से पूर्व पर्यावरण अनापत्ति अपेक्षित होगी ;

(iii) अनुसूची में प्रवर्ग 'ख' के रूप में सम्मिलित सभी परियोजनाओं या क्रियाकलापों, जिसके अंतर्गत पैरा 2 के उपपैरा (ii) में यथाविनिर्दिष्ट विद्यमान परियोजनाओं या क्रियाकलापों का विस्तार और आधुनिकीकरण या पैरा 2 के उपपैरा (iii) में यथाविनिर्दिष्ट उत्पाद मिश्रण में परिवर्तन भी हैं, किन्तु जिसमें वे सम्मिलित नहीं हैं जो अनुसूची में निश्चित की गई साधारण शर्तों को पूरा करते हैं, राज्य/संघ राज्यक्षेत्र पर्यावरण समाघात निर्धारण प्राधिकरण से पूर्व पर्यावरणीय अनापत्ति अपेक्षित होगी । एसईआईएए का अपना विनिश्चय, इस इस अधिसूचना में गठित की जाने वाली किसी राज्य या संघ राज्यक्षेत्र स्तर विशेषज्ञ आंकलन समिति (एसईएसी) की सिफारिशों पर आधारित होगा । एसईआईएए सम्यक् रूप से गठित एसईआईएए या एसईएसी की अनुपस्थिति में, कोई प्रवर्ग 'ख' परियोजना प्रवर्ग 'क' परियोजना समझी जाएगी ;

5. **स्क्रीनिंग, विस्तारण और आंकलन समिति :-** केंद्रीय सरकार के स्तर पर वही विशेषज्ञ आंकलन समिति और राज्य या संघ राज्य स्तर पर राज्य विशेषज्ञ आंकलन समिति (जिन्हें इसमें इसके पश्चात् ईएसी और एसईएसी कहा गया है) क्रमशः प्रवर्ग 'क' और प्रवर्ग 'ख' परियोजनाओं या क्रियाकलापों की स्क्रीनिंग, विस्तारण और आंकलन करेंगी । ईएसी और एसईएसी की प्रत्येक मास में कम से कम एक बार बैठक होगी ।

(क) ईएसी की संरचना परिशिष्ट VI में दी जाएगी । राज्य या संघ राज्यक्षेत्र स्तर पर एसईएसी का गठन संबंधित राज्य सरकार या संघ राज्यक्षेत्र प्रशासन के परामर्श से समान संरचना सहित गठन किया जाएगा ।

(ख) केंद्रीय सरकार, संबद्ध राज्य सरकार या संघ राज्यक्षेत्र प्रशासन की पूर्व सहमति से प्रशासनिक सुविधा और लागत के कारणों से एक या अधिक राज्य या संघ राज्यक्षेत्र के लिए एक एसईएसी का गठन कर सकेगी ।

(ग) विशेषज्ञ आंकलन समिति और राज्य विशेषज्ञ आंकलन समिति तीन वर्ष की अवधि के लिए गठित की जाएगी ।

(घ) संबंधित विशेषज्ञ आंकलन समिति और राज्य विशेषज्ञ आंकलन समिति के प्राधिकृत सदस्य उस परियोजना या क्रियाकलाप के संबंध में जिसके लिए पूर्व पर्यावरणीय अनापत्ति मांगी गई है, को स्क्रीन करने या विस्तार करने या आंकलन के प्रयोजनों के लिए आवेदक को जो निरीक्षण के लिए आवश्यक सुविधाएं देगा, कम से कम सात दिन की पूर्व सूचना देंगे ।

(ङ) विशेषज्ञ आंकलन समिति और राज्य विशेषज्ञ आंकलन समिति संयुक्त दायित्व के सिद्धांत पर कृत्य करेगी । अध्यक्ष प्रत्येक मामले में सहमति बनाने का प्रयास करेगा और सहमति नहीं बन पाती है तो बहुमत का विचार माना जाएगा ।

6. **पूर्व पर्यावरणीय अनापत्ति के लिए आवेदन (ईसी) :--** सभी मामलों में पर्यावरणीय अनापत्ति मांगने के लिए कोई आवेदन, परियोजना और/या क्रियाकलापों के लिए, जिससे आवेदन संबंधित है, आवेदक द्वारा स्थल पर किसी सन्निर्माण क्रियाकलाप या भूमि की तैयारी के प्रारंभ के पूर्व, पूर्वेक्षित स्थल (स्थलों) की पहचान के पश्चात् परिशिष्ट 2 दिया गया है, यदि लागू हों, इससे संलग्न प्ररूप 1 और अनुपूरक प्ररूप 1क में किया जाएगा । आवेदक, उसके सिवाय, सन्निर्माण परियोजनाओं या क्रियाकलापों (अनुसूची की मद 8) के मामले में प्ररूप 1 और अनुपूरक प्ररूप 1क के अतिरिक्त पूर्व साध्यता परियोजना रिपोर्ट की एक प्रति, पूर्व साध्यता रिपोर्ट के स्थान पर धारणा योजना की एक प्रति आवेदन के साथ पेश करेगा ।

7. (i) **नई परियोजनाओं के लिए पूर्व पर्यावरणीय अनापत्ति (ईसी) प्रक्रिया के प्रक्रम :--** नई परियोजनाओं के लिए पर्यावरणीय अनापत्ति प्रक्रिया में अधिकतम चार प्रक्रम समाविष्ट होंगे, जिनमें से सभी इस अधिसूचना में नीचे यथाउपवर्णित विशिष्ट मामलों में लागू नहीं होंगे , ये चार प्रक्रम श्रृंखलाबद्ध क्रम में होंगे :--

- प्रक्रम (1) स्क्रीनिंग (केवल प्रवर्ग 'ख' परियोजनाओं और क्रियाकलापों के लिए)
- प्रक्रम (2) विस्तारण
- प्रक्रम (3) लोक परामर्श
- प्रक्रम (4) आंकलन

I. प्रक्रम (1) - स्क्रीनिंग :

प्रवर्ग 'ख' परियोजनाओं या क्रियाकलापों के मामले में, यह प्रक्रम परियोजना की प्रकृति और अवस्थिति विनिर्देश पर आधारित पर्यावरणीय अनापत्ति मंजूर करने से पूर्व उसके आंकलन के लिए कोई पर्यावरणीय समाघात निर्धारण रिपोर्ट तैयार करने के लिए यह अवधारण करने के लिए कि परियोजना या क्रियाकलाप के लिए आगे पर्यावरणीय अध्ययन करना अपेक्षित है या नहीं संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति (एसईएसी) द्वारा प्ररूप 1 में पूर्व पर्यावरणीय अनापत्ति मांगने के लिए किसी आवेदन की संवीक्षा होगी । कोई पर्यावरणीय समाघात निर्धारण रिपोर्ट की अपेक्षा करने वाली परियोजनाओं को प्रवर्ग "ख1" कहा जाएगा और शेष परियोजनाओं को प्रवर्ग "ख2" कहा जाएगा और उसके लिए कोई पर्यावरणीय समाघात निर्धारण रिपोर्ट अपेक्षित नहीं होगी । मद 8ख के सिवाय परियोजनाओं के ख 1 या ख2 में प्रवर्गीकरण के लिए पर्यावरण और वन मंत्रालय समय-समय पर समुचित मार्गदर्शक सिद्धांत जारी करेगा ।

II. प्रक्रम (2) विस्तारण :

(i) उस प्रक्रिया को निर्दिष्ट करता है जिसके द्वारा प्रवर्ग 'क' परियोजनाओं या क्रियाकलापों के मामले में विशेषज्ञ आंकलन समिति, और प्रवर्ग 'ख1' परियोजनाओं या क्रियाकलापों के मामले में, राज्य स्तर विशेषज्ञ आंकलन समिति, जिसके अंतर्गत विद्यमान परियोजनाओं या क्रियाकलापों के विस्तार और/या आधुनिकीकरण और/या उत्पाद मिश्रण में परिवर्तन के विस्तार, सौपे जाने वाले विस्तृत और व्यापक कार्य अवधारित करने के लिए, उस परियोजना या क्रियाकलाप के संबंध में कोई पर्यावरणीय समाघात निर्धारण रिपोर्ट तैयार करने के लिए सभी सुसंगत पर्यावरणीय समुत्थानों को, जिसके लिए पूर्व पर्यावरणीय अनापत्ति ईप्सित की गई है, आवेदन सम्मिलित हैं । विशेषज्ञ आंकलन समिति या राज्य स्तर विशेषज्ञ आंकलन समिति विहित आवेदन प्ररूप 1/प्ररूप 1क में दी गई जानकारी के आधार पर सौंपे जाने वाले कार्य अवधारित करेगी, जिसके अंतर्गत आवेदक द्वारा सौंपे जाने वाले प्रस्थापित कार्य, किसी विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर आंकलन समिति के किसी सब ग्रुप द्वारा देखा गया कोई स्थल, यदि विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा आवश्यक समझा जाए, आवेदक द्वारा सुझाए गए सौंपे जाने वाले कार्य और अन्य सूचना जो विशेषज्ञ आंकलन समिति या राज्य स्तर विशेषज्ञ आंकलन समिति के पास उपलब्ध हो, सम्मिलित हैं । अनुसूची की मद 8 में प्रवर्ग ख के रूप में सूचीबद्ध सभी परियोजनाओं और क्रियाकलापों (संनिर्माण, नगरी/वाणिज्यिक काम्प्लैक्स/आवासन) के लिए विस्तार अपेक्षित नहीं होगा और उनका आंकलन प्ररूप 1/प्ररूप 1क और धारणा योजना के आधार पर किया जाएगा ।

(ii) सौंपे गए कृत्यों को प्ररूप 1 की प्राप्ति के साठ दिनों के भीतर विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा आवेदक को प्रेषित किया जाएगा । अनुसूची के प्रवर्ग क हाइड्रोक्लेक्ट्रिक परियोजना मद 1 (ग) (i) के मामले में सौंपे गए कृत्यों को पूर्व संनिर्माण क्रियाकलापों के लिए अनापत्ति सहित प्रेषित किया जाएगा । यदि सौंपे गए कृत्यों को अंतिम रूप नहीं दिया गया है और प्ररूप 1 की प्राप्ति के साठ दिनों के भीतर आवेदक को प्रेषित किया जाता है तो आवेदक द्वारा सुझाए गए सौंपे जाने वाले कृत्य ईआईए अध्ययन के लिए अनुमोदित अंतिम सौंपे गए कृत्यों के रूप में समझे जाएंगे । अनुमोदित सौंपे गए कृत्य, पर्यावरण और वन मंत्रालय तथा संबंधित राज्य स्तर पर्यावरण समाघात निर्धारण प्राधिकरण के लिए वेबसाइट पर प्रदर्शित किए जाएंगे ।

(iii) इसी प्रक्रम पर संबंधित विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति की सिफारिश पर संबंधित विनियामक प्राधिकरण द्वारा पूर्व पर्यावरणीय अनापत्ति के लिए आवेदनों को नामंजूर किया जा सकेगा । ऐसे नामंजूर किए जाने की दशा में, विनिश्चय को उसके कारणों सहित आवेदक को, आवेदन की प्राप्ति के साठ दिनों के भीतर लिखित में संसूचित किया जाएगा ।

III प्रक्रम (3) लोक परामर्श

(i) "लोक परामर्श" उसं प्रक्रिया को निर्दिष्ट करता है जिसके द्वारा स्थानीय प्रभावी व्यक्तियों और ऐसे अन्य व्यक्तियों की चिंताओं को, जिनका परियोजना या क्रियाकलापों के पर्यावरणीय समाधातों में न्यायसंगत आधार है, समुचित रूप में अभिकल्पित परियोजना या क्रियाकलाप में संबंधित सभी सामग्री को ध्यान में रखते हुए सुनिश्चित किया जाएगा । सभी प्रवर्ग " क" और प्रवर्ग "ख1" परियोजनाएं या क्रियाकलाप निम्नलिखित के सिवाय लोक परामर्श करेंगे :-

(क) सिंचाई परियोजनाओं का आधुनिकीकरण (अनुसूची की मद 1(ग) (ii))।

(ख) संबंधित प्राधिकारियों द्वारा अनुमोदित औद्योगिक संपदाओं या पार्कों के भीतर अवस्थित सभी परियोजनाएं या क्रियाकलाप (अनुसूची की मद 7(ग)) और जिन्हें ऐसे अनुमोदन में अननुज्ञात नहीं किया जाता है ।

(ग) सड़कों और राजमार्गों का विस्तार (अनुसूची की मद 7(च))जिनमें भूमि का कोई और अर्जन अंतर्वलित नहीं है ।

(घ) सभी भवन/संनिर्माण परियोजनाएं/क्षेत्र विकास परियोजनाएं और नगरीय योजनाएं (मद 8)।

(ङ) सभी प्रवर्ग ख 2 परियोजनाएं और क्रियाकलाप ।

(च) केन्द्रीय सरकार द्वारा यथा अवधारित राष्ट्रीय रक्षा और सुरक्षा से संबंधित सभी परियोजनाएं और क्रियाकलाप या जिसमें अन्य युक्तगत विचार अंतर्वलित हैं ।

(ii) लोक परामर्श में साधारणतया दो घटक समाविष्ट होंगे :-

(क) स्थानीय प्रभावित व्यक्तियों की चिंताओं को सुनिश्चित करने के लिए परिशिष्ट 4 में विहित रीति में की जाने वाली स्थल पर या उसके निकट परिसर में जिला वार कोई लोक सुनवाई ;

(ख) परियोजना या क्रियाकलाप के पर्यावरणीय पहलुओं में कोई न्यायसंगत आधार रखने वाले अन्य संबंधित व्यक्तियों से लिखित में प्रतिक्रियाएं प्राप्त करना ।

(iii) स्थल (स्थलों) पर या उसके निकट परिसर में सभी मामलों में लोक सुनवाई विनिर्दिष्ट रीति में संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति द्वारा की जाएगी और कार्यवाहियों को आवेदक से प्राप्त अनुरोध के पैंतालीस दिनों के भीतर संबंधित विनियामक प्राधिकरण को अग्रेषित किया जाएगा ।

(iv) यदि संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्य क्षेत्र प्रदूषण नियंत्रण समिति लोक सुनवाई नहीं करती है और लोक सनुवाई को विनिर्दिष्ट अवधि के भीतर पूरी नहीं करती है और/या लोक सुनवाई की कार्यवाहियां को विहित अवधि के भीतर यथाउपर्युक्त संबंधित विनियामक प्राधिकरण को प्रेषित नहीं करती है तो विनियामक प्राधिकरण अन्य लोक अभिकरण या प्राधिकरण को, जो विनियामक प्राधिकरण का अधीनस्थ नहीं है, प्रक्रिया को पैंतालीस दिनों की और अवधि के भीतर पूरा करने के लिए लगाएगी ।

(v) यदि ऊपर उपपैरा (iii) के अधीन नामनिर्दिष्ट लोक अभिकरण या प्राधिकरण, संबंधित विनियामक प्राधिकरण को यह रिपोर्ट करता है, कि स्थानीय अवस्थिति के कारण लोक सुनवाई करना संभव नहीं है, तो किसी रीति में स्पष्ट रूप से अभिव्यक्त किए जाने वाले संबंधित स्थानीय व्यक्तियों के विचारों का समर्थन करेंगे । वह उस तथ्य की रिपोर्ट संबंधित विनियामक प्राधिकरण को ब्यौरेवार देगा जो रिपोर्ट पर और अन्य विश्वसनीय सूचना पर सम्यक् रूप से विचार करने के पश्चात्, जिसका लोक परामर्श के लिए विनिश्चय किया गया है, उस दशा में जिसे लोक सुनवाई में सम्मिलित करने की आवश्यकता है, रिपोर्ट करेगा ।

(vi) परियोजना या क्रियाकलापों के पर्यावरणीय पहलुओं में कोई न्यायसंगत आधार रखने वाले अन्य संबंधित व्यक्तियों से लिखित में प्रक्रिया अभिप्राप्त करने के लिए, संबंधित विनियामक प्राधिकरण और राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति, आवेदक द्वारा परिशिष्ट 3क में दिए गए प्ररूप में तैयार की गई संक्षिप्त ईआईए रिपोर्ट को उनके वेबसाइट पर देते हुए ऐसे संबंधित व्यक्तियों से लोक सुनवाई की व्यवस्था के लिए किसी लिखित अनुरोध की प्राप्ति के सात दिनों के भीतर प्रतिक्रियाएं प्राप्त करेंगी । गोपनीय सूचना, जिसके अंतर्गत प्रकट न करने योग्य या विधिक रूप से विशेषाधिकार प्राप्त सूचना, जिसमें बौद्धिक संपदा अधिकार अंतर्वलित हैं, आवेदन में विनिर्दिष्ट स्रोत, वेबसाइट पर नहीं रखे जाएंगे । संबंधित विनियामक प्राधिकरण, परियोजना या क्रियाकलाप की बाबत विस्तृत प्रचार को सुनिश्चित करने के लिए अन्य समुचित मीडिया का उपयोग भी कर सकेगा । विनियामक प्राधिकरण, तथापि लोक सुनवाई की तारीख तक निरीक्षण के लिए प्रारूप ईआईए रिपोर्ट किसी संबंधित व्यक्ति से, सामान्य कार्यालय घंटों के दौरान अधिसूचित स्थान पर किसी लिखित अनुरोध पर उपलब्ध कराएगा । इस लोक परामर्श प्रक्रिया के भाग के रूप में प्राप्त सभी प्रतिक्रियाएं शीघ्रतम उपलब्ध साधन से आवेदक को अग्रेषित की जाएंगी ।

(vii) लोक परामर्श पूरा करने के पश्चात्, इस प्रक्रिया के दौरान अभिव्यक्त सभी सारवान पर्यावरणीय चिंताओं को संबोधित करेगा और प्रारूप ईआइए और ईएमपी में समुचित परिवर्तन करेगा । इस प्रकार तैयार की गई अंतिम ई आई ए रिपोर्ट आवेदक के लिए संबंधित विनियामक प्राधिकरण को प्रस्तुत की जाएगी । आवेदक, लोक परामर्श के दौरान अभिव्यक्त की गई सभी चिंताओं को संबोधित करते हुए, प्रारूप ईआईए और ईएमपी की एक संक्षिप्त रिपोर्ट अंनुकल्पतः प्रस्तुत करेगा ।

IV प्रक्रम(4) - आंकलन :

(i) आंकलन से आवेदन और अन्य दस्तावेजों, ऐसे अंतिम ईआईए रिपोर्ट, लोक परामर्शों का निष्कर्ष, जिसके अंतर्गत लोक सुनवाई की कार्यवाहियां हैं, पर्यावरणीय अनापत्ति मंजूर करने के लिए संबंधित विनियामक प्राधिकरण को

आवेदक द्वारा प्रस्तुत की गई विशेषज्ञ आंकलन समिति या राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा विस्तृत संवीक्षा अभिप्रेत है । यह आंकलन विशेषज्ञ आंकलन समिति या राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा किसी कार्यवाही को, जिसमें आवेदक को आवश्यक स्पष्टीकरण प्रस्तुत करने के लिए व्यक्तिगत रुप से या किसी प्राधिकृत प्रतिनिधि को आमंत्रित किया जाता है, एक पारदर्शी रीति में किया जाएगा । इस कार्यवाही के निष्कर्ष पर विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति संबंधित विनियामक प्राधिकरण को निश्चित निबंधनों और शर्तों पर पूर्व पर्यावरणीय अनापत्ति मंजूर करने के लिए या पूर्व पर्यावरणीय अनापत्ति के लिए आवेदन को नामंजूर करने के लिए उसके कारणों सहित स्पष्ट सिफारिशें करेंगी ।

(ii) सभी परियोजनाओं या क्रियाकलापों का आंकलन जो लोक परामर्श के लिए अपेक्षित नहीं है या कोई पर्यावरण समाघात निर्धारण रिपोर्ट प्रस्तुत करना अपेक्षित नहीं है, जैसा लागू हो विहित आवेदन प्ररूप 1 और प्ररूप 1क के आधार पर उपलब्ध सभी अन्य सुसंगत विधिमान्य सूचना और दौरा किए स्थल को, जहां विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा ऐसा करना आवश्यक समझा जाता है, कार्यान्वित किया जाएगा ।

(iii) किसी आवेदन का आंकलन, विशेषज्ञ आंकलन समिति या संबधित राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा अंतिम पर्यावरण समाघात निर्धारण रिपोर्ट और अन्य दस्तावेजों की प्राप्ति या प्ररूप 1 या प्ररूप 1क के साठ दिनों के भीतर पूरा किया जाएगा, जहां लोक परामर्श आवश्यक नहीं है, वहां विशेषज्ञ आंकलन समिति या संबधित राज्य स्तर विशेषज्ञ आंकलन समिति की सिफारिशों को सक्षम प्राधिकारी के समक्ष अगले पन्द्रह दिनों के भीतर अंतिम विनिश्चय के लिए रखा जाएगा । आंकलन की विहित प्रक्रिया परिशिष्ट V में दी गई है ।

7. (ii) विद्यमान परियोजनाओं का विस्तार या आधुनिकीकरण या उत्पाद मिश्रण में परिवर्तन के लिए पूर्व पर्यावरणीय अनापत्ति प्रक्रिया,-

उस क्षमता के परे जिसके लिए इस अधिसूचना के अधीन पूर्व पर्यावरणीय अनापत्ति मंजूर की गई है, उत्पादन क्षमता में वृद्धि सहित या तो पट्टा क्षेत्र या खनन परियोजनाओं की दशा में उत्पादन क्षमता में वृद्धि सहित या इस अधिसूचना की अनुसूची में विहित अंतिम सीमा के परे कुल उत्पादन क्षमता में वृद्धि सहित विद्यमान यूनिट के आधुनिकीकरण के लिए, प्रक्रिया और/या प्रौद्योगिकी में परिवर्तन के माध्यम से या उत्पाद मिश्रण में किसी परिवर्तन के लिए पूर्व पर्यावरणीय अनापत्ति ईप्सित करने वाले सभी आवेदन प्ररूप 1 में किए जाएंगे और उन पर संबंधित विशेषज्ञ आंकलन समिति या राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा साठ दिनों के भीतर विचार किया जाएगा, जो सम्यक् आवश्यक तत्परता से जिसके अंतर्गत ईआईए का तैयार किया जाना और लोक परामर्श भी है, विनिश्चय करेगी और आवेदन का तद्नुसार पर्यावरणीय अनापत्ति मंजूर करने के लिए आंकलन किया जाएगा ।

8. पूर्व पर्यावरणीय अनापत्ति मंजूर किया जाना या उसको खारिज किया जाना,-

(i) विनियामक प्राधिकरण, संबंधित ई ए सी या एस ई ए सी की सिफारिशों पर विचार करेगा और अपने विनिश्चय को आवेदक को विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति की सिफारिशों की प्राप्ति के पैंतालीस दिनों के भीतर प्रेषित करेगा या अन्य शब्दों में अंतिम पर्यावरणीय समाघात निर्धारण रिपोर्ट की प्राप्ति के एक सौ पांच दिनों के भीतर प्रेषित करेगा और जहां पर्यावरणीय समाघात निर्धारण पूरे आवेदन की प्राप्ति के एक सौ पांच दिनों के भीतर अपेक्षित नहीं है वहां अपेक्षित दस्तावेज, नीचे उपबंधित के सिवाय प्रेषित करेगा ।

(ii) विनियामक प्राधिकरण, सामान्यतः विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति की सिफारिशों को स्वीकार करेगा । उन दशाओं में जहां विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति की सिफारिशों से असहमत है, वहां विनियामक प्राधिकरण विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति की सिफारशों की प्राप्ति के पैंतालिस दिनों के भीतर असहमति के कारणों का कथन करते हुए पुनर्विचार का अनुरोध करेगा । इस विनिश्चय की सूचना आवेदक को साथ-साथ प्रेषित की जाएगी । उसके पश्चात् विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति, विनियामक प्राधिकरण के संप्रेक्षणों पर विचार करेगी और उस पर अपने विचार साठ दिनों की और अवधि के भीतर पेश करेगी । विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति के विचारों को ध्यान में रखने के पश्चात् विनियामक प्राधिकरण का विनिश्चय अंतिम होगा और संबंधित विनियामक प्राधिकरण को अगले तीस दिनों के भीतर आवेदक को प्रेषित किया जाएगा ।

(iii) उस दशा में जहां विनियामक प्राधिकरण का विनिश्चय आवेदक को, ऊपर उपपैरा (i) या (ii) में, जहां लागू हो विनिर्दिष्ट अवधि के भीतर संसूचित नहीं किया जाता है, वहां आवेदक इस प्रकार अग्रसर हो सकेगा मानो मांगी गई पर्यावरण अनापत्ति मंजूर कर दी गई है या विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति की अंतिम सिफारिशों के निबंधनों में विनियामक प्राधिकरण द्वारा नामंजूर कर दी गई है ।

(iv) ऊपर पैरा (i) और (ii) के अधीन, जहां लागू हो, विनियामक प्राधिकरण द्वारा विनिश्चय के लिए विनिर्दिष्ट अवधि के अवसान पर, विनियामक प्राधिकरण का विनश्चय और विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति की अंतिम सिफारिशें लोक दस्तावेज होंगे ।

(v) अन्य विनियामक प्राधिकरणों से परियोजनाओं या क्रियाकलापों, या संबंधित विनियामक प्राधिकरण द्वारा स्क्रीनिंग, विस्तारण या आंकलन या विनिश्चय पूर्व पर्यावरण अनापत्ति के लिए आवेदनों की प्राप्ति के पूर्व तब तक अपेक्षित नहीं होगी जब तक या तो ऐसी अनापत्ति किसी विधि की अपेक्षा का आवश्यक तकनीकी कारणों से कोई श्रृंखलाबद्ध आधार न हो ।

(vi) जान बूझ कर छिपाना और/या मिथ्या प्रस्तुतीकरण या भ्रामक सूचना या आंकडे देना जो स्क्रीनिंग, विस्तारण या आंकलन या आवेदन पर विनिश्चय के लिए सारवान हो, आवेदन को नामंजूर किए जाने या उस आधार पर मंजूर की गई पूर्व पर्यावरणीय अनापत्ति के रद्दकरण के लिए दायी बनाएगी । किसी आवेदन को नामंजूर करना या इस आधार पर पहले मंजूर की गई किसी पूर्व पर्यावरणीय अनापत्ति के रद्दकरण का विनिश्चय विनियामक प्राधिकरण द्वारा आवेदक की व्यक्तिगत सुनवाई करने के पश्चात् किया जाएगा और उसमें नैसर्गिक न्याय के सिद्धांतों का पालन किया जाएगा ।

9. पर्यावरणीय अनापत्ति की विधिमान्यता,-

"पर्यावरणीय अनापत्ति की विधिमान्यता" से वह अवधि अभिप्रेत है जिससे विनियामक प्राधिकरण द्वारा मंजूर की गई पूर्व पर्यावरणीय अनापत्ति मंजूर की जाती है या आवेदक द्वारा यह समझा जा सकेगा कि यह ऊपर पैरा 7 के उपपैरा (iv) के अधीन परियोजना या क्रियाकलाप द्वारा उत्पादन प्रचालन आरंभ करने या संनिर्माण परियोजनाओं की दशा में (अनुसूची की मद 8) सभी संनिर्माण प्रचालन पूरा करने, जिसके के लिए पूर्व पर्यावरण अनापत्ति के लिए

आवेदन का निर्देश करता है, मंजूर की गई है । किसी परियोजना या क्रियाकलाप के लिए नदी घाटी परियोजनाओं (अनुसूची की मद 1(ग)) की दशा में दस वर्ष की अवधि के लिए, विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति द्वारा यथा प्राक्कलित परियोजना की अवधि खनन परियोजनाओं के लिए अधिकतम तीस वर्षों के लिए और सभी अन्य परियोजनाओं और क्रियाकलापों की दशा में पांच वर्ष होगी । तथापि क्षेत्र विकास परियोजनाओं और नगरीय की दशा में (मद 8(ख)) विधिमान्य अवधि केवल ऐसे क्रियाकलापों तक सीमित होगी जहां तक किसी विकासकर्ता के रूप में आवेदक का उत्तरदायित्व है । इस विधिमान्यता की अवधि को संबंधित विनियामक प्राधिकरण द्वारा पांच वर्ष की अधिकतम अवधि तक बढ़ाया जा सकेगा, परन्तु यह तब जब कि कोई आवेदन आवेदक द्वारा विनियामक प्राधिकरण को संनिर्माण परियोजनाओं या क्रियाकलापों के लिए (अनुसूची की मद 8) अद्यतन प्ररूप 1 और अनुपूरक प्ररूप 1क सहित विधिमान्य अवधि के भीतर किया जाता है । इस बाबत विनियामक प्राधिकरण, यथास्थिति, विशेषज्ञ आंकलन समिति या राज्य स्तर विशेषज्ञ आंकलन समिति से भी परामर्श कर सकेगा ।

10. पश्च पर्यावरणीय अनापत्ति को मानीटर करना,-

(i) परियोजना प्रबंधन के लिए प्रत्येक कलेंडर वर्ष की 1 जून और 1 दिसंबर को संबंधित विनियामक प्राधिकरण को निश्चित पूर्व पर्यावरणीय अनापत्ति के निबंधनों और शर्तों के संबंध में अनुपालन रिपोर्टों को अर्धवार्षिक रूप में हार्ड और साफ्ट प्रतियों में प्रस्तुत करना आज्ञापक होगा ।

(ii) परियोजना प्रबंधन द्वारा प्रस्तुत की गई सभी ऐसी अनुपालन रिपोर्टें लोक दस्तावेज होंगी, उसकी प्रतियां संबंधित विनियामक प्राधिकरण को आवेदन पर किसी व्यक्ति को दी जाएंगी । ऐसी अंतिम अनुपालन रिपोर्ट संबंधित विनियामक प्राधिकरण की वेबसाइट पर भी दर्शित की जाएगी ।

11. पर्यावरणीय अनापत्ति की अंतरणीयता,-

किसी आवेदक को किसी विनिर्दिष्ट परियोजना या क्रियाकलाप के लिए मंजूर की गई कोई पूर्व पर्यावरणीय अनापत्ति अंतरक द्वारा या अंतरिकी द्वारा आवेदन पर परियोजना या क्रियाकलाप को करने के हकदार किसी अन्य विधिक व्यक्ति को अंतरक द्वारा लिखित "अनापत्ति सहित" जो इसकी विधिमान्यता की अवधि के दौरान संबंधित विनियामक प्राधिकरण द्वारा उन्हीं निबंधनों और शर्तों के अधीन पूर्व पर्यावरणीय अनापत्ति आरंभ में मंजूर की गई थी और उसी विधिमान्यता अवधि के लिए अंतरित की जा सकेगी । ऐसे मामलों में विशेषज्ञ आंकलन समिति या संबंधित राज्य स्तर विशेषज्ञ आंकलन समिति को कोई निर्देश आवश्यक नहीं है ।

12. लंबित मामलों के निपटान तक ई.आई.ए. अधिसूचना का प्रवर्तन,-

इस अधिसूचना के अंतिम प्रकाशन की तारीख से पर्यावरणीय समाघात निर्धारण की अधिसूचना सं0 का.आ. 60(अ), तारीख 27 जनवरी, 1994 को, उन बातों के सिवाय, जिन्हें ऐसे अधिक्रमण से पूर्व किया गया है या करने से लोप किया गया है, उस सीमा तक अधिक्रांत किया जाता है कि पूर्व पर्यावरणीय अनापत्ति के लिए किए गए और इस अधिसूचना के अंतिम प्रकाशन की तारीख को लंबित सभी या कुछ प्रकार के आवेदनों को, परियोजानाओं या क्रियाकलापों को, उस सूची के सिवाय जिनमें अनुसूची 1 में पूर्व पर्यावरणी अनापत्ति अपेक्षित है, इस अधिसूचना के किसी एक या सभी उपबंधों से छूट दे सकेगी या उक्त अधिसूचना के कुछ या सभी उपबंधों के प्रवर्तन को इस अधिसूचना के जारी करने की की तारीख से एक वर्ष से अनधिक अवधि के लिए जारी रख सकेगी ।

अनुसूची

(पैरा 2 और 7 देखे)

पूर्व पर्यावरणीय अनापत्ति की अपेक्षा वाली परियोजनाओं या क्रियाकलापों की सूची

क्र सं.	परियोजना या क्रियाकलाप	अवसीमा सहित प्रवर्ग		शर्तें, यदि कोई हो
		क	ख	
1	खनन, प्राकृतिक संसाधन का निष्कर्षण और विद्युत उत्पादन विनिर्दिष्ट उत्पादन क्षमता के लिए)			
1	2	3	4	5
1(क)	खनिज का खनन	खनन पट्टा क्षेत्र का ≥50 है0 किसी भी खनन क्षेत्र का ध्यान दिए बिना ऐस्बैस्टज खनन	< 50 हैक्टेयर . ≥ 5 हैक्टेयर खनन पट्टा क्षेत्र	साधारण शर्त लागू होगी टिप्पण खनिज पदार्थों के पूर्वेक्षण (जिसमें ड्रिलिंग न हो) को छूट दी गई है बर्शते कि वास्तिवक सर्वेक्षण के लिए छूट वाले क्षेत्रों की पूर्व अनुमति ली गई है ।
1(ख)	अपतट और तटवर्ती तेल तथा गैस की खोज, विकास और उत्पादन	सभी परियोजनाएं	-	टिप्पण सार खोज सर्वेक्षण (जिसमें ड्रिलिंग न हो) को छूट दी गई है बर्शते कि वास्तिवक सर्वेक्षण के लिए छूट वाले क्षेत्रों की पूर्व अनुमित ली गई है ।
1(ग)	नदी घाटी परियोजनाएं	(i) ≥50 मे0वा0 जल विद्युत उत्पादन (ii)≥10,000 है0खेती योग्य प्रभावित क्षेत्र	(i) <50 ≥ 25 मे0वा0 जल विद्युत उत्पादन (ii) <10,000 है0 खेती योग्य प्रभावित क्षेत्र	सधारण शर्त लागू होगी
1(घ)	तापीय विद्युत संयंत्र	(कोयला लिग्नाइट और नेप्था गैस आधारित) ≥500 मे.वा. ≥ 50 मे.वा. (पैटकोक, डीजल और सभी अन्य ईंधन)	(कोयला/लिग्नाइट/नैफ्था एवं गैस आधारित) <500 मे.वा. (पैटकोक, डीजल और सभी अन्य ईंधन)<50 मे.वा ≥5 मे.वा.	साधारण शर्त लागू होगी
1(ङ)	आणविक विद्युत परियोजनाएं और आणविक ईंधन का प्रसंस्करण	सभी परियोजनाएं	-	
2	प्राथमिक प्रसंस्करण			
2(क)	कोयला धोवनशालाएं	≥1 मिलियन टन/ वार्षिक कोयले का उत्पादन	<1 मिलियन टन/ वार्षिक कोयले का उत्पादन	साधारण शर्त लागू होगी (यदि खनन क्षेत्र के अंदर स्थित है तो प्रस्ताव का मूल्यांकन खनन प्रस्ताव के साथ किया जाना चाहिए)

2(ख)	खनिज सज्जीकरण	≥0.1 मिलियन टन/ वार्षिक कोयले का उत्पादन	<0.1 मिलियन टन/ वार्षिक कोयले का उत्पादन	साधारण शर्त लागू होगी अनापत्ति प्रदान करने के लिए खनन प्रस्ताव का खनिज सज्जीकरण के साथ ही मूल्यांकन किया जाना चाहिए
3		पदार्थ उत्पादन		
3(क)	धातुकर्म उद्योग (फेरस और गैर फैरस)	क) प्राथमिक धातुकर्म उद्योग सभी परियोजनाएं ख) स्पंज आयरन विनिर्माण ≥ 200 टन पी डी ग) गौण धातु कर्म प्रसंस्करण उद्योग सभी विषाक्त और भारी धातु उत्पादित करने वाली ईकाइयां ≥ 20,000 टन/ वार्षिक	स्पंज आयरन विनिर्माण < 200 टन पी डी गौण धातु कर्म प्रसंस्करण उद्योग 1) सभी विषाक्त और भारी धातु उत्पादित करने वाली ईकाइयां <20,000 टन/ वार्षिक 2)अन्य सभी विषरहित गौण धातुकर्म प्रसंस्करण उद्योग > 5000 टन /वार्षिक	स्पंज आयरन विनिर्माण के लिए साधारण शर्त लागू होगी
3(ख)	सीमेंट संयंत्र	वार्षिक उत्पादन क्षमता ≥ 1.0 मिलियन टन	वार्षिक उत्पादन क्षमता < 1.0 मिलियन टन यह सभी ग्राइंडिंग इकाइयों के लिए लागू है	साधारण शर्त लागू होगी
4		पदार्थ प्रसंस्करण		
4 (क)	पेट्रोलिम रिफाइनिंग उद्योग	सभी परियोजनाएं	-	-
4(ख)	कोक भट्टी संयंत्र	≥ 2,50,000 टन वार्षिक	< 2,50,000 एवं ≥ 25,000 टन वार्षिक	-
4(ग)	एस्बेस्टास मिलिंग और एस्बेस्टास आधारित उत्पाद	सभी परियोजनाएं	-	-
4(घ)	क्लोरक्षार उद्योग,	उत्पादन क्षमता ≥ 300टन पी डी या अधिसूचित औद्योगिक क्षेत्र/संपदा से बाह्य अवस्थित ईकाई	उत्पादन क्षमता < 300 टन पी डी और अधिसूचित औद्योगिक क्षेत्र/संपदा में अवस्थित ईकाई	विनिर्दिष्ट शर्त लागू होगी किसी नए पारा प्रकोष्ठ आधारित संयंत्र को अनुज्ञा नहीं दी जाएगी और इस अधिसूचना द्वारा झिल्लीमय प्रकोष्ठ प्रौद्योगिकी में परिवर्तन करने वाली विद्यमान इकाई को छूट प्राप्त है ।

4 (ङ)	सोडा भस्म उद्योग	सभी परियोजनाएं	-	-
4(च)	चमड़ा/त्वचा/खाल प्रसंस्करणं उद्योग	औद्योगिक क्षेत्र से बाहर सभी नई परियोजनाएं या औद्योगिक क्षेत्र के बाहर विद्यमान ईकाइयों का विस्तार	अधिसूचित औद्योगिक क्षेत्र/संपदा में अवस्थित सभी नई परियोजनाएं या परियोजनाओं का विस्तार	विनिर्दिष्ट शर्त लागू होगी
5		उत्पादन/फैब्रिकेशन		
5(क)	रासायनिक उर्वरक	सभी परियोजनाएं	-	-
5(ख)	कीटनाशक उद्योग और कीटनाशक विशिष्ट मध्यक जीवमार (विनिर्मिति को छोड़कर)	तकनीकी श्रेणी के कीटनाशको को उत्पादन करने वाली सभी ईकाइयां	-	-
5(ग)	पेट्रो रसायन परिसर (पेट्रोलियम के अंश और प्राकृतिक गैस और/या सुगन्धितों में सुधार प्रसंस्करण आधारित उद्योग	सभी परियोजनाएं	-	-
5(घ)	मानव निर्मित फाइवर का उत्पादन	रेयन	अन्य	साधारण शर्त लागू होगी
5(ङ)	पेट्रो रसायन आधारित प्रसंस्करण (भंजन से भिन्न अन्य प्रसंस्करण तथा सुधार और जो परिसर के भीतर समाविष्ट नहीं है)	अधिसूचित औद्योगिक क्षेत्र/संपदा के बाह्य अवस्थित	अधिसूचित औद्योगिक क्षेत्र/संपदा के भीतर अवस्थित	विनिर्दिष्ट शर्त लागू होगी
5(च)	संश्लिष्ट कार्बनिक रसायन उद्योग (रंजक और रंजक मध्यक; थोक औषधि और औषधि विनिर्मितियों को छोड़कर मध्यकः संश्लिष्ट रबड़ मूल कार्बनिक रसायन, अन्य संश्लिष्ट कार्बनिक रसायन और रसायन मध्यक)	अधिसूचित औद्योगिक क्षेत्र/संपदा के बाह्य अवस्थित	अधिसूचित औद्योगिक क्षेत्र/संपदा के भीतर अवस्थित	विनिर्दिष्ट शर्त लागू होगी
5(छ)	आसवनी	(i) सभी शीरा आधारित आसवनी । (ii) सभी गन्ने का रस/गैर -शीरा आधारित आसवनी ≥30 कि0ली0 दैनिक	सभी गन्ने का रस/गैर शीरा आधारित आसवनी <30 कि0ली0 दैनिक	साधारण शर्त लागू होगी
5(ज)	समेकित पेंट उद्योग	-	सभी परियोजनाएं	साधारण शर्त लागू होगी
5(झ)	अपशिष्ट कागज से कागज का निर्माण और तैयार लुग्दी और विरंजन किए बिना तैयार लुग्दी से कागज निर्माण के अलावा लुग्दी एवं कागज	लुग्दी विनिर्माण और लुग्दी और कागज विनिर्माण उद्योग	लुग्दी विनिर्माण के बिना कागज विनिर्माण उद्योग	साधारण शर्त लागू होगी

	उद्योग			
5(ञ)	चीनी उद्योग		गन्ना पेरने की क्षमता ≥ 5000 टन दैनिक	साधारण शर्त लागू होगी
5(ट)	प्रेरण/आर्क भट्टी/कुपोला भट्टी 5 टन प्रति घंटा या ज्यादा	-	सभी परियोजनाएं	साधारण शर्त लागू होगी
6		**सेवा सेक्टर**		
6(क)	राष्ट्रीय उद्यानों/ अभयारण्यों/ प्रवाल भित्तियों/ एल एन जी टर्मिनल सहित पारिस्थितिकीय संवेदनशील क्षेत्रों से गुजरने वाली तेल और गैस परिवहन पाइप लाइनें(अपरिकृष्त और परिष्करणी /पेट्रो रसायन उत्पाद)	सभी परियोजनाएं	-	-
6(ख)	एकल भंडारकरण और परिसंकटमय रसायन को संभालना (एमएसआईएचसी नियम, 1989 और 2000 की संशोधित अनुसूची 2 और 3 के स्तंभ 3 में उपदर्शित अवसीमा योजना परिमाण के अनुसार		सभी परियोजनाएं	साधारण शर्त लागू होगी
7		**पर्यावरणीय सेवाओं सहित भौतिक अवसंरचना**		
7(क)	विमानपत्तन	सभी परियोजनाएं	-	-
7(ख)	सभी पोत भंजन यार्ड जिसमें पोत भंजन इकाई भी सम्मिलित है	सभी परियोजनाएं	-	-
7(ग)	औद्योगिक सम्पदा/पार्क/परिसर/ क्षेत्र/निर्यात प्रंस्करण जोन(नि.प्रं.जो.),विशेष आर्थिक जोन(वि.आ.जो.) जैव प्रौद्योगिकी पार्क चमड़ा परिसर	प्रस्तावित औद्योगिक संपदा में यदि एक भी उद्योग श्रेणी क के अंतर्गत आता है तो पूरे औद्योगिक क्षेत्र को श्रेणी क ही समझा जाएगा चाहे वह किसी भी क्षेत्र में हो 500 हैक्टेयर से ज्यादा क्षेत्र की औद्योगिक संपदाएं और जिनमें कम से कम एक श्रेणी ख का उद्योग स्थित हो	औद्योगिक संपदाएं और जिनमें कम से कम एक श्रेणी ख का उद्योग स्थित है और क्षेत्र< 500 हैक्टेयर हो औद्योगिक संपदाएं क्षेत्र > 500 हैक्टेयर और जिसमें श्रेणी क या ख श्रेणी का कोई उद्योग नहीं है	विशेष शर्त लागू होगी टिप्पण 500 हैक्टेयर से कम क्षेत्र की औद्योगिक संपदाओं जिनमें क या ख श्रेणी का कोई उद्योग नहीं है, को मंजूरी की आवश्यकता नहीं है
7(घ)	सामान्य परिसंकटमय ,अपशिष्ट उपचार भंडारकरण और निपटान सुविधाएं (उ.भं.नि.सु.)	सभी एकीकृत सुविधाएं जिनमें भस्मीकरण और भूमिभरण या केवल भस्मीकरण शामिल है	केवल भूमि भरण वाली सभी सुविधाएं	साधारण शर्त लागू होगी

7(ङ)	पत्तन, बंदरगाह	≥ 5 मिलियन टन वार्षिक स्थोरा की उठाई-धराई की क्षमता (मत्स्य बंदरगाह से भिन्न)	< 5 मिलयन टन वार्षिक स्थोरा की उठाई-धराई की क्षमता और पत्तन/बंदरगाह में ≥ 10,000 टन वार्षिक मछली पकड़ने की क्षमता	साधारण शर्त लागू होगी
7(च)	राजमार्ग	1) नए राष्ट्रीय राजमार्ग: और 2) 30 कि.मी. से ज्यादा लंबाई के राष्ट्रीय राजमार्गों का विस्तार जिनमें मार्ग के दोनों ओर अतिरिक्त भूमि अधिग्रहण 20 मीटर से ज्यादा है और एक से अधिक राज्यों से गुजरते हैं ।	1) नए राज्य राजमार्ग: और 2) 30 कि.मी. से ज्यादा लंबे राष्ट्रीय /राज्य राजमार्गों का विस्तार जिनमें मार्ग के दोनों ओर अतिरिक्त भूमि अधिग्रहण 20 मीटर से ज्यादा है ।	साधारण शर्त लागू होगी
7(छ)	आकाशी यात्री रज्जुमार्ग		सभी परियोजनाएं	साधारण शर्त लागू होगी
7(ज)	सामान्य स्राव उपचार संयंत्र (स.स्र.उ.सं.)		सभी परियोजनाएं	साधारण शर्त लागू होगी
7(झ)	नगरपालिका ठोस अपशिट प्रबंधन सुविधा (स.न..अ.प्र.स.)		सभी परियोजनाएं	साधारण शर्त लागू होगी
8	भवन/ संनिर्माण परियोजनाएं/क्षेत्र विकास परियोजनाएं और शहरीकरण			
8(क)	भवन एवं संनिर्माण पथियोजनाएं		≥ 20000 वर्ग मी. के निर्मित क्षेत्र और < 1,50,000 वग मीटर के निर्मित क्षेत्र #	# आवृत संनिर्माण के लिए निर्मित क्षेत्र आकाश की ओर खुली सुविधाओं की दशा में यह क्रियाकलाप क्षेत्र भी होगा ।
8(ख)	नगरी और क्षेत्र विकास परियोजनाएं		≥50है0. क्षेत्र को सम्मिलित करते हुए और या निर्मित क्षेत्र ≥ 1,50,000 वर्ग मीटर ++	++ 8 (ख) के अंतर्गत सभी परियोजनाओं को ख 1 प्रवर्ग के अनुसार निबंधित किया जाएगा ।

टिप्पण

साधारण शर्त (सा.श.)

प्रवर्ग "ख" में विनिर्दिष्ट किसी परियोजना या क्रियाकलाप को प्रवर्ग "क " माना जाएगा, यदि वह : (i) वन्य जीव (संरक्षण) अधिनियम, 1972 के अधीन अधिसूचित संरक्षित क्षेत्र; (ii) उसकी समय-समय पर केन्द्रीय प्रदूषण नियंत्रण बोर्ड द्वारा गंभीर रूप से प्रदूषित क्षेत्र के रूप में पहचान की गई है; (iii) परिस्थितिकी संवेदनशील क्षेत्र अधिसूचित है ; और (iv) अंतरराज्यिक सीमाओं और अंतरराष्ट्रीय सीमाओं से दस किलोमीटर के भीतर संपूर्ण रूप सें या आंशिक रूप में अवस्थित है ।

विनिर्दिष्ट शर्त (वि.श.)

यदि कोई मद 4(घ), 4(च), 5(ड़), 5(च) जैसी समयुग्म की प्रकार का उद्योगों वाला औद्योगिक संपदा/कांप्लेक्स/निर्यात प्रसंस्करण जोन/विशेष आर्थिक जोन/जैव प्रौद्योगिकी उद्यान/चमड़ा परिसर या पूर्व निर्धारित गतिविधियों वाले उद्योग (आवश्यक नहीं कि वे समयुग्म हों) पूर्व पर्यावरणीय अनापत्ति प्राप्त करते हैं, तो ऐसी संपदाओं/कांप्लेक्सों के भीतर प्रस्तावित उद्योगों सहित निजी उद्योगों को तब तक पूर्व पर्यावरणीय अनापत्ति लेना अपेक्षित नहीं है जब तक कि औद्योगिक कांप्लेक्स/संपदा के लिए निबंधनों और शर्तों का अनुपालन नहीं करते (ऐसी संपदा/कांप्लेक्सों की पूर्व पर्यावरणीय अनापत्ति की निबंधनों और शर्तों के लिए सहमता सुनिश्चित करने के विधिक उत्तरदायित्व से स्पष्ट रूप से पहचान करने का प्रबंध होना चाहिए जिसे कांप्लेक्स/संपदा के सारे जीवन में उसके अतिक्रमण के लिए उत्तरदायी ठहराया जा सकेगा) ।

[सं. जे-11013/56/2004-आईए-II(I)]

आर. चन्द्रमोहन, संयुक्त सचिव

परिशिष्ट -I
(पैरा 6 देखें)
प्ररूप 1

(1) आधारभूत जानकारी

परियोजना का नाम :

विचाराधीन अनुकल्पी अवस्थिति/स्थान :

परियोजना का आकार * :

परियोजना की प्राक्कलित लागत

संपर्क जानकारी :

संवीक्षा प्रवर्ग :

- अंचलीय क्रियाकलाप के लिए तत्स्थानी क्षमता (जैसे विनिर्माण करने के लिए उत्पादन क्षमता, खनिज उत्पादन के लिए खनन पट्टा क्षेत्र और उत्पादन क्षमता, खनिज पूर्वेक्षण के लिए क्षेत्र, अनुरेख परिवहन अवसंरचना के लिए लंबाई, विद्युत उत्पादन आदि के उत्पादन क्षमता)

(II) क्रियाकलाप

1. परियोजना का संनिर्माण, प्रचालन या न निकालना जिसमें ऐसी कार्रवाई भी सम्मिलित है जो परिक्षेत्र में भौतिक परिवर्तनों का कारण होगी (स्थलाकृति, भूमि उपयोग, जल निकायों में परिवर्तन आदि)

क्र.सं.	जानकारी/जांच सूची पुष्टिकरण	हां/नहीं	उनके ब्यौरे (लगभग मात्रा/दरों, सहित, जो संभव हो, सहित) आंकड़ों की जानकारी के स्रोत सहित ।
1.1	भूमि उपयोग, समावेश भूमि या स्थलाकृति में स्थायी या अस्थायी जिसमें भूमि उपयोग की मात्रा(स्थानीय भूमि उपयोग योजना के बारे में वृद्धि भी सम्मिलित है)		
1.2	विद्यमान भूमि, वनस्पति और भवनों की अनापत्ति		
1.3	नई भूमि उपयोगों का सृजन		
1.4	संनिर्माण पूर्व अन्वेषण अर्थात बोर, गृह, मिट्टी का परिक्षण करना		
1.5	संनिर्माण कार्य		
1.6	विध्वंस कार्य		

1.7	संनिर्माण कार्य या संनिर्माण कर्मकारों के घर के प्रबंध के लिए उपयोग किए गए अस्थायी स्थल		
1.8	उपर्युक्त भू-भवन, संस्थापनाएं या ढ़ाचा जिसमें अनुरेखीय संस्थापनाएं, काटनी और भरना या खुदाई भी सम्मिलित है ।		
1.9	भूमिगत कार्य जिसमें खनन या सुरंग बनाना भी सम्मिलित है ।		
1.10	भूमि उद्धार कार्य		
1.11	तलकर्षक		
1.12	अपसृष्ट संस्थापनाएं		
1.13	उत्पादन और विनिर्माण प्रक्रियाएं		
1.14	सामग्रियों या माल के भंडार की सुविधाएं		
1.15	ठोस अपशिष्ट या तरल बहिःस्रावों के उपचार या निपटान के लिए सुविधाएं		
1.16	परिचालन कर्मकारों के दीर्घकालिक घर का प्रबंध के लिए सुविधाएं		
1.17	संनिर्माण या प्रचालन के दौरान नई सड़क, रेल या समुद्री यातायात		
1.18	नई सड़क, रेल, वायु जल वाहित या अन्य परिवहन अवसंरचना जिसमें नए या परिवर्तित मार्ग और स्टेशन, पत्तन, विमानपत्तन आदि भी सम्मिलित है ।		
1.19	विद्यमान परिवहन मार्गों को बंद करना या अपवर्तन या यातायात परिचालन में परिवर्तनों के लिए प्रमुख अवसंरचना		
1.20	नई या अपवर्तित प्रेषण लाईनें या पाइपलाइनें		
1.21	अवरूद्ध करना, बांध बनाना, पुलिया बनाना, पुनःरेखांकन या जलमार्गों या एक्वीफरों के जल विज्ञान के लिए अन्य परिवर्तन		
1.22	प्रवाह पार		
1.23	भूजल या भूतल से जल का अंतरण या पृथक्करण		
1.24	नालियों या प्रवाह को प्रभावित करने वाले जलनिष्पादों या भूमि स्तर में परिवर्तन		
1.25	संनिर्माण, परिचालन या निष्कालन के लिए कार्मिक या सामग्रियों का परिवहन		
1.26	दीर्घकालिक रूप मे तोड़ना, प्रारंभ करना या कार्य पुनः आरंभ करना ।		
1.27	आरंभ के दौरान जारी ऐसे क्रियाकलाप जो पर्यावरण पर समाघात कर सकेंगे ।		
1.28	जनता का किसी क्षेत्र के लिए या तो अस्थायी रूप से या स्थायी रूप से आना ।		
1.29	अन्य देशीय प्रजातियों का आना		
1.30	मूल निवासी प्रजातियों या आनुवंशिक विविधता की हानि		
1.31	अन्य कोई कार्रवाईयां		

2. परियोजना के संनिर्माण या प्रचालन के लिए प्राकृतिक संसाधनों का उपयोग(जैसे भूमि,जल सामग्री या ऊर्जा विशेष रूप से ऐसा कोई संसाधन जो नवीकरणीय नहीं हैं या जिसका प्रदाय कम है)

क्र.सं.	सूचना/जांच सूची पुष्टीकरण	हां/नहीं	सूचना आंकड़ों के स्रोत सहित उनके ब्यौरे (लगभग मात्राओं/दरों सहित, जहां कहीं संभव हो)
2.1	विशेष रूप से अविकसित भूमि या कृषि भूमि (हे0)		
2.2	जल (अनुमानित स्रोत और प्रतियोगी उपयोगकर्ता) इकाई : के.एल.डी.		
2.3	खनिज (एम.टी.)		
2.4	संनिर्माण सामग्री -- पत्थर, औसत, बालू/मृदा (अनुमानित स्रोत एम.टी.)		
2.5	वन और इमारती लकड़ी (स्रोत -- एम.टी.)		
2.6	ऊर्जा जिसके अंतर्गत विद्युत और ईंधन (स्रोत, प्रतियोगी उपयोगकर्ता) इकाई : ईंधन (एम.टी.) ऊर्जा (एम.डब्ल्यू)		
2.7	कोई अन्य प्राकृतिक संसाधन (समुचित मानक इकाइयों का उपयोग करें)		

3. पदार्थों या सामग्रियों का उपयोग भंडारण, परिवहन, उठाई धराई या उत्पादन, जो मानव स्वास्थ्य या पर्यावरण के लिए खतरनाक या जिनके मानव स्वास्थ्य की जोखिम की वास्तविकता के बारे में चिंताएं उठती हैं ।

क्र.सं.	सूचना/जांच सूची पुष्टिकरण	हां/नहीं	सूचना आंकड़ों के स्रोत सहित उनके ब्यौरे (लगभग मात्राओं/दरों सहित, जहां कहीं संभव हो)
3.1	पदार्थों या सामग्रियों का उपयोग जो मानव स्वास्थ्य या पर्यावरण (फ्लोरा, फौना और जल प्रदाय के लिए परिसंकटमय) (एम.एस.आई.एच.सी. नियमों के अनुसार) है		
3.2	रोग के होने में परिवर्तन या रोग वाहकों के रोग का प्रभाव (उदहरणार्थ कीट या जल-जन्य रोग)		
3.3	लोगों के कल्याण पर प्रभाव उदहरणार्थ जीवन दशाओं में परिवर्तन करके		
3.4	लोगों के संवेदनशील समूह जो परियोजना अर्थात् अस्पताल रोगियों, बालकों, वृद्धों आदि द्वारा प्रभावित हो सकते हैं		
3.5	कोई अन्य कारण		

4. निर्माण या प्रचालन या प्रारंभ न करने के दौरान ठोस अपशिष्टों का उत्पादन (एम.टी./मास)

क्र.सं.	सूचना/जांच सूची पुष्टीकरण	हां/नहीं	सूचना आंकड़ों के स्रोत सहित उनके ब्यौरे (लगभग मात्राओं/दरों सहित, जहां कहीं संभव हो)
4.1	मृदा, अधिक भार या खान अपशिष्ट		
4.2	नगरपालिक अपशिष्ट (घरेलू और या वाणिज्यिक अपशिष्ट)		
4.3	परिसंकटमय अपशिष्ट (परिसंकटमय अपशिष्ट प्रबंध तंत्र नियमों के अनुसार)		
4.4	अन्य औद्योगिक प्रक्रिया अपशिष्ट		
4.5	अधिशेष उत्पाद		
4.6	मल बही-स्राव उपचार से मल गाद या अन्य गाद		
4.7	निर्माण या ढाये गए अपशिष्ट		
4.8	बेकार मशीनरी या उपस्कर		
4.9	संदूषित मृदाएं या अन्य सामग्रियां		
4.10	कृषि अपशिष्ट		
4.11	अन्य ठोस अपशिष्ट		

5. वायु में संदूषकों या किसी परिसंकटमय विषैले या जहरीले पदार्थों का विसर्जन

क्र.सं.	सूचना/जांच सूची पुष्टीकरण	हां/नहीं	सूचना आंकड़ों के स्रोत सहित उनके ब्यौरे (लगभग मात्राओं/दरों सहित, जहां कहीं संभव हो)
5.1	लेखन सामग्री या चल संसाधनों से जीवाश्म ईंधनों के दहन से उत्सर्जन		
5.2	उत्पादन प्रक्रियाओं से उत्सर्जन		
5.3	सामग्रियों की उठाई धराई से जिसके अंतर्गत भंडारण या परिवहन भी है, उत्सर्जन		
5.4	निर्माण क्रियाकलापों से जिसके अंतर्गत संयंत्र और उपस्कर भी हैं, उत्सर्जन		
5.5	सामग्रियों की उठाई धराई से जिसके अंतर्गत निर्माण सामग्री, मल और अपशिष्ट भी हैं, धूल या गंध		
5.6	अपशिष्ट के भस्मीकरण से उत्सर्जन		
5.7	खुली वायु में अपशिष्ट के जलने से उत्सर्जन (उदाहरणार्थ स्वैश सामग्री, निर्माण सामग्री का ढेर)		
5.8	किन्हीं अन्य स्रोतों से उत्सर्जन		

6. शोर और कंपन का पैदा होना तथा प्रकाश और उष्मा का उत्सर्जन

क्र.सं.	सूचना/जांच सूची पुष्टीकरण	हां/नहीं	सूचना आंकड़ों के स्रोत सहित उनके ब्यौरे (लगभग मात्राओं/दरों सहित, जहां कहीं संभव हो)
6.1	उपस्कर के प्रचालन से उदाहरणार्थ ईंजन, वातायन संयंत्र, संदलनित्र		
6.2	औद्योगिक या उसी प्रकार की प्रक्रियाओं से		
6.3	निर्माण या ढहाने से		
6.4	विस्फोटन या पाइलिंग से		
6.5	निर्माण या प्रचालन संबंधी यातायात से		
6.6	प्रकाशन या प्रशीतन प्रणालियों से		
6.7	किन्हीं अन्य संसाधनों से		

7. भूमि या मल नालियों, सतही जल, भूमिगत जल, तटीय जल या समुद्र में प्रदूषकों के विसर्जन से भूमि या जल के संदूषण के जोखिम

क्र.सं.	सूचना/जांच सूची पुष्टीकरण	हां/नहीं	सूचना आंकड़ों के स्रोत सहित उनके ब्यौरे (लगभग मात्राओं/दरों सहित, जहां कहीं संभव हो)
7.1	परिसंकटमय सामग्री की उठाई धराई, भंडारण, उपयोग या गाद से		
7.2	जल या भूमि में (अनुमानित ढंग और विसर्जन का स्थान) मल या अन्य बही स्रावों के विसर्जन से		
7.3	वायु से भूमि या जल में उत्सर्जित प्रदूषकों के जमा होने से		
7.4	किन्हीं अन्य संसाधनों से		
7.5	क्या इन संसाधनों से पर्यावरण में प्रदूषकों के जमा होने से दीर्घकालिक जोखिम है ?		

8. परियोजना के निर्माण या प्रचालन के दौरान दुर्घटनाओं का जोखिम जो मानव स्वास्थ्य या पर्यावरण को प्रभावित कर सकते हैं

क्र.सं.	सूचना/जांच सूची पुष्टीकरण	हां/नहीं	सूचना आंकड़ों के स्रोत सहित उनके ब्यौरे (लगभग मात्राओं/दरों सहित, जहां कहीं संभव हो)
8.1	परिसंकटमय पदार्थों के विस्फोट, गाद, आग, भंडारण, उठाई धराई या उत्पादन से		
8.2	किन्हीं अन्य कारणों से		
8.3	क्या परियोजना प्राकृतिक विपदाओं द्वारा पर्यावरण को नुकसान पहुंचाएंगी (उदाहरणार्थ बाढ़, भूकंप, भू-सखलन, वृष्टिस्फोट आदि) ?		

9. बातें जिन पर विचार किया जाना चाहिए (जैसे पारिणामिक विकास) जिनके कारण पर्यावरणीय प्रभाव होते हैं या जो संचयी प्रभावों को करने के लिए अन्य विद्यमान प्रभावों सहित या पश्चिक्षेत्र में नियोजित क्रियाकलापों के लिए सामर्थवान हैं

क्र.सं.	सूचना/जांच सूची पुष्टीकरण	हां/नहीं	सूचना आंकड़ों के स्रोत सहित उनके ब्यौरे (लगभग मात्राओं/दरों सहित, जहां कहीं संभव हो)
9.1	जिसके कारण आधार का विकास, सहायक विकास या परियोजना द्वारा विकास को बल मिलता है जिसका पर्यावरण पर प्रभाव हो सकता है अर्थात् – • आधारिक अवसंरचना (सड़कें, बिजली प्रदाय, अपशिष्ट या अपशिष्ट जल उपचार आदि) • आवासन विकास • निष्कर्षित उद्योग • पूर्ति उद्योग • अन्य		
9.2	जिसके कारण स्थल का बाद में उपयोग होता है जिसका पर्यावरण पर प्रभाव हो सकता है		
9.3	पश्चात्वर्ती विकासों के लिए उदाहरण स्थापित करना		
9.4	सामिप्य के कारण अन्य विद्यमान परियोजनाओं पर संचयी प्रभाव हैं या उसी प्रकार के प्रभावों सहित नियोजित परियोजनाएं		

(III) पर्यावरणीय संवेदनशीलता

क्र.सं.	क्षेत्र	नाम/पहचान	आकाशी दूरी (15 किलोमीटर के भीतर) प्रस्तावित परियोजना अवस्थान सीमा
1.	उनके पारिस्थितिक भू-दृश्य, सांस्कृतिक या अन्य संबंधित मूल्यों के लिए अंतरराष्ट्रीय कन्वेंशन, राष्ट्रीय या स्थानीय विधान के अधीन संरक्षित क्षेत्र ।		
2.	क्षेत्र जो पारिस्थितिक कारणों के लिए महत्वपूर्ण या संवेदनशील हैं - वेट लैड्स, जल स्रोत या अन्य जल संबंधी निकाय, तटीय जोन, बायोस्फीयर, पहाड़ियां, वन		
3.	क्षेत्र जो प्रजनन, घोसला बनाने, चारे के लिए, आराम करने के लिए, सर्दी के लिए, प्रवास के लिए फ्लोरा और फोना के संरक्षित महत्वपूर्ण या संवेदनशील प्रजातियों द्वारा उपयोग किए जाते हैं		
4.	अंतरदेशीय, तटीय, सामुद्रिक या भूमिगत जल		

5.	राज्य, राष्ट्रीय सीमाएं		
6.	मनोरंजन की या अन्य पर्यटक/यात्रियों वाले क्षेत्रों में पहुंच के लिए जनता द्वारा उपयोग किए जाने वाले मार्ग या सुविधाएं		
7.	रक्षा प्रतिष्ठापन		
8.	सघन रूप से बसे हुए या निर्मित क्षेत्र		
9.	संवेदनशील मानव निर्मित भूमि उपयोगों के अधिभोगाधीन क्षेत्र अस्पताल, पाठशालाएं, पूजा स्थल, सामुदायिक सुविधाएं		
10.	महत्वपूर्ण, उच्च क्वालिटी या दुर्लभ संसाधनों वाले क्षेत्र (भूमिगत जल संसाधन, भूतल संसाधन, वनोद्योग, कृषि, मत्स्य उद्योग, पर्यटन, खनिज)		
11.	क्षेत्र जो पहले से ही प्रदूषण या पर्यावरणीय नुकसान के अधीन हैं (वे जहां विद्यमान विधिक पर्यावरणीय मानक अधिक होते हैं)		
12.	क्षेत्र जहां प्राकृतिक संकट हो सकता है जो वर्तमान पर्यावरणीय समस्याओं की योजनाओं को प्रभावित कर सकते हैं (धंसना, भूस्खलन, भूमि कटाव, बाढ़ या अत्यंत या प्रतिकूल वातावरणीय दशाएं)		

परिशिष्ट 2
(पैरा 6 देखे)

प्ररूप 1क (केवल अनुसूची की मद 8 के अधीन सूचीबद्ध निर्माण परियोजनाओं के लिए)

पर्यावरणीय प्रभावों की जांच सूची

(पूर्ण जानकारी उपलब्ध कराने के लिए अपेक्षित परियोजना सलाहकार और जहां कहीं आवश्यक हो प्ररूप के साथ स्पष्टीकारक टिप्पण संलग्न करें तथा प्रस्तावित पर्यावरणीय प्रबंधतंत्र योजना और मानिटरी कार्यक्रम के साथ प्रस्तुत करें)

1. भूमि पर्यावरण

(परियोजना स्थल और आसपास का विशाल दृश्य संलग्न करें)

1.1 क्या विद्यमान भूमि के उपयोग में परियोजना से सारवान रूप से परिवर्तन किया जाएगा जो वातावरण आसपास से संगत नहीं है ? (प्रस्तावित भूमि उपयोग सक्षम प्राधिकारी के अनुमोदित मास्टर प्लान/विकास योजना के अनुरूप होना चाहिए । भूमि उपयोग में परिवर्तन यदि कोई हो और सक्षम प्राधिकारी से कानूनी अनुमोदन प्रस्तुत किया जाए) । (i) स्थल अवस्थान, (ii) प्रस्तावित स्थल (पांच सौ मीटर के भीतर आसपास के लक्षणों) और (iii) सामुदिक मापमान के स्थल (स्तर और समोच्च रेखा उपदर्शित करते हुए) के नक्शे संलग्न करें । यदि उपलब्ध नहीं है तो केवल अवधारणा युक्त योजना संलग्न करें ।

1.2 भूमि क्षेत्र, निर्मित क्षेत्र, जल उपभोग, विद्युत अपेक्षा, संयोजकता, सामुदायिक सुविधाएं आदि आवश्यकताओं आदि के अनुसार सभी बड़ी परियोजना की आवश्यकताओं को रूपरेखा दें ।

1.3 प्रस्तावित स्थल से संलग्न विद्यमान सुविधाओं पर प्रस्तावित क्रियाकलाप के [illegible] खुले स्थल, सामुदायिक सुविधाएं, विद्यमान भूमि उपयोग के ब्यौरे, स्थानीय पारिस्थिति [illegible]

1.4 क्या किसी महत्वपूर्ण भूमि चिह्न के परिणामस्वरूप भूस्खलन, भूमि कटाव [illegible] किस्म, ढाल विश्लेषण, भूमि कटाव की संवेदनशीलता, भूकंपन आदि के ब्यौरे दिए जाएं ।

1.5 क्या प्राकृतिक मल निकास प्रणाली के परिवर्तन से संबंधित प्रस्ताव है ? (प्रस्तावित परियोजना स्थल के निकट प्राकृतिक मल निकासी को दर्शित करते हुए किसी समोच्च नक्शे के ब्यौरे दें)

1.6 निर्माण क्रियाकलाप – कर्तन, भरण, भूमि सुधार आदि में अंतर्वलित भूमि कार्य की मात्राएं क्या हैं ? (अंतर्वलित भूमि कार्य, स्थल आदि के बाहर से सामग्री भरने के परिवहन के ब्यौरे दें)

1.7 निर्माण अवधि के दौरान जल प्रदाय अपशिष्ट उठाई धराई आदि के संबंध में ब्यौरे दें ।

1.8 क्या नीचे के क्षेत्रों और वेट लैंडस में परिवर्तन होंगे ? (वह ब्यौरे दें कि किस प्रकार निचले क्षेत्र और वेट लैंडस प्रस्तावित क्रियाकलापों से उपांतरित हो रहे हैं)

1.9 क्या निर्माण के दौरान निर्माण के कूड़ा करकट और अपशिष्ट से स्वास्थ्य को खतरा होगा ? (निर्माण के दौरान जिसके अंतर्गत निर्माण श्रम और व्ययन की युक्तियां भी हैं, जनित अपशिष्टों की विभिन्न किस्मों की मात्राएं दें ।)

2. जल पर्यावरण

2.1 विभिन्न उपयोगों की अपेक्षाओं के विश्लेषण सहित प्रस्तावित परियोजना के लिए जल अपेक्षा की कुल मात्रा दें । जल अपेक्षा की पूर्ति कैसे होगी । स्रोतों और मात्राओं का कथन करें तथा एक जल अतिशेष विवरण दें ।

2.2 जल के प्रस्तावित स्रोत की क्षमता क्या है ? (बहाव या प्राप्ति के आधार पर)

2.3 अपेक्षित जल की क्वालिटी क्या है यदि पूर्ति किसी नगर पालिक स्रोत से नहीं है ? (जल की क्वालिटी के वर्ग सहित भौतिक, रासायनिक, जैव वैज्ञानिक लक्षणों को दर्शित करें)

2.4 कितनी जल अपेक्षा की उपचारित बेकार जल के पुनः चक्रण से पूर्ति हो सकती है ? (मात्राओं, स्रोतों और उपयोगिताओं के ब्यौरे दें ।)

2.5 क्या अन्य उपयोक्ताओं से जल का उपयोजन होगा ? (कृपया अन्य विद्यमान उपयोगों और उपभोग की मात्राओं पर परियोजना के प्रभाव का निर्धारण करें)

2.6 प्रस्तावित क्रियाकलापों से प्राप्त बेकार जल से प्रदूषण के भार में क्या वृद्धि है ? (प्रस्तावित क्रियाकलापों से प्राप्त बेकार जल की मात्राओं और संघटन के ब्यौरे दें)

2.7 जल अपेक्षाओं की जल संचयन से हुई पूर्ति के ब्यौरे दें । सृजित सुविधाओं के ब्यौरें प्रस्तुत करें ।

2.8 दीर्घकालिक आधार पर निर्माण चरण के पश्चात् क्षेत्र की प्रस्तावित परियोजना के पूरा होने के लक्षणों (मात्रात्मकता के साथ-साथ क्वालिटी भी) के कारण भूमि उपयोग में हुए परिवर्तनों का क्या प्रभाव होगा ? क्या इससे बाढ़ या जल के जमा होने की किसी रूप में समस्या में वृद्धि होगी ?

2.9 भूमिगत जल पर प्रस्ताव के क्या प्रभाव होंगे ? (क्या भूमिगत जल में नल लगाया जाएगा ; भूमिगत जल की सारणी, पुनः प्रभारण क्षमता और सक्षम प्राधिकारी से अभिप्राप्त अनुमोदन यदि कोई हों के ब्यौरे दें)

2.10 भूमि और पनिलों को प्रदूषित करने वाले निर्माण क्रियाकलापों को बंद होने को रोकने के लिए क्या सावधानियां/कदम उठाए जाने हैं ? (प्रतिकूल प्रभावों से बचने के लिए मात्राओं और अपनाए जाने वाले उपायों के ब्यौरे दें)

2.11 स्थल के भीतर किस प्रकार तेज जल की व्यवस्था की जाएगी ? (क्षेत्र में बाढ़ से बचने के लिए किए गए उपबंध, समोच्च स्तरों के उपदर्शन के स्थल अभिन्यास सहित उपलब्ध कराई गई जल निकासी सुविधाओं के ब्यौरे का कथन करें)

2.12 क्या आवश्यक अवधि में विशेष रूप से निर्माण श्रमिकों के लगाए जाने से परियोजना स्थल के आसपास अस्वच्छता दशाएं उत्पन्न हो जाती हैं ? (उचित स्पष्टीकरण से न्यायोचित ठहराएं)

2.13 स्थल सुविधाओं पर संग्रहण, उपचार और जल निकासी के सुरक्षित व्ययन के लिए क्या व्यवस्था की जाती है ? (पुनःचक्रण और व्ययन के लिए प्रोद्योगिकी और सुविधओं सहित जनन, उपचार क्षमताओं की, चाहे जैसी हों मात्राओं के ब्यौरे दें)

2.14 दोहरी नलसाजी प्रणाली के ब्यौरे दें यदि उपयोग किए गए उपचारित अपशिष्ट का प्रसाधनों को बहाने या किसी अन्य उपयोग के लिए उपयोग किया जाता है ।

3 वनस्पति

3.1 क्या जैवविविधता पर परियोजना का कोई खतरा है ? (स्थानीय पारिस्थितिक प्रणाली का उसकी विशिष्ट बातों सहित यदि कोई हों वर्णन करें)

3.2 क्या निर्माण में वनस्पति की विस्तृत निकासी या उपांतरण अंतर्वलित है ? (परियोजना द्वारा प्रभावित वृक्षों और वनस्पति का विस्तृत लेखा जोखा दें)

3.3 महत्वपूर्ण स्थल की बातों पर प्रभावों को कम करने के लिए प्रस्तावित उपाय क्या हैं ? (किसी समुचित मापमान कि किसी अभिन्यास योजना सहित वृक्षारोपण, भूदृश्य, जल निकायों आदि के सृजन के प्रस्ताव के ब्यौरे दें)

4. जीव जन्तु

4.1 क्या जीव जन्तुओं, स्थलीय और जलीय रूप से किसी प्रकार हटाने या उनके चलने फिरने के लिए रूकावटें होने की संभावना है ? ब्यौरे दें ।

4.2 क्षेत्र के जीव जन्तुओं पर क्या कोई प्रत्यक्ष या अप्रत्यक्ष प्रभाव हैं ? ब्यौरे दें ।

4.3 जीवजन्तुओं पर प्रतिकूल प्रभावों को कम करने के लिए कारीडोर, मछली सीड़ियों आदि जैसे उपाय विहित करें ।

5. वायु पर्यावरण

5.1 क्या परियोजना से द्वीपों में गैसों के वायुमंडलीय सांद्रण में वृद्धि होगी और उसके परिणामस्वरूप ऊष्मा बढ़ेगी ? (प्रस्तावित निर्माणों के परिणामस्वरूप वर्धित यातायात बढ़ने को ध्यान में रखते हुए विक्षेपण आदर्शों पर आधारित अनुमानित मूल्यों सहित पृष्ठभूमि वायु क्वालिटी स्तरों के ब्यौरे दें)

5.2 धूल, जहरीली वाष्पों या अन्य परिसंकटमय गैसों के बनने पर क्या प्रभाव हैं ? सभी मौसम विज्ञान परिमापों के संबंध में ब्यौरे दें ।

5.3 क्या प्रस्ताव से यानों को पार्क करने के स्थल में कमी आएगी ? परिवहन अवसंरचना और सुधार के लिए प्रस्तावित उपायों के, जिसके अंतर्गत परियोजना स्थल के प्रवेश और निर्गम पर यातायात व्यवस्था भी है, विद्यमान स्तर के ब्यौरे दें ।

5.4 प्रत्येक प्रवर्ग के अधीन क्षेत्रों में आंतरिक सड़कों, बाइसिकिल मार्गों, पैदल यात्री मार्गों, पैदल मार्गों आदि पर चलने के पैटर्नों के ब्यौरे दें ।

5.5 क्या यातायात शोर और कंपन में महत्वपूर्ण वृद्धि होगी ? ऊपर वर्णित बातों को कम करने के लिए स्रोतों और प्रस्तावित उपायों के ब्यौरे दें ।

5.6 परियोजना स्थल के आसपास शोर स्तरों और कंपन तथा घिरी हुई वायु की क्वालिटी पर डीजी सेटों और अन्य उपस्करों पर क्या प्रभाव होगा ? ब्यौरे दें ।

6. सौन्दर्यबोधी

6.1 क्या प्रस्तावित निर्माणों के परिणामस्वरूप किसी दृश्य, दृश्यसुविधा या भूदृश्य में रूकावट होगी ? क्या प्रस्तावकों ने इन बातों पर विचार कर लिया है ?

6.2 क्या विद्यमान परिनिर्माणों पर नए निर्माण से कोई प्रतिकूल प्रभाव होगा ? किन बातों को ध्यान में रखा गया है ?

6.3 क्या डिजाइन मापमान को प्रभावित करने वाले शहर रूपी या शहरी डिजाइनों का कोई स्थानीय आकलन है ? उनका स्पष्ट रूप से उल्लेख किया जा सकता है ।

6.4 क्या कोई मानव विज्ञान संबंधी या पुरातत्वीय स्थल या बाह्य चीजें आसपास में हैं ? कथन करें यदि कोई अन्य महत्वपूर्ण बात, जिसपर प्रस्तावित स्थल के परिक्षेत्र में होने पर विचार किया गया है ।

7 सामाजिक - आर्थिक पहलू

7.1 क्या प्रस्ताव के परिणामस्वरूप स्थानीय जनता के समाज संबंधी परिनिर्माणों में कोई परिवर्तन होगा ? ब्यौरे दें ।

7.2 प्रस्तावित परियोजना के आसपास विद्यमान सामाजिक अवसंरचना के ब्यौरे दें ।

7.3 क्या परियोजना से स्थानीय समुदायों पर प्रतिकूल प्रभाव, पवित्र स्थलों या अन्य सांस्कृतिक मूल्यों में विघ्न पड़ेगा ? प्रस्तावित सुरक्षापाय क्या हैं ?

8 निर्माण सामग्री

8.1 अधिक ऊर्जा संहित निर्माण सामग्री का उपयोग हो सकेगा । क्या ऊर्जा दक्ष प्रक्रियाओं सहित निर्माण सामग्री उत्पादित की जाती है ? (निर्माण सामग्री और उनकी ऊर्जा दक्षता का चयन करने में ऊर्जा संरक्षण उपायों के ब्यौरे दें)

8.2 निर्माण के दौरान सामग्री का परिवहन और उठाई धराई के कारण प्रदूषण, शोर और लोक अशान्ति हो सकती है । इन प्रभावों को कम करने के लिए क्या उपाय किए जाने हैं ?

8.3 क्या सड़कों और ढ़ाचों में पुनः चक्रित सामग्री उपयोग की जाती है ? की गई बचतों की सीमा का कथन करें ?

8.4 परियोजना के प्रचालन संबंधी चरणों के दौरान हुए कूड़े के संग्रहण, पृथक्करण और व्ययन की पद्धति के ब्यौरे दें ।

9 ऊर्जा संरक्षण

9.1 विद्युत अपेक्षा प्रदाय के स्रोत, स्रोत आदि की पृष्ठभूमि आदि के ब्यौरे दें । निर्मित क्षेत्र में प्रति वर्ग फुट ऊर्जा खपत कितनी है ? ऊर्जा खपत को कम करने के लिए क्या प्रयास किए गए हैं ?

9.2 विद्युत की पृष्ठभूमि की किस्म और क्षमता, जिसको देने की आपकी योजना है, क्या है ?

9.3 उपयोग किए जाने वाले कांच के अभिलक्षण क्या हैं ? शार्ट वेव और लांग वेव विकिरण दोनों से संबंधित उसके अभिलक्षणों के निर्देश दें ।

9.4 भवन में कौन से अप्रत्यक्ष सौर वास्तविक कारक उपयोग किए जा रहे हैं ? प्रस्तावित परियोजना में किए गए उपयोजन को स्पष्ट करें ।

9.5 क्या गलियों और भवनों के अभिन्यास सौर ऊर्जा युक्तियों की क्षमता को अधिकतम करते हैं ? क्या आपने भवन कम्प्लैक्स में उपयोग के लिए सड़क प्रकाशन आपात प्रकाशन और सौर तप्त जल प्रणालियों के उपयोग पर विचार कर लिया है ? ब्यौरों का सार दें ।

9.6 क्या प्रशीतन/तापन भार को कम करने के लिए शेडिंग का प्रभावी रूप से उपयोग किया जाता है ? पूर्व और पश्चिम की दीवारों और छत पर शेडिंग को अधिकतम करने के लिए उपयोग करने के सिद्धांत क्या हैं ?

9.7 क्या परिनिर्माणों में ऊर्जा दक्ष स्थल शीतन, प्रकाशन और यांत्रिक प्रणालियों का उपयोग किया जाता है ? तकनीकी ब्यौरे दें । ट्रांसफार्मरों और मोटर दक्षता प्रकाशन तीव्रता और वायु प्रशीतन भार धारणाओं के ब्यौरे दें । क्या आप सीएफसी एचसीएफसी फ्री चिलर्स का उपयोग कर रहे हैं ? विनिर्देश दें ।

9.8 सूक्ष्म जलवायु के परिवर्तन में भवन क्रियाकलापों के संभावित प्रभाव क्या हैं ? तप्त द्वीप और प्रतीपन प्रभावों के सृजन पर प्रस्तावित निर्माण के संभावित प्रभावों पर स्वतः निर्धारण का उल्लेख करें ।

9.9 भवन आहाते के तापीय अभिलक्षण क्या हैं ? (क) छत ; (ख) बाह्य दीवारें ; और (ग) झरोखे ? उपयोग की गई सामग्री और व्यष्टिक संघटकों के यू मूल्यों या आर मूल्यों के ब्यौरे दें ।

9.10 अग्नि संकट के लिए प्रस्तावित सावधानियां और सुरक्षा उपाय क्या हैं ? आपात योजनाओं के ब्यौरे दें ।

9.11 दिवाल सामग्री के रूप में यदि कांच का उपयोग किया जाता है तो ब्यौरे और विनिर्देश जिसके अंतर्गत उत्सर्जनता और तापीय अभिलक्षण भी हैं, दें ।

9.12 भवन में वायु प्रवेशन की दर क्या है ? प्रवेशन के प्रभावों को कैसे कम कर रहे हैं, उसके ब्यौरे दें ।

9.13 समग्र ऊर्जा खपत में अपारंपरिक ऊर्जा प्रोद्योगिकियों का किसी सीमा तक उपयोग किया जाता है ? उपयोग की गई नवीकरणीय ऊर्जा प्रोद्योगिकियों के ब्यौरे दें ।

10 पर्यावरण प्रबंध योजना

पर्यावरण प्रबंध योजना में, निर्माण, प्रचालन और परियोजना के क्रियाकलापों के परिणामस्वरूप प्रतिकूल पर्यावरणीय प्रभावों को न्यूनतम करने के लिए समस्त जीवन चक्र के दौरान किए जाने वाले क्रियाकलापों की प्रत्येक मदवार के लिए सभी न्यूनतम करने वाले उपाय अंतर्विष्ट होंगे । इसमें विभिन्न पर्यावरणीय विनियमों के अनुपालन के लिए पर्यावरणीय मानिटरी योजना का आलेखन भी होगा । आपात की दशा में, जैसे स्थल पर दुर्घटना जिसके अंतर्गत आग लगना भी है, उठाए जाने वाले कदमों का कथन भी होगा ।

परिशिष्ट 3
(पैरा 7 देखें)

पर्यावरणीय समाघात निर्धारण दस्तावेज की साधारण संरचना

क्र.सं.	ईआईए संरचना	अंतर्वस्तु
1.	प्राक्कथन	• रिपोर्ट का प्रयोजन • परियोजना और परियोजना प्रस्तावक की पहचान • परियोजना की प्रकृति, आकार, अवस्थान का संक्षिप्त वर्णन और देश, प्रदेश में इसका महत्व • अध्ययन का विस्तार – किए गए विनियामक विस्तार के ब्यौरे (सौंपे गए कृत्यों के अनुसार)
2.	परियोजना वर्णन	• परियोजना के उन पहलुओं का संघनित वर्णन (परियोजना साध्यता अध्ययन पर आधारित) जिनकी पर्यावरणीय प्रभाव कारित करने की संभावना है । निम्नलिखित को स्पष्ट करने के लिए ब्यौरे उपबंधित किए जाने चाहिए : • परियोजना के किस्म • परियोजना की आवश्यकता • अवस्थान (साधारण अवस्थान, विनिर्दिष्ट अवस्थान, परियोजना सीमा और परियोजना स्थल अभिन्यास को दर्शित करते हुए नक्शे) • प्रचालन का आकार या विस्तार (जिसके अंतर्गत परियोजना द्वारा या उसके लिए अपेक्षित सहयोजित क्रियाकलाप) • अनुमोदन और कार्यान्वयन के लिए प्रस्तावित अनुसूची • प्रोद्योगिकी और प्रक्रिया वर्णन • परियोजना वर्णन, जिसके अंतर्गत परियोजना अभिन्यास, परियोजना आदि के संघटकों को दर्शित करते हुए आरेखन । साध्यता आरेखनों के स्कीमबद्ध प्रतिनिधित्व जो ईआईए परियोजना के लिए महत्वपूर्ण जानकारी दें । • पर्यावरणीय मानकों, पर्यावरणीय प्रचालन दशाओं या अन्य ईआईए अपेक्षाओं की पूर्ति के लिए परियोजनाओं में सम्मिलित न्यूनिकरण उपायों का वर्णन (विस्तार द्वारा यथाअपेक्षित) • प्रोद्योगिकीय असफलता के जोखिम के लिए नई और अपरीक्षित प्रोद्योगिकी का निर्धारण
3.	पर्यावरण का वर्णन	• अध्ययन क्षेत्र, अवधि, संघटक और पद्धति • विस्तार में पहचान किए गए मूल्यवान पर्यावरणीय संघटकों के लिए आधारिक लेखा की स्थापना • सभी पर्यावरणीय संघटकों के आधार नक्शे
4.	अनुमानित पर्यावरणीय समाघात और न्यूनीकरण उपाय	• परियोजना अवस्थान, संभावित दुर्घटनाओं, परियोजना डिजाइन, परियोजना निर्माण, नियमित प्रचालनों, पूरी की गई परियोजना को अंतिम रूप से बंद करना या पुर्नस्थापन के कारण अन्वेषित पर्यावरणीय समाघातों के ब्यौरे । • पहचान किए गए प्रतिकूल समाघातों न्यूनिकृत और/या दूर करने के लिए उपाय • पर्यावरणीय संघटकों के असंपरिवर्तनीय और पुनः प्राप्त न किए जा सकने वाले आश्वासन ।

		• समाघातों के महत्व का निर्धारण (**महत्व महत्व निर्धारण का अवधारणा** करने के लिए मानदण्ड) • न्यूनीकरण उपाय
5.	अनुकल्पियों का विश्लेषण (प्रोद्योगिकी और स्थल)	• यदि विस्तारित करने के कार्य के परिणामस्वरूप **अनुकल्पियों** की आवश्यकता होती है : • प्रत्येक अनुकल्पी का वर्णन • प्रत्येक अनुकल्पी के प्रतिकूल समाघातों का सार • प्रत्येक अनुकल्पी के लिए प्रस्तावित न्यूनीकरण उपाय और • अनुकल्पी का चयन
6.	पर्यावरणीय मानिटरी कार्यक्रम	• न्यूनीकरण उपायों की प्रभावशीलता को मानीटर करने के तकनीकी पहलू (जिसके अंतर्गत माप, पद्धति, आवर्त, अवस्थान, आंकड़े विश्लेषण, रिपोर्ट करने की अनुसूचियां, आपात प्रक्रियाएं, विस्तृत बजट और उपापन अनुसूचियां भी है)
7.	अतिरिक्त अध्ययन	• लोक परामर्श • जोखिम निर्धारण • सामाजिक समाघात निर्धारण आर और आर अनुवर्ती योजनाएं
8.	परियोजना के फायदे	• भौतिक अवसंरचना में सुधार • सामाजिक अवसंरचना में सुधार • नियोजन क्षमता - कुशल ; अर्धकुशल और अकुशल • अन्य मूर्त फायदे
9.	पर्यावरणीय लागत फायदा विश्लेषण	यदि विस्तारण प्रक्रम पर सिफारिश की जाती है ।
10.	ईएमपी	• यह सुनिश्चित करने के लिए कि न्यूनीकरण संबंधी उपाय कार्यान्वित किए गए हैं और ईआईए के अनुमोदन के पश्चात् उनकी प्रभावी मानीटरी की गई है, प्रशासनिक पहलुओं का वर्णन ।
11.	संक्षिप्त सार और निष्कर्ष (यह ईआईए रिपोर्ट का संक्षिप्त सार होगा)	• परियोजना के कार्यान्वयन के लिए समग्र औचित्य । • यह स्पष्टीकरण कि प्रतिकूल प्रभाव किस प्रकार कम किए जाते हैं
12.	नियोजित परामर्शियों का प्रकटन	• उनके संक्षिप्त कार्य और दिए गए परामर्श की प्रकृति सहित नियोजित किएं गए परामर्शियों के नाम.

परिशिष्ट 3क

(पैरा 7 देखे)

संक्षिप्त पर्यावरणीय समाघात निर्धारण की अंर्तवस्तु

पर्यावरणीय समाघात निर्धारण का संक्षिप्त सार अधिकतम ए -4 आकार के दस पृष्ठों पर पूरी पर्यावरणीय समाघात निर्धारण का एक संक्षिप्त सार होगा । इसमें संक्षेप में अनिवार्य रूप से पूर्ण पर्यावरणीय समाघात निर्धारण रिपोर्ट के निम्नलिखित अध्याय होने चाहिएं :-

(1) परियोजना वर्णन :
(2) पर्यावरण का वर्णन :
(3) अनुमानित पर्यावरणीय समाघात और न्यूनीकरण उपाय :
(4) पर्यावरणीय मानीटरी कार्यक्रम :
(5) अतिरिक्त अध्ययन :
(6) परियोजना के फायदे :
(7) पर्यावरण प्रबंधन योजना :

परिशिष्ट 4

(पैरा 7 देखिए)

लोक सुनवाई को संचालित करने के लिए प्रक्रिया

1.0 लोक सुनवाई की, संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति द्वारा परियोजना स्थल (स्थलों) में या उसके निकटस्थ परिसर में जिला वार एक प्रणालीबद्ध, समयबद्ध और पारदर्शी रीति में अधिकतम संभव लोक भागीदारी को सुनिश्चित करते हुए व्यवस्था की जाएगी ।

2.0 प्रक्रिया :

2.1 आवेदक, उस राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति के सदस्य सचिव को, जिसकी अधिकारिता में परियोजना अवस्थित है, विहित कानूनी अवधि के भीतर लोक सुनवाई की व्यवस्था करने के लिए एक सादा पत्र के माध्यम से अनुरोध करेगा । यदि परियोजना स्थल का किसी राज्य या संघ राज्यक्षेत्र के परे विस्तार है तो प्रत्येक राज्य या संघ राज्यक्षेत्र में जिसमें परियोजना स्थित है, लोक सुनवाई आज्ञापक है और आवेदक, इस प्रक्रिया के अनुसार लोक सुनवाई करने के लिए प्रत्येक संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति को पृथक अनुरोध करेगा ।

2.2 आवेदक, अनुरोध पत्र के साथ प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट की कम से कम दस हार्ड प्रतियां और उसी के बराबर सॉफ्ट (इलैक्ट्रानिक) प्रतियां, परिशिष्ट 3 में दी गई सामान्य संरचना सहित (जिसके अंतर्गत विस्तार (प्रक्रम 2) के पश्चात् संसूचित किए गए सौंपे गए कृत्यों के अनुसार निर्बाध रूप से अंग्रेजी और स्थानीय भाषा में तैयार की गई संक्षिप्त पर्यावरणीय समाघात निर्धारण रिपोर्ट सम्मिलित है) संलग्न की जाएगी । इसके साथ-साथ आवेदक संक्षिप्त पर्यावरणीय समाघात निर्धारण रिपोर्ट के साथ ऊपर प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट की एक हार्ड प्रति और एक सॉफ्ट प्रति पर्यावरण और वन मंत्रालय तथा निम्नलिखित प्राधिकारियों या कार्यालयों को जिनकी अधिकारिता में परियोजना अवस्थित होगी, अग्रेषित करने की व्यवस्था करेगा :

(क) जिला मजिस्ट्रेट

(ख) जिला परिषद या नगर निगम

(ग) जिला उद्योग कार्यालय

(घ) पर्यावरण और वन मंत्रालय का संबंधित प्रादेषिक कार्यालय

2.3 ऊपर उल्लिखित प्राधिकारी, पर्यावरण और वन मंत्रालय के सिवाय, प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट की प्राप्ति पर, अपनी अधिकारिताओं के भीतर, उसमें हितबद्ध व्यक्तियों से संबंधित विनियामक प्राधिकरणों को अपनी टीका-टिप्पणियां भेजने का अनुरोध करते हुए, विस्तृत प्रचार करने की व्यवस्था करेंगे । वे लोक सुनवाई होने तक सामान्य कार्यालय घंटों के दौरान जनता को इलैक्ट्रानिक रूप से या अन्यथा निरीक्षण करने के लिए प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट भी उपलब्ध कराएंगे । पर्यावरण और वन मंत्रालय अपनी वेबसाइट पर प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट का सार तत्परता से प्रदर्शित करेगा और दिल्ली स्थित मंत्रालय में सामान्य कार्यालय घंटों के दौरान किसी अधिसूचित स्थान पर निर्देश के लिए पूरे प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट को भी उपलब्ध करेगा ।

2.4 संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्य प्रदूषण नियंत्रण समिति भी राज्य/संघ राज्यक्षेत्र के भीतर परियोजना की बाबत प्रचार करने के लिए उसी प्रकार की व्यवस्था करेगी और चयनित कार्यालयों या लोक पुस्तकालयों या पंचायतों आदि में निरीक्षण के लिए प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट (परिशिष्ट 3क) का संक्षिप्त सार उपलब्ध कराएगी । वे उपर्युक्त पांच प्राधिकारियों/कार्यालयों अर्थात् पर्यावरण और वन मंत्रालय, जिला मजिस्ट्रेट आदि को प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट की एक प्रति अतिरिक्त रूप से भी उपलब्ध कराएंगे ।

3.0 लोक सुनवाई की सूचना

3.1 संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति का सदस्य सचिव परियोजना सलाहकार से प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट की प्राप्ति की तारीख से तीस दिनों के भीतर लोक सुनवाई संचालित करने के लिए तारीख, समय और निश्चित स्थान को अंतिम रूप देगा और उसको मुख्य राष्ट्रीय दैनिक में और एक प्रादेशिक भाषा के दैनिक समाचारपत्र में विज्ञापित करेगा । जनता को अपनी प्रतिक्रियाएं देने के लिए कम से कम तीस दिनों की सूचना उपलब्ध कराई जाएगी ;

3.2 विज्ञापन, जनता को उन स्थानों या कार्यालयों की बाबत भी सूचित करेगा जहां प्रारूप पर्यावरणीय समाघात निर्धारण रिपोर्ट और पर्यावरणीय समाघात निर्धारण रिपोर्ट के संक्षिप्त सार तक सुनवाई से पूर्व जनता की पहुंच हो सके ;

3.3 लोक सुनवाई की तारीख, समय और स्थान को तब तक आस्थगित नहीं किया जाएगा जब तक कोई अवांछित आपात स्थिति न आ जाए और केवल संबंधित जिला मजिस्ट्रेट की सिफारिश पर किया आस्थगन को उन्हीं राष्ट्रीय और प्रादेषिक भाषा के समाचार पत्रों के माध्यम से अधिसूचित किया जाएगा तथा संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति द्वारा पहचान किए सभी कार्यालयों में मुख्य रूप से प्रदर्शित भी किया जाएगा ;

3.4 ऊपर आपवादिक परिस्थितियों में, केवल जिला मजिस्ट्रेट के परामर्श से संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति के सदस्य-सचिव द्वारा लोक परामर्श के लिए नई तारीख, समय और स्थान का विनिश्चय किया जाएगा और ऊपर 3.1 के अधीन प्रक्रिया के अनुसार नए सिरे से अधिसूचित किया जाएगा ।

4.0 पैनल

जिला मजिस्ट्रेट या किसी अपर जिला मजिस्ट्रेट से अन्यून की पंक्ति का उसका प्रतिनिधि, राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति के प्रतिनिधि की सहायता से समस्त लोक सुनवाई प्रक्रिया का पर्यवेक्षण करेगा और उसकी अध्यक्षता करेगा ।

5.0 वीडियोग्राफी

राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति, समस्त कार्यवाहियों की वीडियो फिल्म तैयार करने की व्यवस्था करेगी । संबंधित विनियामक प्राधिकरण को इसे अग्रेषित करते समय वीडियो टेप की एक प्रति या एक सीडी लोक सुनवाई कार्रवाईयों के साथ संलग्न की जाएगी ।

6.0 कार्यवाहियां

6.1 उन सभी व्यक्तियों की उपस्थिति को जो स्थल पर विद्यमान हैं, अंतिम कार्यवाहियों के साथ संलग्न किया जाएगा ।

6.2 कार्यवाहियों को आरंभ करने के लिए उपस्थिति हेतु कोई गणपूर्ति अपेक्षित नहीं होगी ।

6.3 आवेदक का कोई प्रतिनिधि, परियोजना और पर्यावरण समाघात निर्धारण रिपोर्ट के संक्षिप्त सार की प्रस्तुति के साथ कार्यवाहियां आरंभ करेगा ।

6.4 स्थल पर उपस्थित प्रत्येक व्यक्ति को, आवेदक से परियोजना पर सूचना या स्पष्टीकरण मांगने का अवसर दिया जाएगा । लोक सुनवाई कार्यवाहियों का संक्षिप्त सार ठीक रूप से प्रदर्शित करते हुए अभिव्यक्त सभी विचारों और अभिव्यक्त चिंताओं को राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति के प्रतिनिधि द्वारा अभिलिखित किया जाएगा और प्रांतीय भाषा में अंतर्वस्तुओं को स्पष्ट करते हुए कार्यवाहियों के अंत में श्रोताओं को पढ़ कर सुनाया जाएगा तथा करार पाए गए कार्यवृत्त पर उसी दिन जिला मजिस्ट्रेट या उसके प्रतिनिधि द्वारा हस्ताक्षर किए जाएंगे तथा संबंधित राज्य प्रदूषण नियंत्रण बोर्ड/संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति को अग्रेषित किया जाएगा ।

6.5 जनता द्वारा उठाए गए मुद्दों का एक विवरण और आवेदक की टीका-टिप्पणियों को भी स्थानीय भाषा में और अंग्रेजी भाषा में तैयार किया जाएगा तथा कार्यवाहियों के साथ संलग्न किया जाएगा ।

6.6 लोक सुनवाई की कार्यवाहियों को उस पंचायत घर के कार्यालय पर, जिसकी अधिकारिता में परियोजना अवस्थित है, संबंधित जिला परिषद, जिला मजिस्ट्रेट और राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति के कार्यालय में सहजदृश्य रूप से प्रदर्शित किया जाएगा । राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति साधारण जानकारी के लिए अपने वेबसाइट पर कार्यवाहियों को प्रदर्शित भी करेगी । कार्यवाहियों पर टीका-टिप्पणियों को, यदि कोई हों, संबंधित विनियामक प्राधिकरणों और संबंधित आवेदक को प्रत्यक्षतः भेजी जा सकेगी ।

7.0 लोक सुनवाई को पूरा करने के लिए कालावधि :

7.1 लोक सुनवाई, आवेदक से अनुरोध पत्र की प्राप्ति की तारीख से पैंतालीस दिन की अवधि के भीतर पूरी की जाएगी । अतः संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्यक्षेत्र प्रदूषण नियंत्रण समिति लोक सुनवाई के पूरा होने के आठ दिनों के भीतर संबंधित विनियामक प्राधिकरण को लोक सुनवाई की कार्यवाहियों को भेजेगी । आवेदक, लोक सुनवाई और लोक परामर्श के पश्चात् तैयार की गई अंतिम पर्यावरणीय समाघात निर्धारण रिपोर्ट या प्रारूप पर्यावरण समाघात निर्धारण रिपोर्ट पर अनुपूरक रिपोर्ट की प्रति के साथ संबंधित विनियामक प्राधिकरण को, अनुमोदित लोक सुनवाई कार्यवाहियों की एक प्रति प्रत्यक्षतः भी अग्रेषित करेगा ।

7.2 यदि राज्य प्रदूषण नियंत्रण बोर्ड या संघ राज्य क्षेत्र प्रदूषण नियंत्रण समिति, नियत पैंतालीस दिनों के भीतर लोक सुनवाई करने में असफल रहती है तो केन्द्रीय सरकार, पर्यावरण और वन मंत्रालय, प्रवर्ग 'क' परियोजना या क्रियाकलाप के लिए और प्रवर्ग ख परियोजना या क्रियाकलाप के लिए और राज्य सरकार या संघ राज्यक्षेत्र प्रशासन, राज्य पर्यावरणीय समाघात निर्धारण प्राधिकरण के अनुरोध पर, किसी अन्य अभिकरण या प्राधिकरण को इस अधिसूचना में अधिकथित प्रक्रिया के अनुसार प्रक्रिया को पूरा करने के लिए नियोजित करेगी ।

परिशिष्ट 5

(पैरा 7 देखिए)

आंकलन के लिए विहित प्रक्रिया

1. आवेदक, संबंधित विनियामक प्राधिकरण को निम्नलिखित दस्तावेजों को संलग्न करते हुए, जहां लोक परामर्श आज्ञापक है, एक सादा सूचना के माध्यम से आवेदन करेगा :-

- अंतिम पर्यावरण समाधात निर्धारण रिपोर्ट की बीस हार्ड प्रतियां और एक साफ्ट प्रति
- लोक सुनवाई की कार्यवाहियों की वीडियो टेप की एक प्रति या सी.डी.
- अंतिम अभिन्यास योजना की बीस प्रतियां
- परियोजना साध्यता रिपोर्ट की एक प्रति

2. आवेदक द्वारा प्रस्तुत की गई अंतिम पर्यावरणीय समाघात निर्धारण रिपोर्ट और अन्य सुसंगत दस्तावेजों की संबंधित विनियामक प्राधिकरण द्वारा उसकी प्राप्ति की तारीख से तीस दिनों के भीतर कार्यालय में तत्परता से टीओआर के प्रतिनिर्देश से समीक्षा की जाएगी और ध्यान में रखी गई अपर्याप्तताओं को प्रत्येक अंतिम पर्यावरणीय समाघात निर्धारण रिपोर्ट की एक प्रति संलग्न करते हुए, जिसके अंतर्गत लोक सुनवाई कार्यवाहियां और प्राप्त की गई अन्य लोक प्रतिक्रियाएं भी हैं, प्ररूप 1 या प्ररूप 1क की एक प्रति और प्रस्तावों पर विचार करने के लिए पर्यावरणीय निर्धारण समिति/राज्य पर्यावरणीय निर्धारण समिति की बैठकों के लिए निश्चित तारीखें सहित पर्यावरणीय निर्धारण समिति/राज्य पर्यावरणीय निर्धारण समिति के सदस्यों को एकल सेट में इलेक्ट्रानिक रूप से या अन्यथा संसूचित किया जाएगा ।

3. जहां कोई लोक परामर्श् आज्ञापक नहीं है और इसलिए कोई औपचारिक पर्यावरणीय समाघात निर्धारण अध्ययन अपेक्षित नहीं है, वहां आंकलन, विहित आवेदन प्ररूप 1 के आधार पर और अनुसूची की मद 8 से भिन्न सभी परियोजनाओं और क्रियाकलापों की दशा में किसी पूर्व साध्यता रिपोर्ट के आधार पर किया जाएगा । अनुसूची की मद 8 की दशा में, इसके विलक्षण परियोजना चक्र को ध्यान में रखते हुएं, संबंधित पर्यावरणीय निर्धारण समिति या राज्य पर्यावरणीय निर्धारण समिति, प्ररूप 1, प्ररूप 1क और धारणा योजना के आधार पर सभी प्रवर्ग 'ख' परियोजनाओं या क्रियाकलापों का आंकलन करेगी और पर्यावरणीय अनापत्ति के लिए शर्तें नियत करेंगी । जब कभी आवेदक सभी अन्य आवश्यक कानूनी अनुमोदनों सहित निश्चित पर्यावरणीय अनापत्ति शर्तों को पूरा करते हुए अनुमोदित स्कीम/भवन योजना प्रस्तुत करता है तो पर्यावरणीय निर्धारण समिति/राज्य पर्यावरणीय निर्धारण समिति, सक्षम प्राधिकारी को पर्यावरणीय अनापत्ति मंजूर करने की सिफारिश करेगी ।

4. प्रत्येक आवेदन, पर्यावरणीय निर्धारण समिति/राज्य पर्यावरणीय निर्धारण समिति के समक्ष और इसका पूरा आंकलन, विहित रीति में अपेक्षित दस्तावेजों/ब्यौरों सहित इसकी प्राप्ति के साठ दिनों के भीतर रखा जाएगा ।

5. आवेदक को परियोजना प्रस्ताव पर विचार करने के लिए पर्यावरणीय निर्धारण समिति/राज्य पर्यावरणीय निर्धारण समिति की निश्चित तारीख से कम से कम पन्द्रह दिन पूर्व सूचित किया जाएगा ।

6. पर्यावरणीय निर्धारण समिति/राज्य पर्यावरणीय निर्धारण समिति की बैठक के कार्यवृत्त को बैठक के पांच कार्यकरण दिनों के भीतर अंतिम रूप दिया जाएगा और संबंधित विनियामक प्राधिकरण के वेबसाइट पर प्रदर्शित किया जाएगा । परियोजना या क्रियाकलापों को पर्यावरणीय अनापत्ति को मंजूर किए जाने के लिए सिफारिश की दशा में, कार्यवृत्त में विनिर्दिष्ट पर्यावरणीय सुरक्षापायों और शर्तों को स्पष्ट रूप से सूचीबद्ध किया जाएगा । यदि सिफारिशें नामंजूर करने के लिए हैं तो उसके कारणों को भी स्पष्ट रूप से कथित किया जाएगा ।

परिशिष्ट 6

(पैरा 5 देखिए)

केन्द्रीय सरकार द्वारा गठित की जाने वाली प्रवर्ग 'क' परियोजनाओं के लिए सेक्टर/परियोजना विनिर्दिष्ट विशेषज्ञ आंकलन समिति और प्रवर्ग 'ख' परियोजनाओं के लिए राज्य/संघ राज्यक्षेत्र स्तर विशेषज्ञ आंकलन समितियों की संरचना

1. विशेषज्ञ आंकलन समितियां और राज्य/संघ राज्यक्षेत्र स्तर विशेषज्ञ आंकलन समितियां केवल निम्नलिखित पात्रता कसौटी को पूरा करने वाले वृत्तिकों और विशेषज्ञों से मिलकर बनेगी

वृत्तिक : ऐसा व्यक्ति जिसके पास कम से कम (i) एम.ए./एम.एस.सी डिग्री सहित संबंधित विद्या शाखा में पांच वर्ष का औपचारिक विश्वविद्यालय प्रशिक्षण या (ii) इंजीनयरी/प्रौद्योगिकी/वास्तुविद विद्या शाखाओं की दशा में, बी.टेक/बी.ई./बी.आर्क. डिग्री सहित क्षेत्र में विहित व्यावहारिक प्रशिक्षण सहित किसी वृत्तिक प्रशिक्षण पाठ्यक्रम में चार वर्षीय औपचारिक प्रशिक्षण या (iii) अन्य वृत्तिक डिग्री (जैसे विधि) जिसमें पांच वर्ष का औपचारिक विश्वविद्यालय प्रशिक्षण या विहित व्यावहारिक प्रशिक्षण अंतर्वलित है, या (iv) विहित शिक्षुता/कारीगारी तथा संबंधित वृत्तिक संगम द्वारा संचालित परिक्षाएं उत्तीर्ण की हो (जैसे चार्टर्ड अकाउंटेंसी) या (v) किसी विश्वविद्यालय डिग्री के पश्चात् किसी विश्वविद्यालय या सेवा अकादमी में दो वर्ष का औपचारिक प्रशिक्षण (जैसे एम.बी.ए./आई.ए.एस./आई.एफ.एस.) व्यष्टि वृत्तकों का चयन करते समय उनके द्वारा उनके क्षेत्रों में प्राप्त अनुभव को ध्यान में रखा जाएगा ।

विशेषज्ञ : ऊपर पात्रता कसौटी को पूरा करने वाला कोई वृत्तिक जिसके पास क्षेत्र में कम से कम पंद्रह वर्ष का सुसंगत अनुभव या संबंधित क्षेत्र में कोई उच्चतर डिग्री हो (जैसे पी.एच.डी. और कम से कम दस वर्ष का सुसंगत अनुभव) ।

आयु : सत्तर वर्ष से नीचे । तथापि, किसी क्षेत्र में विशेषज्ञों की अनुपलब्धता/कमी की दशा में विशेषज्ञ आंकलन समिति के सदस्यों की अधिकतम आयु को पचहतर वर्ष तक अनुज्ञात किया जा सकेगा ।

2. पर्यावरणीय निर्धारण समिति के सदस्य निम्नलिखित क्षेत्रों/विद्या शाखाओं में अपेक्षित विशेषज्ञता और अनुभव वाले विशेषज्ञ होंगे । उस दशा में कि "विशेषज्ञ" की कसौटी को पूरा करने वाले व्यक्ति उपलब्ध नहीं हैं, तो उसी क्षेत्र में पर्याप्त अनुभव रखने वाले वृत्तिकों पर भी विचार किया जा सकेगा ।

- पर्यावरण क्वालिटी विशेषज्ञ : पर्यावरणीय क्वालिटी के संबंध में माप/मानिटरी, विश्लेषण और निर्वचन में विशेषज्ञ ।

- परियोजना प्रबंधन में क्षेत्रीय विशेषज्ञ : परियोजना प्रबंधन या सुसंगत क्षेत्रों में प्रक्रिया /प्रचालन/सुविधा प्रबंधन में विशेषज्ञ ।
- पर्यावरणीय समाघात निर्धारण प्रक्रिया विशेषज्ञ : पर्यावरणीय समाघात निर्धारण का संचालन और कार्यान्वयन तथा पर्यावरणीय प्रबंधन योजना और अन्य प्रबंधन योजना तैयार करने में विशेषज्ञ और जो पर्यावरणीय समाघात निर्धारण प्रक्रिया में उपयोग की जाने वाली भावी तकनीकों और औजारों में विस्तृत विशेषज्ञता और ज्ञान रखते हों ।
- जोखिम निर्धारण विशेषज्ञ ।
- पेड़ - पौधे और जीव- जन्तु प्रबंधन में प्राणी विज्ञान विशेषज्ञ ।
- वन और वन्य जीव विशेषज्ञ ।
- परियोजना आंकलन में अनुभव सहित पर्यावरणीय अर्थशास्त्र विशेषज्ञ ।

3. पर्यावरणीय निर्धारण समिति की सदस्यता पंद्रह नियमित सदस्यों से अधिक की नहीं होगी । तथापि, अध्यक्ष, समिति की किसी विशिष्ट बैठक के लिए किसी सुसंगत क्षेत्र में किसी विशेषज्ञ को सदस्य के रूप में सहयोजित कर सकेगा ।

4. अध्यक्ष, सुसंगत विकास क्षेत्र में एक प्रतिष्ठित और पर्यावरणीय निति या प्रबंधन में अथवा लोक प्रशासन में अनुभव प्राप्त विशेषज्ञ होगा ।

5. अध्यक्ष, सदस्यों में से एक सदस्य को उपाध्यक्ष के रूप में नामनिर्देशित करेगा जो अध्यक्ष की अनुपस्थिति में पर्यावरणीय निर्धारण समिति की बैठक की अध्यक्षता करेगा ।

6. पर्यावरण और वन मंत्रालय का एक प्रतिनिधि उसके सचिव के रूप में समिति की सहायता करेगा ।

7. किसी सदस्य की अधिकतम पदावधि, जिसके अंतर्गत अध्यक्ष भी है, प्रत्येक तीन वर्ष की दो पदावधि होगी ।

8. अध्यक्ष/सदस्य को किसी कारण और समुचित जांच के बिना पदावधि के अवसान से पूर्व नहीं हटाया जा सकेगा ।

MINISTRY OF ENVIRONMENT AND FORESTS
NOTIFICATION

New Delhi, the 14th September, 2006

S.O. 1533(E).—Whereas, a draft notification under Sub-rule (3) of Rule 5 of the Environment (Protection) Rules, 1986 for imposing certain restrictions and prohibitions on new projects or activities, or on the expansion or modernization of existing projects or activities based on their potential environmental impacts as indicated in the Schedule to the notification, being undertaken in any part of India[1], unless prior environmental clearance has been accorded in accordance with the objectives of National Environmment Policy as approved by the Union Cabinet on 18th May, 2006 and the procedure specified in the notification, by the Central Government or the State or Union Territory Level Environment Impact Assessment Authority (SEIAA), to be constituted by the Central Government in consultation with the State Government or the Union Territory Administration concerned under Sub-section (3) of Section 3 of the Environment (Protection) Act, 1986 for the purpose of this notification, was published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii) *vide* number S.O. 1324(E), dated the 15th September, 2005 inviting objections and suggestions from all persons likely to be affected thereby within a period of sixty days from the date on which copies of Gazette containing the said notification were made available to the public ;

And whereas, copies of the said notification were made available to the public on 15th September, 2005;

And whereas, all objections and suggestions received in response to the above mentioned draft notification have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986, read with clause (d) of sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986 and in supersession of the notification number S.O. 60 (E) dated the 27th January, 1994, except in respect of things done or omitted to be done before such supersession, the Central Government hereby directs that on and from the date of its publication the required construction of new projects or activities or the expansion or modernization of existing projects or activities listed in the Schedule to this notification entailing capacity addition with change in process and or technology shall be undertaken in any part of India only after the prior environmental clearance from the Central Government or as the case may be, by the State Level Environment Impact Assessment Authority, duly constituted by the Central Government under sub-section (3) of section 3 of the said Act, in accordance with the procedure specified hereinafter in this notification.

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[1]Includes the territorial waters

2. Requirements of prior Environmental Clearance (EC):- The following projects or activities shall require prior environmental clearance from the concerned regulatory authority, which shall hereinafter referred to be as the Central Government in the Ministry of Environment and Forests for matters falling under Category 'A' in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category 'B' in the said Schedule, before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity:

(i) All new projects or activities listed in the Schedule to this notification;

(ii) Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;

(iii) Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.

3. **State Level Environment Impact Assessment Authority:-** (1) A State Level Environment Impact Assessment Authority hereinafter referred to as the SEIAA shall be constituted by the Central Government under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 comprising of three Members including a Chairman and a Member – Secretary to be nominated by the State Government or the Union territory Administration concerned.

(2) The Member-Secretary shall be a serving officer of the concerned State Government or Union territory administration familiar with environmental laws.

(3) The other two Members shall be either a professional or expert fulfilling the eligibility criteria given in Appendix VI to this notification.

(4) One of the specified Members in sub-paragraph (3) above who is an expert in the Environmental Impact Assessment process shall be the Chairman of the SEIAA.

(5) The State Government or Union territory Administration shall forward the names of the Members and the Chairman referred in sub- paragraph 3 to 4 above to the Central Government and the Central Government shall constitute the SEIAA as an authority for the purposes of this notification within thirty days of the date of receipt of the names.

(6) The non-official Member and the Chairman shall have a fixed term of three years (from the date of the publication of the notification by the Central Government constituting the authority).

(7) All decisions of the SEIAA shall be unanimous and taken in a meeting.

4. **Categorization of projects and activities:-**

(i) All projects and activities are broadly categorized in to two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man made resources.

(ii) All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification;

(iii) All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, *will* require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification. In the absence of a duly constituted SEIAA or SEAC, a Category 'B' project shall be treated as a Category 'A' project;

5. Screening, Scoping and Appraisal Committees:-

The same Expert Appraisal Committees (EACs) at the Central Government and SEACs (hereinafter referred to as the (EAC) and (SEAC) at the State or the Union territory level shall screen, scope and appraise projects or activities in Category 'A' and Category 'B' respectively. EAC and SEAC's shall meet at least once every month.

(a) The composition of the EAC shall be as given in Appendix VI. The SEAC at the State or the Union territory level shall be constituted by the Central Government in consultation with the concerned State Government or the Union territory Administration with identical composition;

(b) The Central Government may, with the prior concurrence of the concerned State Governments or the Union territory Administrations, constitutes one SEAC for more than one State or Union territory for reasons of administrative convenience and cost;

(c) The EAC and SEAC shall be reconstituted after every three years;

(d) The authorised members of the EAC and SEAC, concerned, may inspect any site(s) connected with the project or activity in respect of which the prior environmental clearance is sought, for the purposes of screening or scoping or appraisal, with prior notice of at least seven days to the applicant, who shall provide necessary facilities for the inspection;

(e) The EAC and SEACs shall function on the principle of collective responsibility. The Chairperson shall endeavour to reach a consensus in each case, and if consensus cannot be reached, the view of the majority shall prevail.

6. Application for Prior Environmental Clearance (EC):-

An application seeking prior environmental clearance in all cases shall be made in the prescribed Form 1 annexed herewith and Supplementary Form 1A, if applicable, as given in Appendix II, after the identification of prospective site(s) for the project and/or activities to which the application relates, before commencing any construction activity, or preparation of land, at the site by the applicant. The applicant shall furnish, along with the application, a copy of the pre-feasibility project report except that, in case of construction projects or activities (item 8 of the Schedule) in addition to Form 1 and the Supplementary Form 1A, a copy of the conceptual plan shall be provided, instead of the pre-feasibility report.

7. Stages in the Prior Environmental Clearance (EC) Process for New Projects:-

7(i) The environmental clearance process for new projects will comprise of a maximum of four stages, all of which may not apply to particular cases as set forth below in this notification. These four stages in sequential order are:-

- Stage (1) Screening (Only for Category 'B' projects and activities)
- Stage (2) Scoping
- Stage (3) Public Consultation
- Stage (4) Appraisal

I. **Stage (1) - Screening**:

In case of Category 'B' projects or activities, this stage will entail the scrutiny of an application seeking prior environmental clearance made in Form 1 by the concerned State level Expert Appraisal Committee (SEAC) for determining whether or not the project or activity

requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of environmental clearance depending up on the nature and location specificity of the project . The projects requiring an Environmental Impact Assessment report shall be termed Category 'B1' and remaining projects shall be termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the Ministry of Environment and Forests shall issue appropriate guidelines from time to time.

II. **Stage (2) - Scoping:**

(i) "Scoping": refers to the process by which the Expert Appraisal Committee in the case of Category 'A' projects or activities, and State level Expert Appraisal Committee in the case of Category 'B1' projects or activities, including applications for expansion and/or modernization and/or change in product mix of existing projects or activities, determine detailed and comprehensive Terms Of Reference (TOR) addressing all relevant environmental concerns for the preparation of an Environment Impact Assessment (EIA) Report in respect of the project or activity for which prior environmental clearance is sought. The Expert Appraisal Committee or State level Expert Appraisal Committee concerned shall determine the Terms of Reference on the basis of the information furnished in the prescribed application Form1/Form 1A including Terms of Reference proposed by the applicant, a site visit by a sub- group of Expert Appraisal Committee or State level Expert Appraisal Committee concerned only if considered necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, Terms of Reference suggested by the applicant if furnished and other information that may be available with the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned. All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction/Township/Commercial Complexes /Housing) shall not require Scoping and will be appraised on the basis of Form 1/ Form 1A and the conceptual plan.

(ii) The Terms of Reference (TOR) shall be conveyed to the applicant by the Expert Appraisal Committee or State Level Expert Appraisal Committee as concerned within sixty days of the receipt of Form 1. In the case of Category A Hydroelectric projects Item 1(c) (i) of the Schedule the Terms of Reference shall be conveyed along with the clearance for pre-construction activities .If the Terms of Reference are not finalized and conveyed to the applicant within sixty days of the receipt of Form 1, the Terms of Reference suggested by the applicant shall be deemed as the final Terms of Reference approved for the EIA studies. The approved Terms of Reference shall be displayed on the website of the Ministry of Environment and Forests and the concerned State Level Environment Impact Assessment Authority.

(iii) Applications for prior environmental clearance may be rejected by the regulatory authority concerned on the recommendation of the EAC or SEAC concerned at this stage itself. In case of such rejection, the decision together with reasons for the same shall be communicated to the applicant in writing within sixty days of the receipt of the application.

III. **Stage (3) - Public Consultation**:

(i) "Public Consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category 'A' and Category B1 projects or activities shall undertake Public Consultation, except the following:-

(a) modernization of irrigation projects (item 1(c) (ii) of the Schedule).

(b) all projects or activities located within industrial estates or parks (item 7(c) of the Schedule) approved by the concerned authorities, and which are not disallowed in such approvals.

(c) expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land.

(d) all Building /Construction projects/Area Development projects and Townships (item 8).

(e) all Category 'B2' projects and activities.

(f) all projects or activities concerning national defence and security or involving other strategic considerations as determined by the Central Government.

(ii) The Public Consultation shall ordinarily have two components comprising of:-

(a) a public hearing at the site or in its close proximity- district wise, to be carried out in the manner prescribed in Appendix IV, for ascertaining concerns of local affected persons;

(b) obtain responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity.

(iii) the public hearing at, or in close proximity to, the site(s) in all cases shall be conducted by the State Pollution Control Board (SPCB) or the Union territory Pollution Control Committee (UTPCC) concerned in the specified manner and forward the proceedings to the regulatory authority concerned within 45(forty five) of a request to the effect from the applicant.

(iv) in case the State Pollution Control Board or the Union territory Pollution Control Committee concerned does not undertake and complete the public hearing within the specified period, and/or does not convey the proceedings of the public hearing within the prescribed period directly to the regulatory authority concerned as above, the regulatory authority shall engage another public agency or authority which is not subordinate to the regulatory authority, to complete the process within a further period of forty five days,.

(v) If the public agency or authority nominated under the sub paragraph (iii) above reports to the regulatory authority concerned that owing to the local situation, it is not possible to conduct the public hearing in a manner which will enable the views of the concerned local persons to be freely expressed, it shall report the facts in detail to the concerned regulatory authority, which rnay, after due consideration of the report and other reliable information that it may have, decide that the public consultation in the case need not include the public hearing.

(vi) For obtaining responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity, the concerned regulatory authority and the State Pollution Control Board (SPCB) or the Union territory Pollution Control Committee (UTPCC) shall invite responses from such concerned persons by placing on their website the Summary EIA report prepared in the format given in Appendix IIIA by the applicant along with a copy of the application in the prescribed form , within seven days of the receipt of a written request for arranging the public hearing . Confidential information including non-disclosable or legally privileged information involving Intellectual Property Right, source specified in the application shall not be placed on the web site. The regulatory authority concerned may also use

other appropriate media for ensuring wide publicity about the project or activity. The regulatory authority shall, however, make available on a written request from any concerned person the Draft EIA report for inspection at a notified place during normal office hours till the date of the public hearing. All the responses received as part of this public consultation process shall be forwarded to the applicant through the quickest available means.

(vii) After completion of the public consultation, the applicant shall address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal. The applicant may alternatively submit a supplementary report to draft EIA and EMP addressing all the concerns expressed during the public consultation.

IV. Stage (4) - Appraisal:

(i) Appraisal means the detailed scrutiny by the Expert Appraisal Committee or State Level Expert Appraisal Committee of the application and other documents like the Final EIA report, outcome of the public consultations including public hearing proceedings, submitted by the applicant to the regulatory authority concerned for grant of environmental clearance. This appraisal shall be made by Expert Appraisal Committee or State Level Expert Appraisal Committee concerned in a transparent manner in a proceeding to which the applicant shall be invited for furnishing necessary clarifications in person or through an authorized representative. On conclusion of this proceeding, the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall make categorical recommendations to the regulatory authority concerned either for grant of prior environmental clearance on stipulated terms and conditions, or rejection of the application for prior environmental clearance, together with reasons for the same.

(ii) The appraisal of all projects or activities which are not required to undergo public consultation, or submit an Environment Impact Assessment report, shall be carried out on the basis of the prescribed application Form 1 and Form 1A as applicable, any other relevant validated information available and the site visit wherever the same is considered as necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

(iii) The appraisal of an application be shall be completed by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within sixty days of the receipt of the final Environment Impact Assessment report and other documents or the receipt of Form 1 and Form 1 A, where public consultation is not necessary and the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee shall be placed before the competent authority for a final decision within the next fifteen days .The prescribed procedure for appraisal is given in Appendix V ;

7(ii). Prior Environmental Clearance (EC) process for Expansion or Modernization or Change of product mix in existing projects:

All applications seeking prior environmental clearance for expansion with increase in the production capacity beyond the capacity for which prior environmental clearance has been granted under this notification or with increase in either lease area or production capacity in the case of mining projects or for the modernization of an existing unit with increase in the total production capacity beyond the threshold limit prescribed in the Schedule to this notification through change in process and or technology or involving a change in the product –mix shall be made in Form 1 and they shall be considered by the concerned Expert Appraisal Committee or State Level Expert Appraisal Committee within sixty days, who will decide on the due diligence

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necessary including preparation of EIA and public consultations and the application shall be appraised accordingly for grant of environmental clearance.

8.Grant or Rejection of Prior Environmental Clearance (EC):

(i) The regulatory authority shall consider the recommendations of the EAC or SEAC concerned and convey its decision to the applicant within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned or in other words within one hundred and five days of the receipt of the final Environment Impact Assessment Report, and where Environment Impact Assessment is not required, within one hundred and five days of the receipt of the complete application with requisite documents, except as provided below.

(ii) The regulatory authority shall normally accept the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned. In cases where it disagrees with the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, the regulatory authority shall request reconsideration by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned while stating the reasons for the disagreement. An intimation of this decision shall be simultaneously conveyed to the applicant. The Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, in turn, shall consider the observations of the regulatory authority and furnish its views on the same within a further period of sixty days. The decision of the regulatory authority after considering the views of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be final and conveyed to the applicant by the regulatory authority concerned within the next thirty days.

(iii) In the event that the decision of the regulatory authority is not communicated to the applicant within the period specified in sub-paragraphs (i) or (ii) above, as applicable, the applicant may proceed as if the environment clearance sought for has been granted or denied by the regulatory authority in terms of the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

(iv) On expiry of the period specified for decision by the regulatory authority under paragraph (i) and (ii) above, as applicable, the decision of the regulatory authority, and the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be public documents.

(v) Clearances from other regulatory bodies or authorities shall not be required prior to receipt of applications for prior environmental clearance of projects or activities, or screening, or scoping, or appraisal, or decision by the regulatory authority concerned, unless any of these is sequentially dependent on such clearance either due to a requirement of law, or for necessary technical reasons.

(vi) Deliberate concealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis. Rejection of an application or cancellation of a prior environmental clearance already granted, on such ground, shall be decided by the regulatory authority, after giving a personal hearing to the applicant, and following the principles of natural justice.

9. Validity of Environmental Clearance (EC):

The "Validity of Environmental Clearance" is meant the period from which a prior environmental clearance is granted by the regulatory authority, or may be presumed by the applicant to have been granted under sub paragraph (iv) of paragraph 7 above, to the start of production operations by the project or activity, or completion of all construction operations in case of construction projects (item 8 of the Schedule), to which the application for prior environmental clearance refers. The prior environmental clearance granted for a project or activity shall be valid for a period of ten years in the case of River Valley projects (item 1(c) of the Schedule), project life as estimated by Expert Appraisal Committee or State Level Expert Appraisal Committee subject to a maximum of thirty years for mining projects and five years in the case of all other projects and activities. However, in the case of Area Development projects and Townships [item 8(b)], the validity period shall be limited only to such activities as may be the responsibility of the applicant as a developer. This period of validity may be extended by the regulatory authority concerned by a maximum period of five years provided an application is made to the regulatory authority by the applicant within the validity period, together with an updated Form 1, and Supplementary Form 1A, for Construction projects or activities (item 8 of the Schedule). In this regard the regulatory authority may also consult the Expert Appraisal Committee or State Level Expert Appraisal Committee as the case may be.

10. Post Environmental Clearance Monitoring:

(i) It shall be mandatory for the project management to submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year.

(ii) All such compliance reports submitted by the project management shall be public documents. Copies of the same shall be given to any person on application to the concerned regulatory authority. The latest such compliance report shall also be displayed on the web site of the concerned regulatory authority.

11. Transferability of Environmental Clearance (EC):

A prior environmental clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor, or by the transferee with a written "no objection" by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period. No reference to the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned is necessary in such cases.

12. Operation of EIA Notification, 1994, till disposal of pending cases:

From the date of final publication of this notification the Environment Impact Assessment (EIA) notification number S.O.60 (E) dated 27th January, 1994 is hereby superseded, except in suppression of the things done or omitted to be done before such suppression to the extent that in case of all or some types of applications made for prior environmental clearance and pending on the date of final publication of this notification, the Central Government may relax any one or all provisions of this notification except the list of the projects or activities requiring prior environmental clearance in Schedule I , or continue operation of some or all provisions of the said notification, for a period not exceeding one year from the date of issue of this notification.

SCHEDULE

(See paragraph 2 and 7)

LIST OF PROJECTS OR ACTIVITIES REQUIRING PRIOR ENVIRONMENTAL CLEARANCE

Project or Activity		Category with threshold limit		Conditions if any
		A	B	
	1	**Mining, extraction of natural resources and power generation (for a specified production capacity)**		
(1)	(2)	(3)	(4)	(5)
1(a)	Mining of minerals	≥ 50 ha. of mining lease area Asbestos mining irrespective of mining area	<50 ha ≥ 5 ha .of mining lease area.	General Condition shall apply Note Mineral prospecting (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey
1(b)	Offshore and onshore oil and gas exploration, development & production	All projects		Note Exploration Surveys (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey
1(c)	River Valley projects	(i) ≥ 50 MW hydroelectric power generation; (ii) ≥ 10,000 ha. of culturable command area	(i) < 50 MW ≥ 25 MW hydroelectric power generation; (ii) < 10,000 ha. of culturable command area	General Condition shall apply
1(d)	Thermal Power Plants	≥ 500 MW (coal/lignite/naphta & gas based); ≥ 50 MW (Pet coke diesel and all other fuels -)	< 500 MW (coal/lignite/naptha & gas based); <50 MW ≥ 5MW (Pet coke ,diesel and all other fuels)	General Condition shall apply

(1)	(2)	(3)	(4)	(5)
1(e)	Nuclear power projects and processing of nuclear fuel	All projects		
2		**Primary Processing**		
2(a)	Coal washeries	≥ 1 million ton/annum throughput of coal	<1million ton/annum throughput of coal	General Condition shall apply (If located within mining area the proposal shall be appraised together with the mining proposal)
2 (b)	Mineral beneficiation	≥ 0.1million ton/annum mineral throughput	< 0.1million ton/annum mineral throughput	General Condition shall apply (Mining proposal with Mineral beneficiation shall be appraised together for grant of clearance)

3		Materials Production		
(1)	(2)	(3)	(4)	(5)
3(a)	Metallurgical industries (ferrous & non ferrous)	a)Primary metallurgical industry All projects		
		b) Sponge iron manufacturing ≥ 200TPD	Sponge iron manufacturing <200TPD	General Condition shall apply for Sponge iron manufacturing
		c)Secondary metallurgical processing industry All toxic and heavy metal producing units ≥ 20,000 tonnes /annum	Secondary metallurgical processing industry i.)All toxic andheavymetal producing units <20,000 tonnes /annum ii.)All other non –toxic secondary metallurgical processing industries >5000 tonnes/annum	
3(b)	Cement plants	≥ 1.0 million tonnes/annum production capacity	<1.0 million tonnes/annum production capacity. All Stand alone grinding units	General Condition shall apply

4		**Materials Processing**		
(1)	(2)	(3)	(4)	(5)
4(a)	Petroleum refining industry	All projects	-	-
4(b)	Coke oven plants	≥2,50,000 tonnes/annum -	<2,50,000 & ≥25,000 tonnes/annum	-
4(c)	Asbestos milling and asbestos based products	All projects	-	-
4(d)	Chlor-alkali industry	≥300 TPD production capacityor a unit located out side the notified industrial area/ estate	<300 TPD production capacity and located within a notified industrial area/ estate	Specific Condition shall apply No new Mercury Cell based plants will be permitted and existing units converting to membrane cell technology are exempted from this Notification
4(e)	Soda ash Industry	All projects	-	-
4(f)	Leather/skin/hide processing industry	New projects outside the industrial area or expansion of existing units out side the industrial area	All new or expansion of projects located within a notified industrial area/ estate	Specific condition shall apply
5		**Manufacturing/Fabrication**		
5(a)	Chemical fertilizers	All projects	-	-
5(b)	Pesticides industry and pesticide specific intermediates (excluding formulations)	All units producing technical grade pesticides	-	-

(1)	(2)	(3)	(4)	(5)
5(c)	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	All projects -	-	-
5(d)	Manmade fibres manufacturing	Rayon	Others	General Condition shall apply
5(e)	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes)	Located out side the notified industrial area/ estate -	Located in a notified industrial area/ estate	Specific Condition shall apply
5(f)	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	Located out side the notified industrial area/ estate	Located in a notified industrial area/ estate	Specific Condition shall apply
5(g)	Distilleries	(i)All Molasses based distilleries (ii) All Cane juice/ non-molasses based distilleries ≥30 KLD	All Cane juice/non-molasses based distilleries – <30 KLD	General Condition shall apply
5(h)	Integrated paint industry	-	All projects	General Condition shall apply

(1)	(2)	(3)	(4)	(5)
5(i)	Pulp & paper industry excluding manufacturing of paper from waste paper and manufacture of paper from ready pulp with out bleaching	Pulp manufacturing and Pulp& Paper manufacturing industry -	Paper manufacturing industry without pulp manufacturing	General Condition shall apply
5(j)	Sugar Industry	- -	≥ 5000 tcd cane crushing capacity	General Condition shall apply
5(k)	Induction/arc furnaces/cupola furnaces 5TPH or more	- -	All projects	General Condition shall apply
6		**Service Sectors**		
6(a)	Oil & gas transportation pipe line (crude and refinery/ petrochemical products), passing through national parks /sanctuaries/coral reefs /ecologically sensitive areas including LNG Terminal	All projects -		-

(1)	(2)	(3)	(4)	(5)
6(b)	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of schedule 2 & 3 of MSIHC Rules 1989 amended 2000)	-	All projects	General Condition shall apply
7		**Physical Infrastructure including Environmental Services**		
7(a)	Air ports	All projects	-	-
7(b)	All ship breaking yards including ship breaking units	All projects	-	-
7(c)	Industrial estates/ parks/ complexes/ areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes.	If at least one industry in the proposed industrial estate falls under the Category A, entire industrial area shall be treated as Category A, irrespective of the area. Industrial estates with area greater than 500 ha. and housing at least one Category B industry.	-Industrial estates housing at least one Category B industry and area <500 ha. Industrial estates of area> 500 ha. and not housing any industry belonging to Category A or B.	Special condition shall apply Note: Industrial Estate of area below 500 ha. and not housing any industry of category A or B does not require clearance.
7(d)	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	All integrated facilities having incineration &landfill or incineration alone	All facilities having land fill only	General Condition shall apply

(1)	(2)	(3)	(4)	(5)
7(e)	Ports, Harbours	≥ 5 million TPA of cargo handling capacity (excluding fishing harbours)	< 5 million TPA of cargo handling capacity and/or ports/ harbours ≥10,000 TPA of fish handling capacity	General Condition shall apply
7(f)	Highways	i) New National High ways; and ii) Expansion of National High ways greater than 30 KM, involving additional right of way greater than 20m involving land acquisition and passing through more than one State.	i) New State High ways; and ii) Expansion of National / State Highways greater than 30 km involving additional right of way greater than 20m involving land acquisition.	General Condition shall apply
7(g)	Aerial ropeways		All projects	General Condition shall apply
7(h)	Common Effluent Treatment Plants (CETPs)		All projects	General Condition shall apply
7(i)	Common Municipal Solid Waste Management Facility (CMSWMF)		All projects	General Condition shall apply

(1)	(2)	(3)	(4)	(5)
8		**Building /Construction projects/Area Development projects and Townships**		
8(a)	Building and Construction projects		≥20000 sq.mtrs and <1,50,000 sq.mtrs. of built-up area#	#(built up area for covered construction; in the case of facilities open to the sky, it will be the activity area)
8(b)	Townships and Area Development projects.		Covering an area ≥ 50 ha and or built up area ≥1,50,000 sq .mtrs ++	++All projects under Item 8(b) shall be appraised as Category B1

Note:-

General Condition (GC):

Any project or activity specified in Category 'B' will be treated as Category A, if located in whole or in part within 10 km from the boundary of: (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas, (iv) inter-State boundaries and international boundaries.

Specific Condition (SC):

If any Industrial Estate/Complex / Export processing Zones /Special Economic Zones/Biotech Parks / Leather Complex with homogeneous type of industries such as Items 4(d), 4(f), 5(e), 5(f), or those Industrial estates with pre –defined set of activities (not necessarily homogeneous, obtains prior environmental clearance, individual industries including proposed industrial housing within such estates /complexes will not be required to take prior environmental clearance, so long as the Terms and Conditions for the industrial estate/complex are complied with (Such estates/complexes must have a clearly identified management with the legal responsibility of ensuring adherence to the Terms and Conditions of prior environmental clearance, who may be held responsible for violation of the same throughout the life of the complex/estate).

[No. J-11013/56/2004-IA-II(I)]
R. CHANDRAMOHAN, *Jt. Secy.*

APPENDIX I

(See paragraph – 6)

FORM 1

(I) Basic Information

Name of the Project:

Location / site alternatives under consideration:

Size of the Project: *

Expected cost of the project:

Contact Information:

Screening Category:

- *Capacity corresponding to sectoral activity (such as production capacity for manufacturing, mining lease area and production capacity for mineral production, area for mineral exploration, length for linear transport infrastructure, generation capacity for power generation etc.,)*

(II) Activity

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)		
1.2	Clearance of existing land, vegetation and buildings?		
1.3	Creation of new land uses?		
1.4	Pre-construction investigations e.g. bore houses, soil testing?		
1.5	Construction works?		
1.6	Demolition works?		
1.7	Temporary sites used for construction works or housing of construction workers?		
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations		
1.9	Underground works including mining or tunneling?		
1.10	Reclamation works?		
1.11	Dredging?		
1.12	Offshore structures?		
1.13	Production and manufacturing processes?		

1.14	Facilities for storage of goods or materials?		
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?		
1.16	Facilities for long term housing of operational workers?		
1.17	New road, rail or sea traffic during construction or operation?		
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?		
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?		
1.20	New or diverted transmission lines or pipelines?		
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?		
1.22	Stream crossings?		
1.23	Abstraction or transfers of water form ground or surface waters?		
1.24	Changes in water bodies or the land surface affecting drainage or run-off?		
1.25	Transport of personnel or materials for construction, operation or decommissioning?		
1.26	Long-term dismantling or decommissioning or restoration works?		
1.27	Ongoing activity during decommissioning which could have an impact on the environment?		
1.28	Influx of people to an area in either temporarily or permanently?		
1.29	Introduction of alien species?		
1.30	Loss of native species or genetic diversity?		
1.31	Any other actions?		

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):

S.No.	Information/checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)		

2.2	Water (expected source & competing users) unit: KLD		
2.3	Minerals (MT)		
2.4	Construction material – stone, aggregates, and / soil (expected source – MT)		
2.5	Forests and timber (source – MT)		
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)		
2.7	Any other natural resources (use appropriate standard units)		

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)		
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)		
3.3	Affect the welfare of people e.g. by changing living conditions?		
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,		
3.5	Any other causes		

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes		

4.2	Municipal waste (domestic and or commercial wastes)		
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)		
4.4	Other industrial process wastes		
4.5	Surplus product		
4.6	Sewage sludge or other sludge from effluent treatment		
4.7	Construction or demolition wastes		
4.8	Redundant machinery or equipment		
4.9	Contaminated soils or other materials		
4.10	Agricultural wastes		
4.11	Other solid wastes		

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources		
5.2	Emissions from production processes		
5.3	Emissions from materials handling including storage or transport		
5.4	Emissions from construction activities including plant and equipment		
5.5	Dust or odours from handling of materials including construction materials, sewage and waste		

5.6	Emissions from incineration of waste		
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)		
5.8	Emissions from any other sources		

6. Generation of Noise and Vibration, and Emissions of Light and Heat:

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers		
6.2	From industrial or similar processes		
6.3	From construction or demolition		
6.4	From blasting or piling		
6.5	From construction or operational traffic		
6.6	From lighting or cooling systems		
6.7	From any other sources		

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7. **Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:**

S.No.	**Information/Checklist** confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials		
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)		
7.3	By deposition of pollutants emitted to air into the land or into water		
7.4	From any other sources		
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?		

8. **Risk of accidents during construction or operation of the Project, which could affect human health or the environment**

S.No.	**Information/Checklist** confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances		
8.2	From any other causes		
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?		

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting. lities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: • Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) • housing development • extractive industries • supply industries • other		
9.2	Lead to after-use of the site, which could havean impact on the environment		
9.3	Set a precedent for later developments		
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects		

(III) Environmental Sensitivity

S.No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value		

2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests		
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration		
4	Inland, coastal, marine or underground waters		
5	State, National boundaries		
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas		
7	Defence installations		
8	Densely populated or built-up area		
9	Areas occupied by sensitive man-made land uses *(hospitals, schools, places of worship, community facilities)*		
10	Areas containing important, high quality or scarce resources *(ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)*		
11	Areas already subjected to pollution or environmental damage. *(those where existing legal environmental standards are exceeded)*		
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (*earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions*)		

(IV). Proposed Terms of Reference for EIA studies

APPENDIX II

(See paragraph 6)

FORM-1 A (only for construction projects listed under item 8 of the Schedule)

CHECK LIST OF ENVIRONMENTAL IMPACTS

(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the Form and submit along with proposed environmental management plan & monitoring programme)

1. LAND ENVIRONMENT

(Attach panoramic view of the project site and the vicinity)

1.1. Will the existing landuse get significantly altered from the project that is not consistent with the surroundings? (Proposed landuse must conform to the approved Master Plan / Development Plan of the area. Change of landuse if any and the statutory approval from the competent authority be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii)the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

1.2. List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.

1.3. What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing landuse, disturbance to the local ecology).

1.4. Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc may be given).

1.5. Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)

1.6. What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc.)

1.7. Give details regarding water supply, waste handling etc during the construction period.

1.8. Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)

1.9. Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)

2. WATER ENVIRONMENT

2.1. Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.

2.2. What is the capacity (dependable flow or yield) of the proposed source of water?

2.3. What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)

2.4. How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)

2.5. Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)

2.6. What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)

2.7. Give details of the water requirements met from water harvesting? Furnish details of the facilities created.

2.8. What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?

2.9. What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)

2.10. What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)

2.11. How is the storm water from within the site managed?(State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)

2.12. Will the deployment of construction labourers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)

2.13. What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal)

2.14. Give details of dual plumbing system if treated waste used is used for flushing of toilets or any other use.

3. VEGETATION

3.1. Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with it's unique features, if any)

3.2. Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)

3.3. What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale)

4. FAUNA

4.1. Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.

4.2. Any direct or indirect impacts on the avifauna of the area? Provide details.

4.3. Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna

5. AIR ENVIRONMENT

5.1. Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)

5.2. What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.

5.3. Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site.

5.4. Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category.

5.5. Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.

5.6. What will be the impact of DG sets & other equipment on noise levels & vibration in & ambient air quality around the project site? Provide details.

6. AESTHETICS

6.1. Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?

6.2. Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?

6.3. Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.

6.4. Are there any anthropological or archaeological sites or artefacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.

7. SOCIO-ECONOMIC ASPECTS

7.1. Will the proposal result in any changes to the demographic structure of local population? Provide the details.

7.2. Give details of the existing social infrastructure around the proposed project.

7.3. Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?

8. BUILDING MATERIALS

8.1. May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)

8.2. Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?

8.3. Are recycled materials used in roads and structures? State the extent of savings achieved?

8.4. Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.

9. ENERGY CONSERVATION

9.1. Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?

9.2. What type of, and capacity of, power back-up to you plan to provide?

9.3. What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?

9.4. What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.

9.5. Does the layout of streets & buildings maximise the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.

9.6. Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?

9.7. Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers? Provide specifications.

9.8. What are the likely effects of the building activity in altering the micro-climates? Provide a self assessment on the likely impacts of the proposed construction on creation of heat island & inversion effects?

9.9. What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.

9.10. What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans.

9.11. If you are using glass as wall material provides details and specifications including emissivity and thermal characteristics.

9.12. What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.

9.13. To what extent the non-conventional energy technologies are utilised in the overall energy consumption? Provide details of the renewable energy technologies used.

10. Environment Management Plan

The Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the site including fire.

APPENDIX III

(See paragraph 7

GENERIC STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSENT DOCUMENT

S.NO	EIA STRUCTURE	CONTENTS
1.	Introduction	• Purpose of the report • Identification of project & project proponent • Brief description of nature, size, location of the project and its importance to the country, region • Scope of the study – details of regulatory scoping carried out (As per Terms of Reference)
2.	Project Description	• Condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effects. Details should be provided to give clear picture of the following: • Type of project • Need for the project • Location (maps showing general location, specific location, project boundary & project site layout)

		• Size or magnitude of operation (incl. Associated activities required by or for the project • Proposed schedule for approval and implementation • Technology and process description • Project description. Including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for EIA purpose • Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements (as required by the scope) • Assessment of New & untested technology for the risk of technological failure
3.	Description of the Environment	• Study area, period, components & methodology • Establishment of baseline for valued environmental components, as identified in the scope • Base maps of all environmental components
4.	Anticipated Environmental Impacts & Mitigation Measures	• Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project • Measures for minimizing and / or offsetting adverse impacts identified • Irreversible and Irretrievable commitments of environmental components • Assessment of significance of impacts (Criteria for determining significance, Assigning significance) • Mitigation measures
5.	Analysis of Alternatives (Technology & Site)	• In case, the scoping exercise results in need for alternatives: • Description of each alternative • Summary of adverse impacts of each alternative • Mitigation measures proposed for each alternative and • Selection of alternative

6.	Environmental Monitoring Program	• Technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules)
7.	Additional Studies	• Public Consultation • Risk assessment • Social Impact Assessment. R&R Action Plans
8.	Project Benefits	• Improvements in the physical infrastructure • Improvements in the social infrastructure • Employment potential –skilled; semi-skilled and unskilled • Other tangible benefits
9.	Environmental Cost Benefit Analysis	If recommended at the Scoping stage
10.	EMP	• Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA
11	Summary & Conclusion (This will constitute the summary of the EIA Report)	• Overall justification for implementation of the project • Explanation of how, adverse effects have been mitigated
12.	Disclosure of Consultants engaged	• The names of the Consultants engaged with their brief resume and nature of Consultancy rendered

APPENDIX III A
(See paragraph 7)

CONTENTS OF SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT

The Summary EIA shall be a summary of the full EIA Report condensed to ten A-4 size pages at the maximum. It should necessarily cover in brief the following Chapters of the full EIA Report: -

1. Project Description
2. Description of the Environment
3. Anticipated Environmental impacts and mitigation measures
4. Environmental Monitoring Programme
5. Additional Studies
6. Project Benefits
7. Environment Management Plan

APPENDIX IV

(See paragraph 7)

PROCEDURE FOR CONDUCT OF PUBLIC HEARING

1.0 The Public Hearing shall be arranged in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site(s) or in its close proximity District -wise, by the concerned State Pollution Control Board (SPCB) or the Union Territory Pollution Control Committee (UTPCC).

2. 0 **The Process:**

2.1 The Applicant shall make a request through a simple letter to the Member Secretary of the SPCB or Union Territory Pollution Control Committee, in whose jurisdiction the project is located, to arrange the public hearing within the prescribed statutory period. In case the project site is extending beyond a State or Union Territory, the public hearing is mandated in each State or Union Territory in which the project is sited and the Applicant shall make separate requests to each concerned SPCB or UTPCC for holding the public hearing as per this procedure.

2.2 The Applicant shall enclose with the letter of request, at least 10 hard copies and an equivalent number of soft (electronic) copies of the draft EIA Report with the generic structure given in Appendix III including the Summary Environment Impact Assessment report in English and in the local language, prepared strictly in accordance with the Terms of Reference communicated after Scoping (Stage-2). Simultaneously the applicant shall arrange to forward copies, one hard and one soft, of the above draft EIA Report along with the Summary EIA report to the Ministry of Environment and Forests and to the following authorities or offices, within whose jurisdiction the project will be located:

(a) District Magistrate/s
(b) Zila Parishad or Municipal Corporation
(c) District Industries Office
(d) Concerned Regional Office of the Ministry of Environment and Forests

2.3 On receiving the draft Environmental Impact Assessment report, the above-mentioned authorities except the MoEF, shall arrange to widely publicize it within their respective jurisdictions requesting the interested persons to send their comments to the concerned regulatory authorities. They shall also make available the draft EIA Report for inspection electronically or otherwise to the public during normal office hours till the Public Hearing is over. The Ministry of Environment and Forests shall promptly display the Summary of the draft Environmental Impact Assessment report on its website, and also make the full draft EIA available for reference at a notified place during normal office hours in the Ministry at Delhi.

2.4 The SPCB or UTPCC concerned shall also make similar arrangements for giving publicity about the project within the State/Union Territory and make available the Summary of the draft Environmental Impact Assessment report (Appendix III A) for inspection in select offices or public libraries or panchayats etc. They shall also additionally

make available a copy of the draft Environmental Impact Assessment report to the above five authorities/offices viz, Ministry of Environment and Forests, District Magistrate etc.

3.0 Notice of Public Hearing:

3.1 The Member-Secretary of the concerned SPCB or UTPCC shall finalize the date, time and exact venue for the conduct of public hearing within 7(seven) days of the date of receipt of the draft Environmental Impact Assessment report from the project proponent, and advertise the same in one major National Daily and one Regional vernacular Daily. A minimum notice period of 30(thirty) days shall be provided to the public for furnishing their responses;

3.2 The advertisement shall also inform the public about the places or offices where the public could access the draft Environmental Impact Assessment report and the Summary Environmental Impact Assessment report before the public hearing.

3.3 No postponement of the date, time, venue of the public hearing shall be undertaken, unless some untoward emergency situation occurs and only on the recommendation of the concerned District Magistrate the postponement shall be notified to the public through the same National and Regional vernacular dailies and also prominently displayed at all the identified offices by the concerned SPCB or Union Territory Pollution Control Committee;

3.4 In the above exceptional circumstances fresh date, time and venue for the public consultation shall be decided by the Member –Secretary of the concerned SPCB or UTPCC only in consultation with the District Magistrate and notified afresh as per procedure under 3.1 above.

4.0 The Panel

4.1 The District Magistrate or his or her representative not below the rank of an Additional District Magistrate assisted by a representative of SPCB or UTPCC, shall supervise and preside over the entire public hearing process.

5.0 Videography

5.1 The SPCB or UTPCC shall arrange to video film the entire proceedings. A copy of the videotape or a CD shall be enclosed with the public hearing proceedings while forwarding it to the Regulatory Authority concerned.

6.0 Proceedings

6.1 The attendance of all those who are present at the venue shall be noted and annexed with the final proceedings.

6.2 There shall be no quorum required for attendance for starting the proceedings.

6.3 A representative of the applicant shall initiate the proceedings with a presentation on the project and the Summary EIA report.

6.4 Every person present at the venue shall be granted the opportunity to seek information or clarifications on the project from the Applicant. The summary of the public

hearing proceedings accurately reflecting all the views and concerns expressed shall be recorded by the representative of the SPCB or UTPCC and read over to the audience at the end of the proceedings explaining the contents in the vernacular language and the agreed minutes shall be signed by the District Magistrate or his or her representative on the same day and forwarded to the SPCB/UTPCC concerned.

6.5 A Statement of the issues raised by the public and the comments of the Applicant shall also be prepared in the local language and in English and annexed to the proceedings.

6.6 The proceedings of the public hearing shall be conspicuously displayed at the office of the Panchyats within whose jurisdiction the project is located, office of the concerned Zila Parishad, District Magistrate ,and the SPCB or UTPCC . The SPCB or UTPCC shall also display the proceedings on its website for general information. Comments, if any, on the proceedings which may be sent directly to the concerned regulatory authorities and the Applicant concerned.

7.0 **Time period for completion of public hearing**

7.1 The public hearing shall be completed within a period of 45 (forty five) days from date of receipt of the request letter from the Applicant. Therefore the SPCB or UTPCC concerned shall sent the public hearing proceedings to the concerned regulatory authority within 8(eight) days of the completion of the public hearing .The applicant may also directly forward a copy of the approved public hearing proceedings to the regulatory authority concerned along with the final Environmental Impact Assessment report or supplementary report to the draft EIA report prepared after the public hearing and public consultations.

7.2 If the SPCB or UTPCC fails to hold the public hearing within the stipulated 45(forty five) days, the Central Government in Ministry of Environment and Forests for Category 'A' project or activity and the State Government or Union Territory Administration for Category 'B' project or activity at the request of the SEIAA, shall engage any other agency or authority to complete the process, as per procedure laid down in this notification.

APPENDIX –V
(See paragraph 7)

PROCEDURE PRESCRIBED FOR APPRAISAL

1. The applicant shall apply to the concerned regulatory authority through a simple communication enclosing the following documents where public consultations are mandatory: -

- Final Environment Impact Assessment Report [20(twenty) hard copies and 1 (one) soft copy)]
- A copy of the video tape or CD of the public hearing proceedings
- A copy of final layout plan (20 copies)
- A copy of the project feasibility report (1 copy)

2. The Final EIA Report and the other relevant documents submitted by the applicant shall be scrutinized in office within 30 days from the date of its receipt by the concerned Regulatory Authority strictly with reference to the TOR and the inadequacies noted shall be communicated electronically or otherwise in a single set to the Members of the EAC

/SEAC enclosing a copy each of the Final EIA Report including the public hearing proceedings and other public responses received along with a copy of Form -1or Form 1A and scheduled date of the EAC /SEAC meeting for considering the proposal .

3. Where a public consultation is not mandatory and therefore a formal EIA study is not required, the appraisal shall be made on the basis of the prescribed application Form 1 and a pre-feasibility report in the case of all projects and activities other than Item 8 of the Schedule .In the case of Item 8 of the Schedule, considering its unique project cycle , the EAC or SEAC concerned shall appraise all Category B projects or activities on the basis of Form 1, Form 1A and the conceptual plan and stipulate the conditions for environmental clearance . As and when the applicant submits the approved scheme /building plans complying with the stipulated environmental clearance conditions with all other necessary statutory approvals, the EAC /SEAC shall recommend the grant of environmental clearance to the competent authority.

4. Every application shall be placed before the EAC /SEAC and its appraisal completed within 60 days of its receipt with requisite documents / details in the prescribed manner.

5. The applicant shall be informed at least 15 (fifteen) days prior to the scheduled date of the EAC /SEAC meeting for considering the project proposal.

6. The minutes of the EAC /SEAC meeting shall be finalised within 5 working days of the meeting and displayed on the website of the concerned regulatory authority. In case the project or activity is recommended for grant of EC, then the minutes shall clearly list out the specific environmental safeguards and conditions. In case the recommendations are for rejection, the reasons for the same shall also be explicitly stated.

APPENDIX VI

(See paragraph 5)

COMPOSITION OF THE SECTOR/ PROJECT SPECIFIC EXPERT APPRAISAL COMMITTEE (EAC) FOR CATEGORY A PROJECTS AND THE STATE/UT LEVEL EXPERT APPRAISAL COMMITTEES (SEACs) FOR CATEGORY B PROJECTS TO BE CONSTITUTED BY THE CENTRAL GOVERNMENT

1. The Expert Appraisal Committees (EAC(s) and the State/UT Level Expert Appraisal Committees (SEACs) shall consist of only professionals and experts fulfilling the following eligibility criteria:

Professional: The person should have at least (i) 5 years of formal University training in the concerned discipline leading to a MA/MSc Degree, or (ii) in case of Engineering /Technology/Architecture disciplines, 4 years formal training in a professional training course together with prescribed practical training in the field leading to a B.Tech/B.E./B.Arch. Degree, or (iii) Other professional degree (e.g. Law) involving a total of 5 years of formal University training and prescribed practical training, or (iv) Prescribed apprenticeship/article ship and pass examinations conducted by the concerned professional association (e.g. Chartered Accountancy),or (v) a University degree , followed by 2 years of formal training in a University or Service Academy (e.g. MBA/IAS/IFS). In selecting the individual professionals, experience gained by them in their respective fields will be taken note of.

Expert: A professional fulfilling the above eligibility criteria with at least 15 years of relevant experience in the field, or with an advanced degree (e.g. Ph.D.) in a concerned field and at least 10 years of relevant experience.

Age: Below 70 years. However, in the event of the non-availability of /paucity of experts in a given field, the maximum age of a member of the Expert Appraisal Committee may be allowed up to 75 years

2. The Members of the EAC shall be Experts with the requisite expertise and experience in the following fields /disciplines. In the event that persons fulfilling the criteria of "Experts" are not available, Professionals in the same field with sufficient experience may be considered:

- **Environment Quality Experts**: Experts in measurement/monitoring, analysis and interpretation of data in relation to environmental quality

- **Sectoral Experts in Project Management**: Experts in Project Management or Management of Process/Operations/Facilities in the relevant sectors.

- **Environmental Impact Assessment Process Experts**: Experts in conducting and carrying out Environmental Impact Assessments (EIAs) and preparation of Environmental Management Plans (EMPs) and other Management plans and who have wide expertise and knowledge of predictive techniques and tools used in the EIA process

- **Risk Assessment Experts**

- **Life Science Experts in floral and faunal management**
- **Forestry and Wildlife Experts**
- **Environmental Economics Expert with experience in project appraisal**

3. The Membership of the EAC shall not exceed 15 (fifteen) regular Members. However the Chairperson may co-opt an expert as a Member in a relevant field for a particular meeting of the Committee.

4. The Chairperson shall be an outstanding and experienced environmental policy expert or expert in management or public administration with wide experience in the relevant development sector.

5. The Chairperson shall nominate one of the Members as the Vice Chairperson who shall preside over the EAC in the absence of the Chairman /Chairperson.

6. A representative of the Ministry of Environment and Forests shall assist the Committee as its Secretary.

7. The maximum tenure of a Member, including Chairperson, shall be for 2 (two) terms of 3 (three) years each.

8. The Chairman / Members may not be removed prior to expiry of the tenure without cause and proper enquiry.

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सत्यमेव जयते

SUSTAINABLE SAND MINING MANAGEMENT GUIDELINES 2016



पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय

इंदिरा पर्यावरण भवन, जोर बाग रोड, नई दिल्ली–110 003

Ministry of Environment, Forest and Climate Change

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Acknowledgment

The Sustainable Sand Mining Management Guidelines 2016, has been prepared after extensive consultation with the States and stakeholders over a period of last one year. The Guideline assimilates the knowledge and experience of stakeholder. The main objective of the Guidelines is to ensure sustainable sand mining and environment friendly management practices in order to restore and maintain the ecology of river and other sand sources. The team of the officers of Ministry of Environment, Forest and Climate Change who have worked for preparing these Guidelines comprised of following:

1. Shri Manoj Kumar Singh, Joint Secretary
2. Dr. U. Sridharan, Scientist 'F'
3. Dr. R.B. Lal, Scientist 'D'
4. Dr. Sonu Singh, Scientist 'D'

SUSTAINABLE SAND MINING MANAGEMENT GUIDELINES

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प्रकाश जावडेकर
Prakash Javadekar

सत्यमेव जयते

राज्य मंत्री (स्वतंत्र प्रभार)
MINISTER OF STATE (INDEPENDENT CHARGE)
पर्यावरण, वन एवं जलवायु परिवर्तन
ENVIRONMENT, FOREST & CLIMATE CHANGE
भारत सरकार / GOVERNMENT OF INDIA



FOREWORD

Environmental Protection and Sustainable Development have been the cornerstones of the policies and procedures governing the industrial and other developmental activities in India. The Ministry of Environment, Forest and Climate Change has taken several policy initiatives and enacted environmental and pollution control legislations to prevent indiscriminate exploitation of natural resources and to promote integration of environmental concerns in developmental projects. One such initiative is the Notification on Environmental Impact Assessment (EIA) of developmental projects issued on 14th September, 2006 under the provisions of Environment (Protection) Act, 1986, making EIA mandatory for certain categories of developmental projects.

Another land mark decision has been taken with the new notifications dated 15.01.2016 and 20.01.2016 on mining of minor minerals and constitution of District Level Environment Impact Assessment Authority and District Level Environment Appraisal Committee. This will ensure environmentally sustainable mining especially for sand and gravel under close supervision of district authorities. Use of information technology and information technology enabled services for scientific monitoring of mining and transportation of mined out material is another important feature of above notification.

Sand and gravel are one of the most important construction materials. Ensuring their availability is vital for the development of the infrastructure in the country. There are different sources of sand and gravel, the most important among them is the river. As the requirement of these construction materials is on rise, they also are very vital for the health, physical character of the river and the different important functions of the river. The extraction of sand and gravel from the river bodies has to be regulated and done with adoption of required environmental safeguards.

In view of evolving scenario in industry and development sector, My Ministry has prepared a "Sustainable Sand Mining Management Guidelines". The Guidelines *inter-alia* focus on preparation of District Survey Report; Management Plan; Marine Sand Mining and Impact on Marine Biodiversity; Issues and Management of Mining in Cluster; Management of Sand Deposited after Flood on Agricultural Field of Farmers; Mining of Sand from Agricultural Field; Monitoring System for Sustainable Sand Mining using Information Technology System; Creation of District Level Environment Impact Assessment Authority (DEIAA) and District Level Expert Appraisal Committee (DEAC) for granting Environment Clearance for Mining of Minor Minerals; Exemption of certain cases for requirement of Environment Clearance and Standard Environmental Conditions for Sustainable Sand Mining.

The Guidelines will help the Departments of Mines and Geology, State Pollution Control Boards/Committees, Industries, Regulators, Authorities and various Stakeholders to ensure environmentally sustainable mining in the Country.

(Prakash Javadekar)

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सत्यमेव जयते

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भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
Secretary
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PREFACE

Sand is naturally occurring granular material composed of finely divided rock and mineral particles. Sand and gravel together known as aggregate, represent the highest volume of raw material used on earth. The mining of aggregate has been continuing for many years. Now the mining of aggregates has reached a level threatening the environment and ecosystem besides also reaching a level of scarcity that would threaten the economy. It is recommended that sand and aggregate mining, and quarrying should be done only after sound scientific assessment and adopting best practices to limit the impact on the environment.

The main objectives of the Guidelines, inter-alia, includes to ensure that sand and gravel mining is done in environmentally sustainable and socially responsible manner; availability of adequate quantity of aggregate in sustainable manner; improve the effectiveness of monitoring of mining and transportation of mined out material; conservation of the river equilibrium and its natural environment by protection and restoration of the ecological system; avoid aggradation at the downstream reach especially those with hydraulic structures such as jetties, water intakes etc.; to ensure the rivers are protected from bank and bed erosion beyond its stable profile; no obstruction to the river flow, water transport and restoring the riparian rights and in-stream habitats; to avoid pollution of river water leading to water quality deterioration; to prevent depletion of ground water reserves due to excessive draining out of ground water; and streamlining the process for grant of environmental clearance (EC) for sustainable mining.

The recommendations for management of sustainable sand extraction are the key objectives of the Guidelines. Emphasis is given to the setting up of monitoring plans that will provide data on profile changes and sediment transport capacity to enable the authorities to evaluate the long-term effect of the mining activities both upstream and downstream of sand extraction sites. Special emphasis is given on monitoring of the mined out material, which is key to the success of environment management plan. So use of IT and IT enabled services for effective monitoring of the quantity of mined out material and transportation along with process reengineering has been made a part of the Guideline. The Guidelines propose delegation of responsibility and authority to the cutting edge level i.e. the District Environment Impact Assessment Authority along with streamlining the process of impact assessment, environment management plan and environment clearance in cluster situation.

(Ashok Lavasa)

New Delhi
Date: 15-03-2016

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EXECUTIVE SUMMARY

The sand and gravel are one of the most important construction materials. Ensuring their availability is vital for the development of the infrastructure in the country. There are different sources of sand and gravel, the most important among them is the river. As the requirement of these construction materials is on rise, they also are very vital for the health, physical character of the river and the different important functions of the river. The extraction of sand and gravel from the river bodies has to be regulated and done with adoption of required environmental safeguards.

For making available these resources, a mapping of these resources at the district level, identification of appropriate sites for extraction, appraisal of the extraction process, putting in place the required environmental safeguards, and rigorous monitoring of the volume of extracted material is required to ensure sustainability of the entire process.

The district is the unit of administration which is best placed to do the mapping of these resources, adopt the best environmental practices for extraction of these materials and monitor its extraction and movement. The large number of leases which are awarded, the scattered geographical location of the availability of these materials and decentralized requirement and usage of the sand and aggregates also places districts in a unique position to play a vital role in adoption of environmental safeguards needed for sustainable extraction of river sand and gravel.

Recommendations for management of sustainable sand extraction are the key objective of the Guidelines. Emphasis is given to the setting up of monitoring plans that will provide data on profile changes and sediment transport capacity to enable the authorities to evaluate the long-term effect of the mining activities both upstream and downstream of sand extraction sites.

Special emphasis is given on monitoring of the mined out material, which is key to the success of environment management plan. So use of IT and IT enabled services for effective monitoring of the quantity of mined out material and transportation along with process reengineering has been made a part of the Guideliness. The Guidelines proposes delegation of responsibility and authority to the cutting edge level i.e. the District Environment Impact Assessment Authority along with streamlining the process of impact assessment, environment management plan and environment clearance in cluster situation.

Promotion of manufactured sand, artificial sand and alternative technologies in construction materials and processes are also required for reducing the dependence and demand on naturally occurring sand and gravel. Development of slag sand, sand from stone chips and there certification under BIS is an important step in this direction.

INTRODUCTION

Sustainable Development is built on three pillars - environmental, social and economic. Sustainable development cannot be achieved if the environment is protected but poverty is prevalent in a significant part of the population. Similarly, sustainable development cannot be achieved through inappropriate economic growth, if it undermines the environment in which people and businesses exists. These Guideliness support that fundamental concept, promoting environmental protection, limiting negative physiological, hydrological and social impacts under pinning sustainable economic growth.

Sand and gravel have long been used as aggregate for construction of roads and building. Today, the demand for these materials continues to rise. In India, the main sources of sand are river flood plain, coastal sand, paleo channel sand, and sand from agricultural fields.

River sand mining is a common practice as habitation concentrates along the rivers and the mining locations are preferred near the markets or along the transportation route, for reducing the transportation cost. River sand mining can damage private and public properties as well as aquatic habitats. Excessive removal of sand may significantly distort the natural equilibrium of a stream channel.

Removing sediment from the active channel bed in river interrupt the continuity of sediment transport through the river system, disrupting the sediment mass balance in the river downstream and induces channel adjustments (usually incision) extending considerable distances (commonly one kilometer or more) beyond the extraction site.

The magnitude of the impact basically depends on the magnitudes of the extraction relative to bed load sediment supply and transport through the reach. Implementation of the principles and processes outlined in this Guidelines will limit the negative externalities of sand and gravel mining.

NEED FOR POLICY GUIDELINES

Sand is naturally occurring granular material composed of finely divided rock and mineral particles between 150 micron to 4.75 mm in diameter (IS 383-1970). Sand is formed due to weathering of rocks due to mechanical forces. In the process the weathered rocks forms gravel and then sand.

Sand and gravel together known as aggregate, represent the highest volume of raw material used on earth after water. The mining of aggregate has been continuing for many years. Now the mining of aggregates has reached a level threatening the environment and ecosystem besides also reaching a level of scarcity that would threaten the economy. It is recommended that sand & aggregate mining, and quarrying should be done only after sound scientific assessment and adopting best practices to limit the impact on the environment.

It is also felt that the greater use of substitute material (Manufactured Sand, artificial sand etc.) & construction technology, and sustainable use of the resource could drastically reduce adverse impact of mining on the environment.

OBJECTIVE OF THE GUIDELINES

The Guideliness has been based on the following principles:

- Uncontrolled sand mining is not sustainable.
- Compliance with present and future legislation and regulations on the subject is mandatory and not voluntary.
- Each lease holder should be given the opportunity to self-regulate to the extent that it can demonstrate compliance with legislation and regulations.
- Where self- regulation fails to deliver compliance with legislation and regulations, increased formal enforcement and monitoring should be implemented with punitive measures applied in line with the legal framework.
- There is a need to protect the environment and the right of the population to live in clean and safe surroundings, with the need to use natural resources in a way that will make a positive and sustainable contribution to the economy.

The main objectives of the Guidelines

- To ensure that sand and gravel mining is done in environmentally sustainable and socially responsible manner.
- To ensure availability of adequate quantity of aggregate in sustainable manner.
- To improve the effectiveness of monitoring of mining and transportation of mined out material.

- Ensure conservation of the river equilibrium and its natural environment by protection and restoration of the ecological system.
- Avoid aggradation at the downstream reach especially those with hydraulic structures such as jetties, water intakes etc.
- Ensure that the rivers are protected from bank and bed erosion beyond its stable profile.
- No obstruction to the river flow, water transport and restoring the riparian rights and in-stream habitats.
- Avoid pollution of river water leading to water quality deterioration.
- To prevent depletion of ground water reserves due to excessive draining out of ground water.
- To prevent ground water pollution by prohibiting sand mining on fissures where it works as filter prior to ground water recharge.
- To maintain the river equilibrium with the application of sediment transport principles in determining the locations, period and quantity to be extracted.
- Streamlining and simplifying the process for grant of environmental clearance (EC) for sustainable mining.

THE EFFECT OF SAND AND GRAVEL MINING

Mining within or near riverbed has a direct impact on the stream's physical characteristics, such as channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature etc. Alteration or modification of the above attributes may cause hazardous impact on ecological equilibrium of riverine regime. This may also cause adverse impact on in-stream biota and riparian habitats. This disturbance may also cause changes in channel configuration and flow-paths.

The effects of sand and gravel mining are as follows:

a) Extraction of bed material in excess of replenishment by transport from upstream causes the bed to lower (degrade) upstream and downstream of the site of removal.

b) In-stream habitat is impacted by increase in river gradient, suspended load, sediment transport and sediment deposition. Excessive sediment deposition for replenishment increases turbidity which prevents penetration of light required for photosynthesis and reduces food availability of aquatic fauna.

c) Riparian habitat including vegetative cover on and adjacent to the river banks it controls erosion, provide nutrient inputs into the stream and prevents intrusion of pollutants in the stream through runoff. Bank erosion and change of morphology of the river can destroy the riparian vegetative cover.

d) Bed degradation are responsible for channel shifting, causing loss of properties and degradation of landscape, it can also undermine bridge supports, pipe lines or other structures.

e) Degradation may change the morphology of the river bed, which constitutes one aspect of the aquatic habitat.

f) Degradation can deplete the entire depth of gravelly bed material, exposing other substrates that may underlie the gravel, which could in turn affect the quality of aquatic habitat. Lowering of ground water table in the flood plain because of lowering of riverbed level as well as river water level takes place because of extraction and draining out of excessive ground water from the adjacent areas. So, if a floodplain aquifer drains to the stream, groundwater levels can be lowered as a result of bed degradation.

g) Lowering of the water table can destroy riparian vegetation.

h) Excessive pumping of ground water in the process of mining in abandoned channels depletes ground water causing scarcity of irrigation and drinking water. In extreme cases it may create ground fissures and subsidence in adjacent areas.

i) Flooding is reduced as bed elevations and flood heights decrease, reducing hazard for human occupancy of floodplains and the possibility of damage to engineering works.

j) The supply of overbank sediments to floodplains is reduced as flood heights decrease.

k) An un-scientific and unregulated sand and gravel mining tends to increase channel bank

scouring and erosion. This causes a large degree of meandering of rivers and sometimes it could be in kms.

l) Rapid bed degradation may induce bank collapse and erosion by increasing the heights of banks.

m) Polluting ground water by reducing the thickness of the filter material especially if mining is taking place at top of recharge fissures.

n) Choking of sand layer which acts as filter for ingress of ground water from river by dumping of finer material, compaction of filter zone due to movement of heavy vehicles. It also reduces the permeability and porosity of the filter material.

o) Removal of gravel from bars may cause downstream bars to erode if they subsequently receive less bed material than is carried downstream from them by fluvial transport.

p) Ecological effects on bird nesting, fish migration, angling, etc.

q) Indiscrete mining activities lead to increased concentration of suspended sediment in the river which in turn causes siltation of water resources projects.

r) Un-scientific and unregulated sand and gravel mining leads to the severe health hazards like air quality degradation and dust fog.

s) Direct destruction from heavy equipment operation; discharges from equipment and refueling.

t) Biosecurity and pest risks.

u) Impacts on coastal processes.

The other deleterious impacts of indiscrete mining include

Loss of riparian habitat resulting from direct removal of vegetation along the stream bank to facilitate the use of a dragline or through the process of lowering the water table, bank undercutting, and channel incision. The physical composition and stability of substrates are altered as a result of in-stream mining and most of these physical effects may exacerbate sediment entrainment in the channel.

Furthermore, the process of in-stream mining and gravel washing produces fine sediments under all flow conditions, resulting in a deposition of fine sediment in riffles as well as other habitats at low discharge. Excess sediment is considered the greatest pollutant in waters and constitutes one of the major environmental factors in the degradation of stream fisheries.

However, in-stream mining may contribute additional sediment to downstream reaches due to the disruption of substrate stability. Once sediment enters the stream, it is best to let natural geomorphological and hydrological processes reach a dynamic equilibrium, rather than further exacerbating the situation by additional disturbance.

All other things being equal:

a) Extracting gravel from an excavation that does not penetrate the water table and is located away from an active stream channel should cause little or no change to the natural hydrological processes unless the stream captures the pit during periods of flooding.

b) In-stream extraction of gravel from below the water level of a stream generally causes more changes to the natural hydrologic processes than limiting extraction to a reference point above the water level.

c) In-stream extraction of gravel below the deepest part of the channel (the thalweg) generally causes more changes to the natural hydrological processes than limiting extraction to a reference point above the thalweg.

d) Excavating sand and gravel from a small straight channel with a narrow floodplain generally will have a greater impact on the natural hydrological processes than excavations on a braided channel with a wide floodplain.

e) Extracting sand and gravel from a large river or stream will generally create less impact than extracting the same amount of material from a smaller river or stream.

f) Over-extraction of gravel can destabilise channels and banks, and/or affect the ecologic functioning of rivers particularly if undertaken at the wrong time, or in the wrong place, or in a way that damages the river bed or margins.

GENERAL APPROACH TO SUSTAINABLE SAND AND GRAVEL MINING

Following considerations should be kept in mind for sand / gravel mining:

a) Parts of the river reach that experience deposition or aggradation shall be identified first. The Lease holder/ Environmental Clearance holder may be allowed to extract the sand and gravel deposit in these locations to manage aggradation problem.

b) The distance between sites for sand and gravel mining shall depend on the replenishment rate of the river. Sediment rating curve for the potential sites shall be developed and checked against the extracted volumes of sand and gravel.

c) Sand and gravel may be extracted across the entire active channel during the dry season.

d) Abandoned stream channels on terrace and inactive floodplains be preferred rather than active channels and their deltas and flood plains. Stream should not be diverted to form inactive channel.

e) Layers of sand and gravel which could be removed from the river bed shall depend on the width of the river and replenishment rate of the river.

f) Sand and gravel shall not be allowed to be extracted where erosion may occur, such as at the concave bank.

g) Segments of braided river system should be used preferably falling within the lateral migration area of the river regime that enhances the feasibility of sediment replenishment.

h) Sand and gravel shall not be extracted within 200 to 500 meter from any crucial hydraulic structure such as pumping station, water intakes, and bridges. The exact distance should be ascertained by the local authorities based on local situation. The cross-section survey should cover a minimum distance of 1.0 km upstream and 1.0 km downstream of the potential reach for extraction. The sediment sampling should include the bed material and bed material load before, during and after extraction period. Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross- section. Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume. Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.

i) Sand and gravel could be extracted from the downstream of the sand bar at river bends. Retaining the upstream one to two thirds of the bar and riparian vegetation is accepted as a method to promote channel stability.

j) Flood discharge capacity of the river could be maintained in areas where there are significant flood hazard to existing structures or infrastructure. Sand and gravel mining may be allowed to maintain the natural flow capacity based on surveyed cross- section history.

k) Alternatively, off-channel or floodplain extraction is recommended to allow rivers to replenish the quantity taken out during mining.

l) The Piedmont Zone (Bhabhar area) particularly in the Himalayan foothills, where riverbed material is mined, this sandy-gravelly track constitutes excellent conduits and holds the greater potential for ground water recharge. Mining in such areas should be preferred in locations selected away from the channel bank stretches.

m) Mining depth should be restricted to 3 meter and distance from the bank should be 3 meter or 10 percent of the river width whichever less.

n) The borrow area should preferably be located on the river side of the proposed embankment, because they get silted up in course of time. For low embankment less than 6 m in height, borrow area should not be selected within 25 m from the toe/heel of the embankment. In case of higher embankment the distance should not be less than 50 m. In order to obviate development of flow parallel to embankment, cross bars of width eight times the depth of borrow pits spaced 50 to 60 meters centre-to-centre should be left in the borrow pits.

o) Demarcation of mining area with pillars and geo-referencing should be done prior to start of mining.

THE WORLD SCENARIO

Sand and gravel are mined world-wide and account for the largest volume of solid material extracted globally. Formed by erosive processes over thousands of years, they are now being extracted at a rate far greater than their renewal. Furthermore, the volume being extracted is having a major impact on rivers, deltas and coastal and marine ecosystems, resulting in loss of land through river or coastal erosion, lowering of the water table and decrease in the amount of sediment supply. Despite the colossal quantities of sand and gravel being used, increasing dependence on them and the significant impact that their extraction has on the environment, this issue needs far better attention and awareness.

Globally, between 47 and 59 billion tonnes of material is mined every year of which sand and gravel, known as aggregates, account for both the largest share (from 68% to 85%) and the fastest growth in extraction increase. Although more sand and gravel are mined than any other material, reliable data on their extraction is not available. The absence of global data on aggregates mining makes environmental assessment very difficult and has contributed to the lack of awareness about this issue. One way to estimate the global use of aggregates indirectly is through the production of cement for concrete (concrete is made with cement, water, sand and gravel). The production of cement is reported by 150 countries and it reached 3.7 billion tonnes in 2012 (USGS, 2013a). For each tonne of cement, the building industry needs about six to seven times more tonnes of sand and gravel (USGS, 2013b). Thus, the world's use of aggregates for concrete can be estimated at 25.9 billion tonnes a year for 2012 alone.

Added to this are all the aggregates used in land reclamation, shoreline developments and road embankments (for which the global statistics are unavailable), added to this is the 180 million tonnes of sand used in industry (USGS, 2012). Aggregates also contribute to 90% of asphalt pavements and 80% of concrete roads (Robinson and Brown, 2002). Taking all these estimates into account, a conservative estimate for the world consumption of aggregates exceeds 40 billion tonnes a year.

This large quantity of material cannot be extracted and used without a significant impact on the environment. Extraction has an impact on biodiversity, water turbidity, water table levels and landscape and on climate through carbon dioxide emissions from transportation. There are also socio-economic, cultural and even political consequences. In some extreme cases, the mining of marine aggregates has changed international boundaries, such as through the disappearance of sand islands in Indonesia (New York Times, 2010; Guerin, 2003).

The impacts of sand mining can be mainly categorized as follows:

IMPACTS ON	DESCRIPTION
Biodiversity	Impacts on related ecosystems (for example; fisheries)
Land losses	Both inland and coastal through erosion
Hydrological functions	Change in water flows, flood regulation and marine currents
Water supply	Through lowering of the water table and pollution
Infrastructures	Damage to bridges, river embankments and coastal infrastructures
Climate	Directly through transport emissions
Landscape	Coastal erosion, changes in deltaic structures, quarries, pollution of rivers
Extreme events	Decline of protection against extreme events (flood, drought, storm surge)

World over sand was until recently extracted in land quarries and riverbeds; however, a shift to marine and coastal aggregates mining has occurred due to the decline of inland resources. River and marine aggregates remain the main sources for building and land reclamation. For concrete, in-stream gravel requires less processing and produces high-quality material while marine aggregate needs to be thoroughly washed to remove salt. If the chloride is not removed from marine aggregate, a structure built with it might collapse after few decades due to corrosion of steel reinforced structures. Most sand from deserts cannot be used for concrete and land reclaiming, as the wind erosion process forms round grains that do not bind well.

INDIAN SCENARIO

The data on consumption of sand and aggregate in country is not available with any source. It can be derived indirectly from the usage of cement, construction of roads and stowing of mines. The trend for aggregates extraction can be estimated using cement production as a proxy.

Cement production has multiplied three-fold in the last 20 years from 1.37 billion tonnes of cement in 1994 to 3.7 billion tonnes in 2012 (USGS, 2013a) mainly as a result of rapid economic growth in Asia (UNEP and CSIRO, 2011). Five countries: China (58%), India (6.75%), the United States (2%), Brazil and Turkey - produce 70% of the world's cement (USGS, 2013c). The consumption of cement is expected to reach 324 million tonnes, which equates to use of 2.2 billion tonnes of aggregates. This is in addition to sand and aggregates used in stowing of mines, industry and other allied usage.

In India the main sources of sand are:

(a) River (riverbed and flood plain).

(b) Lakes and reservoirs.

(c) Agricultural fields (Haryana).

(d) Coastal / marine sand.

(e) Palaeo-channels (Bikaner in Rajasthan).

THE PRICE ELASTICITY FOR DEMAND OF SAND

As the price elasticity of demand for sand is inelastic (-0.88), any increase in price in absence of marketable alternative will not have any significant impact on demand. Use of crushed stones or other substitute material should be promoted. The regional context of aggregate resources, market demand, and the environmental impacts of various alternatives must be understood before any site-specific proposal for aggregate extraction can be reviewed.

Evaluation of aggregate supply and demand should be undertaken on the basis of production-consumption regions, encompassing the market for aggregate and all potential sources of aggregate within an economical transport distance. The finite nature of high-quality alluvial gravel resources must be recognized, and high-quality PCC-grade aggregates should be reserved only for the uses demanding this quality material (such as concrete). Alternative sources should be used in less demanding applications (such as road sub-base). Part replacement with fly ash in roads and embankments be promoted in place of sand and aggregates.

The environmental costs of sand mining should be incorporated into the price of the product so that alternative sources that require more processing but have less environmental impact become more attractive.

PROCESS OF SEDIMENT TRANSPORT

The loose boundary (consisting of movable material) of an alluvial channel deforms under the action of flowing water and the deformed bed with its changing roughness (bed forms) interacts with the flow. The resulting movement of the bed material (sediment) in the direction of flow is called sediment transport and a critical bed shear stress must be exceeded to start the particle movement.

Such a critical shear stress is referred as incipient (threshold) motion condition, below which the particles will be at rest and the flow is similar to that on a rigid boundary. Some sediment particles roll or slide along the bed intermittently and some others saltate (hopping or bouncing along the bed). The material transported in one or both of these modes is called 'bed load'.

Finer particles (with low fall velocities) are entrained in suspension by the fluid turbulence and transported along the channel in suspension. This mode of transport is called 'suspended load'. Sometimes finer particles from upland catchment (sizes which are not present in the bed material), called 'wash load', are also transported in suspension. The combined bed material and wash load is called 'total load'.

Bed load ranges from a few percent of total load in lowland rivers to perhaps 15% in Mountain Rivers to over 60% in some arid catchments. Although a relatively small part of the total sediment load, the arrangement of bed load sediment constitutes the architecture of sand, and gravel-bed channels.

The rate of sediment transport typically increases as a power function of flow; that is, a doubling of flow typically produces more than a doubling in sediment transport and most sediment transport occurs during floods. The environmental impacts from in-stream mining can be avoided, if the annual bed load is calculated and aggregate extraction is restricted to that value or some portion of it. To accurately limit extraction to some portion of bed load, the amount of sediment that passes the in-stream mining site during a given period of time must be calculated.

There is a large amount of uncertainty in the process of calculating annual rates of bed load transport. How much coarse material is moved, how long it remains in motion as also how far it moves depends on the size, shape & packing of the material and the characteristics of the river flow.

Downstream movement commonly occurs as irregular bursts of short-distance movement separated by longer periods, when the particles remain at rest. Because bed load changes from hour-to-hour, day-to-day, and year-to-year, estimating annual bed load rates is a dynamic process involving careful examination.

Constant variations in the flow of the river make the channel floor and riverbanks a dynamic interface, where some materials are being eroded while others are being deposited. The net balance of this activity, on a short- term basis, is referred to as scour or fill.

On a long-term basis, continued scour results in erosion (degradation), while continued fill results in deposition (aggradation).

A general indicator of the stability of a stream relates to the amount of vegetation present. Gravel bars that are vegetated or where the gravel is tightly packed, generally indicate streams, where the gravel supply is in balance. Streams with excessive gravel generally have gravel bars with little or no vegetation, and are surfaced with loosely packed gravel.

SUSTAINABLE SAND AND GRAVEL MINING GUIDELINES

The broad principle on which any sustainable sand mining Guidelines / policy can be based is that river/ natural resources must be utilized for the benefit of the present and future generation, so river resources should be prudently managed and developed. The preparation of District Survery Report is an important initial step.

The Processes under the Guidelines:

(a) Identification of areas of aggradation / deposition where mining can be allowed; and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited. Use of satellite imagery for identifying areas of sand deposit and quantity be done.

(b) Calculation of annual rate of replenishment and allowing time for replenishment after mining in area.

(c) Identifying ways of scientific and systematic mining.

(d) Identifying measures for protection of environment and ecology.

(e) Determining measures for protection of bank erosion.

(f) A bench mark (BM) with respect to mean sea level (MSL) should be made essential to in-mining channel reaches (MCR). Below which no mining shall be allowed.

(g) Identifying steps for conservation of mineral.

(h) Permanent gauging facilities (for discharge and sediment both) should be made compulsory for the sites having excessive mining in consultation with Central Water Commission or any competent State Agency.

(i) Implementing safeguards for checking illegal and indiscrete mining.

Following the above processes, to begin with it is important to prepare a survey document mapping the status of sand sources in a district. This survey should be conducted and report be prepared for each district. Though it is an acceptable fact that rivers cut across districts and States and every river is an ecosystem in itself. But, keeping in view the fact that the district is the most established unit of administration at which this kind of survey, planning and monitoring can be ensured effectively, it is proposed that every district will prepare this document taking the river stretch in that district as an ecological unit and inventorising other sources of sand in the district.

Besides, the production of aggregate in a particular area is a function of availability of natural resources, the size of the population, the economy of the area and various developmental and infrastructural works being undertaken in the area.

The natural resources must be utilized in environment friendly manner in scientific and systematic way and with the objective of sustainable development the policy on the subject should have provisions for protection of environment & ecology. These factors can be accounted for in a most efficient manner at district level.

The sustainable mining plan needs to be dynamic. A survey should be carried out by the District Environment Impact Assessment Authority (DEIAA) with the assistance of Geology Department, Irrigation Department, Forest Department, Public Works Department, Ground Water Boards, Remote Sensing Department and Mining Department etc. in the district at regular intervals.

The survey shall contain:

1. District wise detail of river or stream and other sand source.
2. District wise availability of sand or gravel or aggregate resources.
3. District wise detail of existing mining leases of sand and aggregates.

Based on this survey document, the action plan shall divide the river/ stream/ other sources of the District into the following categories:

1. River / Stream beds sections / other sources suitable for extraction of sand and aggregates.
2. River / Stream beds sections / other sources prohibited for extraction of sand and aggregates.

The river/ streams/ other sources of sand and aggregate are studied on following parameters:

a) Geomorphological studies

i) Place of origin
ii) Catchment area.
iii) General profile of river stream.
iv) Annual deposition factor.
v) Replenishment.
vi) Total potential of minor mineral in the river bed.

b) Geological studies

i) Lithology of catchment area.
ii) Tectonics and structural behavior of rocks.

c) Climatic Factors

i) Intensity of rainfall.
ii) Climate Zone.
iii) Temperature variation



The following points to be considered while selecting the river / stream for mining besides the above parameters:

i) A stable river is able to constantly transport the flow of sediments produced by watershed such that it's dimensions (width and depth) pattern and vertical profile are maintained without aggrading (building up) or degrading (scouring down).

ii) The amount of boulders, cobbles, pebbles, and sand deposited in river bed equals to the amount delivered to the river from catchment area and from bank erosion minus amount transported downstream each year.

iii) It is compulsive nature of river to meander in their beds and therefore they will have to be provided with adequate corridor for meandering without hindrance. Any attempt to diminish the width of the corridor (floodway) and curb the freedom to meander would prove counterproductive.

iv) Erosion and deposition is law of nature. The river stream has to complete its geomorphological cycles from youth, mature to old age.

v) River capturing is unavoidable.

vi) Fundamentally the lowest point of any stream is fixed by sea level.

This survey document should be prepared in the district based on direct and indirect benefits of mining and identification of the potential threats to the river / stream beds in the district.

Besides, calculating the carrying capacity of the river / stream beds / other sources to find out maximum quantity available to be allowed for removal each year from the sources, it should also provide various measures to regulate sand and aggregate mining in a systemic way.

It has to provide for environmentally safe depth of mining and safeguards of banks by prescribing safe distance from banks. It is required that there should be a Sub-Divisional Committee which should visit each site and make recommendation. The Committee should comprise of Sub-Divisional Magistrate, Officers from Irrigation department, State Pollution Control Board or Committee, Forest department, Geology or mining officer shall visit each site for which environmental clearance has been applied for and make recommendation on suitability of site for mining or prohibition thereof.

THE STRUCTURE OF DISTRICT SURVEY REPORT

The report can have following structure:

1. Introduction
2. Overview of Mining Activity in the District
3 The List of Mining Leases in the District with location, area and period of validity
4. Details of Royalty or Revenue received in last three years
5. Detail of Production of Sand or Bajari or minor mineral in last three years
6. Process of Deposition of Sediments in the rivers of the District
7. General Profile of the District
8. Land Utilization Pattern in the district: Forest, Agriculture, Horticulture, Mining etc.
9. Physiography of the District
10. Rainfall: month-wise
11. Geology and Mineral Wealth

12. Drainage System with description of main rivers.

Sl.No.	NAME OF RIVER	AREA DRAINED (Sq. Km)	% AREA DRAINED

13. Salient Features of Important Rivers and Streams:

Sl.No.	Name of the River / Stream	Total Length in the District (in Km)	Place of origin	Altitude at Origin

14. Methodology Adopted for Calculating of Mineral Potential

The mineral potential is calculated based on field investigation and geology of the catchment area of the river/ streams. As per the policy of the State and location, depth of minable mineral is defined. The area for removal of mineral in a river or stream can be decided depending on geo-morphology

and other factors, it can be 50% to 60% of the area of a particular river/stream, e.g. in Himachal Pradesh mineral constituents like boulders, river born bajari, sand up to a depth of one meter are considered as resource mineral. Other constituents like clay and silt are excluded as waste while calculating the mineral potential of particular river/ stream.

The specific gravity of each mineral constituent is different. While calculating the mineral potential, the average specific gravity is taken as 2.25. The percent of mineral constituent like boulder, river bajari, sand also varies for different river and streams. While calculating the mineral potential the percentage of each mineral constituent is taken as, Boulders 35-40%, Bajari - 30-35%, Sand 25-30% and 5-10% for silt and clay.

The quantum of deposition varies from stream to stream depending upon factors like catchment lithology, discharge, river profile and geomorphology of the river course. There are certain geomorphological features developed in the river beds such as channel bar, point bar etc. where annual deposition is more even two to three meters.

For illustration one example of Yamuna River in Sirmaour district of Himachal Pradesh is given below:

Portion of the River / Stream Recommended for Mineral Concession	Length of area recommended for mineral concession (in kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in square meter)	Mineable mineral potential (in metric tonne) (60% of total mineral potential)
From Downstream of confluence with Tons River to Behral near Haryana and Uttar Pradesh border	31	478	14818000	16803612

Note: Considering the density of river bed material to be **1.89 g/cm^3**

Present Status of Mining

This gives the detail of mining leases already in operation in this stretch, area and production in last three years from these leases is calculated.

Mineral Potential is calculated in following way:

Mineral Potential

Boulder (MT)	Bajari (MT)	Sand (MT)	Total Mineable Mineral Potential (MT)
5601204	6801462	4400946	16803612

Annual Deposition

336072	408088	264057	1008217

Recommendation:

From the above it is clear that about 16803612 metric tonnes of mineral is available up to depth of one meter in the river bed of Yamuna in Sirmour district.
The annual deposition is 1008217 MT.
The average annual production is 80000 MT.
So, 16723612 MT of mineral can be safely removed.

In similar manner it should be calculated for each river and stream in the district and compiled in following format:

Sl.No.	River/ Stream	Portion of the river / stream recommended for mineral concession	Length of the recommended area for mineral concession (in kilometer)	Average width of the recommended area for mineral concession (in meters)	Area recommended for mineral concession (in sq.mtrs.)	Mineable mineral potential (in metric tonne) (60% of total mineral potential)
Total for the District						

About the size of the mining leases for the aggregates it should be borne in mind that a river / stream can be divided into two zones, which in-turn is dynamic i.e. the zone of erosion and

zone of deposition. These zones of deposition and erosion are extended in different patches in the river.

Any mining lease granted in larger tract can cover both the zones, and mining activity in zone of erosion can further aggravate the problem of erosion and as such the mining activity can be allowed only in the zone of the deposition. The mining leases of larger areas in rivers are neither in interest of environment nor in the interest of mineral conservation.

In Himalayan states the rivers and wasteland has been mostly classed as forest land and mining on that requires diversion of forest land and payment of compensatory afforestation and NPV etc. The land in river beds in hilly tracts and many small rivers at any one site seldom exceed 5 hectare, so not allowing sand mining leases less than 5 hectare on river beds further aggravates the situation. So the size of mining lease for river sand mining should be determined by the State as per the local situation.

MANAGEMENT PLAN

1. River Bed Mining Recommendations:

a) Permit Mining Volume Based on Measured Annual Replenishment

In the first year following adoption of the management plan, a volume equal to the estimated annual replenishment could be extracted from the reach of channel. Replenishment (up to the elevation of the selected channel configuration) would need to occur before subsequent extraction could take place. The concept of annual replenishment accounts for the episodic nature of sediment transport. For example, during wet periods with high stream flows, and a high contribution of sediment from hill slopes and tributaries, monitoring data would show that sand and gravel bars are replenished quickly. During drought periods with low stream flow, and little sediment supply or transport, monitoring data would likely show that bars were replenished at a slower rate.

The use of monitoring data is essential in measuring when actual replenishment occurs. The use of the concept of annual replenishment protects long-term channel stability as well as aquatic and riparian habitat by extracting a volume sustainable by watershed processes.

b) Establish an Absolute Elevation below Which No Extraction May Occur (Minimum Enveloped Level or Redline).

The absolute elevation below which no mining could occur or "redline" would be surveyed on a site-specific basis in order to avoid impacts to structures such as bridges and to avoid vegetation impacts associated with down-cutting due to excessive removal of sediment. An extraction site can be determined after setting the deposition level at 1 m above natural channel thalweg elevation, as determined by the survey approved by mine plan approving authority.

c) Limit River Bed Extraction Methods to Bar Skimming

If mining is limited to the downstream end of the bar with a riparian buffer on both the channel and hill slope (or floodplain) side, bar skimming would minimise impacts. Other methods such as excavation of trenches or pools in the low flow channel lower the local base level, and maximise upstream (head cutting and incision) and downstream (widening and braiding) impacts. In addition, direct disturbance of the substrate in the low flow channel should be avoided. Trenching on bars may be beneficial in the future if the river becomes severely aggraded, flat, shallow and braided. Trenching of bars may initially impact a smaller area of riparian habitat than skimming - as a result of excavating deeper rather than shallow skimming of a large area. However, over the



long-term, the upstream and downstream effects of a trench on the bar or in the channel may offset any short-term benefit derived from this method.

d) Extract Sand and Gravel from the Downstream Portion of the Bar:

Retaining the upstream one to two thirds of the bar and riparian vegetation while excavating from the downstream one to two third of the bar is accepted as a method to promote channel stability and protect the narrow width of the low flow channel necessary for aquatic life. Sand and gravel would be re-deposited in the excavated downstream one to two thirds of the bar (or downstream of the widest point of the bar) where an eddy would form during sediment transporting flows. In contrast, if excavation occurs on the entire bar after removing existing riparian vegetation, there is a greater potential for widening and braiding of the low flow channel.

e) Concentrate Activities to Minimise Disturbance:

River bed extraction activities should be concentrated or localised to a few bars rather than spread out over many bars. This localisation of extraction will minimise the area of disturbance of upstream and downstream effects. Skimming decreases habitat and species diversity - these effects should not be expanded over a large portion of the area.

f) Review Cumulative Effects of Sand and Gravel Extraction:

The cumulative impact of all mining proposals should be reviewed on an annual basis to determine if cumulative riverine effects or effects to the estuary are likely.

g) Maintain Flood Capacity:

Flood capacity in the river should be maintained in areas where there are significant flood hazards to existing structures or infrastructure.

h) Establish a Long-term Monitoring Program:

Monitoring of changes in bed elevation and channel morphology, and aquatic and riparian habitat upstream and downstream of the extraction would identify any impacts of sand and gravel extraction to biologic resources. Long-term data collected over a period of decades as sand and gravel extraction occurs will provide data to use in determining trends.

i) Minimise Activities That Release Fine Sediment to the River:

No washing, crushing, screening, stockpiling, or plant operations should occur at or below the streams "average high water elevation," or the dominant discharge. These and similar activities have the potential to release fine sediments into the stream, providing habitat conditions harmful to local fish.

j) Retain Vegetation Buffer at Edge of Water and Against River Bank:

Riparian vegetation performs several functions essential to the proper maintenance of geomorphic and biological processes in rivers. It shields river banks and bars from erosion. Additionally, riparian vegetation, including roots and downed trees, serves as cover for fish, provides food source, works as a filter against sediment inputs, and aids in nutrient cycling. More broadly, the riparian zone is necessary to the integrity of the ecosystem providing habitat for invertebrates, birds and other wildlife.

k) The River Bed mining should only be allowed during the dry season.

No River bed mining should be permitted during rainy season (see Appendix 9).

l) An Annual Status and Trends Report:

This report should review permitted extraction quantities in light of results of the monitoring program, or as improved estimates of replenishment become available. The report should document changes in bed elevation, channel morphology, and aquatic and riparian habitat. The report should also include a record of extraction volumes permitted, and excavation location. Finally, recommendations for reclamation, if needed should be documented.

2. Off-Channel or Floodplain Extraction Recommendations

a) Floodplain Extraction should be set back from the Main Channel

In a dynamic alluvial system, it is not uncommon for meanders to migrate across a floodplain. In areas where sand and gravel occurs on floodplains or terraces, there is a potential for the river channel to migrate toward the pit. If the river erodes through the area left between the excavated pit and the river, there is a potential for "river capture," a situation where the low flow channel is diverted though the pit. In order to avoid river capture, excavation pits should set back from the river to provide a buffer, and should be designed to withstand the 100-year flood (100-year ARI). Adequate buffer widths and reduced pit slope gradients are preferred over engineered structures which require maintenance in perpetuity. Hydraulic, geomorphic, and geotechnical studies should be conducted prior to design and construction of the pit and bund. In addition to river capture, extraction pits create the possibility of stranding fish.

b) The maximum depth of Floodplain Extraction should remain above the Channel Thalweg

Floodplain pits should not be excavated below the elevation of the thalweg in the adjacent channel. This will minimise the impacts of potential river capture by limiting the potential for head cutting and the potential of the pit to trap sediment. A shallow excavation (above the water table) would provide a depression that would fill with



water part of the year, and develop seasonal wetland habitat. An excavation below the water table would provide deep water habitat.

c) Side Slopes of Floodplain Excavation Should Range from 3:1 to 10:1

Side slopes of a floodplain pit should be graded to a slope that ranges from 3:1 to 10:1. This will allow for a range of vegetation from wetland to upland. Steep side slopes excavated in floodplain pits on other systems have not been successfully reclaimed, since it is difficult for vegetation to become stabilised. Terrace pits should be designed with a large percentage of edge habitat with a low gradient which will naturally sustain vegetation at a variety of water levels.

d) Place Stockpiled Topsoil above the 25-year Return Period or ARI Level

Stockpiled topsoil can introduce a large supply of fines to the river during a flood event and degrade fish habitat. Storage above the 25-year flood (25-year ARI) inundation level is sufficient to minimise this risk.

e) Floodplain Pits Should Be Restored to Wetland Habitat or Reclaimed for Agriculture

The key to successful restoration or reclamation is to conserve or import adequate material to re-fill the pit, while ensuring that pit margins are graded to allow for development of significant wetland and emergent vegetation.

f) Establish a Long-term Monitoring Program

A long-term monitoring program should provide data illustrating any impacts to river stability, groundwater, fisheries, and riparian vegetation. The monitoring program should assess the success of any reclamation or restoration attempted.

g) An Annual Status and Trends Report

The status and trends report described previously should include a section on the hydrologic and biologic components of floodplain pit reclamation.

3. Extraction Methods

The important methods of sand and gravel mining operations are as below:

a) **Bar scalping or skimming** is extraction of sand and gravel from the surface of bars. This method generally requires that surface irregularities be smoothed out and that the extracted material be limited to what could be taken above an imaginary line sloping upwards and away from the water from a specified level above the river's water surface at the time of extraction (typically 0.3 - 0.6 m (1-2 ft). Bar scalping is commonly repeated year after year. To maintain the hydraulic control provided to upstream by the Riffle head, the preferred method of bar scalping is now generally to leave the top one-third (approximately) of the bar undisturbed, mining only from the downstream two-

thirds.

b) Dry-Pit Channel Mining

Dry-pit channel mines are pits excavated within the active channel on dry intermittent or ephemeral stream beds. Dry pits are often left with abrupt upstream margins, from which head cuts are likely to propagate upstream.

c) Wet-Pit Channel Mining

Wet-pit mining involves excavation of a pit in the active channel below the surface water in a perennial stream or below the alluvial groundwater table.

d) Bar Excavation

A pit is excavated at the downstream end of the bar as a source of aggregate and as a site to trap sand and gravel. Upon completion, the pit may be connected to the channel at its downstream end to provide side channel habitat.

e) Channel-wide River bed Mining

In rivers with a highly variable flow regime, sand and gravel are commonly extracted across the entire active channel during the dry season. The bed is evened out and uniformly (or nearly so) lowered.

4. Reclamation Plans

Reclamation plans should include:

a) A baseline survey consisting of existing condition cross-section data: Cross-sections must be surveyed between two documented endpoints set back from the top of bank, and elevations should be referenced to bench mark;

b) The proposed mining cross-section data should be plotted over the baseline data to illustrate the vertical extent of the proposed excavation;

c) The cross-section of the replenished bar should be the same as the baseline data. This illustrates that the bar elevation after the bar is replenished will be the same as the bar before extraction;

d) A planimetric map showing the aerial extent of the excavation and extent of the riparian buffers;

e) A planting plan developed by a plant ecologist familiar with the flora of the river for any areas such as roads that need to be restored;

f) A monitoring plan: The appropriate reclamation plans can turn river-bed and floodplain sand and gravel mining operations into something perceived by the public as desirable.

MARINE SAND MINING AND IMPACT ON MARINE BIODIVERSITY

The mining of marine aggregates is increasing significantly. Marine sand mining has had an impact on seabed flora and fauna. Dredging and extraction of aggregates from the benthic (sea bottom) zone destroys organisms, habitats and ecosystems and deeply affects the composition of biodiversity, usually leading to a net decline in faunal biomass and abundance or a shift in species composition. Aggregate particles that are too fine to be used are rejected by dredging boats, releasing vast dust plumes and changing water turbidity, resulting in major changes to aquatic and riparian habitats over large areas.

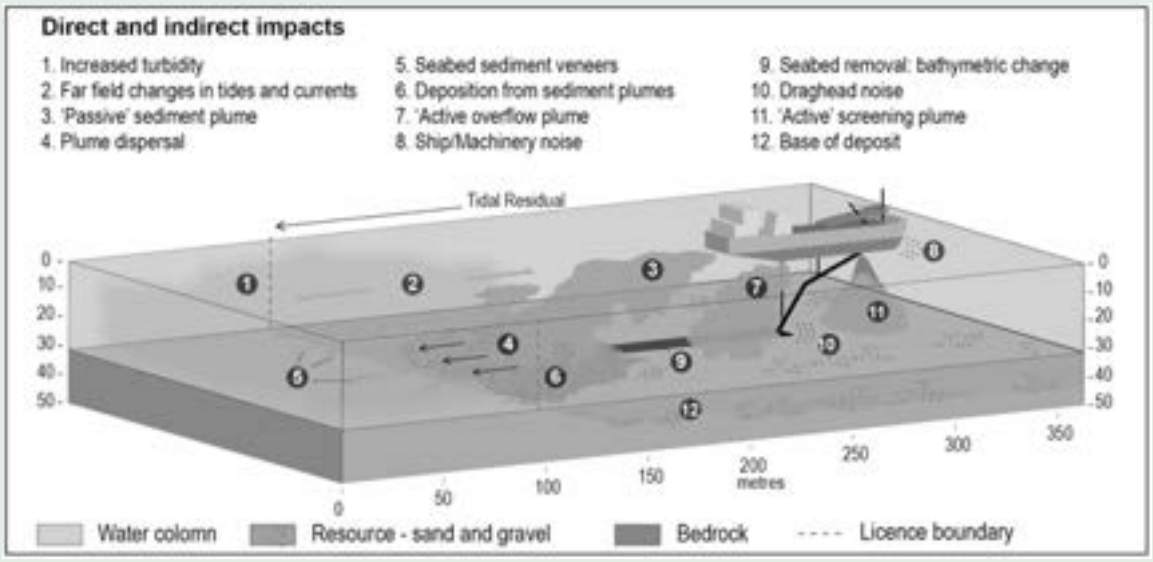


Figure: Direct and indirect consequences of aggregates dredging on the marine environment.

Source: Tillin, H.M., Houghton, A.J., Saunders, J.E., Drabble, R. and Hull, S.C., 2011. Direct and Indirect Impacts of Aggregate Dredging, Marine Aggregate Levy Sustainability Fund (MALSF). Science Monograph Series 1, 1-46.

REDUCING CONSUMPTION OF SAND

Because sand is still very cheap - sand itself is freely accessible; only extraction and transportation costs need to be covered - there is little or no incentive to induce a change in our consumption. Despite the very high value of minerals found in the sand, it is mostly used for concrete or is buried under highways. Recycled building and quarry dust material can be a substitute for sand. Concrete rubble should be recycled to avoid using aggregates, at least for low-quality uses.

Substitutes for sand are available. Quarry dust could be used to replace sand in general concrete structures. The replacement of sand by up to 40% of incinerator ash exhibits higher compressive strength than regular cement mortars. Some desert sand can be used if mixed with other material. There are alternatives for building houses, including wood, straw and recycled material. However, the current building industry is geared toward concrete know-how and equipment.

Training of architects and engineers, new laws and regulations, and positive incentives are needed to initiate a shift for lowering our dependency on sand. Renewable and recycled materials need to be targeted for building houses and roads. Use of Manufactured Sand (M-Sand) also needs to be promoted.

Alternative sources of sand and gravel, which accumulate at the bottom of dams, can also be targeted. Their use would address the problem of these aggregates accumulating which leads to a reduced capacity of dams to store water and could result in the dams' water intakes being blocked. Dams regularly release large amounts of water to flush out aggregates.

The important standard setting bodies in India are taking steps to promote the usage of alternatives to sand and gravel. Bureau of Indian Standards, the National Standards Body of the country, considering the scarcity of sand and coarse aggregates from natural sources, has evolved number of alternatives which are ultimately aimed at conservation of natural resources apart from promoting use of various waste materials without compromising in quality.

These measures include permitting in the Concrete Code (IS 456) as also in the National Building Code of India, the use of slag - a waste from steel industry, fly ash - a waste from thermal power plants, crushed over-burnt bricks and tiles - waste from clay brick and tile industry, in plain cement concrete as an alternative to sand/natural aggregate, subject to fulfilling the requirements of the Code. This Code, further, encourages use of fly ash and ground granulated blast furnace slag as part replacement of ordinary Portland cement in plain as well as reinforced cement concrete.

The Indian Standard on concrete mix design (IS 10262) has been upgraded to include guidance and examples of designing concrete mixes using fly ash and slag. Provisions for compliance for requisite quality of concrete made using fly ash and slag have been duly covered for the manufacturers of ready-mixed concrete in the Indian Standard Code of practice for RMC (IS 4926).

BIS has also formulated an Indian Standard Specification for artificial lightweight aggregates covering manufactured aggregates, such as foamed blast furnace slag, bloated clay aggregate, sintered fly ash aggregate and cinder aggregate (IS 9142).

A series of Indian Standards has also been formulated on various precast concrete products such as solid and hollow concrete blocks, light weight concrete blocks, autoclaved aerated concrete blocks, preformed foam concrete blocks, partial prefabricated concrete flooring and roofing units, concrete pipes, etc, all permitting use of fly ash and slag.

THE REPORT OF THE COMMITTEE HEADED BY SECRETARY, MoEF - 2010

A Committee headed by Secretary, Ministry of Environment and Forest was set up on the subject in 2010. The Committee considered this subject in detail and prepared a report. The important parts of the report are as follows:

Definition of Minor Mineral:

The term 'minor mineral' is defined in clause (e) of Section 3 of MMDR Act, 1957: '3 (e) "minor minerals" means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes and any other material which the Central Government may, by Notification in the Gazette of India declare to be a minor mineral;'

The term `ordinary sand' used in clause (e) of Section 3 of the MMDR Act, 1957 has been further clarified in rule 70 of the MCR, 1960 as:

(iv) Purposes of stowing in coal mines,
(v) For manufacture of silvicrete cement,
(vi) Manufacture of sodium silicate and for
(vii) Manufacture of pottery and glass.

Additionally, the Central Government has declared the following minerals as minor minerals:

Sl.No.	Minor Minerals
i)	Boulder
ii)	Shingle
iii)	Chalcedony pebbles used for ball mill purposes only
iv)	Lime shell, kankar and limestone used in kilns for manufacture of lime used as building material
v)	Murrum

Sl.No.	Minor Minerals
vi)	Brick-earth
vii)	Fuller's earth
viii)	Bentonite
ix)	Road metal
x)	Reh-matti

Sl.No.	Minor Minerals
xi)	Slate and shale when used for building material
xii)	Marble
xiii)	Stone used for making household utensils
xiv)	Quartzite and sandstone when used for purposes of building or for making road metal and household utensils
xv)	Saltpetre, and

xvi)	Ordinary earth (Used for filling or leveling purposes in construction or embankments, roads, railways building).

It may thus be observed that minerals have been classified into major and minor minerals based on their end use rather than level of production, level of mechanization, export and import etc. There do exist some minor mineral mines of silica sand and limestone where the scale of mechanization and level of production is much higher than those of industrial mineral mines. Further, in terms of the economic cost and revenue, it has been estimated that the total value of minor minerals constitutes about 10% of the total value of mineral production whereas the value of non- metallic minerals comprises only 3%. It is, therefore, evident that the operations of mines of minor minerals need to be subject to some regulatory parameters as that of mines of major minerals. Further, unlike India there does not exist such system in any other country where minerals are classified as major and minor based on end usage. Thus, there is a need to re-look at the definition of 'minor minerals' per se. It is, therefore, recommended that Ministry of Mines along with Indian Bureau of Mines, in consultation with the State Governments may re-examine the classification of minerals into major and minor categories so that the regulatory aspects and environment mitigation measures are appropriately integrated for ensuring sustainable and scientific mining with least impacts on environment.

Size of the Mine Lease:

Area for grant of mine lease varies from State to State. Maximum area which can be held under one or more mine lease is 2590 ha or 25.90 sq. miles in Jammu and Kashmir. Rajasthan prescribed a minimum limit of 1 ha for a lease. Maximum area prescribed for permit is 50x50 m. In most of the States area of permit is not specified in the rules.

It has recently been observed by Punjab and Haryana High Court in its order dated 15.05.2009 that State Government are apparently granting short term permits by dividing the mining area into small zones in effect to avoids environmental norms. There is, thus a need to bring uniformity in the extent of area to be granted for mine lease so as to ensure that eco- friendly scientific mining practices can be adopted. It is recommended that the minimum size of mine lease should be 5 ha. Further, preparation of comprehensive mine plan for contiguous stretches of mineral deposits by the respective State Governments may also be encouraged. This may suitably be incorporated in the Mineral Concession Rules, 1960 by Ministry of Mines.

Period of Mine Lease:

The period of lease varies from State to State depending on type of concessions, minerals and its end use. The minimum lease period is one year and maximum 30 years. Minerals like granite where huge investments are required, a period of 20 years is generally given with the provisions of renewal. Permits are generally granted for short periods which vary from one month to a maximum one year. In States like Haryana, minor mineral leases are auctioned for a particular time period. Mining is considered to be capital intensive industry and considerable time is lost for developing the mine before it attains the status of fully developed mine. If the tenure of the mine lease is short, it would encourage the lessee to concentrate more on rapid exploitation of mineral without really undertaking adequate measures for reclamation and rehabilitation of mined out area, posing thereby a serious threat to the environment and health of the workers and public at large.

There is thus, a need to bring uniformity in the period of lease. It is recommended that a minimum period of mine lease should be 5 years, so that eco- friendly scientific and sustainable mining practices are adopted. However, under exceptional circumstances arising due to judicial interventions, short term mining leases / contracts could be granted to the State Agencies to meet the situation arising there from.

Cluster of Mine Approach for Small Sized Mines:

Considering the nature of occurrence of minor mineral, economic condition of the lessee and the likely difficulties to be faced by Regulatory Authorities in monitoring the environmental impacts and implementation of necessary mitigation measures, it may be desirable to adopt cluster approach in case of smaller mine leases being operated presently. Further, these clusters need be provided with processing/crusher zones for forward integration and minimizing excessive pressure on road infrastructure. The respective State Governments / Mine Owners Associations may facilitate implementation of Environment Management Plans in such cluster of mines.

Requirement of Mine Plan for Minor Minerals:

At present, most of the State Governments have not made it mandatory for preparation of mining plan in respect of minor minerals. In some States like Rajasthan, eco- friendly mining plans are prepared, which are approved by the State Mining Department. The eco- friendly mining plans so prepared, though conceptually welcome, are observed to be deficient and need to be made comprehensive in a manner as is being done for major minerals. Besides, the aspects of reclamation and rehabilitation of mined out areas, progressive mine closure plan, as in vogue for major minerals could be introduced for minor minerals as well.

It is recommended that provision for preparation and approval of mine plan, as in the case of major minerals may appropriately be provided in the Rules governing the mining of minor minerals by the respective State Governments. These should specifically include the provision for reclamation and rehabilitation of mined out area, progressive mine closure plan and post mine land use.

Creation of Separate Corpus for Reclamation / Rehabilitation of Mines of Minor Minerals:

Mining of minor minerals, in our country, is by and large unorganized sector and is practiced in haphazard and unscientific manner. At times, the size of the leasehold is also too small to address the issue of reclamation and rehabilitation of mined outs areas. It may, therefore, be desirable that before the concept of mine closure plan for minor minerals is adopted, the existing abandoned mines may be reclaimed and rehabilitated with the involvement of the State Government. There is thus, a need to create a separate corpus, which may be utilized for reclamation and rehabilitation of mined out areas. The respective State Governments may work out a suitable mechanism for creation of such corpus on the `polluter pays' principle. An organizational structure may also need to be created for undertaking and monitoring these activities.

Depth of Mining:

Mining of minerals, whether major or minor have a direct bearing on the hydrological regime of the

area. Besides, affecting the availability of water as a resource, it also affects the quality of water through direct run of going into the surface water bodies and infiltration / leaching into groundwater. Further, groundwater withdrawal, dewatering of water from mine pit and diversion of surface water may cause surface and sub- surface hydrologic systems to dry up. An ideal situation would require that quarrying should be restricted to unsaturated zone only above the phreatic water table and should not intersect the groundwater table at any point of time. However, from the point of view of mineral conservation, it may not be desirable to impose blanket ban on mining operation below groundwater table. It is, therefore, recommended that detailed hydro-geological report should be prepared in respect of any mining operation for minor minerals to be undertaken below groundwater table. Based on the findings of the study so undertaken and the comments/ recommendations of Central Ground Water Authority/ State Ground Water Board, a decision regarding restriction on depth of mining for any area should be taken on case to case basis.

Uniform Minor Mineral Concession Rules:

The economic value of the minor minerals excavated in the country is estimated to contribute to about 9% of the total value of the minerals whereas the non- metallic minerals contribute to about 2.8%. Keeping in view the large extent of mining of minor minerals and its significant potential to adversely affect the environment, it is recommended that Model Mineral Concession rules may be framed for minor minerals as well and the minor minerals may be subjected to a simpler regulatory regime, which is, however, similar to major minerals regime.

River Bed Mining:

1. Environment damage being caused by unregulated river bed mining of sand, bajri and boulders is attracting considerable attention including in the courts. The following recommendations are therefore made for the river bed mining.

    (a) In the case of mining leases for riverbed sand mining, specific river stretches should be identified and mining permits/lease should be granted stretch wise, so that the requisite safeguard measures are duly implemented and are effectively monitored by the respective Regulatory Authorities.

    (b) The depth of mining may be restricted to 3m / water level, whichever is less.

    (c) For carrying out mining in proximity to any bridge and / or embankment, appropriate safety zone should be worked out on case to case basis, taking into account the structural parameters, locational aspects, flow rate etc. and no mining should be carried out in the safety zone so worked out.

Conclusion:

Mining of minor minerals, though individually, because of smaller size of mine leases is perceived to have lesser impact as compared to mining of major minerals. However, the activity as a whole is seen to have significant adverse impacts on environment. It is, therefore, necessary that the mining of minor minerals is subjected to simpler but strict regulatory regime and carried out only under an



approved framework of mining plan, which should provide for reclamation and rehabilitation of the mined out areas. Further, while granting mining leases by the respective State Governments "location of any eco-fragile zone (s) within the impact zone of the proposed mining area, the linked Rules/ Notifications governing such zones and the judicial pronouncements, if any, need be duly noted.

The Union Ministry of Mines along with Indian Bureau of Mines and respective State Governments should therefore make necessary provisions in this regard under the Mines and Minerals (Development and Regulation) Act, 1957, Mineral Concession Rules, 1960 and adopt model Guideliness to be followed by all States (emphasis supplied)".

REGIME OF LAW AND ADMINISTRATIVE ORDERS RELATING TO MINING OF MINOR MINERALS

The Entry 54 of List 1 in Schedule VII to the Constitution of India is the entry which empowers the Parliament in respect of 'Regulation of Mines and Minerals Development. Entry 23 of List 2 of the same Schedule, read with Article 246 (3) of the Constitution confers legislative powers on the State Legislature in respect of Regulation of Mines and Mineral Development, but, this power is subject to the provisions of List 1 with respect to the regulation and development under the control of the Union. The Parliament, with the object to amend and consolidate the law relating to the regulation of labour and safety in mines enacted the Mines Act, 1952. Section 2 (JJ) of the Mines Act, 1952 defines "minerals" to mean, all substances which can be obtained from the earth by mining, digging, drilling, dredging, hydraulicing, quarrying or by any other operation and includes mineral oils (which, in turn, include natural gas and petroleum). On 1st June, 1958, the Mines and Minerals (Development and Regulation) Act, 1957 was promulgated. This Act provides, inter alia, for general restrictions on undertaking prospecting and mining operations, the procedure for obtaining prospecting licenses or mining leases in respect of the land in which the minerals vests in the Government, the rule making power for regulating the grant of prospecting licenses and mining leases, special powers of Central Government to undertake prospecting or mining operations in certain cases, and for development of minerals.

The protection of natural environment is one of the fundamental duties of every citizen under Article 51-A of the Constitution of India. Article 48-A of the Constitution, obliged the State to endeavor to protect and improve the environment and to safeguard the forests and wild life of the country. The Environment (Protection) Act and Rules, 1986 were enacted and came into force on 19th November, 1986. The object of this Act is to provide for the protection and improvement of environment and for matters connected therewith. Under provisions of the Act and Rules of 1986, MoEFCC has issued various Notifications regulating the mining of minor minerals, specifically stating the procedures that were required to be complied by persons intending to carry on such mining activity and for the authorities to regulate the same.

Prior to 1994, there was no specific regime in place in relation to mining activity being carried out. The Notification issued by MoEF on 27th January, 1994, in exercise of the powers vested in it under Sub-Rule 3 of Rule 5 of the Rules of 1986 and Sub Section (1) and Clause (v) of Sub-Section (2) of Section 3 of the Act of 1986, prescribed the requirement and procedure for seeking Environmental Clearance for the projects listed in Schedule I. Schedule I of this Notification did not list mining projects of minor minerals. On the contrary, the projects covered under S. No. 20 of Schedule I of this Notification were only "mining projects (major mineral) with leases more than 5 hectares".

It provided for the constitution of Expert Committees and preparation of Environmental Impact Assessment Report which was to be evaluated and assessed by the Impact Assessment Agency. In exercise of its statutory powers afore-indicated, the Central Government on 14th September, 2006,



issued a Notification, i.e., 'Environment Impact Assessment Notification, 2006'. In terms of this Notification, the projects as stated in the Schedule to this Notification required prior Environmental Clearance as per the procedure. The projects have been categorised into two kinds, i.e., Category 'A' and Category 'B' under Clause 2 of the Notification. Projects under Category 'A' were required to take prior Environmental Clearance by MoEFCC. For Category 'B' projects, Environmental Clearance was to be given by State Environment Impact Assessment Authority (SEIAA).

The mining of minerals (both major and minor) were brought under the ambit of the EIA Notification, 2006. The mine lease area of more than equal to 50 ha was Category 'A' and mine lease area less than 50 ha and more than equal to 5 ha was category 'B' project. Mine lease area of less than 5 ha (both major and minor) was kept out of EIA Notification purview.

The Notification of 2006 came to be amended by Notification dated 1st December, 2009. It included the category of non-coal mine and coal mine lease and provided that non-coal mine lease of area more than equal to 5 ha and less than 50 ha will be category 'B' and mine lease area more than equal to 50 ha will be category 'A'. Similarly, mine lease area of more than equal to 5 ha and less than 150 ha for coal mine lease will be category 'B' and mine lease area of coal mine more than 150 ha will be category 'A'. Here again mining lease area of less than 5 ha (both coal and non-coal mine) was kept out of EIA Notification purview.

The Hon'ble Supreme Court, vide its order dated 27.2.2012 in I.A. No.12-13 of 2011 in SLP (C) No.19628-19629 of 2009 titled Deepak Kumar etc. v/s State of Haryana & Ors. has inter alia ordered *"We, in the meanwhile, order that leases of minor mineral including their renewal for an area of less than five hectares be granted by the States/Union Territories only after getting environmental clearance from the MoEF."*

Hon'ble Apex Court in Deepak Kumar's case (supra) extensively examined the environmental concerns, in the context of mining of minor minerals, considering its impact on the environment. The Apex Court observed that Extraction of alluvial material from within or near a streambed has a direct impact on the stream's physical habitat characteristics. These characteristics include bed elevation, substrate composition and stability, in-stream roughness elements, depth, velocity, turbidity, sediment transport, stream discharge and temperature. Altering these habitat characteristics can have deleterious impacts on both in-stream biota and the associated riparian habitat. The demand for sand continues to increase day by day as building and construction of new infrastructures and expansion of existing ones is continuous thereby placing immense pressure on the supply of the sand resource and hence mining activities are going on legally and illegally without any restrictions. Lack of proper planning and sand management cause disturbance of marine ecosystem and also upset the ability of natural marine processes to replenish the sand. Quarrying, mining and removal of sand from in-stream and upstream of several rivers, which may have serious environmental impact on ephemeral, seasonal and perennial rivers and river beds and sand extraction may have an adverse effect on bio-diversity as well. Further it may also lead to bed degradation and sedimentation having a negative effect on the aquatic life.

Apex Court observed that without conducting any study on the possible environmental impact on/

in the river beds and else- where the auction notices have been issued. Hon'ble Apex Court observed that "We are of the considered view that when we are faced with a situation where extraction of alluvial material within or near a river bed has an impact on the rivers physical habitat characteristics, like river stability, flood risk, environmental degradation, loss of habitat, decline in biodiversity, it is not an answer to say that the extraction is in blocks of less than 5 hectares, separated by 1 kilo meter, because their collective impact may be significant, hence the necessity of a proper environmental assessment plan".

In order to ensure compliance of the aforesaid order of the Hon'ble Supreme Court, MoEF issued an OM No.L-11011/47/2011-IA.II(M) dated 18.05.2012 stating inter alia that all mining projects of minor minerals including their renewal, irrespective of the size of the lease would henceforth require prior EC and that the projects of minor minerals with lease area less than 5 ha would be treated as Category "B" as defined in EIA Notification, 2006 and will be considered by the respective State Environment Impact Assessment Authorities (SEIAAs) notified by MoEF and following the procedure prescribed under the EIA Notification, 2006.

On 24th June, 2013, MoEF issued another Office Memorandum stating Guideliness for consideration of proposals for grant of Environmental Clearance under the Notification of 2006 for mining of 'brick earth' and 'ordinary earth' having lease area of less than 5 hectares. Referring to the judgment of the Hon'ble Supreme Court in the case of Deepak Kumar (supra) and its Office Memorandum dated 18th May, 2012, it further considered that the 'brick kiln' manufactures had stated that it was a small scale activity requiring that certain depth should be kept outside the purview of Environmental Clearance. Having considered various aspects, examining the recommendations of the Expert Committee, constituted by MoEF, finally it was directed as follows:

"(a) The activities of borrowing / excavation of 'brick earth' and ordinary earth', upto an area of less than 5 ha, may be categorized under 'B2' Category subject to the following Guideliness in terms of the provisions under '7.I Stage(1)-Screening' of EIA Notification, 2006:

(i) The activity associated with borrowing/excavation of 'brick earth' and 'ordinary earth' for purpose of brick manufacturing, construction of roads, embankments etc. shall not involve blasting.

(ii) The borrowing/excavation activity shall be restricted to a maximum depth of 2 m below general ground level at the site.

(iii) The borrowing/excavation activity shall be restricted to 2 m above the ground water table at the site.

(iv) The borrowing/excavation activity shall not alter the natural drainage pattern of the area.

(v) The borrowed/excavated pit shall be restored by the project proponent for useful purpose(s).

(vi) Appropriate fencing all around the borrowed/excavated pit shall be made to prevent any mishap.



(vii) Measures shall be taken to prevent dust emission by covering of borrowed/excavated earth during transportation.

(viii) Safeguards shall be adopted against health risks on account of breeding of vectors in the water bodies created due to borrowing/excavation of earth.

(ix) Workers / labourers shall be provided with facilities for drinking water and sanitation.

(x) A berm shall be left from the boundary of adjoining field having a width equal to at least half the depth of proposed excavation.

(xi) A minimum distance of 15 m from any civil structure shall be kept from the periphery of any excavation area.

2. (a) The concerned SEIAA while considering granting environmental clearance for such activity for brick earth / ordinary earth will prescribe the Guideliness as stated at (i) to (xi) above and specify that the clearance so granted shall be liable to be cancelled in case of any violation of above Guideliness.

(b) Notwithstanding what has been stated at (a) above, the following will apply:

(i) No borrowing of earth / excavation of 'brick earth' or 'ordinary earth' shall be permitted in case the area of borrowing/ excavation is within 1 km of boundary of national parks and wild life sanctuaries.

(ii) In case the area of borrowing / excavation is likely to result into a cluster situation i.e. if the periphery of one borrow area is less than 500 m from the periphery of another borrow area and the total borrow area equals or exceeds 5 ha, the activity shall become Category 'B 1' Project under the EIA Notification, 2006. In such a case, mining operations in any of the borrow areas in the cluster will be allowed only if the environmental clearance has been obtained in respect of the cluster. This issues with the approval of the Competent Authority."

These directions which were specific only to 'brick earth' and 'ordinary earth' activities for areas less than 5 hectares, as decided to be categorised as 'B 2' Category projects, subject to the restrictions stated in the memorandum, provided that if the cluster area exceeded 5 hectares, then it would become Category 'B 1' and would not be treated as Category 'B 2' projects. The above Office Memorandum was not dealing with the issues of sand mining or any other minor mineral activity except 'brick earth' and 'ordinary earth'. Further, MoEF has issued an amendment to EIA Notification vide Notification S.O. 2731 (E) dated 9th September 2013 and amended the EIA Notification, 2006 for item 1 (a) as follows:

(1)	(2)	(3)	(4)	(5)
"1(a)	(i) Mining of minerals.	≥ 50 ha of mining lease area in respect of non-coal mine lease	<50 ha of mining lease area in respect of minor minerals mine lease ; and < 50 ha ≥5 ha of mining lease area in respect of other non-coal mine lease.	General Conditions shall apply except for project or activity of less than 5 ha of mining lease area for minor minerals: Provided that the above exception shall not apply for project or activity if the sum total of the mining lease area of the said project or activity and that of existing operating mines and mining projects which were accorded environment clearance and are located within 500 metres from the periphery of such project or activity equals or exceeds 5 ha.
		>150 ha of mining lease area in respect of coal mine lease.	≤ 150 ha ≥ 5 ha of mining lease area in respect of coal mine lease.	(i) Prior environmental clearance is required at the stage of renewal of mine lease for which an application shall be made up to two years prior to the date due for renewal. Further, a period of two years with effect from the 4th April, 2011 is provided for obtaining environmental clearance for all those mine leases, which were operating as

(1)	(2)	(3)	(4)	(5)
				on the 4th April, 2011 with requisite valid environmental clearance and which have fallen due for renewal on or after the 4th November, 2011: Provided that no fresh environmental clearance shall be required for a mining project or activity at the time of renewal of mining lease, which has already obtained environmental clearance under this notification.
	(ii) Slurry pipelines (coal lignite and other ores) passing through national parks or sanctuaries or coral reefs, ecologically sensitive areas.	All projects.		(ii) Mineral prospecting is exempted.

In this Notification a new category of minor mineral was introduced and it was provided that mining lease area of minor mineral less than 50 ha will be category 'B' and will require EC. Accordingly the minor mineral mining projects having less than 5 hectare of lease area are required to be appraised by the SEIAA/SEAC of respective State for granting environment clearance. It was provided that the project or activity of less than 5 ha of mining lease area for minor minerals will be exempt from the General Conditions. Simultaneously the concept of cluster was introduced and it was provided that the exemption of applicability of General Conditions shall not apply for project or activity if the sum total of the mining lease area of the said project or activity and that of existing operating mines and mining projects which were accorded EC and are located within 500 m from the periphery of such project or activity equal or exceeds 5 ha.

The Ministry, on 24th December, 2013, issued another Office Memorandum for consideration of proposals for grant of Environmental Clearance regarding categorisation of Category 'B' projects into Category 'B (1)' and 'B (2)'. Mining of minor minerals had been separately dealt with in this Office Memorandum. This Office Memorandum stated that no river sand mining project with mining lease area of less than 5 hectares may be considered for grant of Environmental Clearance. Such area up to 25 hectares would be categorised as 'B (2)' and such projects were to be considered, subject to the stipulations stated therein. This Office Memorandum stated that no Environmental Clearance would be granted for extraction of minor minerals from any riverbed where the area is less than 5 hectares. Sand mining, in area other than riverbeds, would be permitted, only if the Project Proponent takes Environmental Clearance.

The Ministry vide Notification No. S.O. 1599 (E) dated 25.06.2014 reduced the area of 10 kilo meter to 5 kilo meters for applicability of General Conditions increasing the delegation to States by taking out projects located in 5 to 10 kilo meter of interstate boundary, CEPI, and, PAs from category 'A'.

The anomaly created by the Notification dated 09.09.2013 was corrected vide Notification No. S.O. 2601 (E) dated 7th October 2014, and category of minor mineral was deleted and mining leases were again classed as non-coal mine and coal mine and mining lease area of less than 50 ha was made category 'B' for non-coal mine and mine lease area of less than equal to 150 ha for coal mine was made category 'B'. The mine lease area of less than 5 ha was exempt from the applicability of General Conditions and cluster concept of Notification dated 09.09.2013 was retained.

Notification S.O. 2601 (E) dated 7th October 2014 provides as follows:

(1)	(2)	(3)	(4)	(5)
"1(a)	(i) Mining of minerals.	≥ 50 ha of mining lease area in respect of non-coal mine lease. >150 ha of mining lease area in respect of coal mine lease. Asbestos mining irrespective of mining area.	<50 ha of mining lease area in respect of non-coal mine lease. ≤ 150 ha of mining lease area in respect of coal mine lease.	General Conditions shall apply except for project or activity of less than 5 ha of mining lease area: Provided that the above exception shall not apply for project or activity if the sum total of the mining lease area of the said project or activity and that of existing operating mines and mining projects which were accorded environment clearance and are located within 500 metres from the periphery of such project or activity equals or exceeds 5 ha. Note: (i) Prior environmental clearance is required at the stage of renewal of mine lease for which an application shall be made up to two years prior to the date due for renewal. Provided that no fresh environmental clearance shall be required for a mining project or activity at the time of renewal of mining lease, which has already obtained environmental clearance under this notification. (ii) Mineral prospecting is exempted. "
	(ii) Slurry pipelines (coal lignite and other ores) passing through national parks or sanctuaries or coral reefs, ecologically sensitive areas	All projects.		

The NGT vide order dated 13.01.2015 (O.A. No. 123 of 2014 and M.A. No. 419 of 2014) has declared the Notification dated 09.09.2013 as invalid, inoperative and quashed it. The above order has also quashed the paragraph 4 (b) (i) of O.M. dated 24th June 2013 which provided that "No borrowing of earth / excavation of 'brick earth' or 'ordinary earth' shall be permitted in case the area of borrowing / excavation is within 1 km of boundary of national parks and wild life sanctuary." Though this provision was taken from the observation of Hon'ble Supreme Court in W.P. No. 435 of 2012 (Goa Foundation Vs. Union of India) and order dated 04.08.2006 of Supreme Court in *T.N. Godavarman Thirumulpad v. Union of India & Ors.* Supreme Court has taken a view that 1 km. from the boundaries of National Parks and Sanctuaries would be a safety zone, subject to the orders that may be made in IA No.1000 regarding Jamua Ramgarh Sanctuary and the State will not grant any Temporary Working Permit (TWP) in these safety zones comprising 1 km. from the boundaries of National Parks and Sanctuaries.

Similarly the proviso at paragraph 2 (iii) of O.M. dated 24.12.2013 which says that "No river sand mining project, with mine lease area less than 5 ha, may be considered for granting EC" has been quashed. This condition was taken from the recommendations of the Committee headed by the Secretary, MoEF constituted in 2010. The above proviso were quashed on the ground that as EIA Notification places no such restriction, so same cannot be imposed by an executive order and many hill States find it very difficult to get an area equal to or more than 5 ha. in riverbed. The information made available by the States also makes it clear that majority of the mining leases of sand are of area less than 5 hectares.

THE ISSUES AND MANAGEMENT OF MINING IN CLUSTER

In I.A. No. 12-13 of 2011 in SLP Nos. 729-731 / 2011, 21833 / 2009, 12498-499 / 2010, SLP (C) CC … 16157 / 2011 & CC 18235 / 2011 (Deepak Kumar and Ors. Vs. State of Haryana and Ors. etc.) Hon'ble Supreme Court in its order dated 27.02.2012 on the subject of cluster has quoted the submission of affidavit dated 23.11.2011 of MOEFCC. It says that "The Ministry is of the opinion that where the mining area is homogeneous, physically proximate and on identifiable piece of land of 5 ha. or more, it should not be broken into smaller sizes to circumvent the EIA Notification, 2006 as the EIA Notification, 2006 is not applicable to the mining projects having lease area of less than 5 ha. The Report of Committee on Minor Minerals, under the Chairmanship of Secretary (E&F) with representatives of various state governments as members including the State of Haryana and Rajasthan recommended a minimum lease size of 5 ha for minor minerals for undertaking scientific mining for the purpose of integrating and addressing environmental concerns. Only in cases of isolated discontinued mineral deposits in less than 5 ha, such mining leases may be considered keeping in view the mineral conservation".

The order further quotes that "Cluster of Mine Approach for Small Sized Mines: Considering the nature of occurrence of minor mineral, economic condition of the lessee and the likely difficulties to be faced by Regulatory Authorities in monitoring the environmental impacts and implementation of necessary mitigation measures, it may be desirable to adopt cluster approach in case of smaller mine leases being operated presently. Further these clusters need be provided with processing / crusher zones for forward integration and minimizing excessive pressure on road infrastructure. The respective State Governments / Mine Owners Association may facilitate implementation of Environment Management Plans in such cluster of mines." The order has further quoted the letter dated 1.06.2010 written by the then Minister of Environment, Forest and Climate Change which says on the subject that "A cluster approach to mines should be taken in case of smaller mines leases operating currently". The Hon'ble Court has ordered that "The State of Haryana and various other States have not so far implemented the above recommendations of the MoEF or the Guideliness issued by the Ministry of Mines before issuing auction notices granting short term permits by way of auction of minor mineral boulders gravel, sand etc., in the river beds and elsewhere of less than 5 hectares. We therefore, direct to all the States, Union Territories, MoEF and the Ministry of Mines to give effect to the recommendations made by MoEF in its report of March 2010 and the model Guideliness framed by the Ministry of Mines, within a period of six months from today and submit their compliance reports."

"We in the meanwhile, order that leases of minor mineral including their renewal for an area of less than five hectares be granted by the States/ Union Territories only after getting environmental clearance from the MoEF."

The Ministry vide O.M. No. L-11011/47/2011-IA.II (M) dated 18th May 2012 said that "In order to ensure compliance of the above referred order of the Hon'ble Supreme Court dated 27.02.2012, it has now been decided that all mining projects of minor minerals including their renewal, irrespective of the size of the lease would henceforth require prior environment clearance. Mining projects with lease area up to less than 50 ha including projects of minor mineral with lease area less than 5 ha would be treated as Category 'B' as defined in EIA Notification, 2006 and will be considered by the respective SEIAAs notified by MoEF and following the procedure prescribed under EIA Notification, 2006."

On the issue of cluster, the Notifications No. S.O. 2731 (E) dated 09.09.2013 and Notification No. S.O. No. 2601 (E) of 07.10.2014 were issued.

The above Notifications in Schedule at Item No. 1 (a) in Conditions mentions that "General Conditions shall apply except for projects or activity of less than 5 ha of mining lease area:

Provided that the above exception shall not apply for project or activity if the sum total of the mining lease area of the said project or activity and that of existing operating mines and mining projects which were accorded environment clearance and are located within 500 meters from the periphery of such projects or activity equals or exceeds 5 ha. The Office Memorandum No. J-13012/12/2013-IA-II (1) dated 24.12.2013 is about Guideliness for consideration of proposals for grant of environment clearance under Environment Impact Assessment Notification 2006 and its amendments - regarding categorization of Category 'B' projects/ activities into Category 'B1' & 'B2'.

The above O.M. besides categorizing the Category B into Category B1 & B2 also has directions on mining of brick earth / ordinary earth and river sand mining. These provisions are as follows:

"Mining of minor minerals:

As of now, mining projects of minor minerals with less than 50 hectare of mining lease areas are categorized as Category 'B' as per Notification S.O. 2731 (E) dated 9th September 2013. Also vide O.M. No. L-11011/47/2011-IA-II (M) dated 24.06.2013, Guideliness has been issued regarding categorization of mining projects of brick earth and ordinary earth having lease areas less than 5 hectare as Category 'B2' subject to stipulations stated therein.

In the above backdrop, the projects of mining of minor minerals, categorized as Category 'B' are hereby categorized as 'B2' as per the following:

(i) 'Brick Earth' / 'Ordinary Earth' mining projects having lease area less than 5 ha will be considered for granting EC as per the aforesaid Guideliness issued by MOEF on 24.06.2013.

(ii) 'Brick Earth' / 'Ordinary Earth' mining projects with mining lease area more than equal to 5 ha but less than equal to 25 ha and all other minor , mineral mining projects with mining lease area < 25 ha, except for river sand mining projects will be appraised as Category 'B2' projects.



These projects will be appraised based on the following documents:

(a) Form-1 as per the Appendix-I under the EIA Notification 2006

(b) Pre-feasibility report of the project

(c) Mining plan approved by the authorized agency of the concerned State Government.

Provided in case the mining lease area is likely to result into a cluster situation, i.e. if the periphery of one lease area is less than 500 meter from the periphery of another lease area and the total lease area equals or exceeds 25 ha, the activity shall become Category 'B1' Project under the EIA

Notification, 2006. In such a case, mining operations in any of the mine lease areas in the cluster will be allowed only if the environmental clearance has been obtained in respect of the cluster.

About river sand mining it says that:

(iii) No river sand mining project, with mine lease area less than 5 ha, may be considered for granting EC. The river sand mining projects with lease area more than equal to 5 ha but less than 25 ha will be categorized as 'B2'. In addition to the requirement of documents, as brought out above under sub-para (ii) above for appraisal, such projects will be considered subject to the following stipulations:

(a) The mining activity shall be done manually. The depth of mining shall be restricted to 3 m / water level, whichever is less.

(b) For carrying out mining in proximity to any bridge and / or embankment, appropriate safety zone shall be worked out on case to case basis to the satisfaction of SEAC / SEIAA, taking into account the structural parameters, locational aspects, flow rate etc., and no mining shall be carried out in the safety zone so worked out. No in-stream mining shall be allowed.

(c) The mining plan approved by the authorized agency of the State Government shall inter-alia include study to show that the annual replenishment of sand in the mining lease area is sufficient to sustain mining operations at levels prescribed in the mining plan and that the transport infrastructure is adequate to transport the mines material. In case of transportation by road the transport vehicles will be covered with the tarpaulin to minimize dust/ sand particle emissions.

(d) EC will be valid for mine lease period subject to a ceiling of 5 years.

Provided, in case the mining lease area is likely to result into a cluster situation i.e. if the periphery of one lease area is less than 1 km from the periphery of another lease area and total lease area equals to or exceeds 25 ha., the activity shall become Category 'B1' Projects under EIA Notification, 2006. In such a case, mining operation in any of the mine lease area in the cluster will be allowed only if the environment clearance has been obtained in respect of the cluster.

The NGT order dated 13.01.2015 in O.A. No. 123 of 2014 and M.A. No. 419 of 2014 has following directions on the issue of cluster: "In light of the judgment of the Supreme Court and what has emerged from the various cases that are subject matter of this Judgment, we direct the Ministry of Environment and Forest to formulate a uniform cluster policy in consultation with the States for permitting minor mineral mining activity including its regulatory regime, in accordance with law.

Notification S.O. 1559 (E) dated 25th June 2014 provides that "Any project or activity specified in Category 'B' will be appraised at the Central Level as Category 'A', if located in whole or in part within 5 km. from the boundary of: (i) Protected Areas; (ii) CEPI; (iii) ESA; (iv) Inter-state boundaries or international boundaries ……".

The NGT vide its order dated 13.01.2015 has quashed the Notification dated 9th September 2013, but similar provision on clusters exists in Notification dated 7th October 2014.

The EIA Notification 2006, as amended makes it clear that projects in respect of non-coal mine leases, where the area is more than equal to 50 hectares would require prior Environmental Clearance from MoEFCC, while the projects of area less than 50 hectares would be appraised for prior Environmental Clearance at the level of SEIAA.

The EIA Notification of 2006 in Clause 7 specifies the stages through which projects for grant of Environmental Clearance are required to be passed and processed. The stages include Screening, Scoping, Public Consultation and Appraisal, upon which, the Expert Appraisal Committee makes recommendation to the MoEF/SEIAA. Under 'Screening', this Clause 7 also provides for a further bifurcation of projects falling under category 'B' into 'B 1' and 'B 2'. The relevant part of Clause 7, dealing with this aspect, reads as under: "Stage (1) - Screening (Only for Category 'B' projects and activities): In case of Category 'B' projects or activities, this stage will entail the scrutiny of an application seeking prior environmental clearance made in Form 1 by the concerned State level Expert Appraisal Committee (SEAC) for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of environmental clearance depending up on the nature and location specificity of the project . The projects requiring an Environmental Impact Assessment report shall be termed Category 'B1' and remaining projects shall be termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the Ministry of Environment and Forests shall issue appropriate Guideliness from time to time."

The Ministry on 24th December, 2013, issued Office Memorandum for consideration of proposals for grant of Environmental Clearance regarding categorisation of Category 'B' projects into Category 'B1' and 'B2'. Mining of minor minerals had been separately dealt with in this Office Memorandum. Such area up to 25 hectares would be categorised as 'B 2' and such projects were to be considered, subject to the stipulations stated therein.



The EIA Notification, 2006 does not provide for issuance of Environment Clearance to Cluster of mines. It provides for EC to individual lease holders / project proponents. This position has also been upheld by the Hon'ble Supreme Court in its judgment of Vivek Bansal Vs. State of Haryana that EC should be applied for and granted to the individual lease holder.

There has been rising concerns about adverse impact of mining on small leases (less than 5 hectare) in case the numbers of such leases are large and they are located in close proximity to each other. This leads to the definition of Cluster. To avoid the rigors of environment impact assessment studies, environment management plan and the environment clearance there has been a tendency to break the leases into size which does not attract the provisions of environment impact assessment studies, environment management plan, public consultation and the environment clearance. In Deepak Kumar's case Hon'ble Supreme Court also encountered this situation and in its order dated 27.02.2012 mandated that no mining lease or renewal be done without environment clearance irrespective of size.

It is seen that the categorization of mines into 'B1' and 'B2' category in which Category 'B2' leases are being exempted from the requirement of Environment Impact Assessment, Environment Management Plan, and Public Consultation for grant of EC, in many cases now the mining leases are being given for 25 hectares or less. This defeats the purpose and intent of Hon'ble Supreme Court Judgment which orders environment clearance for all mining leases irrespective of size. The environment clearance without Environment Impact Assessment, Environment Management Plan, and Public Consultation does not serve the purpose of environment clearance which is to ensure environmentally sustainable and socially responsible mining. So if a cluster or individual lease size exceeds 5 hectare, the EIA/ EMP should be completed in the process of grant of prior environment clearance.

The EIA Notification, 2006 and subsequent amendments to that or any O.M. issued by the Ministry do not provide for procedures and Competent Authority for environment clearance for cluster. In a cluster there will mostly be situation where there are a number of different lease holders and as per the settled law the lease holder has to do the working of mine and the lease holder is the one who can apply for and get the environment clearance. The conditions stipulated in the environment clearance have to be complied by the EC holder and any violation of that empowers the authority to cancel the environment clearance or prosecute the EC holder if necessitated by the circumstances.

For cluster there is no mechanism about who will apply for EC, EC will be issued in whose name, and who will be responsible for compliance of EC conditions.

The intent of cluster assessment is to have a holistic knowledge of the impact on environment by different mines operating in close proximity of each other. There are also requirement of mitigative measures which need implementation in concerted manner by different EC holders of that cluster. To ensure that it is important that there should be an integrated Environment Impact Assessment /

Environment Management Plan for the cluster to be presented before the authority appraising the projects and considering the proposals for grant of EC. This integrated EIA/ EMP can be prepared by either the lease holder, group of lease holders, State or the State Agencies. This EIA/ EMP need to be prepared by the accredited consultants / Registered Qualified Persons of the State Governments. The application for EC and grant of EC should be done in the name of individual lease holders in the background of the integrated EIA/EMP report. The Competent Authority (SEIAA/ SEAC / EAC) will entertain individual lease holder's application for grant of EC to individual mining lease projects in that cluster in the name of lease holders. The conditions related to mitigative measures necessitated by the integrated EIA/EMP may run across more than one lease holder or EC holders, that should figure in each EC accordingly and its compliance be ensured by the individual EC holders.

The Hon'ble Supreme Court, NGT, SEAC/EAC and the Project Proponents have raised issue of cluster in mine lease allotment and environment clearance for the same, so following conditions need to be ensured for cluster of mines:

1. To address the concern of adverse impact of minor mineral mining on environment it is proposed that all mining activity including river sand mining (above 5 hectare individual or cluster) will need to prepare Environment Impact Assessment Report and Environment Management Plan before grant of environment clearance. These reports (EIA /EMP) can be prepared by the State or State nominated Agency / the Project Proponent (s).
2. As can be seen from the data provided by the States most of the mining leases for minor minerals are of lease area less than 5 hectare. It is also reported that in hill states getting a stretch in river with area more than 5 hectare is very uncommon. So the size of lease for minor minerals including river sand mining will be determined by the States as per their circumstances.
3. The EIA Notification, 2006 does not provide for cluster EC, it provides for issuance of EC to individual project proponents and the same has also been upheld in the judgment of Hon'ble Supreme Court in Vijay Bansal vs. State of Haryana case. So EC will have to be applied for and issued to the individual project proponent.
4. A cluster shall be formed when the distance between the peripheries of one lease is less than 500 meters from the periphery of other lease in a homogeneous mineral area.
5. The mining of minor minerals is mostly in clusters. The Environment Impact Assessment or Environment Management Plan are required to be prepared for the entire cluster in order to capture all the possible externalities. These reports shall capture carrying capacity of the cluster, transportation and related issues, replenishment and recharge issues, geo-hydrological study of the cluster area. The Environment Impact Assessment or Environment Management Plan shall be prepared by the State or State nominated Agency or group of project proponents



in the Cluster or the project proponent in the cluster.

6. The individual lease holders in cluster can use the same Environment Impact Assessment or Environment Management Plan for application for environmental clearance. The cluster Environment Impact Assessment or Environment Management Plan shall be updated as per need keeping in view any significant change.

7. There shall be one public consultation for entire cluster after which the final Environment Impact Assessment or Environment Management Plan report for the cluster shall be prepared.

8. The details of cluster Environment Impact Assessment or Environment Management Plan shall be reflected in each environmental clearance in that cluster and District Expert Appraisal Committee (DEAC), SEAC, and EAC shall ensure that the mitigative measures emanating from the Environment Impact Assessment or Environment Management Plan study are fully reflected as environmental clearance conditions in the environmental clearance's of individual project proponents in that cluster.

9. As the sand is mostly mined from rivers and majority of the rivers which are important source of sand also form boundary between States, so because of General Conditions most of the sand mining projects become Category 'A' project. So the General Conditions will not apply in case of river sand and gravel mining projects on account of being in 5 kilometer of inter-state boundary.

10. The Committee headed by the District Magistrate or District Collector will be empowered to appraise and grant EC for mining leases up to 5 ha in case of individual lease and up to 25ha in case of cluster for sand mining.

11. In case the mining leases are in cluster (if periphery of one lease is within 500 meters), fowling are the categorization of projects:-

- Category 'B2'Project: Cluster area of mine leases up to 5 ha and to be dealt at DEIAA/ DEAC level
- Category 'B2'Project: Cluster area of Mine leases > 5 ha and < 25 ha with no individual lease > 5 ha and to be dealt at DEIAA/DEAC level
- Category 'B1'Project: Cluster of mine leases of area > 25 hectares with individual lease size < 50ha and to be dealt at SEIAA/SEAC level
- Category 'A' Project: Cluster of any size with any of the individual lease >50ha and to be dealt at MoEFCC/EAC level

The schematic presentation of requirements on Environmental Clearance of Sand Mining including cluster situation is detailed as below:-

Area of Lease (Hectare)	Category of Project	Require-ment of EIA / EMP	Require-ment of Public Hearing	Require-ment of EC	Who can prepare EIA/ EMP	Who will apply for EC	Authority to appraise/ grant EC	Authority to monitor EC compliance
EC Proposal of Sand Mining in cluster situation								
Cluster area of mine leases up to 5 ha	**'B2'**	Form-1M, PFR and Approved Mine Plan	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA/	DEIAA SEIAA SPCB CPCB MoEFCC Agency nominated by MoEFCC
Cluster area of Mine leases > 5 ha and < 25 ha with no individual lease > 5 ha	**'B2'**	Form-I, PFR and Approved Mine Plan and one EMP for all leases in the Cluster	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA/	
Cluster of mine leases of area > 25 hectares with individual lease size < 50ha	**'B1'**	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	SEAC/ SEIAA	

Cluster of any size with any of the individual lease > 50ha	**'A'**	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	EAC/ MoEFCC	

MANAGEMENT OF SAND DEPOSITED AFTER FLOOD ON AGRICULTURAL FIELD OF FARMERS

The Standing Committee on Water Resources on issues, concerning flood management, compensation, and status of ownership of submerged and eroded land in the country including compensation to farmers for loss of their crops destroyed by floods and right to disposal of the sand left in the fields of farmers in its meeting held on 29.04.2015 made observations on this subject.

The Committee observed that pursuant to Hon'ble Supreme Court of India decision in "Deepak Kumar Case" in 2012, regulations were framed by the Ministry of Mines to guide environmental clearance of minor minerals. … The Committee, therefore, desires the Ministry of Water Resources, River Development and Ganga Rejuvenation to work in close coordination with the Ministry of Mines and Environment, Forest and Climate Change to frame regulations / Guideliness in this regard expeditiously.

Mining of Sand

The Committee further observed that due to the floods, the agricultural land of farmer is destroyed and rendered infertile. Further the farmer loses his livelihood as the produce of his land is destroyed by flood and become unsalable. The farmer is also deprived of the right of lifting sand from his land. He is therefore, left helpless and destitute and leave their land in search of job.

The Committee observes that "mining operation" means any operation undertaken for the purpose of winning any mineral. Accordingly, if desilting is undertaken perse with the objective of winning a mineral then only it will be construed as a mining operation. Apparently, if the desilting is undertaken not for winning any mineral, it will not be construed as mining operation and therefore, the farmer can remove the sand from the land without requiring the requisite permits. However, the Committee strongly feels that the farmer be given the right to use and dispose-off the sand accumulated over their land post flood, by incorporating the necessary provisions in the Mines and Mineral (Development and Regulation) Act, 1957".

Removal of sand from the agricultural field by the owner farmer of the land from environment point of view will not be considered as mining operation and its removal and disposal can be allowed without the requirement of environment clearance till it is done only to the extent of reclaiming the agricultural land. The sand deposited after flood only be removed, so no mining / digging below the ground level is allowed. For removing sand in case where private land has gone into the river due to erosion, the requirement of mining lease and environment clearance will continue. This operation



of removal of sand deposited on agricultural field should be done after a mapping of deposition is done by the Land Management Committee of the Gram Panchayat. The sand so deposited post flood can be removed by the farmer owning the land / group of farmers affected by this post flood sand deposition or the Gram Panchayat. Customary rights to remove and dispose off the sand should be given to the farmer affected by deposition of sand on account of sudden flood in his agricultural land.

MINING OF SAND FROM AGRICULTURAL FIELD

This practice is prevalent in Haryana, where the top layer of soil varying between 1 and 2 meters is removed and stacked separately and thereafter the sand deposit which may be 10-15 meter deep is mined. After removing the sand layer up to a maximum depth of 09 meters, the top soil stacked is spread out on the field and the same is brought under the cultivation. Though the level of this land (mined out area) is lowered to the depth of the excavation and in initial years of cultivation the productivity is low, but the productivity of the fields improves with continued cultivation and addition of organic manure in the field. In Haryana some leases are of large area (ranging from 1000 hectare to 2000 hectare) the agricultural fields and river bed both are included in the same lease for mining.

The following recommendations should be kept in mind for mining in such leases:

1. Mining of sand in such mine leases will require environment clearance.
2. The lease should be of sand mining either from the agricultural field or river. In same lease both type of area should not be included.
3. The sand mining from agricultural field is being done in Haryana for a long time and it can be done in a more sustainable manner without adverse impact on agricultural productivity, if proper environmental safeguards are taken.
4. The slope of mining area adjacent to agricultural fields should be proper (preferably 45-60 degree) and adequate gap (minimum 10 feet) be left from adjacent agricultural field to avoid erosion and scouring.

CUSTOMARY RIGHT ON SAND MINING

The native people have their long held customary rights to take silt, sand & soil from their tanks and nearby rivers for their use or community works in the village in almost all the States in some form or the other.

Next to the reserved forests, tanks and rivers are the biggest common properties in India. Most of the village tanks are 'government properties' with some exceptions of privately held tanks. Land revenue department, irrigation department and forest department is given powers to deal with property right' and hence protecting all tanks and rivers preventing damages including encroachments is their responsibility. The local villagers were given 'customary rights' under the Revenue Department Orders, and other laws related to Panchayats and Easements to take sand, soil and earth for agricultural and domestic purposes without seeking any permission from anyone. The States strive to keep these customary rights to use such resources like soil and sand for individuals work and community work in the village intact without requirement of any permit and clearance. These customary rights need to be protected and respected.

DESILTING OF RESERVOIRS / BARRAGES / ANNECUTS / LAKES / CANALS

These structures are generally in possession and maintenance of Irrigation Department / Minor Irrigation Department / PHED of State Governments. The dams and reservoirs can be a significant source of sand. Many such structures are silted and their water holding capacity has gone down considerably. In some instances to compensate for silted capacity raising of height of dam or construction of new structures is proposed which further leads to submergence of new areas of agricultural field and forests. Taking up desilting of such projects can serve dual purpose of increasing the water holding capacity and making available the sand for other usage. In some States the Irrigation Department is permitted to use it for the departmental works free of charge and balance can be disposed of in market after paying the due royalty. A detailed study is required to be carried out to verify economic viability and environmental sustainability before contemplating dredging of storage reservoirs for sand / gravel mining.

The de-silting of reservoir, dredging for upkeep and maintenance of structures, channels and averting natural disasters will not be treated as mining for the purpose of environmental clearance.

The Ministry of Water Resources (MoWR) view on desiltation from flood control point of view is as follows:

A multidisciplinary Committee (Mittal Committee) under the chairmanship of Dr. B.K. Mittal, former Chairman, Central Water Commission was constituted by MoWR, vide letter dated 08.10.2001 to identify cause and extent of siltations in rivers, suggest measures to minimize siltation, examine as to whether desilting is a technically feasible means to minimize magnitude of flood in rivers, suggest appropriate technology/ methods of desilting of rivers, propose a realistic operational programme in a time bound manner and other related aspects. The committee studied in respect of few sites on Ganga, Brahmputra, Godavari, Krishna etc., and inter-alia concluded that:

i) Siltation in river is not pronounced and alarming;

ii) Desilting of rivers for flood control is not an economically viable solution;

iii) Dredging in general has been found to be inadequate and should not be resorted to, particularly in major rivers;

iv) There are, of course, some locations such as tidal rivers, confluence points with narrow constrictions and the like which can be tackled by desilting after thorough examination and techno-economic justification;

v) Selective dredging is suggested depending upon local conditions; and

vi) Desilting of rivers can marginally minimize the magnitude of floods and be effective only for a short period.

Thus, desilting in general is not feasible technically, due to several reasons like non-sustainability, non- availability of vast land required for disposal of dredged material etc. This cannot be viewed in isolation of other approaches to manage floods. Desilting of rivers in vulnerable reaches may be suggested based on model study, if it is found techno-economically viable. For navigation purposes, the river reaches in the water ways path may be dredged to have minimum depth of water.

MINING PLAN

The Environment Clearance shall be given to only those mining leases which have mine plan approved by the Competent Authority designated by the States. Modification of the mining plan during operation will also need approval of the Competent Authority. The Mining Plan shall be prepared by the Recognised Qualified Persons (RQP). The person to be recognized for preparing the mining plan should be a holding a degree of Mining Engineering, Environmental Engineering or a post graduate degree in Geology granted by a University established or incorporated by or under a Central Act or a State Act including any institutions recognized by the UGC or any equivalent qualification granted by any University or institution outside India and have a professional experience of three years of working in a supervisory capacity in the field of mining after obtaining a degree. The States will devise their own mechanism of selection and empanelment of RQPs. A mining plan should be valid for a period of 5 years, which can be renewed further.

EVALUATING THE IMPACT OF SAND MINING

To assess the impact of mining and effect of remedial measures can be assessed through monitoring. This is also required for mid-course corrections. Monitoring will provide data to evaluate the upstream and downstream effects of sand and gravel extraction activities, and long-term changes. A brief report summarizing the annual results of the physical and biological monitoring should document the evolution of the sites over time, and the cumulative effects of sand and gravel extraction. The summary should also recommend any modification of extraction rates needed to minimize impacts of extraction.

Sand Replenishment, Geomorphology and Hydrology:

Physical monitoring requirements of sand and gravel extraction activities should include surveyed channel cross-sections, longitudinal profiles, bed material measurements, geomorphic maps, and discharge and sediment transport measurements. The physical data will illustrate bar replenishment and any changes in channel morphology, bank erosion, or particle size.

In addition to local monitoring for replenishment at specific mining sites, monitoring of the entire reach through the estuary will provide information on the cumulative response of the system to sand and gravel extraction. For example, it is important for downstream bars and the estuary to receive sufficient sand and gravel to maintain estuarine structure and function. Because the elevation of the bed of the channel is variable from year to year, a reach-based approach to monitoring will provide a larger context for site-specific changes. If long-term monitoring data show that there is a reach-scale trend of bed lowering (on bars or in the thalweg), the extraction could be limited.

Cross-sections:

Surveyed channel cross-sections should be located at permanently documented sites upstream, downstream and within the extraction area. Cross-sections intended to show reach- scale changes



should be consistently located over geomorphic features such as at the head of riffles, across the deepest part of pools, or across particular types of channel bars.

Cross-section spacing should be close enough to define the morphology of the river channel. Cross-section data should be surveyed in March or April to evaluate changes that may occur during the flooding season.

Cross-section data should be collected over the reach to the estuary, and locally upstream, downstream, and within each mining site. This long-term monitoring data should be collected and analyzed even if no mining occurs in order to understand and estimate the sand budget of the river reach.

Photo-documentation:

Photographs of the project sites should be taken prior to excavation to document the baseline conditions, and again during each monitoring session. Photos should be taken twice a year. Photos of structures nearby like outfalls / off-takes, intakes, bridges and other structures may also be regularly taken.

Groundwater Level:

Monitoring wells should be established adjacent to each off-channel floodplain excavation to record changes in ground water levels. Measurements should be taken monthly. This should help analyse surface water and ground water interaction along the reach.

Extent and Quality of Riparian Vegetation:

Document the extent and quality of riparian vegetation, including successional status, and any increase in disturbance indicators (non-native plants). The extent of riparian habitat can be determined utilising aerial photos. Habitat quality data, i.e., successional status and species composition, must be determined through field reconnaissance.

Riparian Vegetation Maps:

Develop yearly maps of the sensitive habitat areas and document their aerial extent over time. These maps may be combined with the geomorphic maps. Monitor sites identified as sensitive for disturbance in excess of expected geomorphic trends - i.e., massive bank wasting up or downstream from an active mine site. Monitor sand and gravel mining impacts which may translate up and downstream, causing accelerated erosion of sensitive zones and impacting the ability of new habitat to form due to excessive scour or sedimentation.

This monitoring / documentation should be done by the EC holders and will be regularly checked and assessed by the DEIAA for corrective steps in time. The DEIAA should review the status of monitoring and documentation data of each mining site especially for sand mining once in a year.

MONITORING SYSTEM FOR SUSTAINABLE SAND MINING

The implementation of these Guideliness on Sustainable Sand Mining is not possible till States create a robust mechanism to monitor the mining operation and measure the mined out mineral. The entire exercise of Environment Impact Assessment and Environment Management Plan aims towards making the mining process environmentally sustainable. The Environment Clearance letter indicates the EC capacity that is the quantity of material which can be mined in a year. If this quantity is not measured, and much more mineral than envisaged in the EC is mined out then the entire process of EC is rendered futile. Keeping above objective in mind it is required of the State / State Agencies to create and establish a robust system to monitor and measure the mined out mineral at each lease location and its transportation in State.

The State Governments have tried various methods for monitoring the sand mining in their areas, the main feature of which generally has been through Transport Permits (T.P.). The printing of Transport Permits on security paper, invisible ink mark, fugitive ink background, VOID pantograph and Unique Barcode are some of the tools used by the States. These tools need to be backed by suitable software and dedicated websites with security certifications at different levels.

The system proposed is that States should issue Transport Permit. Bar code on the T.P. when scanned using the system, will generate a unique invoice number. The bidder has to enter destination, distance between plot and destination, vehicle number etc in the system. After scanning, unique bar code number; invoice date & time and validity date & time is sent to the bidder, which need to be written on T.P. Validity of T.P. is calculated based on distance between plot and destination. After validity time is over the T.P. stands invalid. The officers involved in monitoring should be provided with the android application using which the T.P. can be checked anywhere on road. As soon as the bar code on T.P. gets scanned through using android application, all details of T.P. such as plot details, vehicle details, validity time etc. should get fetched from server. This means, if anything is re-written on T.P. and attempt is made to reuse the same, it can be traced immediately. Registering of T.P. on server can be done using website, using android application (smartphone with internet) or even through SMS (smartphone without internet). This implies that TP can be registered on server even if only mobile phone range is available on plot. Various reports can be generated using the system showing daily lifting reports and user performance report. This way the vehicles carrying sand can be tracked from source to destination.

MONITORING SYSTEM FOR SUSTAINABLE SAND MINING

PROCEDURE FOR MONITORING OF SAND MINING OR RIVER BED MINING

1. The security feature of Transport Permit shall be as under:

(a) Printed on Indian Banks' Association (IBA) approved Magnetic Ink Character Recognition (MICR) Code paper.

(b) Unique Barcode.

(c) Unique Quick Response (QR) code.

(d) Fugitive Ink Background.

(e) Invisible Ink Mark.

(f) Void Pantograph.

(g) Watermark.

2. Requirement at Mine Lease Site:

(a) Small Size Plot (Up to 5 hectare): Android Based Smart Phone.

(b) Large Size Plots (More than 5 hectare): CCTV camera, Personal Computer (PC), Internet Connection, Power Back up.

(c) Access control of mine lease site.

(d) Arrangement for weight or approximation of weight of mined out mineral on basis of volume of the trailer of vehicle used.

3. Scanning of Transport Permit or Receipt and Uploading on Server:

(a) Website: Scanning of receipt on mining site can be done through barcode scanner and computer using the software;

(b) Android Application: Scanning on mining site can be done using Android Application using smart phone. It will require internet availability on SIM card;

(c) SMS: Transport Permit or Receipt shall be uploaded on server even by sending SMS through mobile. Once Transport Permit or Receipt get uploaded, an unique invoice code gets generated with its validity period.

4. Proposed working of the system:

The State Mining Department should print the Transport Permit or Receipt with security features enumerated at Paragraph 1 above and issue them to the mine lease holder through the District Collector. Once these Transport Permits or Receipts are issued, they would be uploaded on the server against that mine lease area. Each receipt should be preferably with pre-fixed quantity, so the total quantity gets determined for the receipts issued.

When the Transport Permit or Receipt barcode gets scanned and invoice is generated, that particular barcode gets used and its validity time is recorded on the server. So all the details of transporting of mined out material can be captured on the server and the Transport Permit or Receipt cannot be reused.

5. Checking On Route:

The staff deployed for the purpose of checking of vehicles carrying mined mineral should be in a position to check the validity of Transport Permit or Receipt by scanning them using website, Android Application and SMS.

6. Breakdown of Vehicle:

In case the Vehicle breakdown, the validity of Transport Permit or Receipt shall be extended by sending SMS by driver in specific format to report breakdown of vehicle. The server will register this information and register the breakdown. The State can also establish a call centre, which can register breakdowns of such vehicles and extend the validity period. The subsequent restart of the vehicle also should be similarly reported to the server or call centre.

7. Tracking of Vehicles:

The route of vehicle from source to destination can be tracked through the system using check points, RFID Tags, and GPS tracking.

8. Alerts or Report Generation and Action Review:

The system will enable the authorities to develop periodic report on different parameters like daily lifting report, vehicle log or history, lifting against allocation, and total lifting. The system can be used to generate auto mails or SMS. This will enable the District Collector or District Magistrate to get all the relevant details and shall enable the authority to block the scanning facility of any site found to be indulged in irregularity. Whenever any authority intercepts any vehicle transporting illegal sand, it shall get registered on the server and shall be mandatory for the officer to fill in the report on action taken. Every intercepted vehicle shall be tracked.

The monitoring of mined out mineral, environmental clearance conditions and enforcement of Environment Management Plan will be ensured by the DEIAA, SEIAA and the State Pollution Control Board or Committee. The monitoring arrangements envisaged above shall be put in place. The monitoring of enforcement of environmental clearance conditions shall be done by the Central Pollution Control Board, Ministry of Environment, Forest and Climate Change and the agency nominated by the Ministry for the purpose.

ADMINISTRATIVE STRUCTURE FOR ENVIRONMENT CLEARANCE AND ENSURING COMPLIANCE OF EC CONDITIONS

An no mining in allowed without Envirnomental Clearance. The process of EC involves preparation of EIA/EMP, PER and mine plan.

The EIA/EMP can be prepared by the State Government or any agency of the State, group of project proponents in the cluster or the individual project proponent. The EIA / EMP can be prepared by the accredited consultants or the Registered Qualified Person(s) / agencies selected by the States.

DISTRICT ENVIRONMENT IMPACT ASSESSMENT AUTHORITY

The Central Government has constituted the District Level Environment Impact Assessment Authority (DEIAA), for grant of environmental clearance for Category 'B2' Projects for mining of minor minerals, for all the districts in the country.

For, minor minerals including sand and gravel mining lease of area up to 5 hectare in case of individual lease and up to 25 ha in case of cluster for sand mining, the grant of EC will be done by the District Environment Impact Assessment Authority (DEIAA) headed by the District Magistrate or District Collector. This Authority will be responsible for proper and sustainable management of sand mining in the district. The Authority will be responsible for designating the area / stretch in river suitable for mining in the district and also identifying the area / stretch in river prohibited for sand mining. The Authority will ensure clear demarcation of mining site, its documentation, and ensuring that no mining takes place without EIA / EMP and EC of the mining site.

The Chairperson and official members of the Authority for the districts should hold office during their tenure in the district on said posts and the expert member shall hold office for a period of three years from the date of nomination by the Competent Authority. The Committee shall meet at least once in a month.

The District Environment Impact Assessment Authority (DEIAA) :

The DEIAA will have following composition :

1.	District Magistrate or District Collector of the district	Chairperson
2.	Senior most Divisional Forest Officer in the district	Member
3.	An expert member to be nominated by the Divisional Commissioner or Chief Conservator of the Forest	Member
4.	Sub-Divisional Magistrate or Sub-Divisional Officer of the district head quarter	Member-Secretary

DISTRICT LEVEL EXPERT APPRAISAL COMMITTEE:

The District Level Expert Appraisal Committee (DEAC) will appraise the cases and make recommendations to the District Environment Impact Assessment Authority for environmental clearance. This Committee will also make recommendations / suggestions on the District Survey Report to the DEIAA. The DEAC will have following composition:

1.	Senior most Executive Engineer, Irrigation Department	Chairperson
2.	Senior most Sub-Divisional Officer (Forest)	Member
3.	A representative of Remote Sensing Department or Geology Department or State Ground Water Department to be nominated by the District Magistrate or District Collector	Member
4.	Occupational health expert or Medical Officer to be nominated by the District Magistrate or District Collector	Member
5.	Engineer from Zila Parishad	Member
6.	A representative of State Pollution Control Board or Committee	Member
7.	An expert to be nominated by the Divisional Commissioner or Chief Conservator of Forest	Member
8.	An expert to be nominated by the Divisional Commissioner or Chief Conservator of Forest	Member
9.	An expert to be nominated by the Divisional Commissioner or Chief Conservator of Forest	Member
10.	Senior most Assistant Engineer, Public Works Department	Member
11.	Assistant Director or Deputy Director or District Mines Officer or Geologist in the district in that order	Member- Secretary

The DEAC will meet at least once a month, depending on the work load the frequency of meetings can be decided by the Chairperson of DEAC and Chairperson, DEIAA.

Each proposal for the mining lease under consideration for environmental clearance in the district will be inspected on-site by the Sub-Divisional Level Committee headed by the SDM.

The Sub-Divisional Committee should comprise of following officers:

Sub-Divisional Magistrate	Chairperson
Sub-Divisional Officer, Forest/ Assistant Conservator of Forest/ Forest Range Officer	Member
Representative of State Pollution Control Board	Member
SDO, Irrigation Department	Member
Geologist or Assistant Geologist or Mining Officer / Mining Inspector	Member

The presence of at least three members will be needed for inspection. This Committee shall submit its report within 15 days from the receipt of the proposal.

The monitoring of EC conditions and enforcement of EMP will be ensured by the District Collector and the, State Pollution Control Board. The monitoring of enforcement of EC conditions can also be done by the Central Pollution Control Board, Ministry of Environment, Forest & Climate Change and the agency nominated by the Ministry for the purpose.

Schematic Presentation of Requirements on Environmental Clearance of Sand Mining including cluster situation

Area of Lease (Hectare)	Category of Project	Require-ment of EIA / EMP	Require-ment of Public Hearing	Require-ment of EC	Who can prepare EIA/ EMP	Who will apply for EC	Authority to appraise/ grant EC	Authority to monitor EC compliance
EC Proposal of Sand Mining on the basis of individual mine lease								
0 - 5ha	**'B2'**	Form - 1M, PFR and Approved Mine Plan	No	Yes	Project Proponent	Project Proponent	DEAC/ DEIAA	DEIAA SEIAA SPCB CPCB MoEFCC Agency nominated by MoEFCC

> 5 ha and < 25 ha	**'B2'**	Form-I, PFR and Approved Mine Plan and EMP	No	Yes	Project Proponent	Project Proponent	SEAC / SEIAA	DEIAA SEIAA SPCB CPCB MoEFCC Agency nominated by MoEFCC
≥ 25ha and < 50ha	**'B1'**	Yes	Yes	Yes	Project Proponent	Project Proponent	SEAC / SEIAA	
≥ 50 ha	**'A'**	Yes	Yes	Yes	Project Proponent	Project Proponent	SEAC / SEIAA	
EC Proposal of Sand Mining in cluster situation								
Cluster area of mine leases up to 5 ha	**'B2'**	Form - 1M, PFR and Approved Mine Plan	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA/	DEIAA SEIAA SPCB CPCB MoEFCC Agency nominated by MoEFCC
Cluster area of Mine leases > 5 ha and < 25 ha with no individual lease > 5 ha	**'B2'**	Form -I, PFR and Approved Mine Plan and one EMP for all leases in the Cluster	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA/	

Cluster of mine leases of area ≥ 25 hectares with individual lease size < 50ha	**'B1'**	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	SEAC/ SEIAA	
Cluster of any size with any of the individual lease ≥ 50ha	**'A'**	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	EAC/ MoEFCC	

General Conditions will not apply on account of inter- state boundaries for river sand mining leases.

EXEMPTION OF CERTAIN CASES FROM BEING CONSIDERED AS MINING FOR THE PURPOSE OF REQUIREMNT OF ENVIRONMENTAL CLEARANCE

Keeping in view the purpose, maintenance of infrastructure, abatement of disasters, customary easement and property rights, it is felt that following cases may not be treated as mining for the purpose of requirement of environmental clearance. The following cases shall not require prior environmental clearance, namely:-

1. Extraction of ordinary clay or sand, manually, by the Kumhars (Potter) to prepare earthen pots, lamp, toys, etc. as per their customs.
2. Extraction of ordinary clay or sand, manually, by earthen tile makers who prepare earthen tiles.
3. Removal of sand deposits on agricultural field after flood by farmers.
4. Customary extraction of sand and ordinary earth from sources situated in Gram Panchayat for personal use or community work in village.
5. Community works like de-silting of village ponds or tanks, construction of village roads, ponds, bunds undertaken in Mahatama Gandhi National Rural Employment and Guarantee Schemes, other Government sponsored schemes, and community efforts.
6. Dredging and de-silting of dams, reservoirs, weirs, barrages, river, and canals for the purpose of their maintenance, upkeep and disaster management.
7. Traditional occupational work of sand by Vanjara and Oads in Gujarat vide notification number GU/90(16)/MCR-2189(68)/5-CHH, dated the 14th February, 1990 of the Government of Gujarat.
8. Digging of well for irrigation or drinking water.
9. Digging of foundation for buildings not requiring prior environmental clearance.
10. Excavation of ordinary earth or clay for plugging of any breach caused in canal, nala, drain, water body, etc., to deal with any disaster or flood like situation upon orders of District Collector or District Magistrate.
11. Activities declared by State Government under legislations or rules as non- mining activity with concurrence of the Ministry of Environment, Forest and Climate Change, Government of India.

STANDARD ENVIRONMENTAL CONDITIONS FOR SAND MINING

Impact Category	S.No.	Environmental Conditions
Stakeholder Engagement	1	In the case of private land not owned by the lease holder an affidavit should be obtained regarding consent of the concerned land owner (s) for carrying out the mining operation.
	2	Stakeholder awareness and ability to raise concerns and getting it to be addressed.
	3	Implementation of Action Plan on the issues raised during the Public Hearing. The Proponent shall complete all the tasks as per the Action Plan submitted with the budgetary provisions during the Public Hearing.
	4	Having valid lease and all the permits is very much needed.
	5	To establish a Monitoring Committee including Local Panchayat, to check on traffic due to transportation and submit an annual report on the same.
	6	The directions given by the Hon'ble Supreme Court of India vide order dated 27.02.2012 in Deepak Kumar case [SLP(C) Nos. 19628-19629 of 2009] and order dated 05.08.2013 of the Hon'ble National Green Tribunal in application No. 171/2013 may be strictly followed.
	7	All the provisions made and restrictions imposed as covered in the Minor Mineral Rule, shall be complied with, particularly regarding Environment Management Practices and its fund management and Payment of compensation to the land owners.
Sustainable Mining Practices	8	District level Survey Report should be prepared and area suitable for mining and area prohibited for mining be identified.
	9	The depth of mining in Riverbed shall not exceed one meter or water level whichever is less, provided that where the Joint Inspection Committee certifies about excessive deposit or over accumulation of mineral in certain reaches requiring channelization, it can go up to 3 meters on defined reaches of the River.
	10	No River sand mining be allowed in rainy season.
	11	To submit annual replenishment report certified by an authorized agency. In case the replenishment is lower than the approved rate of production,

		then the mining activity / production levels shall be decreased / stopped accordingly till the replenishment is completed.
	12	Ultimate working depth shall be up to 3.0 m from Riverbed level and not less than one meter from the water level of the River channel whichever is reached earlier. In hilly terrain this depth be preferably restricted to one meter.
	13	In River flood plain mining a buffer of 3 meter to be left from the River bank for mining.
	14	In mining from agricultural field a buffer of 3 meter to be left from the adjacent field.
	15	Mining shall be done in layers of 1 meter depth to avoid ponding effect and after first layer is excavated, the process will be repeated for the next layers.
	16	To maintain safety and stability of Riverbanks i.e. 3 meter or 10% of the width of the River whichever is more will be left intact as no mining zone.
	17	No stream should be diverted for the purpose of sand mining. No natural water course and/ or water resources are obstructed due to mining operations.
	18	No blasting shall be resorted to in River mining and without permission at any other place.
	19	Depending upon the location, thickness of sand, deposition, agricultural land/Riverbed, the method of mining may be manual, semi-mechanized or mechanized; however, manual method of mining shall be preferred over any other method.
Identification and Preparation of Mining Site	20	Mining should be done only in area / stretch identified in the District Level Survey Report suitable for mining and so certified by the Sub-Divisional Level Committee after site visit.
	21	Mining should begin only after pucca pillar marking the boundary of lease area is erected at the cost of the lease holder after certification by the mining official and its geo coordinates are made available to the District Level Committee.
	22	The top soil in case of surface land mining shall be stored temporarily in an earmarked site and concurrently used for land reclamation.

Monitoring the Mining of Mineral and its Transportation	23	The EC holder shall keep a correct account of quantity of mineral mined out, dispatched from the mine, mode of transport, registration number of vehicle, person in-charge of vehicle and mine plan. This should be produced before officers of Central Government and State for inspection.
	24	For each mining lease site the access should be controlled in a way that vehicles carrying mineral from that area are tracked and accounted for.
	25	The State / District Level Environment Committee should use technology like Bar Coding, Information and Communications Technology (ICT), Web based and ICT enabled services, mobile SMS App etc. to account for weight of mineral being taken out of the lease area and the number of trucks moving out with the mineral.
	26	There should be regular monitoring of the mining activities in the State to ensure effective compliance of stipulated EC conditions and of the provisions under the Minor Mineral Concessions Rules framed by the State Government.
Noise Management	27	Noise arising out of mining and processing shall be abated and controlled at source to keep within permissible limit.
	28	Restricted working hours. Sand mining operation has to be carried out between 6 am to 7 pm.
Air Pollution and Dust Management	29	The pollution due to transportation load on the environment will be effectively controlled and water sprinkling will also be done regularly.
	30	Air Pollution due to dust, exhaust emission or fumes during mining and processing phase should be controlled and kept in permissible limits specified under environmental laws.
	31	The mineral transportation shall be carried out through covered trucks only and the vehicles carrying the mineral shall not be overloaded. Wheel washing facility should be installed and used.
Management of Visual Impact	32	The mining operations are to be done in a systematic manner so that the operations shall create a major visual impact on the site.
Bio-Diversity Protection	33	Restoration of flora affected by mining should be done immediately. Twice the number of trees destroyed by mining to be planted preferably of indigenous species. Each EC holder should plant and maintain for lease period at least 5 trees per hectare in area near lease.
	34	No mining lease shall be granted in the forest area without forest clearance in accordance with the provisions of the Forest Conservation Act, 1980 and the rules made thereunder.

	35	Protection of turtle and bird habitats shall be ensured.
	36	No felling of tree near quarry is allowed. For mining lease within 10km of the National Park / Sanctuary or in Eco-Sensitive Zone of the Protected Area, recommendation of Standing Committee of National Board of Wild Life (NBWL) have to be obtained as per the Hon'ble Supreme Court order in I.A. No. 460 of 2004.
	37	Spring sources should not be affected due to mining activities. Necessary Protection measures are to be incorporated.
Management of Instability and Erosion	38	Removal, stacking and utilization of top soil in mining are should be ensured. Where top soil cannot be used concurrently, it shall be stored separately for future use keeping in view that the bacterial organism should not die and should be spread nearby area.
	39	The EC should stipulate conditions for adequate steps to check soil erosion and control debris flow etc. by constructing engineering structures
	40	Use of oversize material to control erosion and movement of sediments
	41	No overhangs shall be allowed to be formed due to mining and mining shall not be allowed in area where subsidence of rocks is likely to occur due to steep angle of slope.
	42	No extraction of stone / boulder / sand in landslide prone areas.
	43	Controlled clearance of riparian vegetation to be undertaken
Waste Management	44	Site clearance and tidiness is very much needed to have less visual impact of mining.
	45	Dumping of waste shall be done in earmarked places as approved in Mining Plan.
	46	Rubbish burial shall not be done in the Rivers.
Pollution Prevention	47	The EC holder shall take all possible precautions for the protection of environment and control of pollution.
	48	Effluent discharge should be kept to the minimum and it should meet the standards prescribed.
Protection of Infrastructure	49	Mining shall not be undertaken in a mining lease located in 200-500 meter of bridge, 200 meter upstream and downstream of water supply / irrigation scheme, 100 meters from the edge of National Highway and railway line, 50 meters from a reservoir, canal or building, 25 meter from the edge of State Highway and 10 meters from the edge of other

		roads except on special exemption by the Sub-Divisional level Joint Inspection Committee.
	50	For carrying out mining in proximity to any bridge or embankment, appropriate safety zone (not less than 200 meters) should be worked out on case to case basis, taking into account the structural parameters, location aspects and flow rate, and no mining should be carried out in the safety zone so worked out.
	51	Mining activities shall not be done for mine lease where mining can cause danger to site of flood protection works, places of cultural, religious, historical, and archeological importance.
Enhancement Road Safety	52	Vehicles used for transportation of sand are to be permitted only with **of** fitness and PUC Certificates.
	53	Junction at takeoff point of approach road with main road be properly developed with proper width and geometry required for safe movement of traffic by concession holder at his own cost.
	54	Project Proponent shall ensure that the road may not be damaged due to transportation of the mineral; and transport of minerals will be as per IRC Guideliness with respect to complying with traffic congestion and density.
	55	No stacking allowed on road side along National Highways.
Closure and Reclamation of Mined Out Area	56	The Project Proponent shall undertake phased restoration, reclamation and rehabilitation of land affected by mining and completes this work before abandonment of mine.
	57	Restoration, reclamation and rehabilitation in cluster should be done systematically and jointly by each EC holder in that cluster. This should be appropriately reflected as EC condition in each EC in cluster.
	58	Site specific plan with eco-restoration should be in place and implemented.
Health and Safety	59	Health and safety of workers should be taken care of.
	60	Transport of mineral will not be done through villages / habitations.
	61	The Project Proponent shall make arrangement for drinking water, first aid facility (along with species specific anti-venom provisioning) in case of emergency for the workers.

	62	Project Proponent shall implement the Disaster Management Plan if the mine lease area is located in Seismic Zone-IV. Project Proponent shall appoint a Committee to have a check over any disaster to warn workers well before for the safety of the workers. Emergency helpline number will be displayed at all levels.
	63	Project Proponent shall appoint an Occupational Health Specialist for Regular and Periodical medical examination of the workers engaged in the Project and records maintained; also, Occupational health check-ups for workers having some ailments like BP, diabetes, habitual smokers, etc. shall be undertaken once in six months and necessary remedial/preventive measures taken accordingly. Recommendations of National Institute for Labour for ensuring good occupational environment for mine workers would also be adopted.
Monitoring the Impact of Mining	64	The Project Proponent shall report monitoring data on replenishment, traffic management, levels of production, River Bank erosion and maintenance of Road etc.
Mineral Conservation	65	Use of alternate material such as M-sand in place of natural River sand shall be encouraged in order to reduce stress on natural eco-system.

APPENDIX: TABLE - 1

REVENUE FROM SAND MINING IN STATES / UTs

(Rs. in crores)

Sl.No.	STATE / U.T	2012 - 2013	2013 - 2014	2014 - 2015
01	Andaman & Nicobar	0.073	0	0
02	Arunachal Pradesh	7	8	5
03	National Capital Territory of Delhi	0	0	
04	Himachal Pradesh	0.70	0.35	0.07
05	Jharkhand	4.25	3.04	0.07
06	Karnataka	23.74	15.33	25.99
07	Madhya Pradesh	184.93	179.41	172.53
08	Meghalaya	14.50	15.88	15.50 (as forest royalty from govt. contractors)
09	Mizoram	0.018	0.0475	0.0861
10	Puducherry	0.80	0.20	0.03
11	Rajasthan	173.36	252.06	134
12	Tamil Nadu	188.50	117.73	109.10
13	Uttar Pradesh	97.27	166.45	168.38

* States/UTs not mentioned have not provided the data.

APPENDIX: TABLE - 2

NUMBER OF MINING LEASES IN STATE

Sl.No.	STATE / U.T	In stream	Flood Plain	Sea Shore	Agricul-tural field	River	Total
01	Andaman & Nicobar						Nil
02	Andhra Pradesh						Nil
03	Haryana	5	12		7		31
04	Jammu & Kashmir					650	650
05	Jharkhand	10				387	397
06	Lakshadweep					1090	1090
07	Manipur						NIL
08	Meghalaya						NIL
09	Odisha						NIL
10	Punjab	2 + 80 Temporary Working Permit				73	155
11	Sikkim		85				85
12	Tripura	21	244		5		270

* States/UTs not mentioned have not provided the data.

APPENDIX: TABLE - 3

AVERAGE SIZE OF SAND MINING LEASES IN STATE / UT: 2014-15

(In Hectare)

Sl.No.	STATE / U.T	AVERAGE SIZE	SMALLEST MINING LEASE AREA	LARGEST MINING LEASE AREA
01	Andaman & Nicobar	NOT APPLICABLE		
02	Arunachal Pradesh	ONLY MINING PERMITS		
03	Himachal Pradesh	1.20	0.25	4.09
04	Jharkhand	0.25	0.13	87.38
05	Karnataka	5	5	19.42
06	Madhya Pradesh	8.52	0.30	306.98
07	Meghalaya	Mostly < 1.5 ha.		
08	Mizoram	NA		
09	Puducherry	NA		
10	Rajasthan	2 5 in Bikaner	24.82 2 in Bikaner	1901.89 5 in Bikaner
11	Tamil Nadu	29 leases < 10 ha.	14 leases of 10 - 15 ha.	42 leases > 15 ha.
12	Uttar Pradesh	25	5	200

* States/UTs not mentioned have not provided the data.

APPENDIX: TABLE - 4

AVERAGE PERIOD OF SAND MINING LEASES IN STATE / UT

(In Hectare)

Sl.No.	STATE / U.T	AVERAGE MINING LEASE PERIOD (YEARS)
01	Andaman & Nicobar	Not Applicable
02	Arunachal Pradesh	Only mining permit is given
03	Himachal Pradesh	5
04	Jharkhand	3
05	Karnataka	2
06	Madhya Pradesh	5 to 10
07	Meghalaya	No lease in operation currently
08	Mizoram	No mining lease in operation currently
09	Puducherry	One year permit
10	Rajasthan	5 20-30 years in Bikaner
11	Tamil Nadu	3
12	Uttar Pradesh	3

* States/UTs not mentioned have not provided the data.

APPENDIX: TABLE - 5

COMMON METHOD AND PRACTICE OF SAND MINING IN STATE / UT

Sl.No.	STATE / U.T	COMMON METHOD AND PRACTICE OF SAND MINING
01	Andaman & Nicobar	1. The Apex Court in its order dated 7.5.2002 in I.A. No. 502 in WP (C) No. 202 of 1995, had directed that extraction of sand be phased out @ minimum 20% per year on reducing balance basis to bring the sand mining to a level of 33% of the present level of mining within a maximum period of five years. 2. Since the level of extraction of sand in the territory in the year 2001-02 i.e. the base year, was 68909 cubic meter, the quantity of extractable sand is fixed at 22581 cubic meter. 3. The quantity of sea sand so allowed by MoEF is extracted from the identified and approved sites having such deposits on the sea beaches (identified accreting area) with adequate environmental safeguards so as to prevent any damage to the sensitive coastal eco-system including corals, turtle/ bird nesting sites and the protected areas. 4. The allotment of sea sand is made to the individuals by the Sand Allotment Committee constituted by the Lieutenant Governor under the Chairmanship of Chief Secretary who also heads the A&N CZMA. The quantum of sea sand allotted is fixed by the Committee on the basis of availability of sea sand and the number of applicants (local) applied for their bonafide use.
02	Arunachal Pradesh	1. Mining of sand restricted to foothills only that too for a very short period. Grant of mining lease is kept in abeyance, short term mining permits are issued to various Central and State agencies for carrying out developmental works under the strict supervision of the departmental officers.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	COMMON METHOD AND PRACTICE OF SAND MINING
03	Himachal Pradesh	Manual. The mining lease areas are sanctioned on the river bed if the area is approved in survey document. The mining activities are allowed strictly in accordance with the approved working cum Environment Management Plan and after the environment clearance.
04	Jharkhand	Manual
05	Karnataka	Manual
06	Madhya Pradesh	Manual
07	Meghalaya	Hill quarrying in private areas
08	Mizoram	Extraction of sand limited mainly for domestic purpose in the state. The produce extracted illegally is seized as per the Mizoram Forest Act, 1955. Mining is only limited to river banks and riverbeds with improvised equipments like spade, shovel, small canoes, etc.
09	Puducherry	Manual
10	Rajasthan	In Rajasthan sand is available in seasonal streams and rivers except Chambal which is perennial but mining is banned because of Chambal Crocodile Sanctuary. Mining is done up to 3 meters and is open cast. It is filled in trucks either manually or semi mechanized method. In Bikaner no river exists and mining for sand is being done from palaeo-channel. In this palaeo-channel the sand deposit occurs at the depth of 5 meter to 20 meter below ground level with an over burden of 5 to 20 meters. The mining here is done open cast benching method, where overlying blown sand, gravel, pebble etc. is removed, the sand is further sieved, graded and washed upto 12 to 18 mesh size.
11	Tamil Nadu	Manual mining is carried out in certain quarries. In most of the sand quarries two poclains are used by the PWD.
12	Uttar Pradesh	Manual and Semi-mechanised

* States/UTs not mentioned have not provided the data.

APPENDIX: TABLE - 6

SUGGESTIONS / RECOMMENDATIONS FROM STATES / UTs FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING

Sl.No.	STATE / U.T	SUGGESTIONS / RECOMMENDATIONS FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING
01	Andaman & Nicobar	The quantum of extractable sand fixed at 22581 cubic meter should be enhanced. This limit has been fixed by the orders of Hon'ble Supreme Court subject to study by National Institute of Oceanography.
02	Arunachal Pradesh	1. For environmentally sustainable sand mining a strict and comprehensive sand mining policy need to be framed.
		2. River sand is becoming a scarce commodity and hence exploring alternative to it has become imminent. Manufactured sand is a good alternative both for fine as well as coarse sand used in concrete.
		3. Sand mining should be restricted to surface collection only without the use of heavy machinery.
		4. Due to turbulent and inaccessible nature of rivers flowing in the hilly terrains of the state, deposition of the sand in the river bed is very negligible and except for few quarries in the foothills and plains, most of the notified quarries are boulders and mining of sand is very negligible.
		5. In view of environment related issues the grant of mining lease for river bed minor mineral viz. sand, gravel, shingle, aggregate, boulder are kept in abeyance and extraction of these minerals is regulated only by grant of mining permits, that too not exceeding 3000 cubic meter in one permit.
		6. For scientific mining of sand and other minor minerals Guideliness has been prepared and accordingly Geo-Technical Committee has been constituted under the chairmanship of ADC/SDO in the district level to determine the quantity of quarriable mineral that can be safely removed and also to give technical clearance for notification of quarries of smaller size, preferably within one hectare.
03	Chhattisgarh	1. While attempting to prepare a model Guidelines / policy for the country, the differences that exist in different states may be taken into account. It may be tried to take all stakeholders along.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	SUGGESTIONS / RECOMMENDATIONS FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING
		2. To ease the process of EC granting, SEIAA may have benches across the State with each bench having a SEAC under it. Time bound clearance with ease of access and grant.
		3. Sand mining with use of machinery should be allowed.
		4. Road construction material like murram should be exempted from EC considering their local / pocket occurrences and impossibility of obtaining EC.
		5. Considering the traffic issue at urban areas and to reduce intermediaries like storage point dealers, night mining with adequate lighting should be allowed.
		6. To make the availability of sand from local rivulet / streams the river bank to in-stream mine area distance should be reduced from 10 meter to 3 meters.
04	NCT of Delhi	1. Location of sand mining should be identified by a committee comprising of revenue deptt., Irrigation Deptt., CGWB, SPCB, Forest Department and mining department. Mining area should distinctly be marked at site, before allowing mining.
		2. Depth of mining should be restricted to 3 mtrs or water level, whichever is less and that to from aggradation areas. The side slope of excavation should be less than 3:1.
		3. Requirement of sand and gravel should be reduced by utilization of construction and demolition waste. It requires not only legislative support but also awareness campaign among the society.
		4. Guidelines should be distinctly clear and easy to understand covring do's and don't during mining operation.
		5. Sufficient safe distance should be left between mining site and adjoining engineering structures like embankment, spurs, bed bars, bridges, reservoir and regulator etc.
		6. Security amount should be sufficient enough to compel the agency to carry out rehabilitation, corrective measures and to ensure strict compliance of conditions of lease. S.D. should be released after inspection of committee and recording of certificate that agency complied with the lease conditions.
		7. Mining may be carried out by state agency instead of private agaencies.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	SUGGESTIONS / RECOMMENDATIONS FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING
05	Himachal Pradesh	1. Working cum Environment Management Plan has been made mandatory. The mining activities are allowed after submission of environment clearance.
		2. In compliance of order of Hon'ble Supreme Court dated 27.02.2012 in Deepak Kumar case, the Himachal Pradesh has repealed its rules called the Himachal Pradesh Minor Mineral (Concession) and Mineral (Prevention of illegal mining, transportation and Storage) Rule, 2015 in accordance to the recommendation of the Ministry of Environment & Forest and rules circulated by the Ministry of Mines. Hence the State of Himachal Pradesh has complied with the above directions of the Hon'ble Apex Court,
		3. Therefore the condition of applicability of Environment Clearance on the area less than 5 hectare shall be exempted.
		4. Further keeping in view, the peculiar topography, geography and socio-economic fabric of the State, the condition for the minimum size of the lease should be exempted as the rivers are in youth stage forming different land forms, land holdings are less, population is thin and scattered and the demand of minor mineral is limited, which could be met out locally by exploiting local resources on the small scale.
06	Jammu & Kashmir	1. Uniform Guidelines be framed for sand mining and river bed mining as they cannot be segregated.
		2. Identification of sand belts be made in consultation with CGWB and while framing Guideliness CGWB may be taken on board.
		3. Sand mining leases less than 5 hectare be exempted from EC and comprehensive policy may be made for hilly states for easing the process of grant of lease.
07	Jharkhand	1. Machine should not be used in sand mining. Only manual mining should be done.
		2. The depth of mining shall be restricted to 3 meter / water level whichever is less.
		3. No mining should be carried out in proximity of any bridge / embankment.
		4. In-stream mining should not be allowed.
		5. Mining should be done in accordance with an approved mining plan.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	SUGGESTIONS / RECOMMENDATIONS FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING
		6. EC should be valid for settlement period subject to ceiling of five years.
08	Karnataka	1. Undertaking sand mining activity through a Government agency to be governed by District Level Sand Monitoring Committee headed by Deputy Commissioner.
		2. The area should be properly surveyed and mapped with the help of GPS to assign geo coordinates and accordingly erect boundary pillars so as to avoid illegal and unscientific mining.
		3. Depth of sand available may be indicated in a contour map using suitable drilled holes to ensure sand mining do not exceed one meter depth.
		4. Once thickness is established sand mining may be permitted to one meter depth where the thickness of sand is more than three meter deep. If the thickness of sand is less than three meter, sand mining shall not be permitted.
		5. Sufficient spacing shall be ensured from one block to another block and sufficient time gap shall be provided for replenishment before undertaking mining activity in the same block.
		6. Mining activity shall be restricted to only non-monsoon season and in the area that is exposed.
		7. No in-stream mining shall be permitted.
		8. No stream should be diverted for the purpose of sand mining. No natural water course and/ or water resources are obstructed due to mining operations.
		9. Site specific plan with eco-restoration should be in place.
		10. Sand mining shall be undertaken only by manual method without use of earth moving equipment such as JCB etc. Use of mechanized boats for sucking sand from in-stream area shall be strictly prohibited.
		11. Appropriate safety zones shall be maintained in proximity to any bridge / and / or embankment and other permanent structures. No sand mining shall be undertaken in such safety / buffer zones. Guideliness issued by the Ministry of Mines in this regard shall also be adhered to.
		12. The quarrying activity shall not intersect subterranean water level and ground water table.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	SUGGESTIONS / RECOMMENDATIONS FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING
		13. The top soil in case of surface land mining shall be stored temporarily in an earmarked site and concurrently used for land reclamation.
		14. Use of alternate material such as M-sand in place of natural river sand shall be encouraged in order to reduce stress on natural eco-system.
09	Madhya Pradesh	1. Geographical location of the state should be taken care of.
		2. Keep provision for extraction of sand from forest areas.
		3. Expedite the EC process.
		4. In inter-state boundary leases sand mining EC be giver by the SEIAA.
		5. Clear Guidelines for B-1, B2 be issued.
		6. Simplify cluster cases.
		7. Exempt mining leases of less than 5 hectare from EC.
10	Meghalaya	1. No sand mining within 3 kilometer from Protected area and Reserved Forest area.
		2. Advance royalty etc for entire quantity of mineral be realized in full.
		3. Only loose boulder and sand are allowed to be removed from the mid river stream leaving 15 meter on either side untouched.
		4. No collection of sand is allowed on 15 meter of either side of structures like bridge, culvert etc.
		5. No blasting allowed.
		6. No extraction of stone / boulder / sand in landslide prone areas.
		7. No stacking allowed on road side along national highways.
		8. No felling of tree near quarry is allowed.
		9. No transportation of forest produce (sand from forest area) is allowed after sunset.
		10. Export fee realized if sand is sent outside the state.
		11. Stone crusher cannot be installed without permission of DFO.
		12. Tree should be planted at quarry after completion of mining.
		13. Violation of above conditions will result in cancellation of permit and forfeiture of advance royalty already paid.
11	Mizoram	1. Extraction of sand from the forest may be permitted strictly as per mining plan approved by the Competent Authority and after getting necessary clearance under various acts related to the forest and environment.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	SUGGESTIONS / RECOMMENDATIONS FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING
12	Odisha	1. EC may be exempted for leases less than 5 hectare.
		2. EC should not be required for earth mining.
		3. Minor minerals even close to inter-state borders should be allowed to be cleared by the SEIAA.
		4. In case a river is forming boundary of states and mechanized mining of sand is causing tension in states it should be resolved at the national level.
13	Puducherry	1. Environment Clearance is issued by SEIAA, Puducherry strictly under the provisions of the EIA Notification, 2006 and subsequent amendments.
14	Rajasthan	1. The bajari mined out from river bed is filled back by the river itself during the next rainy season. So, nature itself reclaims the mined out area every year. The formation of bajari is a natural process in the river and it is also essential to remove bajari from the river bed to avoid silting. If the sand deposited in the river bed is not removed, it may cause change of river course and may also results in flood plains will be developed.
		2. Price control system adopted in Rajasthan. Sand is a essential commodity.
		3. The depth of mining should be restricted to 3 meters or above water table.
		4. Machinery having boom height more than 3 meter shall not be allowed in extraction of bajari.
		5. Size of mining leases be allowed below 5 hectare.
		6. In streams with low deposit of sand and if use is mostly local no mechanized mining should be allowed and EC should not be required.
		7. In larger deposits there should be semi-mechanised mining with EC.
		8. The sand (river and stream) in different categories, with their availability, use and size of the deposit. **Category A:** Small deposits in river and stream where thickness of sand bed is very less and sand is used locally in villages and towns only and no mechanical mining is done, in such areas restriction of obtaining Environment Clearance can be relaxed for manual mining.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	SUGGESTIONS / RECOMMENDATIONS FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING
		Category B: Large deposits, where in rivers and streams having thickness of sand bed is medium to large, sand mining, shall be allowed with semi mechanized manner after obtaining Environment Clearance. **Bikaner District:** Bikaner district is a desert terrain where ground water table is very deep. Bajari is excavated above water table and it does not affect the water table. In addition to this boulder, gravel and waste generated due to bajari mining is used in reclamation of pits. Hence environment is not adversely affected due to bajari mining.
15	Sikkim	1. Forest department is the nodal department for sand and stone extraction from the riverbed.
		2. Use of machines is prohibited.
		3. Quarrying sites are allotted to village youth cooperatives.
		4. For bigger companies quarry sites in forest area are allotted after FC.
		5. State Government has considerations for allotment of quarries for Border Road Organization and MoD.
		6. GoI can monitor mining in states through GIS.
16	Tamil Nadu	1. Excess sand deposits identified in the flood plains and in-stream areas only to be mined in order to safeguard and maintain ground water table.
		2. Sand mining operation has to be carried out between 6 am to 7 pm.
		3. Mining operation should be carried out in a systematic manner without affecting environment and ecology of the area.
17	Uttar Pradesh	1. Depth of mining cannot be more than 3 meter or water table whichever is less.
		2. Mining can be done in slices forming benches where bench height cannot be more than 1 meter and bench width cannot be less than 10 meter.
		3. A width of not less than 50 meter or 10% width of river can be restricted for mining activities from river bank. A condition can be imposed that mining will be done from river activities from river bank.
		4. SEIAA should be decentralized to expedite EC process. It can be decentralized to district or zonal level.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	SUGGESTIONS / RECOMMENDATIONS FOR ENVIRONMENTALLY SUSTAINABLE SAND MINING
		5. Make EC conditions practical.
		6. Requirement of mining plan in river bed mining be done away with.
		7. There should not be requirement of EC for short term permit.
		8. The quantity of sand should not be fixed in EC as it leads to loss in revenue and illegal mining.
		9. Semi-mechanised form of sand mining be allowed.
		10. Sand mining to be exempted from EC as it takes 6-8 months and environment department do not have requisite work force to enforce EC conditions. A Guidelines for environmentally sustainable sand mining be framed and it can be complied by imposing it in the lease condition.
18	Uttarakhand	1. Area less than 5 hectare be exempted from EC.
		2. Use of machine be allowed for scientific mining and reducing the cost of production.
		3. RBM deposition in the lease should not be fixed for the entire lease period. RBM in lease area be assessed after rains every year.
		4. 70% of leases in state not operating for want of EC and these vacant lots are source of illegal mining.

* States/UTs not mentioned have not provided the data.

APPENDIX: TABLE - 7

BEST PRACTICE OF SAND MINING ADOPTED IN DISTRICT / STATE / UT

Sl.No.	STATE / U.T	DESCRIPTION OF BEST PRACTICES
01	Andaman & Nicobar	Institute of Ocean Management has been entrusted the task of identification of sand accreting sites.
02	Arunachal Pradesh	Mining of sand is restricted to foothills only that too for a very short period.
03	National Capital Territory of Delhi	In Delhi sand mining lease is granted by Revenue department. NOC from I&FC Deptt. Were issued with condition of limitation of depth, area of mining, operation timing limitation and limited period of NOC. Compliance of laid down conditions and monitoring is ensured by collector.
04	Himachal Pradesh	1. The mining activities on river beds are allowed strictly as per the provisions of river / stream bed mining policy as under.
		2. No river / stream bed mining shall be allowed without the recommendation of the Sub Divisional Level Committee constituted under the Chairmanship of Sub Divisional Magistrate having XEN PWD, Irrigation and Public Health, SPCB, DFO and Mining Officer as its member.
		3. Nor river / stream bed mining shall be allowed within 75 meter from the periphery of soil conservation works, nursery plantations, check dams or within the distance as recommended by the Sub-Divisional Committee whichever is more.
		4. No river / stream bed mining shall be allowed within 1/10th of its span or 5 meters from the banks or as specified by the Sub-Divisional Level Committee, whichever is more.
		5. Nor river / stream bed mining shall be allowed within 200 meters upstream and downstream of water supply scheme or as specified by the Committee whichever is more.
		6. Nor river / stream bed mining shall be allowed within 200 meters upstream and 200 to 500 meters downstream of bridges depending upon the site specific conditions.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	DESCRIPTION OF BEST PRACTICES
		7. No approach road from PWD road shall be allowed to lease area unless lessee / contractor obtains written permission from XEN, PWD for making road leading to all intake places from the PWD road. 8. No boulders/ cobbles/ hand broken road ballast shall be allowed to be transported outside the State from river/stream beds. 9. No digging for more than 3 feet shall be allowed in river/ stream beds. 10. No blasting shall be allowed in river/stream beds.
05	Madhya Pradesh	1. In some districts the Cooperative Societies of Labour are doing the sand collection, loading and unloading work.
06	Tamil Nadu	Permission has been granted in favour of PWD for quarrying sand in the river Poramboke lands in 16 districts in the state of Tamil Nadu. Sand mining is being carried out by the PWD in the entire State.
07	Uttar Pradesh	U.P. Minor Mineral Concession Rules, 1963.

* States/UTs not mentioned have not provided the data.

APPENDIX: TABLE - 8

STATUS OF PROMULGATION OF RULE ON SAND MINING IN THE STATE / UT

Sl.No.	STATE / U.T	NAME OF RULE WITH YEAR OF PROMULGATION
01	Andaman & Nicobar	Indian Forest Act, 1927 as sand has been included as forest produce.
02	Arunachal Pradesh	APMMCR 2002 and made effective from 1.01.2003
03	Himachal Pradesh	1. River/Stream bed Mining Policy-2004.
		2. Himachal Pradesh Minor Mineral Policy-2013.
		3. Himachal Pradesh Minor Mineral (Concession) and Mineral (Prevention of illegal mining, transportation and storage) Rule, 2015.
04	Jharkhand	Rule 12 of Jharkhand Minor Mineral Concession (Amendment) Rule 2014.
05	Karnataka	Karnataka Sand Policy was brought out in the year 2011 and as such amendment to the Karnataka Minor Mineral Concession Rule 1994 were made in the year 2011 and a separate chapter IV B for sand mining was introduced under Rule 31-R. Further, as per the Hon'ble Supreme Court orders sated 27.02.2012 in SLP No. 19628-19629 between Deepak Kumar and State of Haryana and others and as per the model Guideliness issued by the Government of India for Environmental Management of Mining of Minor Minerals, amendment to the Karnataka Minor Mineral Concessions Rule 1994 were brought out on 16.12.2013 incorporating a new chapter II A applicable to all minor minerals on Systematic, Scientific Mining and Protection of Environment, wherein Quarrying Plan, Environmental Management Plan and Environment Clearance was made mandatory. Amendments to Rule 31- R were also made wherein the Government, PWD Department was entrusted with sand mining, storage and transportation, under the District Sand Monitoring Committee and Taluk Sand Monitoring Committee.
06	Madhya Pradesh	Rules have been framed as per the orders of Hon'ble Supreme Court for sand mining under M.P. Minor Mineral Rules 1996 and Sand Mining Policy 2015 is also formulated in the State.

* States/UTs not mentioned have not provided the data.

Sl.No.	STATE / U.T	NAME OF RULE WITH YEAR OF PROMULGATION
07	Meghalaya	No rules notified by the state on sand mining
08	Mizoram	Mizoram Forest Act, 1955, which came into force on 1.01.1956.
09	Puducherry	Puducherry Minor Minerals (Concession) Rules, 1977.
10	Rajasthan	RMMCR, 1986 Notification dated 2.11.2012: 1. First proviso of Rule 8(2) and first proviso of 17 (1) - Renewal of Bajari Mining Leases is not allowed. 2. Rule 16 (3) - Mining Leases of Bajari to be granted for 5 years. 3. Rule 18 (18) - Part surrender of lease area of Bajari not allowed. Notification dated 3.4.2013 - (First proviso Rule 7 (1)- Mining leases of Bajari to be granted only by way of tender or auction. Notification dated 12.07.2013 - (First proviso Rule 11 (2)) - Maximum area limit of 10 sq. km. not applicable for Bajari Mining Leases. Bikaner District: Chapter II of RMMCR, 1986 (last amended 12.07.2013).
11	Sikkim	Sikkim Forest (Allotment of Areas for Quarrying of Sand and Stone), 2006.
12	Tamil Nadu	1. As per G.O. Ms. No. 95 Industries (MMCI) Department dated 1.10.2003, a new Rule 38 A has been introduced in the Tamil Nadu Minor Mineral Concession Rules, 1959. Accordingly quarrying and sale of sand is being carried out by PWD in the state of Tamil Nadu since October 2003. 2. As per G.O. Ms. No. 158 Industries (MMIC) Department dated 25.08.2008, a new Rule 38 B has been introduced in the Tamil Nadu Minor Mineral Concession Rules, 1959. Accordingly transportation of sand outside the state not to be made. To regulate storage and transportation of sand a new Rule 38 C B has been introduced in the Tamil Nadu Minor Mineral Concession Rules, 1959 vide G.O. No. 32 Industries (MMIC) Department dated 11.02.2011.

* States/UTs not mentioned have not provided the data.

APPENDIX: TABLE -9

NORMAL DATES OF ONSET AND WITHDRAWAL OF SOUTH-WEST MONSOON

The India Meteorological Department, Nagpur, vide letter No. NAGPUR RMC /CS-312, dated 18th January,2016 has provided the period of Rainy Season viz. Normal dates of Onset and Withdrawal of Southwest Monsoon over India as state-wise and union territory- wise which are as below:-

States	Normal date of Onset of SW-Monsoon	Normal date of Withdrawal of SW-Monsoon
Andhra Pradesh	1st June	15th October
Arunachal Pradesh	5th June	15th October
Assam	5th June	15th October
Bihar	10th June	15th October
Chhattisgarh	10th June	15th October
Goa	5th June	15th October
Gujarat	15th June	15th September
Haryana	1st July	15th September
Himachal Pradesh	1st July	15th September
Jammu & Kashmir	1st July	15th September
Jharkhand	10th June	15th October
Karnataka	5th June	15th October
Kerala	1st June	15th October
Madhya Pradesh	15th June	1st October
Maharashtra	10th June	1st October
Manipur	1st June	15th October
Meghalaya	1st June	15th October
Mizoram	1st June	15th October
Nagaland	5th June	15th October
Odisha (Orissa)	5th June	15th October
Punjab	1st July	15th September
Rajasthan	1st July	1st September
Sikkim	5th June	15th October
Tamil Nadu	1st June	15th October
Telangana	5th June	15th October
Tripura	1st June	15th October

States	Normal date of Onset of SW-Monsoon	Normal date of Withdrawal of SW-Monsoon
Uttar Pradesh	15th June	1st October
Uttarakhand	15th June	1st October
West Bengal	10th June	15th October
Union territory	**Normal date of Onset of SW-Monsoon**	**Normal date of Withdrawal of SW-Monsoon**
Andaman and Nicobar Islands	20th May	15th October
Dadra and Nagar Haveli	10th June	1st October
Daman and Diu	10th June	1st October
Lakshadweep	1st June	15th October
Delhi	1st July	15th September
Puducherry	1st June	15th October

Note: The District Environment Impact Assessment Authority (DEIAA) in consultation with District Expert Appraisal Committee (DEAC) can make necessary changes as per local meteorological variations in this period of rainy season with respect to prohibition of River Sand Mining in the District.

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ENSURING SUSTAINABLE SAND MINING FOR SUSTAINABLE DEVELOPMENT

A Major Initiative of Ministry of Environment, Forest and Climate Change for ensuring Environmentally Sustainable Sand Mining and Prevention of illegal Sand Mining.

{Notification No: SO No. 141 (E) dated 15.01.2016 and S.O. No. 190 (E) dated 20.01.2016 available at www.envfor.nic.in}

- Use of Satellite imagery to decide the site suitable for mining and quantity of sand which can be mined.
- Transit permit with tamper proof security features and tracking of mined out mineral.
- Monitoring of mined out mineral to prevent mining in excess of environmental clearance capacity.

- Delegation of power to grant environmental clearance for sand mining to an authority headed by District Magistrate.

- Intergration of power with District Authorities to grant environmental clearance and prevent illegal mining.



Note : Any information of mining without environmental clearance or against the norms prescribed in these notifications be reported at e-mail id: sandmining-moef@gov.in

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Enforcement & Monitoring Guidelines for Sand Mining

Ministry of Environment, Forest and Climate change

January, 2020

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1.0 INTRODUCTION

The Ministry of Environment Forest & Climate Change formulated the Sustainable Sand Management Guidelines 2016 which focuses on the Management of Sand Mining in the Country. But in the recent past, it has been observed that apart from management and systematic mining practices there is an urgent need to have a guideline for effective enforcement of regulatory provision and their monitoring.

Section 23 C of MMDR, Act 1957 empowered the State Government to make rules for preventing illegal mining, transportation and storage of minerals. But in the recent past, it has been observed that there was large number of illegal mining cases in the Country and in some cases, many of the officers lost their lives while executing their duties for curbing illegal mining incidence. The illegal and uncontrolled illegal mining leads to loss of revenue to the State and degradation of the environment.

India is developing at a faster pace and much technological advancement has already been taken place in the surveillance and remote monitoring in the field of mining. Thus, it is prudent to utilize the technological advancement for the effective monitoring of the mining activities particularly sand mining in the country.

Use of latest remote surveillance and IT services helps in effective monitoring of the sand mining activity in-country and also assist the government in controlling the illegal mining activity in the country. Thus, there is a need for an effective policy for monitoring of sand mining in the Country which can be enforced on the ground. These guidelines focus on the effective monitoring of the sand mining since from the identification of sand mineral sources to its dispatch and end-use by consumers and the general public. Further, the effective monitoring and enforcement require efforts from not only Government agencies but also by consumers and the general public.

It is the responsibility of every citizen of India to protect the environment and effective monitoring can only be possible when all the stakeholders viz. Central Government, State Government, Leaseholders/Mine Owners, Distributors, Dealers, Transporters and Consumers (bulk & retail) will contribute towards sustainable mining, and comply with all the statutory provisions. It is felt necessary to identify the minimum requirements across all geographical region to have a uniform protocol for monitoring and enforcement of regulatory provision prescribed for sustainable sand and gravel mining.

This document will serve as a guideline for collection of critical information for enforcement of the regulatory provision(s) and also highlights the essential infrastructural requirements necessary for effective monitoring for Sustainable Sand Mining.

The document is prepared in consideration of various orders/directions issued by Hon'ble NGT in matters pertaining to illegal sand mining and also based on the reports submitted by expert committees and investigation teams.

Further, this document is supplemental to the existing "Sustainable Sand Mining Management Guideline-2016" (SSMG-2016), and these two guidelines viz. "Enforcement & Monitoring Guidelines for Sand Mining" (EMGSM-2020) and SSMG-2016 shall be read and implemented in sync with each other. In case, any ambiguity or variation between the provision of both these document arises, the provision made in "Enforcement & Monitoring Guidelines for Sand Mining-2020 "shall prevail.

2.0 NEED FOR POLICY GUIDELINES

The Ministry of Environment, Forest & Climate Change (MoEF&CC) published Environmental Impact Assessment Notification 1994 which is only applicable for the Major Minerals more than 5 ha. In order to cover the minor minerals also into the preview of EIA, the MoEF&CC issued EIA Notification 2006 for Major & Minor Mineral more than 5 Ha. The Hon'ble Supreme Court in its Judgment dated the 27th February 2012 in I.A. No.12- 13 of 2011 in Special Leave Petition (C) No.19628-19629 of 2009, in the matter of Deepak Kumar etc. Vs. State of Haryana and Others etc. made prior environment clearance mandatory for mining of minor minerals irrespective of the area of mining lease. In order to comply with the judgment of Hon'ble Supreme Court, the Ministry issued S.O.141 (E) dated 15.01.2016. Further, MoEF&CC published Sustainable Sand Mining Management Guidelines 2016 for scientific and sustainable sand mining in the Country. The recommendations for the management of sustainable sand extraction are the key objective of the Guidelines. Special emphasis is given on monitoring of the mined out material, which is key to the success of the environmental management plan. Use of IT and IT-enabled services for effective monitoring of the quantity of mined out material and transportation along with process re-engineering has been made a part of the Guidelines. Guidelines support the fundamental concept, promote environmental protection, limit negative physiological, hydrogeological and social impacts underpinning sustainable economic growth.

The Hon'ble NGT in its order dated 04.09.2018 in O.A. 173/2018 in the matter of Sudarsan Das vs. State of West Bengal & Ors. Inter-alia observed that "***There can be no two views that an effective institutional monitoring mechanism is required not only at the stage when Environmental Clearance is granted but also at subsequent stages". "The guidelines focus on the preparation of District Survey Report and the Management Plan" … We are of the view that all the safeguards which are suggested***

in sustainable sand mining guidelines as well as notification dated 15.01.2016 ought to be scrupulously followed."...It is a known fact that in spite of the above-suggested guidelines being in existence, on the ground level, illegal mining is still going on. The existing mechanism has not been successful and effective in remedying the situation." ..." Since there is an utter failure in the current monitoring mechanism followed by the State Boards, SEIAAs and DEIAAs, it is required to be revised for effective monitoring of sand and gravel mining and a dedicated monitoring mechanism be set up."

The Hon'ble NGT in its order dated 04.09.2018 in O.A. 173/2018 in the matter of Sudarsan Das vs. State of West Bengal & Ors. directed that ***MoEF&CC has issued directions from time to time under Section 3 and 5 of the Environment (Protection) Act, 1986. The MoEF&CC needs to revise its directions keeping in mind the following:***

- *Mining Surveillance System discussed in para 23 above be finalized in consultation with ISRO Hyderabad.*
- *Safeguards suggested in Sustainable Sand Mining Guidelines published by the MoEF&CC in the year 2016.*
- *Suggestions in the High Power Committee Report.*
- *The requirement of demarcation of boundaries being published in respect of different leases in the public domain.*
- *Need to issue SOP laying down mechanism to evaluate loss to the ecology and to recover the cost of restoration of such damage from the legal or illegal miners. Such evaluation must include the cost of mining material as well as the cost of ecological restoration and the net present value of future ecosystem services forgone.*
- *Need to set up a dedicated institutional mechanism for effective monitoring of sand and gravel mining which may also take care of mining done without any Environmental Clearance as well as mining done in violation of Environmental Clearance conditions.*

- *The Mining Department may make a provision for keeping apart at least 25% of the value of mined material for the restoration of the area affected by the mining and also for compensating the inhabitants affected by the mining.*

- *One of the conditions of every lease of mine or minerals would be that there will be independent environmental audit at least once in a year by reputed third party entity and report of such audit be placed in the public domain.*

- *In the course of such an environmental audit, a three-member committee of the local inhabitants will also be associated. Composition of three members committee may preferably include ex-servicemen, a former teacher and former civil servant. The Committee will be nominated by the District Magistrate.*

The Hon'ble NGT in its order dated 05.09.2018 in O.A. 44/2016 in the matter of Mushtakeem Vs. MoEF & CC & Ors. Inter-alia observed the following:

"Para 20. In Original Application No. 481/2016, the allegation is that there is the connivance of the District Administration with the miners and mining is going in violation of conditions of Environmental Clearance. According to the applicant, an effective mechanism is required to be evolved so that illegal mining does not place."

"Para 22. We proceed to consider the main question proposed for the consideration stated earlier hereinabove as to ***how to ensure the protection of the environment by checking illegal mining."***

"Para 23. We have dealt with the identical issue relating to the illegal sand mining in the border districts in the State of West Bengal and Odisha in the order dated 04th September 2018 in Sudarsan Das Vs. State of West Bengal & Ors., Original Application No. 173 of 2018. We have directed the MoEF&CC to revise the guidelines on the subject for an effective mechanism for sand mining, relevant portions of which are reproduced below: -..."

The Hon'ble NGT in its order dated 10.09.2018 in O.A. 304/2015 in the matter of Jai Singh & Anr.Vs. Union of India Ors. inter-alia observed the following:

"Para 6. After disposal of the above matters, a disturbing event widely reported in media which took place on 07th September 2018 has been brought to our notice. ***A Deputy Ranger who tried to stop illegal mining was killed by mining mafia at Morena in the State of M.P.***

"Para 7. The above disturbing event may also be kept in mind by the MoEF, while considering the issuance of revised guidelines in light of the judgment dated 05th September 2018 (Supra)."

The Hon'ble NGT in its order dated 05.04.2019 in O.A. 360/2015 in the matter of National Green Tribunal Bar Association & Anr.Vs. Union of India & Ors. inter-alia observed the following:

"*The 2016 Guidelines need revision in the light of the report of High Powered Committee in September 2016, failure of Monitoring mechanism followed by State Boards, SEIIAs, DEIAAs and MSS system developed by Ministry of Mines & IBM with the assistance of BISAG and MAITY and other observations quoted in paras 12 to 15 above.*

50. As noted earlier in paras 17, 23, 27, 31 and 35, States of West Bengal, Odisha, Gujarat, Karnataka, Maharashtra, Punjab, Haryana and Uttar

Pradesh are required to follow SSMG, 2016 as may be revised by MoEF&CC and even other States where illegal sand mining is taking place.

The States may review the monitoring mechanism in terms of several directions of the Tribunal and guidelines of MoEF&CC.

The international conservation concern regarding natural wealth is a universal demand. Article 51(a) subsection (G) of the constitution requires every citizen of India to protect and improve the natural environment including forest, lakes, rivers, wildlife and to have compassion for the living creature.

The Hon'ble Supreme Court in the case of M.C. Mehta Vs. Kamal Nath (1997) 1 SCC 388 held that under Article of Indian Constitution incorporates the "Public Trust Doctrine" and as such extents to the protection of all-natural resources which includes the protection of flora and fauna.

The Hon'ble Supreme Court in the case of Vellore Citizens Welfare Forum Vs. Union of India & Ors (1996) held that the precautionary principle is part of the Environmental Law in India. It further stated that onus of proof is on the actor of the developer/industrialize to show that its actions are environmentally benign."

3.0 OBJECTIVE OF GUIDLINES

- Identification and Quantification of Mineral Resource and its optimal utilization.
- To regulate the Sand & Gravel Mining in the Country since its identification to its final end-use by the consumers and the general public.
- Use of IT-enabled services & latest technologies for surveillance of the sand mining at each step.
- Reduction in demand & supply gaps.
- Setting up the procedure for replenishment study of Sand.
- Post Environmental Clearance Monitoring.
- Procedure for Environmental Audit.
- To control the instance of illegal mining.

4.0 REQUIREMENTS FOR MONITORING & ENFOCEMENT

Sustainable Sand Mining Management Guidelines (SSMMG) 2016 and past experience suggest that the source of sand in India are through

a) River (riverbed and flood plain),
b) Lakes and reservoirs,
c) Agricultural fields,
d) Coastal / marine sand,
e) Palaeo-channels and
f) Manufactured Sand (M-Sand).

The SSMMG-2016 highlights the identification of the sand mining sources, replenishment of the River Bed Material (Sand, Boulder, Gravel, Cobble etc.), preparation of Districts Survey Report, and Standard Environmental Conditions suitable for sand mining projects.

The necessary requirements to comply with the direction of Hon'ble NGT and to facilitate effective monitoring and enforcement of regulatory provision for sand mining in the country are as follows:

i) Identification of sand mining sources, its quantification and feasibility for mining considering various environmental (proximity of protected area, wetlands, creeks, forest etc.) and other factors such as important structures, places of archaeological importance, habitation, prohibited area etc.

ii) The mining lease auctioned by State government as per their Minor Mineral Concession Rules are granted of Letter of Intent (LoI), but it has been observed that many of the sites are not suitable w.r.t environmental aspects. In most of the cases, the unplanned grant of mining lease leads to formation of cluster and/or contiguous cluster

of small mining leases which sometimes is difficult to regulate and monitor. In order to address such issues, more emphasis is required on the preparation of District Survey Report and its format for reporting,

iii) Mining Plan is an important document to assist the mine owner to operate the mine in a scientific manner. States have their own format for preparation of mining plan and it is observed that recording of the initial level of mining lease at shorter interval say 25m X 25 m grid interval is not present.

iv) There is no practice for regular replenishment study to ascertain the rate of depositing, plan and section needs to be prepared based on the restrictions provided in letter of intent and provisions of Sustainable Sand Mining Management Guidelines 2016.

v) Environmental Clearance is a process wherein the regulatory authorities after considering the potential environment impact of mining clearance is granted with a set of specific & standard conditions to carry out mining operations, but often it is observed that letter of intent is granted for a location which has less potential for mining and not feasible for environment-friendly mining. This leads to an unnecessary financial burden on the mine owners and litigations. Thus, LoI should be preferably granted for those locations which have the least possibility of an impact on the environment and nearby habitation.

vi) It is the responsibility of the mine owner to obtain all the statutory clearance and comply with the conditions stipulated in the clearance letter. Mining should be carried out within the mining lease area as per

approved mining plan or mining plan concurred by other regulatory authorities.

vii) Mining operation also involves transportation of mineral from the mining area to end-user and its necessary that movement of the mineral needs to be monitored.

The State Government already have power under section 23c of MMDR, Act 1957 to make rules for preventing illegal mining, transportation and storage of minerals. However, there are instances of illegal mining which shows that there is a need for strengthening the system of mineral dispatch and its monitoring. This document provides good practices already under implementation by various states for regulating the mineral sale, dispatch, storage, transportation and use.

viii) The river reaches with sand provide the resource and thus it is necessary to ascertain the rate of replenishment of the mineral. Regular replenishment study needs to be carried out to keep a balance between deposition and extraction. This document provides the procedure to be followed for conducting replenishment study.

ix) Even after all the regulatory procedure and policy being in place, there are instances where illegal mining is taking place. There is a need for regular surveillance of the sand mining reaches. The monitoring agencies can monitor the sites remotely by using Unmanned Artificial Vehicles (UAVs)/Drone which is now a viable option. The drone can also be used for reserves estimation, quantity estimation, land use monitoring. This document highlights possible use of IT/Satellite/Drone technology for effective monitoring of sand mining.

4.1 Identification of possible sand mining sources and preparation of District Survey Report (DSR)

4.1.1 Preparation of District Survey Report.

"Sustainable Sand Mining Guidelines, 2016" issued by MoEF&CC requires preparation of District Survey Report (DSR), which is an important initial step before grant of mining lease/LoI. The guidelines emphasize detailed procedure to be followed for the purpose of identification of areas of aggradation/ deposition where mining can be allowed and identification of areas of erosion and proximity to infrastructural structures and installation where mining should be prohibited. Calculation of annual rate of replenishment, allowing time for replenishment after mining, identification of ways of scientific and systematic mining; identifying measures for protection of environment and ecology and determining measures for protection of bank erosion, benchmark (BM) with respect to mean Sea Level (MSL) should be made essential in mining channel reaches (MCR) below which no mining shall be allowed.

The Hon'ble NGT in its Judgment dated 08.12.2017 in the matter of Anjani Kumar vs State of Uttar Pradesh & Ors. inter-alia mentioned the following regarding sand mining in the Uttar Pradesh.

> *"It states that the main object of preparation of District Survey Report is to ensure identification of areas of aggradation/deposition where mining can be allowed and identification of areas of erosion and proximity to infrastructural structures and installation where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining area. Thus, the environmental protection requires a strictly regulated mining in terms of area, quantity as well as most importantly replenishment thereof."*

"The data collection and declared for preparation of DSR shall take precedence over other data and would form the foundation for providing mining lease in terms of Appendix- x to the Notification dated 15th January 2016 must be prepared by the statutory authority stated therein i.e. DEIAA prior to awarding of permits for carrying on mining activity in any part of the State of UP."

The Hon'ble High Court of Jharkhand at Ranchi in its orders dated the 11th April 2018 and 19th June 2018 in W.P. (PIL) No. 1806 of 2015, in the matter of Court on its Own Motion Versus the State of Jharkhand & Others with W.P. (PIL) No. 290 of 2013, in the matter of Hemant Kumar Shilkarwar Versus the State of Jharkhand & Others, has inter-alia directed the preparation of District Survey Report for minor minerals other than Sand and Bajri or delegation of the powers for preparation of format of District Survey Report of minor minerals other than sand and Bajri to the State Government and/or District Environment Impact Assessment Authority and District Expert Appraisal Committee. To comply with the direction of Hon'ble High Court the Ministry has issued S.O. 3611(E) dated 25.07.2018, wherein, the procedure of preparation of DSR is mentioned. But it is felt that still there is other information that needs to be reported in DSR to make it a comprehensive DSR.

Therefore, preparation of District Survey Report is a very important step and sustainable sand mining in any part of the country will depends on the quality of District Survey Report.

Considering the importance of district survey report, the Ministry of Environment Forest and climate change, after consultation with experts dealing with mining-related matters, formulated the following guidelines for the preparation of comprehensive District Survey Report for sand mining.

a) District Survey Report for sand mining shall be prepared before the auction/e-auction/grant of the mining lease/Letter of Intent (LoI) by Mining department or department dealing the mining activity in respective states.

b) The first step is to develop the inventory of the River Bed Material and Other sand sources in the District. In order to make the inventory of River Bed Material, a detailed survey of the district needs to be carried out, to identify the source of River Bed Material and alternative source of sand (M-Sand). The source will include rivers, de-siltation of reservoir/dams, Patta lands/Khatedari Land, M-sand etc.

The revenue department of Kerala already conducted river mapping and sand auditing of around 20 rivers of Kerala which is a good example wherein the profile of rivers was created at regular intervals and aggradation/deposition was identified along with water level. In the same study, benchmarks were also created at a prominent location at regular interval for future surveying. Such study helps the mining departments to identify the source of sand.

Thus, it is proposed that for preparation of district survey report, the auditing of rivers needs to be carried out. There is already a provision under MMDR Act 2015 for National Mineral Exploration Trust (MET) wherein a 2% of royalty amount to be deposited in the trust. This fund is used for mineral exploration in the country. The Sand Auditing is also a sort of identification of mineral and State Government may request Central Govt. for proving funds for river auditing. The Central Govt. (Ministry of Mines) may also explore the possibilities for providing the funds for river auditing. The other option is that State Govt. may conduct such studies by its own fund and the same may be recovered from the leaseholders to whom the mining lease will be allocated.

c) District Survey Report is to be prepared in such a way that it not only identifies the mineral-bearing area but also define the mining and no mining zones considering various environmental and social factors.

d) Identification of the source of Sand & M-Sand. The sources may be from Rivers, Lakes, Ponds, Dams, De-silting locations, Patta land/Khtedari lands. The details in case of Rivers such as [name, length of river, type (Perennial or Non-Perennial), Villages, Tehsil, District], in case of Lakes, Ponds, Dams, De-silting locations [Name, owned/maintained by (State Govt./PSU), area, Villages, Tehsil, District] in case of Patta land/Khtedari lands [Owner Name, Sy No, Area, Agricultural/Non-Agricultural, Villages, Tehsil, District], in case of M-Sand Plant [Owner Name, Sy No, Area, Quantity/Annum, Villages, Tehsil, District], needs to be recorded as per format given in **Annexure-I.**

e) Defining the sources of Sand/M-Sand in the district is the next step for identification of the potential area of deposition/aggradation wherein mining lease could be granted. Detailed survey needs to be carried out for quantification of minerals. The purpose of mining in the river bed is for channelization of rivers so as to avoid the possibility of flooding and to maintain the flow of the rivers. For this, the entire river stretch needs to be surveyed and original ground level (OGL) to be recorded and area of aggradation/deposition needs to be ascertained by comparing the level difference between the outside riverbed OGL and water level. Once the area of aggradation/deposition are identified, then the quantity of River Bed Material available needs to be calculated. The next step is channelization of the river bed and for this central ¾th part of the river, width needs to be identified on a map. Out of the ¾th part area, where there is a deposition/aggradation of the material needs to be identified. The remaining ¼th area needs to be kept as no mining zone for the

protection of banks. The specific gravity of the material also needs to be ascertained by analyzing the sample from a NABL accredited lab. Thus, the quantity of material available in metric ton needs to be calculated for mining and no mining zone.

Note: As physical survey with conventional method is time-consuming, use of unmanned aerial vehicle (UAV) may be explored to carry out the survey and finalizing the original ground level and for developing a 3D model of the area.

f) The permanent boundary pillars need to be erected after identification of an area of aggradation and deposition outside the bank of the river at a safe location for future surveying. The distance between boundary pillars on each side of the bank shall not be more than 100 meters.

g) Identifying the mining and no mining zone shall follow with defining the area of sensitivity by ascertaining the distance of the mining area from the protected area, forest, bridges, important structures, habitation etc. and based on the sensitivity the area needs to be defined in sensitive and non-sensitive area.

h) Demand and supply of the Riverbed Material through market survey needs to be carried out. In addition to this future demand for the next 5 years also needs to be considered.

i) It is suggested that as far as possible the sensitive areas should be avoided for mining, unless local safety condition arises. Such deviation shall be temporary & shall not be a permanent feature.

j) The final area selected for the mining should be then divided into mining lease as per the requirement of State Government. It is suggested the mining lease area should be so selected as to cover the entire deposition area. Dividing a large area of deposition/aggradation into smaller

mining leases should be avoided as it leads to loss of mineral and indirectly promote illegal mining.

k) Cluster situation shall be examined. A cluster is formed when one mining lease of homogenous mineral is within 500 meters of the other mining lease. In order to reduce the cluster formation mining lease size should be defined in such a way that distance between any two clusters preferably should not be less than 2.5 Km. Mining lease should be defined in such a way that the total area of the mining leases in a cluster should not be more than 10 Ha.

l) The number of a contiguous cluster needs to be ascertained. Contiguous cluster is formed when one cluster is at a distance of 2.5 Km from the other cluster.

m) The mining outside the riverbed on Patta land/Khatedari land be granted when there is possibility of replenishment of material. In case, there is no replenishment then mining lease shall only be granted when there is no riverbed mining possibility within 5 KM of the Patta land/Khatedari land. For government projects, mining could be allowed on Patta land/Khatedari land but the mining should only be done by the Government agency and material should not be used for sale in the open market. Cluster situation as mentioned in para k above is also applicable for the mining in Patta land/Khatedari land.

n) The State Government should define the transportation route from the mining lease considering the maximum production from the mines as at this stage the size of mining leases, their location, the quantity of mineral that can be mined safely etc. is available with the State Government. It is suggested that the transportation route should be selected in such a way that the movement of trucks/tippers/tractors from the villages having habitation should be avoided. The transportation route so

selected should be verified by the State Government for its carrying capacity.

o) Potential site for mining having its impact on the forest, protected area, habitation, bridges etc, shall be avoided. For this, a sub-divisional committee may be formed which after the site visit shall decide its suitability for mining. The list of mining lease after the recommendation of the Committee needs to be defined in the following format given in as **Annexure-II**. The Sub-Divisional Committee after the site visit shall make a recommendation on the site for its suitability of mining and also records the reason for selecting the mining lease in the Patta land. The details regarding cluster and contiguous cluster needs to be provided as in **Annexure-III**. The details of the transportation need to be provided as in **Annexure IV.**

p) **Public consultation-**The Comments of the various stakeholders may be sought on the list of mining lease to be auctioned. The State Government shall give an advertisement in the local and national newspaper for seeking comments of the general public on the list of mining lease included in the DSR. The DSR should be placed in the public domain for at least one month from the date of publication of the advertisement for obtaining comments of the general public. The comments so received shall be placed before the sub-divisional committee for active consideration. The final list of sand mining areas [leases to be granted on riverbed & Patta land/Khatedari land, de-siltation location (ponds/lakes/dams), M-Sand Plants (alternate source of sand)] after the public hearing needs to be defined in the final DSR in the format as per **Annexure-V.** The details regarding cluster and contiguous cluster needs to be provided in **Annexure-VI**. The details of the transportation need to be provided in **Annexure-VII.**

4.2 Grant of Letter of Intent to those mining leases which are falling in potential mining zone

The State Government shall issue letter of intent as per procedure laid down in their Minor Mineral Concession Rules with due consideration of final district survey report. The State Government shall ensure that all the letter of intent shall have complete details of the mining lease including geo-coordinate of the corner points, the involvement of forest land, distance from the forest land, distance from the protected area, distance from other sites of archaeological importance, details of the cluster situation etc. The demarcation of the boundaries of LoI/Lease area shall be placed in public domain along with LoI/lease deed details.

The LOI should not be granted for mining area falling on both riverbed and outside riverbed. Therefore, in the same lease, both types of area should not be included.

The authority responsible for grant of lease for sand mining shall ensure that annual audit of the sand mining process, production and compliance of the imposed conditions by regulatory authority (Environmental clearance or mine plan) shall be one of the essential condition of the lease agreement. The annual audit report shall be submitted to the district administration, which shall be put in public domain through the district website. Any deviation observed shall be appropriately and in-accordance with applicable law shall be dealt by the concerned authority and corrective measures shall also be taken to restoration of ecological/environmental damage, if observed.

4.3 Mining Plan

The preparation of Mining Plan is also very important. The mining plan should include the original ground level recorded at an interval not more than 10M x 10M along & across the length of the river. In addition to this-levels, outside the mining lease and bank of the river up to meters needs to be recorded. In the mining plan, there should be 3 plates for each year production & development planning (pre-monsoon, monsoon and post-monsoon). The time period of monsoon should be defined in the DSR. At the time of review of the mining plan, the details of the replenishment study conducted for all the years needs to be included in the mining plan. The Mining Plan should include the certificate from PCCF on forest land, distance from the protected area, past production details for mining leases seeking expansion.

Following considerations shall be kept in mind for sand/gravel mining while approving mining plan

a) Parts of the river reach that experience deposition or aggradation shall be identified. The Leaseholder/ Environmental Clearance holder may be allowed to extract the sand and gravel deposit in these locations to manage aggradation problem.

b) The distance between sites for sand and gravel mining shall depend on the replenishment rate of the river. Sediment rating curve for the potential sites shall be developed and checked against the extracted volumes of sand and gravel.

c) Sand and gravel may be extracted across the entire active channel during the dry season.

d) Abandoned stream channels on the terrace and inactive floodplains be preferred rather than active channels and their deltas and flood plains. The stream should not be diverted to form the inactive channel.

e) Layers of sand and gravel which could be removed from the river bed shall depend on the width of the river and replenishment rate of the river.

f) Sand and gravel shall not be allowed to be extracted where erosion may occur, such as at the concave bank.

g) Segments of the braided river system should be used preferably falling within the lateral migration area of the river regime that enhances the feasibility of sediment replenishment.

h) Sand and gravel shall not be extracted up to a distance of 1 kilometre (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.

i) The sediment sampling should include the bed material and bed material load before, during and after the extraction period. Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross-section. Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume. Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.

j) Sand and gravel could be extracted from the downstream of the sand bar at river bends. Retaining the upstream one to two-thirds of the bar and riparian vegetation is accepted as a method to promote channel stability.

k) The flood discharge capacity of the river could be maintained in areas where there is a significant flood hazard to existing structures or infrastructure. Sand and gravel mining may be allowed to maintain the natural flow capacity based on surveyed cross-section history. Alternatively, off-channel or floodplain extraction is recommended to allow rivers to replenish the quantity taken out during mining.

l) The Piedmont Zone (Bhabhar area) particularly in the Himalayan foothills, where riverbed material is mined, this sandy-gravelly track constitutes excellent conduits and holds the greater potential for groundwater recharge. Mining in such areas should be preferred in locations selected away from the channel bank stretches.

m) Mining depth should be restricted to 3 meters and distance from the bank should be ¼th or river width and should not be less than 7.5 meters.

n) The borrow area should preferably be located on the riverside of the proposed embankment because they get silted in the course of time. For low embankment, less than 6 m in height, borrow area should not be selected within 25 m from the toe/heel of the embankment. In the case of the higher embankment, the distance should not be less than 50 m. In order to obviate the development of flow parallels to the embankment, crossbars of width eight times the depth of borrow pits spaced 50 to 60 meter center-to-center should be left in the borrow pits.

o) Demarcation of mining area with pillars and geo-referencing should be done prior to the start of mining.

p) A buffer distance /un-mined block of 50 meters after every block of 1000 meters over which mining is undertaken or at such distance as may be the directed/prescribed by the regulatory authority shall be maintained.

q) A buffer distance /unmined block of 50 meters after every block of 1000 meters over which mining is undertaken or at such distance as may be the directed/prescribed by the regulatory authority shall be maintained.

r) River bed sand mining shall be restricted within the central 3/4th width of the river/rivulet or 7.5 meters (inward) from river banks but up to 10% of the width of the river, as the case may be and decided by regulatory authority while granting environmental clearance in consultation with irrigation department. Regulating authority while regulating the zone of river bed mining shall ensure that the objective to minimize the effects of riverbank erosion and consequential channel migration are achieved to the extent possible. In general, the area for removal of minerals shall not exceed 60% of the mine lease area, and any deviation or relaxation in this regard shall be adequately supported by the scientific report.

s) Mining Plan for the mining leases(non-government) on agricultural fields/Patta land shall only be approved if there is a possibility of replenishment of the mineral or when there is no riverbed mining possibility within 5 KM of the Patta land/Khatedari land. For government projects mining could be allowed on Patta land/Khatedari land but the mining should only be done by the Government agency and material should not be used for sale in the open market.

The minerals reserve for river bed area is calculated on the basis of maximum depth of 3 meters and margins, width and other dimensions as mentioned in para (s) above. The area multiplied by depth gives the volume and volume multiplied with bulk density gives the quantity in Metric Ton. In case of river bed, mineable material per hectare area available for actual mining shall not exceed the maximum quantity of 60,000 MT per annum.

4.4 Obtaining Environmental & Other Statutory Clearance

The LOI Holder/Lease Holder to obtain Environmental and Other Statutory Clearances from the concerned authorities as per provision of applicable laws.

4.5 Baseline date before Commencement of Mining Operations

Baseline data in respect of the initial level of mining lease in the interval not more than 25 X 25 meters shall be collected for record by leaseholder. The level of river bed upstream and downstream up to 100 meters also needs to be recorded. The area outside the mining lease/river bank (if lease boundary coincides with mining lease) up to 100 meters from both the banks/mining lease needs to surveyed for initial level.

4.6 Additional measures where project proponent is selected by a bidding

In those states where sand plots are auctioned to the highest bidder, the following is suggested:

It has been observed that bidders try to form a cartel and bids are received for certain plots where legal mining is done, and bids for certain other plots don't elicit any response. Sand from these un-

auctioned plots is then excavated using the same machinery deployed for the excavation of adjacent plot which might have been auctioned off. It is not easily possible for the field machinery to prevent such illegal activities. This may be prevented by having plot of larger size. plots are large in size as possible are identified for auction. Care may be taken to ensure that no continuous stretch of plot in the river bed is divided for auction. A continuous stretch of plot shall be preferred for auction, and the attempt may not be made to auction it off in pieces.

5.0 REPLENISHMENT STUDY

The need for replenishment study for river bed sand is required in order to nullify the adverse impacts arising due to excessing sand extraction. Mining within or near riverbed has a direct impact on the stream's physical characteristics, such as channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature etc. Alteration or modification of the above attributes may cause an impact on the ecological equilibrium of the riverine regime, disturbance in channel configuration and flow-paths. This may also cause an adverse impact on in-stream biota and riparian habitats. It is assumed that the riparian habitat disturbance is minimum if the replenishment is equal to excavation for a given stretch. Therefore, to minimize the adverse impact arising out of sand mining in a given river stretch, it is imperative to have a study of replenishment of material during the defined period.

5.1 Generic Structure of Replenishment Study

Initially replenishment study requires four surveys. The first survey needs to be carried out in the month of April for recording the level of mining lease before the monsoon. The second survey is at the time of closing of mines for monsoon season. This survey will provide the quantity of the material excavated before the offset of monsoon. The third survey needs to be carried out after the monsoon to know the quantum of material deposited/replenished in the mining lease. The fourth survey at the end of March to know the quantity of material excavated during the financial year. For the subsequent years, there will be a requirement of only three surveys. The results of year-wise surveys help the state government to establish the replenishment rate of the river. Based on the replenishment rate future auction may be planned.

The replenishment period may vary on nature of the channel and season of deposition arising due to variation in the flow. Such period and season may vary on the geographical and precipitation characteristic of the region and requires to be defined by the local agencies preferable with the help of the Central Water Commission and Indian Meteorological Department. The excavation will, therefore, be limited to estimated replenishment estimated with consideration of other regulatory provisions.

5.2 Methodology for Replenishment Study

The replenishment estimation is based on a theoretical empirical formula with the estimation of bedload transport comprising of analytical models to calculate the replenishment estimation. The iso-pluvial maps of IMD can be used for estimation of rainfall. Catchment yield is computed using different standard empirical formulas relevant to the geographical and channel attributes. eg. Strange's Monsoon runoff curves for runoff coefficient). Peak flood discharge for the study area can be calculated by using Dickens, Jarvis and Rational formula at 25, 50 and 100 years return period. The estimation of bed load transport using Ackers and White Equation or similar can be made. A simulation model is used with basic data generated from the field in the pre-study and post-study period (preferably pre-monsoon and post-monsoon) to estimate the volume of replenished material. The particle size distribution and bulk density of the deposited material are required to be assessed from a NABL recognized laboratory. Considering the bulk density and the volume, the estimation of replenishment in weight will be calculated after considering safeguards and stability of the slopes and riverine regime. Some of the common methods used for field data acquisition for replenishment study

5.2.1. Physical survey of the field by the conventional method

i. The conventional survey technical using DGPS and other survey tools are used to define the topography, contours and offsets of the lease area. The survey should clearly depict the important attributes of the stretch of the river and its nearby important civil and other feature of importance. Such information will provide the eligible spatial area for mining. The contour and the elevation benchmarks will provide the baseline data for assessing the pre and post-study period scenario.

ii. Physical benchmarks are to be fixed at appropriate intervals (preferable 1 in 30 m) and the Reduced Level (RL) shall be validated from a nearby standard RL. These RL should be engraved on a steel plate (Bench Plate) and shall be fixed and placed at locations which are free from any damages and are available in pre and post-study period. The bench plates shall be available for use during the mining period as reference for all mining activity. Reference pillar may also be used in place of Bench Plates with visible and readable demarcation on the ground as common reference points to control the topographic survey and mining activity.

iii Baseline data on elevation status for a grid of 10 m x 10 m is preferred to have accuracy in the assessment. It is expected that two consecutive cross-sections in longitudinal and lateral direction should not be more than 10-meter distance apart, however, the regulatory authority may fix these intervals depending on the geographical and site-specific conditions, only and after providing the scientific reason for such deviation.

iv The changes observed in the elevation in per and post scenario at each node should be depicted in graphical forms with an appropriate scale to estimate the area of deposition and erosion. These graphical

presentations should depict the active channel regime and the flow bed elevation with other important features required to be considered for estimation of the mining area. The area of deposition and erosion shall be calculated for each cross-section after giving due regard to the stability and safety of active channel banks, and other features of importance. The elevation level shall be in reference to the nearest bench-plates established for the purpose.

v The levels (MSL & RL) of the corner point of each grid should be identifiable and safety barriers (Non-Mining) demarcated as restricted in consensus with Mineral Concession Rules of respective State, and the provision mentioned in this Sustainable Sand Mining Management Guidelines.

vi A clear identification is required to be highlighted between grids under mineable and grids under the non-mineable area. These baseline data (pre and post) be subjected to stimulation with the help of data mine software to derive at the replenishment area and corresponding volume and estimated weight.

vii The database should be structured in a tabulated form clearly depicting the nomenclature of the section lines, latitude and longitude of the starting point, chain-age and respective levels of all the points taken on that section line.

viii Net area shall be derived after the summation of the area of deposition minus area of erosion for each cross-section. The volume will be estimated by multiplying the distance between two cross-sections with the average of net area of these two consecutive cross-sections.

ix One sample per 900 square meters (30 m x 30 m) shall be preferred sample density for assessment of bulk density for estimation of deposition rate. Care should be taken that the sample for assessment

of bulk density is taken from the deposition zone and not from erosion. However, depending on the site condition, river morphology and geographical condition, sample density may be adjusted. Reason for such deviation shall be appropriately highlighted in the report with supporting scientific data.

5.2.2. Use of UAV/Drone and other image data processing techniques

With the development in image data processing tools and its accuracy acceptability, Drone/UAV fitted with the advance camera are used for survey purposes. Such technology has promising potential in the survey of sand mining zones due to its fast and reliable output deliveries. The survey is conducted using a set of instruments and compatible software to utilized the properly referenced data for depicting the topography of the study area. Instrument calibration and software compatibility and its validation with the ground data are an essential requirement for using this technique.

The details of the instruments their limitation and software used shall be demonstrated in the form of the accuracy assessment report, through a chapter in the replenishment study report. Other details to be incorporated in the report with regard to the study using such imaginary techniques shall highlight the followings:

a) **Flight Planning:** - The lease co-ordinates and the flight plan devised to capture the front and side overlap percentages for in each flight in reference to global coordinates (Kml or SHP file) system. The software used for the purpose and its details along with limitations with basic analytical assumptions.

b) **Block file generation:** - This operation concerns the selection of the sensor model and the definition of block properties, the addition of

imagery to the block file, marking of GCPs, generation of tie points and refining of the model.

c) **Interior orientation:** - The interior orientation of the stereo pair rational polynomial coefficients (RPC) used, which should be bundled with the scenes. RPCs are coefficient, which is used by photogrammetric software to represent the ground to-image viewing geometry.

d) **Exterior orientation:** For exterior orientation, ground control points shall be used, which are collected from the DGPS survey.

e) **Aero Triangulation:** - A critical phase in photogrammetric mapping is to rectify the satellite imagery at an appropriate tract on the surface of the earth. This is accomplished by collecting horizontal and vertical data [GCP's] to ascertain the spatial location of a number of features that are visible and measurable on the aerial images – this process is often called control bridging, which refers to passing horizontal and vertical information from one aerial image to the next.

f) **Ortho Generation:** - After running the above steps; the software shall automatically generate orthorectified imagery.

g) **DTM extraction:** For extraction of DTM, Generated point cloud data classified manually to extract bare earth.

5.2.3 Accuracy Assessment of Aerial Data:

To check the accuracy of DTM generated by Aerial data, few points are selected and compared with on-site by using DGPS instrument for the ground-truthing purpose. It is preferred to do ground-truthing at minimum 5 locations spread evenly across the lease area. The readings from the DGPS instrument are then compared with the Drone data for accuracy assessment

purpose. A comparative chart will be prepared in comparison of Data related to ground-truthing (by DGPS) and from Drone. Such accuracy assessment report shall a chapter of the replenishment study.

5.2.4 Replenishment study shall have the details of

- List of instruments
- List of software
- Establishment of Benchmark by putting No. of pillar points and various Ground Control Points (GCP) at the site.
- Ground Control Points (GCP) Collection: - Various GCPs were observed by using DGPS for Permanent Benchmarks and for control points.
- The summary of the elevation data from each section's profile based on the post-monsoon the survey should have mentioned in the table form.
- The detail of post-monsoon survey data in the tabular form shall be
- The detailed comparison of both pre-monsoon and post-monsoon elevation data shall be attached
- Cross-sectional depiction of deposition and erosion for each section in pre and post-deposition season shall be given supported by relevant field study data and plan.

6.0 ENFORCEMENT

6.1 Mining Operation:

The mining operations should be strictly carried out in accordance with the approved mining plan and after complying with all the conditions stipulated in Environmental & Other Statutory Clearance. Mine owner shall follow the operational procedure (for sale, dispatch, storage, reserve reconciliation and transportation) as may be defined by the concerned state government in its monitoring guidelines. Mine owner should comply with the recommendation and suggestion made by the High Power Committee as applicable.

6.2 Post Environment Clearnace Monitoring:

It's the responsibility of the EC Holder to comply with the Environmental Clearance conditions and upload the six-monthly EC compliance report on the website of the Ministry. For the category, 'A' mines (>100 Ha individual & cluster) Regional Office of the MoEF&CC are entrusted to carry out EC Monitoring and for the Category 'B' Mines by SEIAA. The monitoring shall be carried out as per the procedure/schedule suggested by MoEF&CC from time to time. MOEF&CC vide its notification S.O. 637(E) dated 28.02.2014 has delegated the power to State/Union Territory Environmental Impact Assessment Authority to issue show cause notice to project proponent in case of violation of Conditions of Environmental Clearance issued by the said authority and to issue direction for keeping the said EC in abeyance or withdrawing it. Thus, for category 'B' (0 to 100 Ha) projects SEIAAs are responsible for EC monitoring.

6.3 Environment Audit:

The Hon'ble NGT in its order dated 04.09.2018 in O.A. 173/2018 in the matter of Sudarsan Das vs. State of West Bengal & Ors. Inter-alia directed

that "*One of the conditions of every lease of mine or minerals would be that there will be independent environmental audit at least once in a year by reputed third party entity and report of such audit be placed in the public domain. In the course of such an environmental audit, a three-member committee of the local inhabitants will also be associated. Composition of three member's committee may preferably include ex-servicemen, a former teacher and former civil servant. The Committee will be nominated by the District Magistrate.*

The gazette notification on environmental audit has been issued by the Ministry of Environment and Forests on March 13, 1992 (amended vide notification GSR 386 (E) dated April 22, 1993). This notification applies to every person carrying on an industry, operation or process requiring consent to operate under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) or under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981), or both, or authorization under the Hazardous Waste (Management and Handling) Rules, 1989, issued under the Environment (Protection) Act, 1986 (29 of 1986). The notification requires that an Environmental Statement for the financial year ending the 31st March be submitted to the concerned State Pollution Control Board, on or before the 30th September of the same year.

It is suggested that NABET Accredited consultant may be engaged for Environment Audit and during the course of the audit, a three-member committee nominated by District Magistrate shall be associated.

6.4 Monitoring of Sale & Purchase of Sand:

6.4.1 In order to curb illegal mining it is very necessary that the general public is aware of the legal source of sand and RBM suppliers. The Ministry of Mines issued ***Sand Mining Framework 2018*** wherein it has proposed two mechanisms for the online sale of sand depending on whether there is a free market for sand in the State or the prices are regulated by the Government.

Para 1.2.12.2 Under the market model

In the case of the market model, all the lessees/ certified dealers in the State should register themselves on the online portal/ mobile app. For registering, the lessee/ certified dealer will have to enter the details of its concession/ stockyard, location, the quantity of sand expected on a weekly basis, as per the approved mining plan. Once registered, the online portal/ app will display the name of the reach/ stockyard and sand could be booked by the consumer from those leases/ stockyards and prices up to the delivery level. Further, the lessee/ certified dealer needs to regularly update the sand available in the reach/ stockyard, and they can decide the price at which they want to sell their sand. Anyone who wishes to purchase sand in the State will have the following options for buying:

1. *Mobile app*
2. *Online portal*
3. *Customer care/ telephone call*
4. *Licensed traders*

The consumer needs to register on the portal and log in using his/her credentials (Aadhar card based only). After logging in, the portal will display the entire list of reaches/ stockyards along with the quantity of sand available in those reaches/ stockyards and the quality and price of

sand. The consumer can filter/ sort the reaches/ stockyards based on such parameters as location, quality and price, and book from the lease/ stockyard he/she wishes to. The consumer should also have the option to purchase the sand by ordering at customer care. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

Para 1.2.12.3 Controlled market prices

In case the prices are regulated by the State Government, the only difference from the previous model is that the price of sand at the river reach/ stockyard shall be uniform across the State/ district based on the quality and transportation lead. A consumer after logging in may choose the reach/ stockyard from which he/she wishes to purchase the sand. The payment for booking the sand in both the cases should be made on the portal/ app so that proper accounting of the sale of sand can be maintained by the Government. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

It is suggested that the State Government should develop an online portal for sale and purchase of Sand & RBM. In addition to this State Government shall decide on the model viz. *Under market model or Controlled market prices or both* to be adopted for their respective States. The State Government shall accordingly modify their Minor Mineral Concession Rules within 6 months of publication of these guidelines. It is suggested that the controlled price model is more effective in controlling illegal sand mining. Because if the State Government is the only agency to provide the sand in the State, then price and supply of sand can be controlled more effectively. There will be no confusion in the consumers about legality of the purchase as the only source of sand provider is the State Government through its network of registered stockiest, retailers and transporters. The consumers

can fill the online request, pay the amount, select the transporter and give its feedback after the receipt of the sand. The transportation can also be controlled as the tippers used for transportation is registered tippers with GPS facility, the transportation route is well defined for easy monitoring, control over overloading of tippers, control over spillage of mineral etc. The State Govt. shall also make provision for penalizing the persons/agency buying the sand and RBM from the illegal sources.

6.4.2 The Ministry of Mines in its Sand Mining Framework also mentioned the following different level of monitoring:

Para 1.2.13.1 Level 1- Reach/ Stockyard level monitoring

For monitoring of the active reaches:

a. *Quantity of sand to be extracted from the reach should be based on the quantity of sand assessed in the reach by the Joint Inspection Team.*

b. *The lease boundary should be demarcated with geo-coordinates or geo-fenced to ensure that sand extraction is going on only within the permitted area.*

c. *De-casting from river beds should be monitored on a regular basis to keep a track of excavated quantity.*

d. *After every two years, a mandatory audit of the quantity extracted and quantity permitted along with the replenishment rate.*

e. *Mandatory e-pass/ e-permit should be made available at reach level for transportation of any sand by any GPS enabled vehicle with the provision of entering the vehicle number of the sand carrying vehicle and expected delivery address and customer name/ mobile number. Also, provision should be made available for stockyards/ stockiest of sand. In the case of*

nomination based (controlled pricing) business model, the margin of private stockist should be capped over a fixed percentage of notified prices.

f. At the stockyard, the stock supervisor should verify the authenticity of online payment receipt before issuing the transit pass. The loading of sand should be monitored electronically and all transporting vehicles should pass through an electronically monitored weighbridge. g. Real-time data capture for transportation

Para 1.2.13.2 Level 2 - Transportation monitoring

To make transportation monitoring effective and useful, all the sand carrying vehicles (tractors/ trucks) should be registered with the department and GPS equipment should be installed in all the sand carrying vehicles. Weighbridges with CCTV should be installed at all the stockyards, active reaches to ascertain the exact quantity of sand being transported in the vehicle. Check posts with CCTV cameras should be established near all major consumption centres to check if all the transporting vehicles are carrying a valid transport permit. The transport permit generated should contain the security features mentioned under section 5.11 so that one permit cannot be re-used by generating photocopies of the permit.

Para 1.2.13.3 Level 3 - End consumer monitoring/ bulk consumer

For end consumer monitoring, a customer grievance redressal center should be established to enquire about the grievances faced by the sand consumers. The telephone number of the call center should be advertised so that it reaches the general public through which anyone in the State can register his/her complain related to the sand, be it in terms of price or any other grievance. Additionally, profiles of customers should be analyzed such as the delivery of sand at the same address, usage pattern and its comparison with the estimated usage, as mentioned in purpose, etc. Further, surprise checking

should be conducted by the district level committee staff as per instructions of the monitoring agency.

Para 1.2.13.4 Level 4 - Indirect monitoring

Indirect monitoring can be done by determining sand consumption through the quantum of cement sales in the State, as the sale of cement is quite organized and data is easily available at the State level and district levels for the same. From district-wise cement consumption, the further trend of sand consumption can be derived. Any anomalies in the sand consumption/demand can be analyzed further.

Note: *The above monitoring mechanism is just a suggestion and the States may visit Andhra Pradesh and Telangana to study the monitoring mechanism in greater detail.*

It is suggested that State Government may consult with concern department of State of Telangana and Tamil Nadu to have better understanding on their experience and knowledge in adopting best sand mining enforcement provisions and monitoring practices and frame their own regulatory regime and monitoring framework. The framework of monitoring should essential include online sale & purchase of River Bed Material/ Auction of leases, Sand from rivers and other sources, online monitoring of excavation, storage and transportation of mineral for control of illegal mining.

The respective State Governments shall develop the online Sale & Purchase System after defining the model viz. Under market model or Controlled market prices model. The level of monitoring needs to be defined and guidelines need to be finalized by the respective State Governments as per their requirement with due consideration of suggestive guideline in this document. These all measure will help in curbing illegal mining.

7.0 Recommendations of High Power Committee:

A high power committee (HPC) was constituted by Hon'ble National Green Tribunal to assess the status of illegal mining the stretch of River Yamuna, under the chairmanship of Secretary, Ministry of Environment Forest & Climate Change. The committee after exhaustive field survey and interaction with stakeholders and having surprise visits submitted a comprehensive report on river sand mining along with certain recommendations on enforcement requirements and monitoring essentials. The same is provided in the following section for consideration of monitoring / regulatory authority to adopt applicable provisions in their monitoring framework and also to ensure that the infrastructural requirements recommended by the HPC are put in use at all locations including the lease area.

7.1 Recommendations of High Power Committee (HPC)

The following recommendation of the High Power Committee shall be considered while framing the monitoring mechanism by the State Government.

i. Project Proponent must ensure that following security features are included in the Transport Permission/Permits (TP) so that duplicate/fraudulent/forged TPs for transport, not accounted for in the IT-based system, is not possible.:

(a) Printed on Indian Bank Association (IBA) approved
(b) Magnetic Ink Character Recognition Code (MICR) paper;
(c) Unique Barcode;
(d) Unique Quick Response Code (QR);
(e) Fugitive Ink Background;
(f) Invisible Ink Mark;
(g) Void Pantograph;
(h) Watermark.

ii. Project Proponent must ensure that CCTV camera, Personal Computer (PC) or laptop, Internet Connection, Power Back up, access control of mine lease site; and arrangement for weight or approximation of weight of mined out mineral on basis of volume of the trailer of vehicle used at mine lease site are available.

iii. The PP has to enter the destination, distance between plot and destination, vehicle number etc in the system. After scanning, unique bar code number, invoice date time and validity date-time are generated by the software which gets printed individually on each TP Validity of TP is calculated based on the distance between plot and destination. After validity time is over the TP stands invalid.

iv. The officers involved in monitoring should be provided with mobile application and/or bar code scanners using which the TP can be checked anywhere on road. As soon as the bar or QR code on TP gets scanned through using the mobile application and/or scanner or vehicle number is entered into the application or sent by SMS to a predefined number, all details of TP such as plot details, vehicle details, validity time, etc. should be fetched from the server. This means if anything is re-written on TP and attempt is made to reuse the same, it can be traced immediately. Various reports can be generated using the system showing daily lifting reports and user performance report. This way the vehicles carrying sand can be tracked from source to destination.

v. The facility to fetch details using mobile app, website and SMS may be made available to the general public as well. However, they shall not be allowed to stop the vehicles to check the transportation. The only option that they should have is to check vehicle numbers of the passing vehicle in the mobile app or SMS for the validity of the pass. The only result that should be available to them should be if the vehicle carrying sand has a

valid permit at the relevant point of time or not. If the citizen finds that the vehicle doesn't have such a permit, as ascertained from mobile app or website or SMS, he should alert local authorities, who shall then take further action as per the law.

vi. In case, the vehicle break-down, the validity of Transport Permit or Receipt shall be extended by sending SMS by the driver in specific format to report the breakdown of the vehicle. The server will register this information and register the breakdown. The State can also establish a call center, which can register breakdowns of such vehicles and extend the validity period. The subsequent restart of the vehicle also should be similarly reported to the server/call center.

vii. The route of the vehicle from source to destination shall be tracked through the system using checkpoints, Radio-frequency identification (RFID) tags, and Global Positioning System (GPS) tracking.

viii. The system shall enable the Authorities to develop a periodic report on different parameters like daily lifting report, vehicle log/ history, lifting against allocation, and total lifting. The system can be used to generate auto mails/SMS. This will enable the District Collector / Magistrate and other authorities to get all the relevant details and will enable the authority to block the scanning facility of any site found to be indulged in irregularity. Whenever any authority intercepts any vehicle transporting illegal sand, it shall get registered on the server and shall be mandatory for the officer to fill in the report on action taken. Every intercepted vehicle should be tracked.

ix. It is necessary to prevent any truck/vehicle from transporting sand out of the identified plot bypassing the strong IT enabled system. Therefore, at each of the sand plot, the following additional measures should be taken.

(a) There shall be one entry and exit point provided for trucks/vehicles. The said entry point should have facilities as mentioned above. In case, it is necessary to have more than one entry/exit points, all such points shall have checkpoints with facilities as mentioned above. All other possible ways of entry/exit should be closed using barriers like compound, trench, etc. All provisions shall be made to not make it possible for any vehicle to enter or exit without entry into the computerized system.

(b) All such points should have 24X7 CCTV coverage, the footage of which should be made available online to the district administration. In cases, where sufficient internet bandwidth is not available, it may be deposited with the district administration on a weekly basis. If possible, the entry/exit points should have boom barriers which will record the vehicles entering and exiting the plot.

8.0 GENERAL APPROACH TO SUSTAINABLE SAND MINING

8.1 Pre-requisite for starting sand mining operation

i) All district to prepare a comprehensive mining plan for the district as per the provision of District Survey Report. These reports shall be put on the website of District Administration. No mining shall be allowed in the area which has not been identified in the comprehensive mining plan of the District.

ii) Replenishment study should be conducted on regular basis.

iii) All potential rivers mining zone/area shall be identified and put for auction with proper geo-tagged details by the auctioning authority concerned.

iv) The latitude and longitude of each mining lease shall be clearly mentioned in Letter of Intent issued to the potential mine lease. Such information shall be provided on the website of the district administration.

v) The provision of these guidelines shall be considered while identifying the potential stretches /locations and boundaries of the leases for the minable area.

vi) The LoI holder shall seek Environmental Clearance as per the provision of EIA Notification, and the regulatory authority shall ensure that the provision suggested in "Sustainable Sand Mining & Management 2016" and in this documents, as applicable are part of the clearance conditions.

vii) There shall be no river bed mining operation allowed in monsoon

period. The period as defined by IMD Nagpur for each state shall be adhered with.

viii) The monitoring infrastructures including weighbridge and adequate fencing of the lease area, CCTV, Transport permits, etc, as suggested in this document shall be ensured in order to reduce unrecorded dispatch.

ix) Regular monitoring of mined minerals and its transportation and storage shall be ensured and all information shall be captured at centralized database so that easy tracking of illegal material can be done.

x) Annual audit of each mining lease shall be carried out wherein three independent member of repute, nominated by District administration shall also participate.

8.2 Mining of Sand from Agricultural Fields

This practice is prevalent in Haryana; to ensure that mining from outside doesn't affect rivers, no mining is permitted in an area up to a width of 100 meters from the active edge of embankments or distance prescribed by Irrigation department whichever is critical. The top layer of soil varying between 1 and 2 meters is removed and stacked separately and thereafter the sand deposit which maybe 10-15 meter deep is mined. After removing the sand layer up to a maximum depth of 09 meters or the maximum mineable minerals, as permitted by competent authority. The topsoil stacked is spread out on the field and the same is brought under the cultivation. Though the level of this land (mined out area) is lowered to the depth of the excavation and in initial years of cultivation the productivity is low, but the productivity of the fields improves with continued cultivation and addition of organic manure in the field. In Haryana, some leases are of large area

(ranging from 1000 hectare to 2000 hectare) and agricultural fields and river bed both are included in the same lease for mining.

The following recommendations should be kept in mind for mining in such leases:

1. Mining of sand in such mine leases will require environment clearance.
2. The lease should be of sand mining either from the agricultural field or river. In the same lease, both types of area should not be included.
3. The sand mining from the agricultural field is being done in Haryana for a long time and it can be done in a more sustainable manner without adverse impact on agricultural productivity if proper environmental safeguards are taken.
4. The slope of mining area adjacent to agricultural fields should be proper (preferably 45 degree) and adequate gap (minimum 10 feet) be left from adjacent agricultural field to avoid erosion and scouring.

The provision for sand mining in agricultural field may be permitted, whenever replenishment of sand occurs due to natural phenomena.

Permission may also be granted by competent authority (District administration) for excavation of sand/Soil from agricultural fields, after due diligence of this prevailing condition in order to avoid any unacceptable impact on the environment and nearby livelihood from agriculture provided such objective of such excavation mining of Soil/Sand in limited increase the productivity of sand agricultural field.

9.0 MONITORING MECHANISM

9.1 Illegal Mining

The Hon'ble Supreme Court in its Judgment dated 2.08.2017 in W.P 114 of 2014 in the matter of Common Cause Vs Union of India & Ors, inter-alia passed the following:

Para 128. *The simple reason for not accepting this interpretation is that Rule 2(ii-a) of the MCR was inserted by a notification dated 26th July 2012 while we are concerned with an earlier period. That apart, as mentioned above, the holder of a mining lease is required to adhere to the terms of the mining scheme, the mining plan and the mining lease as well as the statutes such as the EPA, the FCA, the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981. If any mining operation is conducted in violation of any of these requirements, then that mining operation is illegal or unlawful. Any extraction of a mineral through an illegal or unlawful mining operation would become illegally or unlawfully extracted mineral."*

In view of above Judgement, any mining activities which are not governed under the provision of Environment (Protection) Act, 1985, The Water (Prevention & Control of Pollution Act, 1974, The Air (Prevention & Control of Pollution) Act, 1981, Forest Conservation Act-1980, Wildlife Protection Act - 1972, shall be considered as illegal mining within the provision of section 21(5) of Mines and Minerals (Development & Regulation) Act, 1957 (MMDR Act) and the concerned authority shall take necessary action within the provision of MMDR Act.

As per the provision of 23(C) of MMDR Act, the State Government is empowered to make rules for preventing illegal mining, and transportation

& storage of Illegal minerals. All such mining which qualifies under illegal, shall be dealt with in the provision of MMDR Act by the concern authorities.

State Pollution Control Board (SPCB) is the nodal authority in the State for dealing with cases related to pollution or environment management coming under the purview of the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981 and the Environment Protection Act 1986. SPCB shall initiate appropriate action under the provision of these acts for non-compliance of violation of the provisions.

9.2 Environmental Damage due to illegal mining

The environmental damages incurred or resulting due to illegal mining shall be assessed by a committee constituted by District Administration having expertise from relevant fields, and also having independent representation of locals and State Pollution Control Board. Guidelines for assessment of ecological damages prescribed by the State Government or Concerned Pollution Control Boards or any other authority shall be applicable and compensation as fixed shall be paid by the project proponent, in light of Hon'ble National Green Tribunal orders.

9.3 Monitoring of Mining near Inter-district or inter-state boundary

There are situations where bifurcated river becomes district boundaries or state boundaries in such situation it is difficult to assess the mining potential, or to have close monitoring and enforcement of the regulatory provision. Such challenges have been identified and dealt with in SSMG-2016. However, in the absence of any standardized procedure, the monitoring has not been effectively practiced. This has been highlighted by the High Power Committee constituted by NGT in the matter pertaining to illegal mining.

The districts/state sharing the boundary shall constitute the combined task force for monitoring of mined materials, mining activity and also should actively participate in the preparation of DSR by providing appropriate inputs. In such cases, the draft DSR so prepared shall be put up for public consultation in both the districts through respective district administration website.

The task force shall meet every quarter to reconcile the data collected during the period and identify any gap/ lapses based on the outcome of such meeting. The respective district shall take action/ corrective measures. Effort shall be made for real-time data sharing between both the district.

The task –force shall include essentially the representative of respective districts from the mining department, transport department, regional office of SPCB concerned and a reputed citizen nominated by district administration. The Taskforce shall be headed by officer not less than ADM rank and quarterly outcome shall be submitted to District administration.

In addition to the above, there is a need for strict surveillance, particularly at night. The State of Gujarat has already initiated a program called '*Trinetra*' for night surveillance by using night-vision drones to control illegal mining incidents. This program is giving satisfactory results. Such type of system may also be developed by each State within a reasonable time.

A typical standard operating procedure for assessing illegal mining by the committee constituted shall, but not limited to, include the steps given in the following table. However, the process of assessing can be modified based on site-specific conditions and any deviation shall be recorded in the report with proper justification.

Suggestive standard Practice for assessing illegal mining

Step 1	The assessment team should collect the information and documents prescribed in the Pre-Requisite section.
Step 2	The assessment team should verify the applicability/validity of statutes under EPA-1986, Air and Water Act, MMDR 1957, State Mines and Mineral Rules, etc.
Step 3	Field visit should be conducted for identification of mining lease area (in hectare) and boundary pillar constructed to indicate the same.
Step 4	With the help of GPS instrument, the team should assess the area where any extraction or mining have been carried out on the day of visit and calculate the mined-out area in a hectare.
Step 5	If available, the team may avail the use of latest satellite images for calculating the total mined out area.
Step 6	The team should verify the Ground / Surface Level (in meter above MSL) of at least 04 highest points in or around the area where mining has been done. The Ground/surface level will then be computed based on averaging of 04 highest points verified by the team.
Step 7	With the help of Depth Measurement kit or any depth measuring instruments, the depth should be measured for at least 04 points in the mined-out area. For computing, the depth, averaging of the value obtained at 04 points should be done.
Step 8	Verification of compliance conditions of Environmental Clearance and Consent to operate, mining methodology under Mining Plan
Step 9	Identification of vulnerable impacts observed on the field and non-compliance of conditions of Environmental Clearance and Consent to Operate.

Step 10	Field Survey for identification, monitoring and verification of ecological species based on the information available and documents mentioned in the Pre-requisite section.
Step 11	Preparation of inventory of machinery used/observed on the field (optional)
Step 12	Preparation of inventory of hydraulic structures observed on the field (optional)
Step 13	Water sampling for assessment of water quality including physical and biological parameters. (optional)
Step 14	Reconciliation collation of data/information and compilation to maintain violation.
Step 15	Identification of restoration plan and computation of cost of the restoration plan.

9.4 Monitoring Mechanism

A uniform monitoring mechanism is required to assess the regulatory provision in quantitative terms, with robust institutional and legal framework. Based on past experience and suggestions available, the following requirements are suggested for defining a mechanism for monitoring of mining activities which will help in identification of mining which is operating either illegally or are violating the regulatory provisions. Some suggestion will facilitate direct or indirect information to help in such an assessment.

1. All precaution shall be taken to ensure that the water stream flows unhindered and process of Natural river meandering doesn't get affected due to mining activity.

2. River mining from outside shall not affect rivers, no mining shall be permitted in an area up to a width of 100 meters from the active edge of embankments or distance prescribed by the Irrigation department.

3. The mining from the area outside river bed shall be permitted subject to the condition that a safety margin of two meters (2 m) shall be maintained above the groundwater table while undertaking mining and no mining operation shall be permissible below this level unless specific permission is obtained from the Competent Authority. Further, the mining should not exceed nine-meter (9 m) at any point in time.

4. Survey shall be carried out for identifying the stretches having habitation of freshwater turtles or turtle nesting zones. Similarly, stretches shall be identified for other species of significant importance to the river eco-system. Such stretch with adequate buffer distance shall be declared as no-mining zone and no mining shall be permitted. The regulatory authority as defined for granting Environmental Clearance, while considering the application of issuance of ToR and/or EC for the adjacent block (to non-mining zone) of mining shall take due precaution and impose requisite conditions to safeguard the interest of such species of importance.

5. District administration shall provide detailed information on its website about the sand mines in its district for public information, with an objective to extend all information in public domain so that the citizens are aware of the mining activities and can also report to the district administration on any deviation observed. Appropriate feedback and its redressal mechanism shall also be made operational. The details shall include, but not limited to, lease area, geo-coordinates of lease area and mineable area, transport routes, permitted capacity, regulatory conditions for operation including mining, environmental and social commitments etc.

6. A website needs to be maintain to track the movement of centralised sand mining and a Centralised server system should be made to manage the data related to sand mining across India.

7. The mineral concession holders shall maintain electronic weighbridges at the appropriate location identified by the district mining officer, in order to ensure that all mined minerals from that particular mine are accounted for before the material is dispatched from the mine. The weighing bridge shall have the provision of CCTV camera and all dispatch from the mine shall be accounted for.

8. The mineral movement shall be monitored and controlled through the use of transit permit with security features like printing on IBA approved MICR papers, Unique bar/QR, fugitive ink background, invisible ink mark, void pantographs and watermarks papers or through use of RFID tagged transit permits and IT /IT-enabled services. Such monitoring system shall be created and made operationalised by State Mining department and district level mining officer shall be responsible for ensuring that all legal and operational mines are connected and providing the requisite information on the system. Regular check and associated report shall be submitted to DLTF and uploaded on the website.

9. State Government shall constitute a District Level Task Force (DLTF) under the Chairmanship of Deputy Commissioner/District Magistrate/Collector with Superintendents of Police and other related senior functionaries (District Forest Officer, District transport officer, Regional officer- SPCBs, Senior Officer of Irrigation Department, District Mining Officer) with one/two independent member nominated by the Commissioner concerned. The independent member shall be retired government officials/teacher or ex-serviceman or ex-judiciary member.

The DLTF shall keep regular watch over the mining activities and movement of minerals in the district. The DLTF shall have its regular meeting, preferably every month to reconcile the information from the mining activity, and other observations made during the month and take appropriate corrective and remedial action, which may include a recommendation for revoking mining lease or environmental clearance. The DLTF may constitute an independent committee of the expert to assess the environmental or ecological damage caused due to illegal mining and recommend recovery of environmental compensation from the miner's concern. The recommendation may also include action under the provision of E(P) Act, 1986.

10. The area not identified for mining due to restriction or otherwise are also to be monitored on a regular basis by the DLTF. Any observations of mining activity from the restricted area shall be reported and corrective measures shall be initiated on an urgent basis by the DLTF.

11. The dispatch routes shall be defined in the Environmental Clearance and shall be avoided through densely habituated area and the increase in the number of vehicle movement on the road shall be in agreement with the IRC guidelines / carrying capacity of the road. The alternate and dedicated route shall be explored and preferred for movement of mining to avoid inconvenience to the local habitat. The mining production capacity, by volume/weight, shall be governed by total permissible dispatch calculated based on the carrying capacity of dispatch link roads and accordingly, the production should be regulated.

12. The movement of minerals shall be reconciled with the data collected from the mines and various Naka/check posts. Other measures may also include a general survey of the potential mineable area in the district

which has not been leased/auctioned or permitted for mining due to regulatory or other reasons.

13. The location and number of check post requirement shall be reviewed by DLTF on a regular basis so that appropriate changes in location/number could be made as per the requirement. Such review shall be carried out on a regular basis for the district on inter-state boundary or district providing multiple passages between two districts of different states.

14. The district administration shall compile the information from their district of the permitted and legal mined out minerals and other details and share such information and intelligence with the officials of the adjoining district (Inter or/and Intra State) for reconciliation. The information shall include the area of operation, permissible quantity, mined out minerals (production) the permitted route etc., and other observations, especially where the mine lease boundary is congruent with the district boundary. Such coordination meeting shall be held on a quarterly basis, alternatively in two district headquarters or any other site in two districts decided mutually by the District Magistrate.

15. The mining department shall include submission of an annual environmental audit report as one of the conditions in the mining lease agreement. The annual audit for each river bed mining lease shall be carried out and the audit report shall be uploaded on the website of district administration. The audit shall be carried out by an independent team of 3 members nominated by District Collector/Magistrate/Commissioner comprising of Ex-Serviceman, Ex-Government officials of repute, Professor or Person having experience of mining/environment. The guidelines and method of the audit shall reflect adequately the monitor-able parameters and output and reflect

the compliance status with respect to the conditions imposed by the regulatory authorities including conditions of Environmental clearance.

16. The in-situ and ex-situ environmental mitigative measures stipulated as EMP, CER, CSR and other environmental and safety conditions in mines including the welfare of labours shall properly reflect in the audit report.

9.5 Suggestive additional requirements are

i. The requirement at the Mine Lease Site:

a. Small Size Plot (Up to 5 hectares): Android Based Smart Phone.
b. Large Size Plots (More than 5 hectares): CCTV camera, Personal Computer (PC), Internet Connection, Power Back up.
c. Access control of mine lease site.
d. Arrangement for weight or approximation of the weight of mined out mineral on the basis of the volume of the trailer of vehicle used.

ii. Scanning of Transport Permit or Receipt and Uploading on Server:

a. Website: Scanning of receipt on mining site can be done through barcode scanner and computer using the software;

b. Android Application: Scanning on mining site can be done using Android Application using a smartphone. It will require internet availability on SIM card;

c. SMS: Transport Permit or Receipt shall be uploaded on the server even by sending SMS through mobile. Once Transport Permit or Receipt get uploaded, a unique invoice code gets generated with its validity period.

iii. Proposed working of the system:

The State Mining Department should print the Transport Permit or Receipt with security features and issue them to the mining leaseholder through the District Collector. Once these Transport Permits or Receipts are issued, they would be uploaded on the server against that mine lease area. Each receipt should be preferable with pre-fixed quantity, so the total quantity gets determined for the receipts issued. When the

Transport Permit or Receipt barcode gets scanned and invoice is generated, that particular barcode gets used and its validity time is recorded on the server. So all the details of transporting of mined out material can be captured on the server and the Transport Permit or Receipt cannot be reused.

iv. Checking On Route:

The staff deployed for the purpose of checking of vehicles carrying mined mineral should be in a position to check the validity of Transport Permit or Receipt by scanning them using the website, Android Application and SMS.

v. Breakdown of Vehicle:

In case the vehicle break-down, the validity of Transport Permit or Receipt shall be extended by sending SMS by the driver in specific format to report the breakdown of the vehicle. The server will register this information and register the breakdown. The State can also establish a call center, which can register breakdowns of such vehicles and extend the validity period. The subsequent restart of the vehicle also should be similarly reported to the server or call center.

vi. Tracking of Vehicles:

The route of the vehicle from source to destination can be tracked through the system using checkpoints, RFID Tags, and GPS tracking.

vii. Alerts or Report Generation and Action Review:

The system will enable the authorities to develop a periodic report on different parameters like daily lifting report, vehicle log or history, lifting against allocation, and total lifting. The system can be used to generate auto mails or SMS. This will enable the District Collector or District Magistrate to get all the relevant details and shall enable the authority to block the scanning facility of any site found to be indulged in irregularity. Whenever any authority intercepts any vehicle transporting illegal sand, it shall get registered on the server and shall be mandatory for the officer to fill in the report on action taken. Every intercepted vehicle shall be tracked.

The monitoring of mined out mineral, environmental clearance conditions and enforcement of Environment Management Plan will be ensured by the regulatory authority and the State Pollution Control Board or Committee. The monitoring arrangements envisaged above shall be put in place. The monitoring of enforcement of environmental clearance conditions shall be done by the Central Pollution Control Board, Ministry of Environment, Forest and Climate Change and the agency nominated by the Ministry for the purpose.

Some of the State has followed the SSMMG-2016 and has also improvised or customized on the provisions given therein, and are successfully in operation. Salient provision adopted at different stages of sand mining in the state of Tamil Nadu is given as **Annexure VIII.**

9.6 Actions against illegal excavation and transport

Solapur district administration in Maharashtra had adopted a multi-pronged strategy to penalize the persons involved in illegal excavation and transport which resulted in a significant increase in revenue earned by the state. Following rules and procedures as mentioned in these guidelines will add to the costs of PP. Those involved in illegal activities are not required to bear these costs and this will make their supply in the market cheaper (though illegal). This will put the players running their business by following rules and procedures laid down by the government to disadvantage as far as the selling price is considered. Therefore, it is necessary to come down heavily on those involved in illegal excavation/transport, so that there is no incentive for players to abide by the rules.

The following action may be taken to achieve this deterrence against illegal business:

1. The action should be taken under all legal options available simultaneously. Thus, after identifying the case of illegal excavation, storage and/or transport of minor minerals (including sand), fine should be levied as per the land revenue laws/code(s) of the state. In addition, FIR should be lodged in the police station under relevant sections of law including sec 379 IPC. In addition, action under the Motor Vehicle Act, 1989 and relevant rules should initiate to cancel/suspend the driving license of the driver and permit of the vehicle. Further, action should be initiated under provisions in the Income Tax Act, 1961 for unaccounted income and under the Central Goods and Services Act, 2017 for non-payment of GST. (Earlier this was done under the state act pertaining to Value Added Tax/Sales Tax). Habitual offenders should also be taken up under local state laws for externment and/or preventive action. It is clarified that as per law, it is possible to take all actions under various laws

simultaneously for one offence. What is prohibited in law is an action under the same law for the same act more than once.

2. The action should be taken against all persons responsible. Often, there is a tendency to penalize only the drivers of the vehicles. The mafia of illegal mining and transport is much bigger and drivers are only one part of the system. It is necessary to identify all those involved in the offence. It is usually not possible to reach the place of excavation without creating a motorable pathway up to the same through land which may be private land. Such role of such landowners needs to be looked into for each offence and proceeded against simultaneously. Further, the role of vehicle owners needs to be probed. Role of the person who allowed his land to be used for illegal excavation and storage should also be examined. Lastly, the person who purchases such sand should also be probed. The legal proceedings stated above needs to be initiated against all of these together. An attempt should be made to fix the financial responsibility in joint and several ways so that recovery is easier.

3. There may be discretion available in law about the extent of the penalty to be levied. If such discretion is very wide, then it is advisable that guidelines may be laid down to reduce such discretion in law for levying penalties. For example, in Maharashtra, Land Revenue Code, fine of any amount of penalty up to thrice the value of the sand can be levied. Solapur district administration had instructed Tahsildars and SDMs not to use discretion and levy the fine of three times the value. Availability of discretion makes junior level functionaries susceptible to pressures and it may also lead to corrupt practices.

4. It is emphasized that actions, as stated above, are most important to ensure that the IT-based system works. If these exemplary actions are not taken against everyone, it shall create a strong disincentive to those

involved in legal excavation and transportation. For IT-based (or any other) legal system to work, it is necessary to ensure that illegal system stops working altogether.

Annexure-I

Details of Sand/M-Sand Sources

a) Rivers:

River Name/M-Sand Plant	Total Stretch of River (in KM)	Type of River (Perennial or Non-Perennial)

b) De-Siltation Location: (Lakes/Ponds/Dams etc.)

Name of Reservoir/Dams	Maintain/Controlled by State Govt./PSU etc.	Location	District	Tehsil	Village	Size(Ha)

c) Patta Lands/Khatedari Land:

Owner	Sy. No	Area (Ha)	District	Tehsil	Village	Agricultural Land (Yes/No)

d) M-Sand Plants:

Plant Name	Owner	District	Tehsil	Village	Geo-location	Quantity Tonnes/Annum

Note: For inclusion of M-Sand Plant/Patta Land in DSR the plant/landowners need to submit the request to the Mining Department with complete details. Inclusion in DSR does not give them the right to operate the M-Sand Plant/Sand Mining lease.

Annexure-II

List of Potential Mining Leases (existing & proposed)

Rivers

River Details	Lease Details	Area (in Ha)	Distance (in KM) from PA/BR/WC/	Distance from Forest Area (in KM)	Mining leases within 500 meters (if yes cluster area)	Total excavation in Tonnes /Annum considering digging depth max as 3 meters	Mineral to be mined (Sand/ Bajri/ RBM etc.)	Existing / Proposed

Patta Lands/Khatedari Land: (existing & proposed)

Owner	Sy. No	Area	District	Tehsil	Village	Total Reserve (MT)	Total Mineral to be mined (MT)	Existing /Proposed

De-Siltation Location: (Lakes/Ponds/Dams etc.) (Existing & proposed)

Name of Reservoir /Dams	Maintain /Controlled by State Govt./PSU etc.	Location	District	Tehsil	Village	Size (Ha)	Quantity MT / Year	Existing /Proposed

M-Sand Plants :(existing & proposed)

Plant Name	Owner	District	Tehsil	Village	Geo-location	Quantity Tonnes/Annum	Existing/Proposed

Annexure-III

Cluster & Contiguous Cluster details

Clusters:

River Name	Cluster No.	Lease No	Location (Riverbed / Patta Land)	Village	Area (in Ha)	Total Excavation (Ton)	Total Mineral Excavation (Ton)

Contiguous Clusters:

River Name	Contiguous Cluster No.	Cluster No	Number of leases in the cluster	Location (Riverbed / Patta Land)	Distance between clusters	Village	Area of Cluster (Ha)	Total Mineral Excavation (Ton)

Annexure-IV

Transportation Routes for individual leases and leases in Cluster

Lease No	Transportation Route No	Number of tippers /day of lease	Number of tippers /day of all the lease on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for road (Black Topped/ unpaved)	The road will be Constructed by Govt/ Lease Owner	Route Map & Location

Cluster No	Transportation Route No	Number of tippers /day of cluster	Number of tippers /day of all the clusters on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for road(Black Topped/ unpaved)	The road will be Constructed by Govt/Lease Owner	Route Map & Location

Annexure-V

Final List of Potential Mining Leases (existing & proposed)

Rivers

River Details	Lease Details	Area (in Ha)	Distance (in KM) from PA/BR/WC/	Distance from Forest Area (in KM)	Mining leases within 500 meters (if yes cluster area)	Total excavation in (MT/Yr) (Mine depth max as 3 m)	Mineral to be mined (Sand/Bajri/RBM etc.)	Existing /Proposed

Patta Lands/Khatedari Land: (existing & proposed)

Owner	Sy. No	Area	District	Tehsil	Village	Total Reserve (MT)	Total Mineral to be mined (MT)	Existing /Proposed

De-Siltation Location: (Lakes/Ponds/Dams etc.) (Existing & proposed)

Name of Reservoir/ Dams	Maintain/ Controlled by State Govt./PSU etc.	Location	Distt.	Tehsil	Village	Size(Ha)	Quantity MT/Year	Existing/ Proposed

M-Sand Plants :(existing & proposed)

Plant Name	Owner	District	Tehsil	Village	Geo-location	Quantity MT/Annum	Existing/Proposed

Annexure-VI

Final List of Cluster & Contiguous Cluster

Clusters:

River Name	Cluster No.	Lease No	Location (Riverbed / Patta Land)	Village	Area (in Ha)	Total Excavation (Ton)	Total Mineral Excavation (Ton)

Contiguous Clusters:

River Name	Contiguous Cluster No.	Cluster No	Number of leases in the cluster	Location (Riverbed /Patta Land)	Distance between clusters	Village	Area of Cluster (in Ha)	Total Mineral Excavation (Ton)

Annexure-VII

Final Transportation Routes for individual leases and leases in Cluster

Lease No	Transportation Route No	Number of tippers /day of lease	Number of tippers /day of all the lease on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for road(Black Topped/ unpaved)	The road will be Constructed by Govt/Lease Owner	Route Map & Location

Cluster No	Transportation Route No	Number of tippers /day of cluster	Number of tippers /day of all the clusters on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for road(Black Topped/ unpaved)	The road will be Constructed by Govt/Lease Owner	Route Map & Location

Annexure VIII

Salient provision for sand mining in the state of Tamil Nadu

STEPS TO BE FOLLOWED BEFORE EXECUTION:

- The state as a policy should endeavor to have single authority/agency responsible for all river sand mining in the state with an objective to ease the gap in demand and supply and accordingly, take necessary measures including planning, monitoring of mined material and its transport, and to curb illegal mining and sale of materials.

- The prospective site for sand quarry may be identified based on the availability of adequate sand deposits along the river beds, which hinders the free flow of water and results in flooding during monsoon seasons. Emphasis may be given to such quarry sites which is more viable for replenishment.

- A detailed study may be conducted by engaging expert from reputed Institutions to identify prospective sand reaches, assessment of the impact of sand quarrying on the Ground Water Table and water availability, conduct bore log details and study the social and environmental aspects. The generic requirement for replenishment study is to be followed.

- Once the site is identified for prospective sand quarry site based on the detailed replenishment study, the concerned department shall submit the proposal with the geo-tagged boundary of the proposed mining Precise Area Proposal to the District Collector for approval.

- A joint inspection may be carried out by the RDO/Sub-Collector, Assistant/Deputy Director,

- Executive Engineer, TWAD Board and the PWD officials to consider the various factors before giving consent to the proposal.

- The RDO concerned along with Revenue officials may verify the revenue records of the proposed sand quarrying area and give the NOC.

- The AD/DD Mines may verify the presence of permanent structures such as tower line, bridge, monuments if any, in the vicinity of the proposed mining site as per Tamil Nadu Minor Mineral Concession Rules,1959 (As per Rule 36 " there shall be no quarrying of sand in any river bed or adjoining area or any other area which is located within 500 meter radial distance from the location of any bridge, water supply system, infiltration well or pumping installation of any of the local bodies or Central or State Government Department or the Tamil Nadu Water Supply and Drainage Board head works or any area identified for locating water supply schemes by any of the above mentioned Government Department or other bodies" and " The distance of 50 meter shall be measured in the case of railway, reservoir or canal horizontally from the outer toe of the bank or the outer edge of the cutting, as the case may be …. "). Also, the availability of minerals may be cross verified with the available DSR.

- The TWAD officials may verify the drinking water schemes located nearby the proposed quarry site and the minimum distance required as per statutory norms.

- Based on the feasibility report of the joint inspection by the Revenue, Tamil Nadu Water Supply and Drainage Board and Mining officials/experts, the District Collector may give consent for the Precise Area proposal.

- After getting Precise Area approval, a detailed Mining Plan and sketch shall be prepared by the Executive Engineer, PWD using the services of a NABET accredited consultant who holds the pivotal role in the preparation of mining plan. Due responsibility will be expected on the concerned consultant in the mining plan preparation taking care of adhering to all mining rules, existing as on date. The mining plan shall contain the details of quantity to be excavated, the period of mining, method of excavation, deployment of required machinery, Environment Management Plan (EMP), proposed number of laborers to be deployed and Conceptual Mining Plan, as per Rule 41 of TNMMC Rules 1959. It is also the duty of the consultant to give the safe distance of 50 m or twice the bank height from the toe of the riverbank, whichever is higher and fixing the Geo coordinates for boundaries using DGPS instruments.

- The concerned Executive Engineer, PWD shall submit the Mining Plan prepared by the NABET accredited consultant to the concerned Assistant/Deputy Director, Department of Geology and Mines for approval, as per Rule 42 of TNMMC 1959. After scrutiny, the Assistant/Deputy Director, Department of Geology will present the Mining plan before the State Level Environment Impact Assessment Authority (SEIAA) for granting Environmental Clearance.

- The Executive Engineer, PWD shall prepare Form I and Pre-feasibility report with the help of the consultant and submit to SEIAA for an area less than 50 Ha. or to the Ministry of Environment and Forest and Climate Change (MoEF&CC) for the area more than 50 Ha.

- The State Expert Appraisal Committee (SEAC) under SEIAA, consisting of experts from renowned fields such as Mines, Environment, Sociology etc. shall conduct a site inspection of the proposed sand quarry site and after intense scrutiny, may recommend the proposal to SEIAA for approval.

- SEIAA shall grant Environmental Clearance for the sand quarry proposal after analyzing all the statutory provisions and based on the recommendation of the SEAC.

- The Environmental Clearance shall be informed to the public with basic details through advertisement in at least two widely circulated local newspapers with at least one in the vernacular language of the locality, within 7 days of the receipt of the clearance.

- On receipt of the Environmental Clearance, the Executive Engineer, PWD shall apply for Consent to Establish (CTE), from the Tamil Nadu Pollution Control Board as per the Air and Water Act, to enter upon the sand quarry site and commence the preliminary works such as construction of temporary sheds, bio-toilets, formation of biodegradable road using sugar cane leaves etc., drilling of bore wells etc. as per the statutory requirements. After all the preliminary works are completed, the Executive Engineer, PWD shall apply for the Consent to Operate (CTO) from the Tamil Nadu Pollution Control Board. Earmarking boundary of the identified land site through the concrete posts along with red flags need to be established.

- On receipt of the CTO, the Executive Engineer, PWD shall request the consent of the District Collector to commence the quarries. The District Collector shall request the Taluk Level Task Force comprising of Tahsildar, Inspector of Police, Officials from the Departments of Geology and Mining, Transport and Forest, Assistant Engineer, PWD and the Village Administrative Officer concerned, to verify the compliance of all preconditions mentioned in the Environmental Clearance and grant necessary permission to start the functioning of new sand quarries.

II. STEPS TO BE FOLLOWED DURING EXECUTION:

- Before the commencement of mining operations, the depth of sand quarrying needs to be measured accurately using Advanced technology and new gadgets like Total Stations, Global Positioning System (GPS) instruments etc. The Total Station and GPS instruments also need to be calibrated before measurement. Both the traditional and modern techniques may be infused in the right blend to get an accurate measure of the depth. A clear contour map (0.25m interval) of the levels within 2Km (one Km U/s and one Km D/s) needs to be prepared and submitted to both the Project Director, Sand Quarrying Operations and all the Monitoring Committee members. The depth of sand quarrying shall be restricted to 1 m from the theoretical/design bed level.

- The mining area must be demarcated at a minimum distance of at least 50 m away from the river embankment on either side. The boundaries of the quarries may be fixed with reference to the existing survey marks from the survey fields adjacent to the river. Sand quarrying lease area shall be demarcated on the ground with pucca stone or concrete pillars to show the present natural bed level and the depth of mining allowed.

- Modern techniques such as drone survey may be adopted to assess the depth and quantity of the mined area. Boundary pillars shall be erected at an interval of 50 m each on all four sides of the sand quarry site with red flags on every pillar and also in site pillars. The levels of shoal height, river bed height and depth to be excavated up to one meter downwards shall be marked in the pillars to avoid any deviation from the approved depth of excavation.

- It shall be ensured that no sand quarrying of any type is undertaken with 50m of the distance mentioned in the proposal (whichever is higher)

from both the banks of the river to control and avoid erosion of river banks.

- Temporary access roads or Katcha roads shall be formed between the banks of the river and the mining area with locally available bio-degradable materials such as sugarcane waste (bagasse), hay, etc.

- Proper entry and exit point for the movement of loading vehicles in and out of the sand quarry site shall be carefully located taking into consideration the habitations/settlements in the area.

- To monitor the groundwater level during sand quarrying operations, a network of existing wells may be established around the sand quarrying area and new piezometers must be installed at all sand quarry sites. Monitoring of Ground Water Quality in the vicinity (one Km radius from the sand quarrying site) shall be carried out once in two months.

- Periodic Monitoring (at least four times in a year – pre-monsoon, Monsoon, Post monsoon and winter) once in each season shall be carried out by PWD and the data thus collected may be sent regularly to SEIAA/TNPCB. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity; necessary corrective measures shall be carried out, which includes immediate stopping of mining.

- Similar to the Baseline studies for data on water, soil and air etc., that is being done before the sand quarrying operations, the air and water quality may be checked periodically by Tamil Nadu Pollution Control Board to ensure that no pollution is caused due to Sand Quarrying Operations. 10. Safety gadgets such as earplugs, goggles, respiratory

devices, luminescent vests etc. may be provided to the workers at the sand quarry site.

- First aid kit with all essentials shall be kept ready at all quarry/depot site, in case of any emergency.

- To prevent air pollution due to the dust during sand quarrying operations and safeguard the persons in the sand quarry and depot site, constant water sprinkling on the pathways and dust prone areas may be done. The sand loaded vehicles are to be covered with a tarpaulin before moving out of the quarries/depots.

- Suitable depots shall be located in the vicinity of the sand quarry site to facilitate the sale of sand. While selecting the site for depots, it must be ensured that the site is within 25 km from the sand quarry site and has an area of around 10-15 Acres with parking facilities and proper entry and exit for smooth movement of the vehicles. The depot site shall preferably be a Government poramboke land, foreshore area of tank bund etc., near an NH/SH/MDR/ODR. In the absence of any Government land in the vicinity, private Patta land may be leased out and rent fixed as per the approved Government rates applicable therein.

- Permission must be obtained from the Electricity Board for power supply to operate the CCTV cameras at sand quarry site and depots.

- Minimum of two CCTV cameras, one each at the entry and exit point and one PTZ camera may be installed at all quarries/depots to monitor illegality if any taking place in the sand quarry/depot.

- To ensure uninterrupted seamless live streaming of videos from the surveillance cameras, a high-speed Internet Lease Line connection may

be made available at all quarries/depots. Arrangements may also be made for online monitoring of the sand quarrying, Centre for Assessing Real-Time Sand Mining (CARS) that could be located at the office of the Project Director in Chennai.

- The live streaming of the videos shall be monitored at a Centralised control room and the data shall be stored in the Server for future references. A robust Customer Care may also be functional 24 x 7 at the Control Room, to redress the grievance of the public.

- Drop gates shall be installed at the entry and exit points of all quarries/depots.

- Display boards shall be erected in local vernacular language at sand quarry/depot site, in the nearest village by which sand transportation will be carried and at the entrance of the village road from the main road.

- The concerned authority of PWD shall call for e-tender to select the contractors for loading/raising of sand at the quarry site, transporting contractors to transport sand from the quarry site to depots and loading/maintenance contractors at depots.

- Sand shall be loaded in the quarries in the PWD tendered GPS fitted vehicles and online transmit permit shall be issued by the competent authorities in PWD to the transporting vehicles to transport sand from the quarry to depots.

- On the arrival of the sand shunting vehicles from quarry to the depot, an online authentication shall be done to confirm the arrival of the

appropriate quantity of sand mentioned in the transport permit into the depot.

- The loading of sand from the depots shall be carried out by booking through the online portal "www.tnsand.in" as done presently. Online transit passes will also be issued to the loaded vehicles which could be verified by using an Android app "TNsand Investigator".

- During operation of the quarries, the PWD officers shall ensure that at no point in time, the depth of quarry exceeds 1 m depth from the river bed level and quarrying is done in a uniform manner over the entire mining area to avoid overexploitation and formation of pits at fixed places.

- Proper registers may be maintained at the entry and exit points of the sand quarry/depot sites and a Loading Register may be made available during inspection. An Inspection Register and a Complaint Register may be made available at the sand quarry/depot site.

- The functioning time of quarries/depots shall be from 7.00 AM to 6.00 PM. No sand transporting vehicles to be parked inside the quarry/depot site during night time.

- A copy of the approved mining plan may be kept at the quarry site for ready reference.

- Photographs and sketch showing the pit dimensions, depth etc. may be recorded every week and maintained in the sand quarry. The Executive Engineer, PWD may inspect each sand quarry on a weekly basis and ensure that mining activities are taking place within the approved boundaries/depth.

- The sand quarrying activity shall be stopped if the entire quantity is quarried even before the expiry of the sand quarry lease period and the same shall be mentioned by the PWD authorities.

- The Taluk Level Taskforce shall inspect the quarries every fortnight, as per G.O. (Ms) No. 135 of Industries Department, dated 13.11.2009 and record the status of the compliance in the registers maintained at the sand quarry site.

- The Taluk Level Task Force has to submit its inspection report to the District Level Task Force chaired by the District Collector. The District Level Task Force has to be convened every month to discuss cases of illegal quarrying. An Environmentalist from reputed State / Central Institution and a legal expert on environmental matters may be part of the District Level Task Force. The District Level Task Force shall also dispose of the petitions on illegal sand quarrying after due enquiry and scrutiny, and pass orders within a period of two months from the date of receipt of the complaint. If any person is aggrieved with the orders passed by the District Level Task Force, an appeal may be preferred before the Appellate Forum.

- The District Collector shall take necessary steps to strengthen the existing District and Taluk Level Committees and act on the complaints received, if any, on illegal sand quarrying and take strict remedial measures to rectify the same in a time-bound manner. The District Level Task Force may send its monthly report to the Appellate Forum formed as per G.O. (Ms) No. 27 of Industries Dept. dated 17.02.2015.

- The Appellate Forum shall hear the appeals filed against the orders passed by the District Level Task Force. The Appellate Forum comprises

of the Secretaries to Government from Industries Department, Public Works Department, Revenue Department, Environment and Forests Department, Commissioner of Geology and Mining and an Expert from a reputed Government Institution.

- The Appellate Forum may convene once in 2 months to deliberate on the reports from the District Level Task Force and shall dispose of the appeals made by the petitioners aggrieved with the orders passed by the District Level Task Force.

- Periodical Capacity building and sensitization of PWD officials on the environmental and legal aspects of sand quarrying may be made mandatory. Continuous training and awareness programs shall be scheduled and conducted by IIT/Anna University for the PWD staff to keep themselves aware of the best practices in this field. It may be ensured that the enforcement officials from the Departments of Revenue, Police, Geology and Mining and Transport in the districts where quarries are situated are given adequate training and capacity building on their duties and responsibilities with respect to inspection of sand quarries and sand transporting vehicles at specified time intervals.

- No blasting shall be carried out any point in time.

- It is the obligation of the Public Works Department to run the quarry in an environmentally friendly and ecologically sustainable manner.

- The Hon'ble High Court-appointed Monitoring Committee shall inspect the sand quarries periodically and submit a report to the Hon'ble High Court.

- The PWD should explore/take necessary steps to introduce Mining Surveillance System (MSS) in line with MSS evolved by the Indian Bureau of Mines and Bhaskaracharya Institute for Space Applications and Geo-informatics (BISAG).

III. STEPS TO BE FOLLOWED AFTER EXECUTION:

- A Judicious mine closure plan may be formulated once the quarry is closed after exhaustion of the quantity of sand.

- Reclamation works may be factored into the contract agreement and strict monitoring by the PWD officials may be initiated to scrupulously follow up the mine closure plan.

- It may be ensured that the total quantity of sand permitted in the EC shall not be exceeded in any case.

- After the exhaustion of the quantity of sand, the sheds constructed at the quarry site may be removed. All the roads and pathways may be levelled so that there is no obstruction for the normal flow in the river.

- All the records/registers may be carefully maintained by the PWD for future reference.

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भारत का राजपत्र
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अधिसूचना

नई दिल्ली, 28 मार्च, 2020

का.आ. 1224(अ).—खनिज विधि (संशोधन) अधिनियम 2020 (2020 का 2), खान और खनिज (विकास और विनियमन) अधिनियम, 1957 (1957 का 67) (जिसे इसमें इसके पश्चात् एमएमडीआर अधिनियम कहा गया है) द्वारा 10 जनवरी, 2020 से प्रभावी संशोधन किया गया है और अन्य बातों के साथ कानूनी निर्बाधन के अंतरण के लिए उपबंधों से संबंधित नई धारा 8ख का अंत:स्थापन किया गया है;

और, एमएमडीआर अधिनियम की धारा 8ख की उप-धारा (2) यह उपबंध करता है कि इस अधिनियम में या तत्समय प्रवृत्त किसी अन्य विधि में अंतर्विष्ट किसी बात के होते हुए भी, धारा 8क की उप-धारा (5) और उप-धारा (6) के उपबंधों के अधीन अवसान होने वाले खनन पट्टे का सफल बोली लगाने वाला और उस अधिनियम के अधीन या तद्धीन बनाए गए नियमों के अधीन उपबंधित प्रक्रिया के अनुसार नीलामी के माध्यम से अर्जित सभी विधिमान्य अधिकार, अनुमोदन, निकासी, अनुज्ञप्ति और इसी प्रकार दो वर्ष की अवधि के लिए पूर्ववर्ती पट्टेदार पर निहित होना समझा जाएगा;

और, एमएमडीआर अधिनियम की धारा 8ख की उप-धारा (3) यह उपबंध करता है कि तत्समय प्रवृत्त अन्य विधि में अंतर्विष्ट किसी बाते के होते हुए भी, यह उस भूमि पर जिसमें नया पट्टा के प्रारंभ से दो वर्ष की अवधि के लिए पूर्ववर्ती पट्टादार द्वारा खनन संक्रियाएं कार्यान्वित किए जा रहे थे, निरंतर खनन संक्रियाओं को नए पट्टेदार के लिए विधिपूर्ण किया जाएगा;

और, एमएमडीआर अधिनियम को पूर्वोक्त संशोधन के प्रयोजन के लिए केंद्रीय सरकार, भारत सरकार के तत्कालीन पर्यावरण और वन मंत्रालय की अधिसूचना सं. का. आ. 1533 (अ), तारीख 14 सितंबर, 2006 (जिसे इसमें इसके पश्चात् ईआईए अधिसूचना, 2006 कहा गया है) के सुसंगत उपबंधों को सम्मिलित करने के लिए आवश्यक समझती है।

और, पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय में सड़कों के लिए साधारण पृथ्वी का उपयोग करने के लिए पूर्व पर्यावरणीय अनापत्ति की अपेक्षा के अधित्याग के लिए अभ्यावेदनों की प्राप्ति पर; और पारंपरिक समुदाय द्वारा अंतर ज्वारीय क्षेत्र के भीतर चूने के गोले (मृत भू-पटल), पवित्र स्थानों, आदि के मैनुअल निकासी;

अत:, अब, केन्द्रीय सरकार, पर्यावरण (संरक्षण) नियम, 1986 के नियम 5 के उप-नियम (4) के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 3 की उप-धारा (1) और उप-धारा (2) के खंड (v) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, लोकहित में, उक्त नियमों के नियम 5 के उप-नियम (3) के खंड (क) के अधीन सूचना की अपेक्षा से अभिमुक्ति के पश्चात् और अधिसूचना सं. का. आ. 4307 (अ), तारीख 29 नवंबर, 2019 को अधिक्रांत करते हुए, ईआईए अधिसूचना, 2006 में निम्नलिखित संशोधन करती है, अर्थात् :-

उक्त अधिसूचना में, -

(i) पैरा 11 में, उप-पैरा (2) के पश्चात् निम्नलिखित उप-पैरा अंत:स्थापित किया जाएगा, अर्थात् :-

"(3) खान और खनिज (विकास और विनियमन) अधिनियम, 1957 (1957 का 67) की धारा 8क की उप-धारा (5) और उप-धारा (6) के उपबंधों के अधीन अवसान होने वाले खनन पट्टे का सफल बोली लगाने वाला और उस अधिनियम के अधीन और तद्धीन बनाए गए नियमों के अधीन उपबंधित प्रक्रिया के अनुसार नीलामी के माध्यम से चयनित नया पट्टा के प्रारंभ की तारीख से दो वर्ष की अवधि के लिए पूर्ववर्ती पट्टेदार पर निहित पूर्व पर्यावरणीय अनापत्ति विधिमान्य अर्जित किया गया समझा जाएगा और यह नया पट्टा प्रारंभ की तारीख से दो वर्ष की अवधि के लिए या उसमें उल्लिखित निबंधनों शर्तों के अनुसार नया पर्यावरणीय अनापत्ति, नया निकासी अभिप्राप्त होने तक, इसमें से जो भी पूर्वतर हो, उक्त पट्टा क्षेत्र पर पूर्ववर्ती पट्टेदार का स्वीकृत पर्यावरणीय अनापत्ति के निबंधनों और शर्तों के अनुसार निरंतर खनन संक्रिया नया पट्टेदार के लिए विधिपूर्ण होंगी;

परन्तु, सफल बोली लगाने वाला नया पट्टा मंजूर करने की तारीख से दो वर्ष की अवधि के भीतर विनियामक प्राधिकरण से पूर्व पर्यावरणीय अनापत्ति के लिए आवेदन करेगा और अभिप्राप्त करेगा।";

(ii) अनुसूची के मद 1 (क) के सामने, स्तंभ (5) के खंड (2) के टिप्पण के पश्चात् निम्नलिखित खंड अंत:स्थापित किया जाएगा, अर्थात् :-

"(3) उक्त पट्टा के अवसान के पश्चात् पूर्ववर्ती पट्टेदार द्वारा खनन और खनिज (विकास और विनियमन) अधिनियम, 1957 (1957 का 67) के उपबंधों के अधीन खनन पट्टे के अवसान होने तक भीतर पड़ी पहले से ही खनिज वाह्य सामग्री का निष्क्रमण या निष्कासन और परिवहन उस अधिनियम के अधीन और तद्धीन बनाए गए नियमों के अधीन उपबंधित प्रक्रिया के अनुसार नीलामी के माध्यम से चयनित सफल बोली लगाने की इस प्रकार अनुज्ञात खनन हैसियत के भाग के रूप में नहीं होगा।"

(iii) परिशिष्ट – IX के लिए, निम्नलिखित परिशिष्ट प्रतिस्थापित किया जाएगा, अर्थात् :-

"परिशिष्ट – 9

कतिपय मामलों के पर्यावरणीय अनापत्ति की अपेक्षा से छूट

निम्नलिखित मामलों को पूर्व पर्यावरणीय अनापत्ति की अपेक्षा नहीं होगी, अर्थात् :-

1. मैनुअल खनन द्वारा साधारण मिट्टी या बालू की कुम्हारों द्वारा मिट्टी के घड़े, लैम्प, खिलौने, आदि बनाने के लिए उनकी प्रथाओं के अनुसार निकासी ।

2. मैनुअल खनन द्वारा मिट्टी की टाइलें बनाने द्वारा जो मिट्टी की टाइलें बनाते हैं, के लिए साधारण मिट्टी या बालू की निकासी।

3. किसानों द्वारा बाढ़ के पश्चात् कृषि भूमि से बालू के जमाव को हटाना।

4. ग्राम पंचायत में अवस्थित स्रोतों से बालू और साधारण मिट्टी को वैयक्तिक उपयोग या ग्राम में समुदाय कार्य के लिए प्रथा के अनुसार खनन।

5. सामुदायिक कार्य जैसे ग्रामीण तालाबों या टैंकों से गाद हटाना, महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार और गारंटी स्कीमों, अन्य सरकारी स्कीमों, प्रायोजित तथा सामुदायिक प्रयासों द्वारा ग्रामीण सड़कों, तालाबों या बांधों का संनिर्माण।

6. सड़क, पाइपलाइन, आदि जैसे रेखीय परियोजनाओं के लिए साधारण मिट्टी की निकासी, निष्कासन या प्रयोग करना।

7. बांधों, तालाबों, मेड़ों, बैराजों, नदी और नहरों की उनके अनुरक्षित तथा आपदा प्रबंधन के प्रयोजन के लिए तलमार्जन और गाद निकालना।

8. गुजरात में गुजरात सरकार की तारीख 14 फरवरी, 1990 की अधिसूचना सं. जीयू / 90 (16)/ एमसीआर–2189 (68) / 5 – सीएचएच द्वारा बंजारा और ओड द्वारा बालू के पारंपरिक उपजीविका कार्य।

9. पारंपरिक समुदाय द्वारा अंतर ज्वारीय क्षेत्र के भीतर चूने के गोलों (मृत भू-पटल), पवित्र स्थानों, आदि के मैनुअल निकासी।

10. सिंचाई या पेयजल के लिए कुओं की खुदाई।

11. यथास्थिति, ऐसे भवनों की नींव के लिए खुदाई जिनके लिए पूर्व पर्यावरणीय अनापत्ति अपेक्षित नहीं है।

12. जिला कलेक्टर या जिला मजिस्ट्रेट या किसी अन्य सक्षम प्राधिकारी के आदेश पर किसी नहर, नाला, ड्रेन, जल निकाय, आदि में होने वाली दरार को भरने के लिए साधारण मिट्टी या बालू का उत्खनन ताकि किसी आपदा या बाढ़ जैसी स्थिति से निपटा जा सकें।

13. ऐसे क्रियाकलाप, जिन्हें राज्य सरकार द्वारा विधान या नियमों के अधीन गैर खननकारी क्रियाकलाप के रूप में घोषित किया गया है।"

[फा. सं. जेड–11013 / 47 / 2018–आई. ए. II (एम)]

गीता मेनन, संयुक्त सचिव

टिप्पण : मूल अधिसूचना भारत के राजपत्र, असाधारण, भाग II, खंड 3, उप-खंड (ii) में सं. का. आ. 1533 (अ), तारीख 14 सितंबर 2006 द्वारा प्रकाशित की गई थी और निम्नलिखित सं. द्वारा पश्चात्वर्ती संशोधन किया गया :-

1. का. आ. 1949 (अ), तारीख 13 नवंबर, 2006;
2. का. आ. 1737 (अ), तारीख 11 अक्तूबर, 2007;
3. का. आ. 3067 (अ), तारीख 1 दिसंबर, 2009;
4. का. आ. 695 (अ), तारीख 4 अप्रैल, 2011;
5. का. आ. 156 (अ), तारीख 25 जनवरी, 2012;
6. का. आ. 2896 (अ), तारीख 13 दिसंबर, 2012;
7. का. आ. 674 (अ), तारीख 13 मार्च, 2013;
8. का. आ. 2204 (अ), तारीख 19 जुलाई, 2013;
9. का. आ. 2555 (अ), तारीख 21 अगस्त, 2013;
10. का. आ. 2559 (अ), तारीख 22 अगस्त, 2013;
11. का. आ. 2731 (अ), तारीख 9 सितंबर, 2013;

12. का. आ. 562 (अ), तारीख 26 फरवरी, 2014;

13. का. आ. 637 (अ), तारीख 28 फरवरी, 2014;

14. का. आ. 1599 (अ), तारीख 25 जून, 2014;

15. का. आ. 2601 (अ), तारीख 7 अक्तूबर, 2014;

16. का. आ. 2600 (अ), तारीख 9 अक्तूबर, 2014;

17. का. आ. 3252 (अ), तारीख 22 दिसंबर, 2014;

18. का. आ. 382 (अ), तारीख 3 फरवरी, 2015;

19. का. आ. 811 (अ), तारीख 23 मार्च, 2015;

20. का. आ. 996 (अ), तारीख 10 अप्रैल, 2015;

21. का. आ. 1142 (अ), तारीख 17 अप्रैल, 2015;

22. का. आ. 1141 (अ), तारीख 29 अप्रैल, 2015;

23. का. आ. 1834 (अ), तारीख 6 जुलाई, 2015;

24. का. आ. 2571 (अ), तारीख 31 अगस्त, 2015;

25. का. आ. 2572 (अ), तारीख 14 सितंबर, 2015;

26. का. आ. 141 (अ), तारीख 15 जनवरी, 2016;

27. का. आ. 648 (अ), तारीख 3 मार्च, 2016;

28. का. आ. 2269 (अ), तारीख 1 जुलाई, 2016;

29. का. आ. 2944 (अ), तारीख 14 सितंबर, 2016;

30. का. आ. 3518 (अ), तारीख 23 नवंबर, 2016;

31. का. आ. 3999 (अ), तारीख 9 दिसंबर, 2016;

32. का. आ. 4241 (अ), तारीख 30 दिसंबर, 2016;

33. का. आ. 3611 (अ), तारीख 25 जुलाई, 2018;

34. का. आ. 3977 (अ), तारीख 14 अगस्त, 2018;

35. का. आ. 5733 (अ), तारीख 14 नवंबर, 2018;

36. का. आ. 5736 (अ), तारीख 15 नवंबर, 2018;

37. का. आ. 5845 (अ), तारीख 26 नवंबर, 2018;

38. का. आ. 345 (अ), तारीख 17 जनवरी, 2019;

39. का. आ. 1960 (अ), तारीख 13 जून, 2019;

40. का. आ. 236 (अ), तारीख 16 जनवरी, 2020;

41. का. आ. 751 (अ), तारीख 17 फरवरी, 2020; और

42. का. आ. 1223 (अ), तारीख 27 मार्च, 2020 ।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 28th March, 2020

S.O. 1224(E).—WHEREAS, *vide* the Mineral Laws (Amendment) Act, 2020 (2 of 2020), the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957) (hereinafter referred to as MMDR Act) has been amended with effect from the 10th day of January, 2020 and, *inter alia*, new section 8B relating to the provisions for transfer of statutory clearances has been inserted;

AND WHEREAS, sub-section (2) of section 8B of the MMDR Act provides that notwithstanding anything contained in this Act or any other law for the time being in force, the successful bidder of mining leases expiring under the provisions of sub-sections (5) and (6) of section 8A and selected through auction as per the procedure provided under this Act and the rules made thereunder, shall be deemed to have acquired all valid rights, approvals, clearances, licences and the like vested with the previous lessee for a period of two years;

AND WHEREAS, sub-section (3) of section 8B of the MMDR Act provides that notwithstanding anything contained in any other law for the time being in force, it shall be lawful for the new lessee to continue mining operations on the land, in which mining operations were being carried out by the previous lessee, for a period of two years from the date of commencement of the new lease;

AND WHEREAS, in pursuance of the aforesaid amendment to the MMDR Act, the Central Government deems it necessary to align the relevant provisions of the notification of the Government of India in the erstwhile Ministry of Environment and Forests number S.O. 1533 (E), dated the 14th September, 2006 (hereinafter referred to as the EIA Notification, 2006);

AND WHEREAS, the Ministry of Environment, Forest and Climate Change is in the receipt of representations for waiver of requirement of prior environmental clearance for borrowing of ordinary earth for roads; and manual extraction of lime shells (dead shell), shrines, etc., within inter tidal zone by the traditional community;

Now, therefore, in exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986), read with sub-rule (4) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government, after having dispensed with the requirement of notice under clause (a) of sub-rule (3) of the rule 5 of the said rules, in public interest, and in supersession of the notification number S.O. 4307(E), dated the 29th November, 2019, hereby makes the following further amendments in the EIA Notification, 2006, namely:-

In the said notification,-

(i) in paragraph 11, after sub-paragraph (2), the following sub-paragraph shall be inserted, namely:-

"(3) The successful bidder of the mining leases, expiring under the provisions of sub-sections (5) and (6) of section 8A of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957) and selected through auction as per the procedure provided under that Act and the rules made thereunder, shall be deemed to have acquired valid prior environmental clearance vested with the previous lessee for a period of two years, from the date of commencement of new lease and it shall be lawful for the new lessee to continue mining operations as per the same terms and conditions of environmental clearance granted to the previous lessee on the said lease area for a period of two years from the date of commencement of new lease or till the new lessee obtains a fresh environmental clearance with the terms and conditions mentioned therein, whichever is earlier:

Provided that the successful bidder shall apply and obtain prior environmental clearance from the regulatory authority within a period of two years from the date of grant of new lease.";

(ii) in the Schedule, against the item 1(a), in the column (5), after clause (2) of the Note, the following clause shall be inserted, namely:-

"(3) The evacuation or removal and transportation of already mined out material lying within the mining leases expiring under the provisions of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957), by the previous lessee, after the expiry of the said lease, shall not form the part of the mining capacity so permitted to the successful bidder, selected through auction as per the procedure provided under that Act and the rules made thereunder.";

(iii) for Appendix-IX, the following Appendix shall be substituted, namely:-

"APPENDIX-IX

EXEMPTION OF CERTAIN CASES FROM REQUIREMENT OF ENVIRONMENTAL CLEARANCE

The following cases shall not require Prior Environmental Clearance, namely:-

1. Extraction of ordinary clay or sand by manual mining, by the Kumhars (Potter) to prepare earthen pots, lamp, toys, etc. as per their customs.
2. Extraction of ordinary clay or sand by manual mining, by earthen tile makers who prepare earthen tiles.
3. Removal of sand deposits on agricultural field after flood by farmers.
4. Customary extraction of sand and ordinary earth from sources situated in Gram Panchayat for personal use or community work in village.
5. Community works, like, de-silting of village ponds or tanks, construction of village roads, ponds or bunds undertaken in Mahatma Gandhi National Rural Employment and Guarantee Schemes, other Government sponsored schemes and community efforts.
6. Extraction or sourcing or borrowing of ordinary earth for the linear projects such as roads, pipelines, etc.
7. Dredging and de-silting of dams, reservoirs, weirs, barrages, river and canals for the purpose of their maintenance, upkeep and disaster management.
8. Traditional occupational work of sand by Vanjara and Oads in Gujarat vide notification number GU/90(16)/MCR-2189(68)/5-CHH, dated the 14th February, 1990 of the Government of Gujarat.
9. Manual extraction of lime shells (dead shell), shrines, etc., within inter tidal zone by the traditional community.
10. Digging of wells for irrigation or drinking water purpose.
11. Digging of foundation for buildings, not requiring prior environmental clearance, as the case may be.
12. Excavation of ordinary earth or clay for plugging of any breach caused in canal, nallah, drain, water body, etc., to deal with any disaster or flood like situation upon orders of the District Collector or District Magistrate or any other Competent Authority.
13. Activities declared by the State Government under legislations or rules as non-mining activity."

[F. No. Z-11013/47/2018-IA.II (M)]

GEETA MENON, Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii) *vide* number S.O. 1533 (E), dated the 14th September, 2006 and subsequently amended *vide* the following numbers:-

1. S.O. 1949 (E), dated the 13th November, 2006;
2. S.O. 1737 (E), dated the 11th October, 2007;
3. S.O. 3067 (E), dated the 1st December, 2009;
4. S.O. 695 (E), dated the 4th April, 2011;
5. S.O. 156 (E), dated the 25th January, 2012;
6. S.O. 2896 (E), dated the 13th December, 2012;
7. S.O. 674 (E), dated the 13th March, 2013;
8. S.O. 2204 (E), dated the 19th July, 2013;
9. S.O. 2555 (E), dated the 21st August, 2013;
10. S.O. 2559 (E), dated the 22nd August, 2013;
11. S.O. 2731 (E), dated the 9th September, 2013;
12. S.O. 562 (E), dated the 26th February, 2014;
13. S.O. 637 (E), dated the 28th February, 2014;

14. S.O. 1599 (E), dated the 25th June, 2014;
15. S.O. 2601 (E), dated the 7th October, 2014;
16. S.O. 2600 (E), dated the 9th October, 2014;
17. S.O. 3252 (E), dated the 22nd December, 2014;
18. S.O. 382 (E), dated the 3rd February, 2015;
19. S.O. 811 (E), dated the 23rd March, 2015;
20. S.O. 996 (E), dated the 10th April, 2015;
21. S.O. 1142 (E), dated the 17th April, 2015;
22. S.O. 1141 (E), dated the 29th April, 2015;
23. S.O. 1834 (E), dated the 6th July, 2015;
24. S.O. 2571 (E), dated the 31st August, 2015;
25. S.O. 2572 (E), dated the 14th September, 2015;
26. S.O. 141 (E), dated the 15th January, 2016;
27. S.O. 648 (E), dated the 3rd March, 2016;
28. S.O. 2269(E), dated the 1st July, 2016;
29. S.O. 2944(E), dated the 14th September, 2016;
30. S.O. 3518 (E), dated 23rd November 2016;
31. S.O. 3999 (E), dated the 9th December, 2016;
32. S.O. 4241(E), dated the 30th December, 2016;
33. S.O. 3611(E), dated the 25th July, 2018;
34. S.O. 3977 (E), dated the 14th August, 2018;
35. S.O. 5733 (E), dated the 14th November, 2018;
36. S.O. 5736 (E), dated the 15th November, 2018;
37. S.O. 5845(E), dated the 26th November, 2018;
38. S.O. 345(E), dated the 17th January, 2019;
39. S.O. 1960(E), dated the 13th June, 2019;
40. S.O. 236(E), dated the 16th January, 2020;
41. S.O. 751(E), dated the 17th February, 2020; and
42. S.O. 1223(E), dated the 27th March, 2020.

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GOVERNMENT OF INDIA
MINISTRY OF MINES

Sand Mining Framework



March 2018

नरेन्द्र सिंह तोमर
NARENDRA SINGH TOMAR

ग्रामीण विकास,
पंचायती राज और खान मंत्री
भारत सरकार
कृषि भवन, नई दिल्ली
MINISTER OF RURAL DEVELOPMENT,
PANCHAYATI RAJ AND MINES
GOVERNMENT OF INDIA
KRISHI BHAWAN, NEW DELHI



FOREWORD

Transparency, sustainability, equity and growth have been the cornerstones of the policies and procedures governing the industrial and other development activities of this Government. The Ministry of Mines have taken several policy initiatives to make available natural resources in transparent manner and their exploitation sustainable & economical using technological interventions. A paradigm shift occurred by way of a major step taken by the Ministry of Mines in bringing in the MMDR Amendment Act 2015 which brought in the Auction process for allocation of minerals. While clearly laying down the framework for Major minerals and some provisions for the minor minerals, the devolution of authority to the States for minor minerals is of substantial nature. Sand is a minor mineral.

Sand is an essential component for housing, infrastructure & construction activities. There have been various issues across the country in the mining activities related to sand i.e. environmental degradation, non-availability of sand, high sand prices, illegalities in sand mining, etc. To address these issues, a Committee chaired by the Union Secretary, Ministry of Mines comprising of officials of State Governments has been constituted to study the existing system of sand mining in various states and to submit a report.

Intensive consultations have been carried out with the State Government officials and other stakeholders. A sand mining framework has been prepared. This will help the States to frame their policies taking into consideration their objectives, endowments and state deployment of resources. A commendable work; I hope this report shall provide the framework to address the challenges which States face in addressing this important economic activity in their jurisdiction.

15/3/18

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हरिभाई परथीभाई चौधरी
HARIBHAI PARATHIBHAI CHAUDHARY

1739

खान एवम् कोयला राज्य मंत्री
भारत सरकार
नई दिल्ली-110011

Minister of State for Mines and Coal
Government of India
New Delhi-110011



Foreword

Sand is an essential mineral and is used along with cement primarily in construction and its demand is continuously increasing with increasing infrastructure development of the country. As per estimate, the demand of sand is increasing at the rate of 6-7%. Production and supply of sand is not uniform and its availability depends upon rain and replenishment rate of sand in rivers. Due to uncertainties in supply, the price of the material varies significantly with shortages tempting its illegal mining. Its supply from other sources is very scanty in India.

The issue of unregulated extraction has been a matter of concern for environmental sustainability. There have been various judicial interventions by the Hon'ble Supreme Court (SC) and National Green Tribunal (NGT) in regard to environment protection. To address these issues, a committee was formed under the chairmanship of Secretary (Mines), including officials from various State Governments to study the existing system of sand mining in various states and prepare a uniform set of framework that can be followed by states as per their suitability and applicability.

Based on this extensive exercise and deliberations of the committee, a Framework Document has been developed for assisting the States to arrive at an appropriate policy and administrative system for addressing the needs of this sector. The framework charts out suggestions for various elements of the process chains starting from objectives of the states, demand-supply situation, operations, monitoring, transportation, sales of sand etc.

We would look forward to expeditious and synchronised implementation of the suggested initiatives by various State Governments as per their local needs. This should greatly help in resolving the pertinent issues and to help in the growth of the infrastructure and construction sector.

Hari bhai chaudhary

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सचिव

ARUN KUMAR, I.A.S.
Secretary

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खान मंत्रालय
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20th March, 2018



Preface

Sand is classified as a "minor mineral", as defined under MMDR Act, 1957. The legal and administrative control over minor minerals is devolved to the State Governments. The natural endowment of sand across many states is unable to meet the demand, coupled with the ease of extraction issues of environmental degradation, pricing and illegalities in sand mining have arisen. In consultation with the States, a committee was formed under the chairmanship of Secretary, Ministry of Mines, Government of India on 18.05.2017, for Sand mining.

2. Given the varying objectives of the States, their endowments, administrative structures, market dynamics, our approach was to provide a framework to assist states in arriving at the best possible options before them. States need to manage sand supplies keeping the environmental imperatives in mind. The framework in the report addresses the issues of State objectives, Demand- Supply assessment, measures to sand availablity, allocation models, transportation and monitoring mechanism, suggestions for faster clearances/approvals and using IT interventions in the complete process chain of sand mining. This framework also lays emphasis on the alternatives of sand i.e; Manufactured sand, sand from mined overburden, and import of sand, for reducing our dependency on river sand. Best practices across States have been documented as a pointer for adoption, or further study which the States may need. I hope the States find this report useful.

3. I would also like to express my gratitude to the Committee members, our teams of officers and various stakeholders who gave their valuable time and support, which has made this report possible.

(ARUN KUMAR)

Acknowledgement

The *Sand Mining Framework* has been prepared after extensive study of systems in consultation with Mining Departments of the States and other stakeholders over a period of the last ten months. Detailed analysis of various policy and procedures of the states was done and best practices identified in the study. The framework assimilates the knowledge and experience of stakeholders, miners, technical institutions, and consumers. Framework suggestions are based on the objectives of sustainability, availability, affordability and transparency in sand mining, and to improve the effectiveness of monitoring of mining and also the transportation of mined out material. The policies and practices recommended in the framework may be adopted by the states with suitable customisations.

At the outset, I would like to extend my sincere gratitude to the Secretary, Ministry of Mines, Shri Arun Kumar for his constant guidance as the Chair of the committee. From laying down the contours of the study across different aspects, to the analysis and recommendations, his guidance was fundamental to the evolution of this comprehensive framework.

The task of the Committee has been quite onerous, and in discharging it every member contributed substantively in shaping this report. The contributions of all Committee members for this intense endeavour are gratefully acknowledged.

I would like to place it on record that the Sustainable Sand Mining Guidelines, 2016 of the MoEFCC and their circulars from time to time, give valuable documents and have been kept in the mind while preparing the framework. The co-operation and suggestions extended by the MoEFCC were of immense value, needless to state, environment concerns need to be carefully addressed while undertaking mining.

The support extended by the State Governments and the concerned institutions by providing the required data, inputs and insights is duly acknowledged. The Department of the State Governments and the Institutions that I would specifically like to mention are as follows-

1. Department of Mines & Geology, Andhra Pradesh
2. Directorate of Geology & Mining and Department of Environment and Forest, Assam
3. Directorate of Geology & Mining, Chhattisgarh
4. Commissioner of Geology & Mining, Gujarat
5. Mines and Geology Department, Haryana
6. Department of Mines & Geology, Karnataka
7. Directorate of Geology and Mining, Madhya Pradesh
8. Revenue and Forest Department, Maharashtra
9. Mining Department, Punjab
10. Department of Mines & Geology, Rajasthan
11. Department of Geology & Mining, Tamil Nadu
12. Department of Mines & Geology, Telangana
13. Directorate of Geology & Mining, Uttar Pradesh
14. Geology and Mining, Uttrakhand
15. Cement Manufacturing Association
16. National Council for Cement and Building materials (NCCBM)

I express my sincere gratitude to the team of officials from Indian Bureau of Mines (IBM) & Ministry of Mines, and consultants of WAPCOS, who have conducted the field visits and assisted in preparation of the report which comprises the following:

1. Ms Kirti, Assistant Director, Ministry of Mines
2. Shri Abhay Agrawal, Regional Controller of Mines, IBM
3. Shri Pushpendra Gaur, Deputy Controller of Mines, IBM
4. Shri Satnam Singh, Consultant
5. Shri Manish Singla, Consultant
6. Shri Arvind Kumar Gahlot, Consultant
7. Shri Yash Raj Singh, Consultant

In essence, this report is the result of enormous efforts put in by the Chairman, Members, Consultants and the intellectual inputs drawn from a large number of experts and stakeholders. I gratefully appreciate and acknowledge all these inputs and support, without which this report would not have been possible.

New Delhi

(Prithul Kumar)
Member Secretary
Director, Ministry of Mines

Abbreviations

Acronym	Full Form
AP	Andhra Pradesh
ADMG	Assistant Director, Mines and Geology
CAGR	Compounded Annual Growth Rate
CCTV	Close Circuit Television
C&F Agent	Carry and Forwarding Agent
CFE	Consent for Establishment
CFO	Consent for Operation
CG	Chhattisgarh
CGST	Central Goods and Services Tax
CGM	Commissioner of Geology & Mines
CTO	Consent to Operate
DEAC	District Environment Appraisal Committee
DEIAA	District Environment Impact Assessment Authority
DFO	District Forest Officer
DGM	Department of Geology & Mining
DLSC	District Level Sand Committee
DMG	Department of Mines and Geology
DSR	District Survey Report
EC	Environment Clearance
EIA	Environment Impact Assessment

EMD	Earnest Money Deposit
EMP	Environment Management Plan
FY	Financial Year
GJ	Gujarat
GO	Government Orders
GPS	Global Positioning System
GR	Geological Report
GST	Goods and Services Tax
GVA	Gross Value Added
GWSDA	Ground Water Survey and Development Agency
Ha.	Hectare
HC	High Court
HR	Haryana
I&C	Industries and Commerce
IBA	Indian Banks' Association
IBM	Indian Bureau of Mines
ISO	International Organization for Standardization
IT	Information Technology
JIR	Joint Inspection Report
KTK	Karnataka
MCR	Mineral Concession Rules
MH	Maharashtra
ML	Mining Lease

MMDR	Mines and Mineral (Development and Regulation) Act, 1957
MMT	Million Metric Tonnes
MMTPA	Million Metric Tonnes Per Annum
MoEFCC	Ministry of Environment, Forest and Climate Change
MoM	Ministry of Mines
MP	Mining Plan
MP	Madhya Pradesh
MPSMC	Madhya Pradesh State Mining Corporation
M-sand	Manufactured Sand
MSS	Mining Surveillance System
NA	Information Not Available
NAC	National Academy of Construction
NCCBM	National Council for Cement & Building Materials
NGT	National Green Tribunal
NIT	Notice Inviting Tender
OB	Overburden
PB	Punjab
PCB	Pollution Control Board
PWD	Public Works Department
QL	Quarrying Lease
QP	Quarrying Permit
RBI	Reserve Bank of India
RJ	Rajasthan

RLO	Reach Level Officer
RQP	Recognised Qualified Person
RTG	Real Time Governance
SC	Hon'ble Supreme Court
SEAC	State Environment Assessment Committee
SEIAA	State Environment Impact Assessment Authority
SGST	State Goods and Services Tax
SHG	Self Help Group
SMC	State Mining Corporation
TP	Transport Permit/ Temporary Permit
TSMDC	Telangana State Mining Development Corporation
TSP	Technical Staff Person
TN	Tamil Nadu
USGS	United States Geological Survey
UK	Uttarakhand
UP	Uttar Pradesh
VAT	Value Added Tax
WALTA	Andhra Pradesh's Water Land and Tree Act, 2002
WCL	Western Coalfields Limited

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1. Executive Summary

1.1 Background & Approach

1.1.1 Sand is classified as a “minor mineral”, minor mineral means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central Government may, by notification in the Official Gazette, declare to be a minor mineral; as defined under Section 3(e) of The Mines and Minerals (Development and Regulations) Act, 1957 (MMDR Act). Under the MMDR Act, the legal and administrative control over minor minerals vests with the State Governments, who have the powers to make rules to govern minor minerals. Accordingly, different State Governments have made different rules for awarding, regulating and administering the sand concessions granted under those rules.

1.1.2 At a macro level, there is shortage of sand and this is the situation in many developed/ developing countries. As per a rough estimate, the demand of sand in the country is around 700 million tonnes in FY17 and it is increasing at the rate of 6-7% annually. The quantity of natural generation of sand is static. Moreover, production of sand is not uniform across seasons with a shortage faced in many jurisdictions. Due to uncertainties and inadequateness in supply, the selling rate of the material varies significantly leading to black marketing and illegal mining of the mineral. Illegal and uncontrolled extraction of sand has adverse environmental impact. Consequently, there have been various judicial interventions by the Hon’ble Supreme Court (SC) and National Green Tribunal (NGT). The Ministry of Environment, Forest and Climate Change (MoEFCC) has released “Sustainable Sand Mining Management Guidelines 2016” to promote scientific mining of sand and encourage environmental friendly management practices.

1.1.3 Issues of illegal mining, environmental damage, high sand prices and quality of sand that are interlinked with each other are prevalent across many States. A committee chaired by the Union Secretary, Ministry of Mines comprising of officials of State Governments was constituted vide order dated 18th May 2017 to look into the various issues relating to sand mining and to prepare framework that can be adopted by States while undertaking sand mining. A group with Indian Bureau of Mines (IBM) officials along with the consultants was constituted who were asked to visit various States to understand the ground situation, interact with States/district authorities, lessees and consumers. Feedback from public at large was also solicited by publication of a draft report.

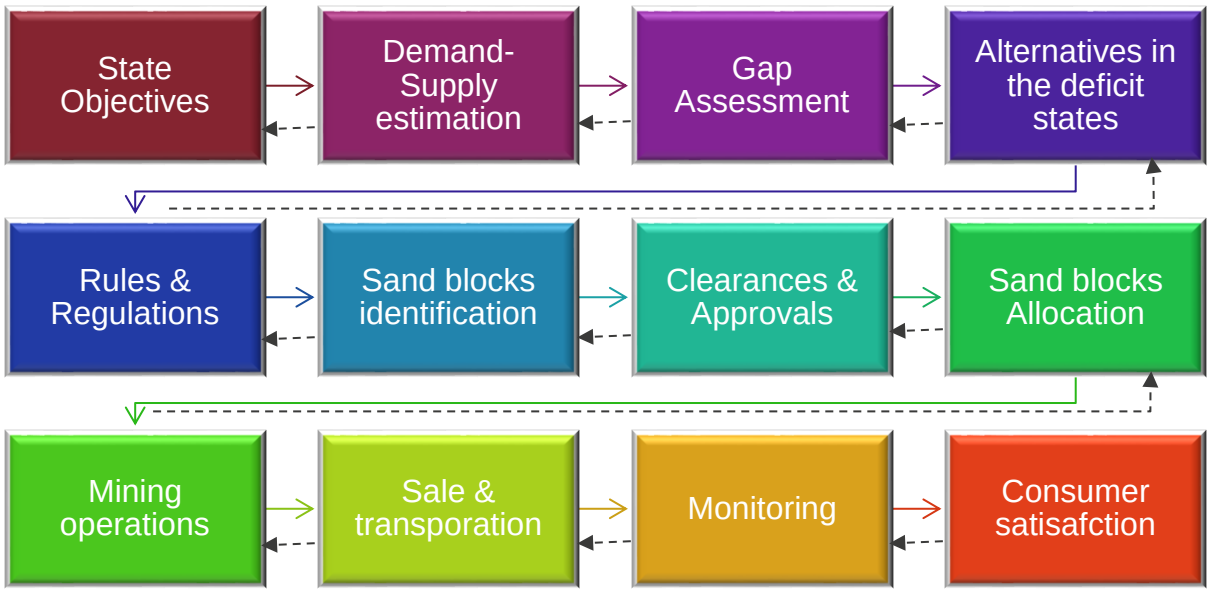
1.1.4 States face different geological endowments, demand & supply scenario and have different objectives of their sand policies. The group visited 14 States and experience was gathered by the visits of the group to the field to document existing/ best practices, as well as to analyze and evaluate the field situation. States which were visited by the group are Assam, Andhra Pradesh, Chhattisgarh, Haryana, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan,

Tamil Nadu, Telangana, Uttar Pradesh and Uttarakhand. Relevant data and documents were sought from all States/UTs. Based on this exercise and deliberations of the committee, a framework has been developed to assist the States to study this report and arrive at an appropriate policy and administrative system to best address their State specific needs.

1.2 Framework across the process chain

The policies and the processes governing sand mining in States have been studied across different elements in the process chain. Once the State's objectives are set, the process needs to be designed as per the paradigm below. However, a reverse flow of information, analysis and feedback is also essential for setting/ modifying State objectives.

Figure 1- 1 Key elements in the process chain of sand mining



1.2.1 State objectives

1.2.1.1 The policies of the State, rules and regulations thereof, shall be dependent upon the objectives, demand-supply assessment and alternatives available for natural sand. Objectives of the State drive the policy formulation for sand mining. States define their own objectives for the sand policy depending upon factors such as demand supply situation in the State, resources available in terms of manpower and related infrastructure and revenue targets of the State. Based on analysis of the policies of the States, it can be interpreted that while some States aim to maximize revenues from sand resources e.g. Haryana, Gujarat, Karnataka, Punjab, Uttar Pradesh, Uttarakhand, Assam, Maharashtra and Rajasthan, others aim to keep the sand prices controlled for the public and they are ready to forego potential revenue from sand e.g. Andhra

Pradesh, Madhya Pradesh, Chhattisgarh and Tamil Nadu. There are few States that are earning reasonable amount of revenues from sand and at the same time keeping the pricing controlled for the public e.g. Telangana.

1.2.2 Demand – Supply estimation

1.2.2.1 Demand Assessment

Different States follow different methodologies for sand demand estimation. From the 14 States analyzed for this study, only few States such as Haryana, Gujarat, Karnataka, Punjab, Rajasthan, Tamil Nadu, Telangana and Uttar Pradesh have carried out demand assessment. However, even where States estimate demand, the methodology adopted does not appear to be robust and estimates vary except in case of four States. Also there are huge variations in estimations undertaken by majority of these States, as compared to estimation using scientific methods.

1.2.2.2 Demand estimation methodologies

Scientific demand-supply assessment and the resultant gap can help the State Government to frame policy for allocation of sand reaches and to adopt business models along with framing policy for alternatives of sand. Further, the following two methods are suggested for estimation of sand demand:

1.2.2.3 RBI Index based methodology

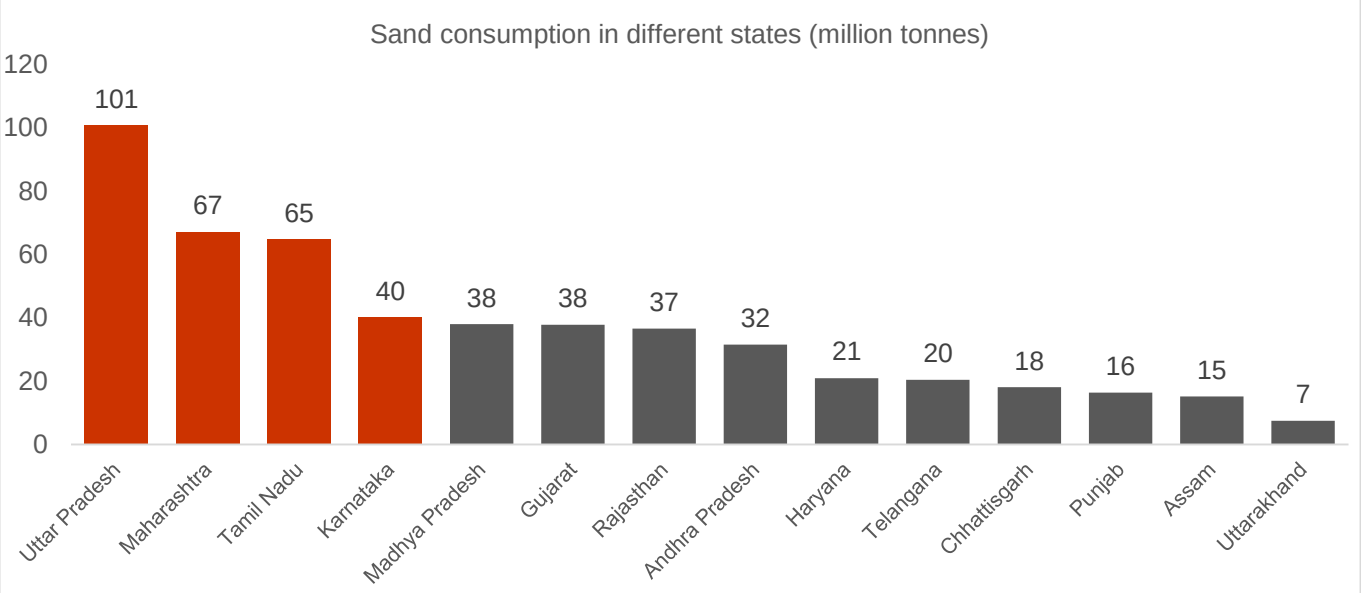
The State-wise demand of sand in India for FY17 has been estimated based on the following factors:

- India's construction GVA [RBI's Handbook of Statistics on Indian Economy]
- India's State-wise construction GVA [RBI's Handbook of Statistics on Indian Economy]
- Conversion factor- Normative cement to sand mixture ratio of 1:2.5

In this method, based on the data released by RBI *(Handbook of Statistics on Indian Economy)*, ratio of construction GVA of State with construction GVA of India is calculated. Further, that number is multiplied by the cement sales in India. Once cement consumption of the State is known, the same is multiplied by the factor of 2.5 to derive the sand consumption. Further, normalization has been done based on the population of the States.

Based on the above methodology, demand of each State has been calculated which may be seen in the table below:

Figure 1- 2 Estimation of State-wise sand consumption in FY17



Source: RBI, Analysis

Further to refine the estimate, another methodology can be adopted which has been described below, for which data needs to be collected by the States. This method can be used for calculating district wise demand as well.

1.2.2.4 Cement consumption based methodology

In this method, the demand of sand in a State or district is based on cement consumption in that State/ district multiplied by a conversion factor in terms of assuming a normative cement to sand consumption ratio. Following inputs are required for estimation.

Inputs:

1. Cement consumption in the State/ district
2. Conversion factor - cement to sand consumption ratio

Cement consumption in the State can be obtained from cement sales considering any of the following sources:

1. Sales data from sales tax officials/ GST officials (State Revenue department/ Tax Department)
2. Cement companies for the sales data of the districts and the State
3. Sales data from cement dealers present in the State

Conversion factor has been considered, as 2.5, as explained in detail in the previous methodology using RBI data. Based on this, a district-wise demand of sand can be derived. This is another suitable, and indirect method for demand estimation of sand.

E.g.: Cement consumed in a State is 10 million tonnes, which is based on cement sales by the companies, and hence the sand consumption shall be 25 million tonnes multiplying cement by the conversion factor of 2.5.

1.2.2.5 Supply Assessment

Data related to supply of sand is being maintained by all the States surveyed as part of this study. Some of the States consolidate the data captured by the district officers based on returns filed by the lessees, while some States use IT tools to capture the supply data. Then, there are other States that calculate based on the royalty collected. Also few States estimate the resources available in the district/ State based on their already prepared District Survey Reports (DSRs).

1.2.2.6 Supply estimation methodology

Estimation of accurate supply in the State is necessary for better planning by the State. States need to develop process flow for data collection from different sources of sand supply using IT tools e.g. every sand lessee in the State shall upload online return every month in the portal which needs to be developed by the State Government. This will enable States to analyse the production trend in the State, lease-wise, month-wise, district-wise, etc. Further, for estimation of resources available in the State and production potential for each year, DSR data of districts need to be consolidated.

1.2.3 Alternate options for natural sand

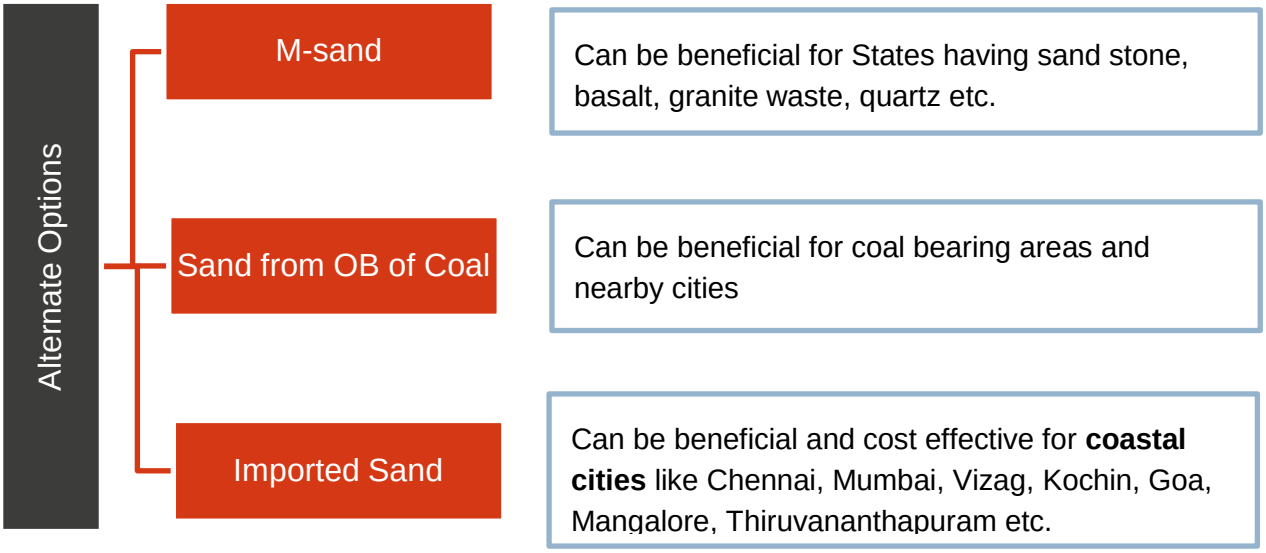
After estimation of gap derived from demand supply assessment, States need to analyse the alternate options for sand, available with them. Considering the large deficits in demand and supply of sand, alternate options need to be promoted, as:

- ✓ Alternate options can cater to the needs of monsoon season/ peak season
- ✓ Alternate supply option will reduce dependence & demand on river sand
- ✓ Supply of alternatives may reduce prices of river sand
- ✓ Supply of alternatives may lead to conservation of natural resources.

The following three alternatives are proposed:

- ➢ M-sand
- ➢ Sand segregation from overburden of coal mines
- ➢ Import of sand

Figure 1- 3 Alternate options for river sand



1.2.3.1 M-Sand

1.2.3.2 Characteristics

Manufactured Sand (M-sand) is the most common alternate of river sand, which has already gained prominence in some of the southern States. It is produced by crushing of rocks, quarry stones to a stipulate size of 150 microns. To arrive at the required grain size, existing coarser hard rock deposits are crushed in a series of crushers and the crushed material is segregated in different fractions as suited to various construction activities. The sand obtained through this process is further refined by removing fine particles and impurities through sieving and washing. As per IS-383, the chemical characteristics and strength are similar to the river sand, and same type of applications can be served using M-sand. The bulk density and specific gravity of both are comparable as well as the chemical characteristics and strength of M-sand are similar to that of river sand as per IS-383. M-sand has a silt content of around 0.2% and water absorption of 1.6%, as compared to 0.45% and 1.15% respectively, in river sand. **M-sand concrete has a marginally higher bond strength, and mortar made of M-sand shows higher compressive strength and modulus for masonry, over those of river sand.**

1.2.3.3 Feasibility Analysis

To prove technical aspects of M-sand, tests were carried out on M-sand by competent agencies for its durability, water permeability, and shrinkage. All the test results concluded with superior positioning of M-sand over river sand. The Rapid Chloride Permeability Test (RCPT) conducted to test the durability of M-sand mixes indicate the RCPT values for concrete with M-sand are less than 1000 coulombs, which indicate a very low chloride permeability and good quality dense concrete. Similarly, water permeability and drying shrinkage tests were conducted for M25 and M40 grades of M-sand. The former test indicated very good dense structure of concrete, and the

latter indicated that shrinkage are within values estimated from Drying Shrinkage estimation curve. **M-sand is economically feasible, cheaper and is superior as compared to river sand in many of the urban centers in India e.g. Bangalore**.

1.2.3.4 Current Status of M-sand in India

Due to the deficit of natural sand supply, Karnataka has intensified the efforts for production of M-sand. The State has 164 M-sand manufacturing units and produces 20 million tonnes of M-sand per annum. Karnataka has separate section for M-sand in the State Minor Mineral Concession Rules and has widely promoted it resulting in wide-spread adoption of M-sand in the State. Apart from Karnataka, the other States working in the direction to promote M-sand are Andhra Pradesh, Gujarat, Tamil Nadu and Telangana. Andhra Pradesh and Telangana also have separate policy for M-sand. Andhra Pradesh and Telangana offer multiple incentives through their G.O.s for setting up M-sand production units. The total M-sand production in Karnataka, Telangana, Tamil Nadu, Andhra Pradesh and Gujarat is 20 MMT, 7.2 MMT, 3.24 MMT, <1 MMT and <1 MMT respectively.

It is suggested that there is a need to promote M-sand units on pan-India basis and to create awareness for M-sand usage given the overall environmental and illegal mining concerns associated with river sand mining. Further, reductions in cost of M-sand will make it a more attractive alternative. M-sand can be promoted by States by having separate policies for M-sand units similar to policies and incentives given by Telangana, Andhra Pradesh and Karnataka.

1.2.4 Sand from Overburden of coal mines

1.2.4.1 Characteristics

The overburden spread over in situ coal seam needs to be removed for extraction of coal to an external dump till sufficient space is created for internal back filling by acquisition of land nearby coal bearing area. Further, this overburden dump needs to be re-handled at the time of closure of mine for land reclamation. As per mine closure plan, 80% of the extracted overburden is used for backfilling the excavated area and remaining 20% overburden can be used for producing sand.

1.2.4.2 Feasibility

Studies conducted by the Central Institute of Mine and Fuel Research show that processing of overburden yield 60 to 65% sand, 30 to 35% clay and 5% pebbles. The theoretical tradeoff between sand recovery and its quality should be quantified through laboratory tests. Western Coalfields Limited (WCL) has already taken the initiative to segregate sand from the overburden. WCL has proposed to set up a sand segregation plant of 200 cubic metre per day capacity near Nagpur. WCL has committed to supply sand at one fourth of the market price to NIT Nagpur,

which has entered a memorandum of understanding to supply sand for the low cost housing projects under Pradhan Mantri Awas Yojna (PMAY).

This option is implementable in all coal bearing States, namely, Jharkhand, Bihar, Madhya Pradesh, Chhattisgarh, Andhra Pradesh, Maharashtra, Gujarat, etc. Further the option is scalable as well with proposal of WCL to set up a sand segregation plant of 200 cubic metre per day capacity near Nagpur.

Based on our assessment, the current annual demand of sand in Maharashtra and Gujarat is 100 million tonnes, and WCL alone can provide 45.36 million tonnes of sand per annum (specific gravity of 1.89) which is 45% of the total annual sand demand. Considering the fact that Maharashtra is a sand deficit State and consequently the price of sand in the State is extremely high, the option can be beneficial for the State.

Further, if all the seven subsidiaries of Coal India Limited are instructed by the Government to process and segregate sand from the overburden left out, around 150 million cubic metres (283 million tonnes) of sand can be processed, which is around 35% of the total sand consumed in the country at present. Besides meeting the requirement of sand, this would also ensure that a productive use of otherwise waste material is done.

1.2.5 Import of sand for coastal cities

Another way to meet the demand could be to import sand. Some of the south-east Asian countries e.g. Malaysia/ Indonesia have ample sand available in their country, which if not removed could lead to floods. The sand could be sourced from these countries and imported to Indian ports to meet the deficit. However, it needs to be considered that while importing sand from other countries, sand should qualify for IS 383 quality standard as well as be free from any phyto-sanitary issues. To ensure this, the imported sand should have quality checks at the following two points.

a. In the country from where sand is sourced.
b. At the port where the sand comes.

Karnataka has already formed rules to allow sale of imported sand in the State and have already started the imports. Tamil Nadu is preparing to import sand. Kerala also has permitted imports of sand from Malaysia and the imported sand is sold in loose at the port at a price of Rs. 2300 per tonne. Imported sand, however, tends to be costly and is therefore suitable only for high deficit areas.

1.2.6 Gap Assessment

Based on analysis of demand supply situation in the State, a gap assessment should be done and accordingly policy and rules/regulations need to be framed. Based on the gap assessment, a State can be classified as follows:

a. Sand surplus State
b. Sand sufficient State
c. Sand deficit State

Sand sufficient States shall soon turn into deficit states as the natural availability of sand shall not increase. These States need to plan activities for future years to enable sufficient supply either through natural sand or alternatives.

1.2.7 Rules & Regulations

Rules and regulations and policies related to sand form a very important part of the process chain of sand mining. In some States, there are separate policies and rules specifically for sand or M-sand e.g. Andhra Pradesh, Chhattisgarh, Karnataka, Madhya Pradesh, Maharashtra, Telangana, Uttarakhand. Further, Andhra Pradesh, Telangana and Karnataka has separate M-sand policy or rules.

1.2.7.1 Administrative control of sand mining

Handling of sand related activities in most of the States surveyed is taken care of by the mining department except in Assam and Maharashtra. The advantage of having the control with the mining department is that the staff in the technical department are well versed with mining and consequently there is no operational gap between the regulating body and those taking care of operations.

1.2.7.2 Separate Policy

Despite being a minor mineral, the processes involved in sand mining are very different from those in other minor minerals. Also sand is different from other minor minerals in its direct usage by the general public. A separate policy for sand mining is extremely crucial considering the volume of sand consumed every year and its socio-economic significance. States that have separate Sand Mining Policy and Rules are better able to manage this sector. It is suggested to the State to have separate Sand Mining Policy. It is further suggested that only the State Mining Department should be entrusted for regulating sand mining in the State.

1.2.7.3 Area and timelines

States need to define the area limits for the grant of concession in their rules and policies. Mining methods shall be as per the approved environment clearance/ Mining Plan and as per notifications

of the MoEFCC. Also, the minimum area can be fixed at 5 Ha for better supply and better control from State Government's point of view. Sand deficit States offering large areas may result in delays in the process of obtaining clearances and approvals and hence may offer smaller areas as per limits of DEIAA and SEIAA.

Table 1 Suggested threshold area for sand mining in a State*

S. No.	Parameter	Minimum area	Time period of allotment
1	For Individual	5 Ha.	5-10 Years
2	For Co-operative society	5 Ha.	5-10 Years

**In case a State Government needs to allot smaller or larger areas, the State is free to do so as per their minor mineral concession rules.*

1.2.8 Identification of Resources

1.2.8.1 Classification of the rivers

Before identification, States need to classify the rivers based on the stream orders i.e. stream orders I, II, III, IV and above. Stream order is a measure of the relative size of streams. The smallest tributaries are referred to as first-order streams. When two first order streams come together, they form a second order stream and with each successive downstream junction, stream order increases. Telangana and Andhra Pradesh do the classification of the rivers based on the streams viz. I, II, III, IV etc. order streams. Other States are also suggested to follow the below process for classification of different streams and sand extraction:

1.2.8.2 I, II and III order streams

If the order of the stream is I, II and III, sand may be allowed to be extracted by manual means for local use in villages or towns bordering the streams for bonafide purposes other than commercial operations/public trading/stocking etc. States need to frame the operational rules or guidelines for stream I to III. The State Government may notify over exploited areas in terms of ground water micro basins from where no sand can be extracted even for local use. The extracted sand can be transported only through a bullock cart or a tractor within the jurisdiction, and the block/ district shall be treated as a unit for movement of sand within the jurisdiction. For IV and V order rivers, mechanized means of extraction is appropriate, though one is aware that there is certain lack of clarity on mechanized mining.

1.2.8.3 Identification of river sand sites/ blocks

For order IV and above streams, identification deals with the preparatory work before a sand block is allocated or bid out for mining. The department should estimate the gap in demand-supply of

districts and hence come out with the requirement of further allotment. Based on the requirement, the process of identification of sand reaches may be taken up by the relevant department responsible for sand mining in the State.

Figure 1- 4 Process to be followed for identification of sand bearing areas



1.2.8.4 Gap assessment based on demand estimation and supply (from District Survey Report)

The District Survey Report (DSR) shall be prepared by the State Government as per the MoEFCC's Sustainable Sand Mining Management Guidelines 2016. As per the guidelines, States need to undertake the replenishment study, which shall provide the following outputs:

- Annual deposition rates of sand from a river
- Deposition stretch of the rivers
- Total Resources available in the State for sand

The above outputs shall help in estimating the annual quantity of sand available in a particular district, for which the States need to complete the replenishment study.

While the need for undertaking the replenishment study is well understood, such assessments are presently not being undertaken in a comprehensive manner at the State level. It is envisaged that there is a need to inter-alia build capacity at the State level that trains the relevant staff in undertaking replenishment studies. As a short term measure, States need to identify colleges/ institutions with expertise related to Geology/ Environment/ Hydrology, and these colleges/ institutions could be handed over the responsibility of capacity building for replenishment study as well as conducting the first few rounds of replenishment studies.

1.2.8.5 Joint Inspection Report

A Joint Inspection Report (JIR) should be prepared by the following departments/concerned officials:

- District Collector (Chairperson)
- Revenue department

- Public Works department
- Water Resources department
- Mines and Geology department
- Geologist
- Environment & Forest department
- any other relevant department, as per State's requirement

The purpose of JIR is to provide a comprehensive assessment of the sand available in each identified block and overall provide a go-no go decision. The JIR team responsible for identification should fill the format containing the various parameters of sand mining as prescribed in the State's rules and MoEFCC guidelines. During the identification stage itself, the details should be noted down and based on those details and other considerations that the States may be facing, it should be decided whether the block should be allocated for mining or not. Further, once the decision is taken, the entire format along with considerations based on which the decision has been taken should be uploaded on the departmental website which shall be available for public view. The responsible officers should submit the joint inspection report with clear recommendations to the concerned authority in charge of sand mining in the State.

1.2.8.6 Technical Report/ Geological Report

A detailed technical report/ geological report containing details of the area, DGPS survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status (if any), geological mapping, laboratory studies of the samples etc. of each sand block should be prepared by the Assistant Geologist/ Geologist, before putting it for auctions/ allotment. The potential areas of the quarry lease should be identified and demarcated using DGPS, topographic and geological maps prepared using Total Station. The area thus identified should be physically demarcated preferably by erecting boundary pillars.

1.2.9 Allocation or Business Model followed for allocation

1.2.9.1 Current business models followed by States

The business model followed by a State depends primarily on the objective of the State Government and the prevalent conditions in sand mining in the State. Essentially there are two types of business models being followed by the States:

1. Notified or controlled pricing model
2. Market model

The most common method of allocation followed across the country is the market model where private contractors are allocated sand mines through competitive bidding while a few States follow

notified or controlled pricing model where sand mines are allocated to State agencies on nomination basis.

1.2.9.2 Notified or controlled pricing model

In this model, the State Governments allocate their sand blocks to State mining corporations or SHGs or Panchayats on nomination basis. Clearances and approvals are procured by the State/PSUs only and mining operations are handled either directly by the Government agency or by the raising contractors that are hired by the Govt./Govt. agency. Further, the sale of sand is undertaken by the State Government or the State Government agency and revenue is accrued accordingly. Sale prices are notified by the Government under this model. State has to deploy resources to manage the systems and constant efforts are required to manage the operations. The States following this model has been shown in Figure 1-5.

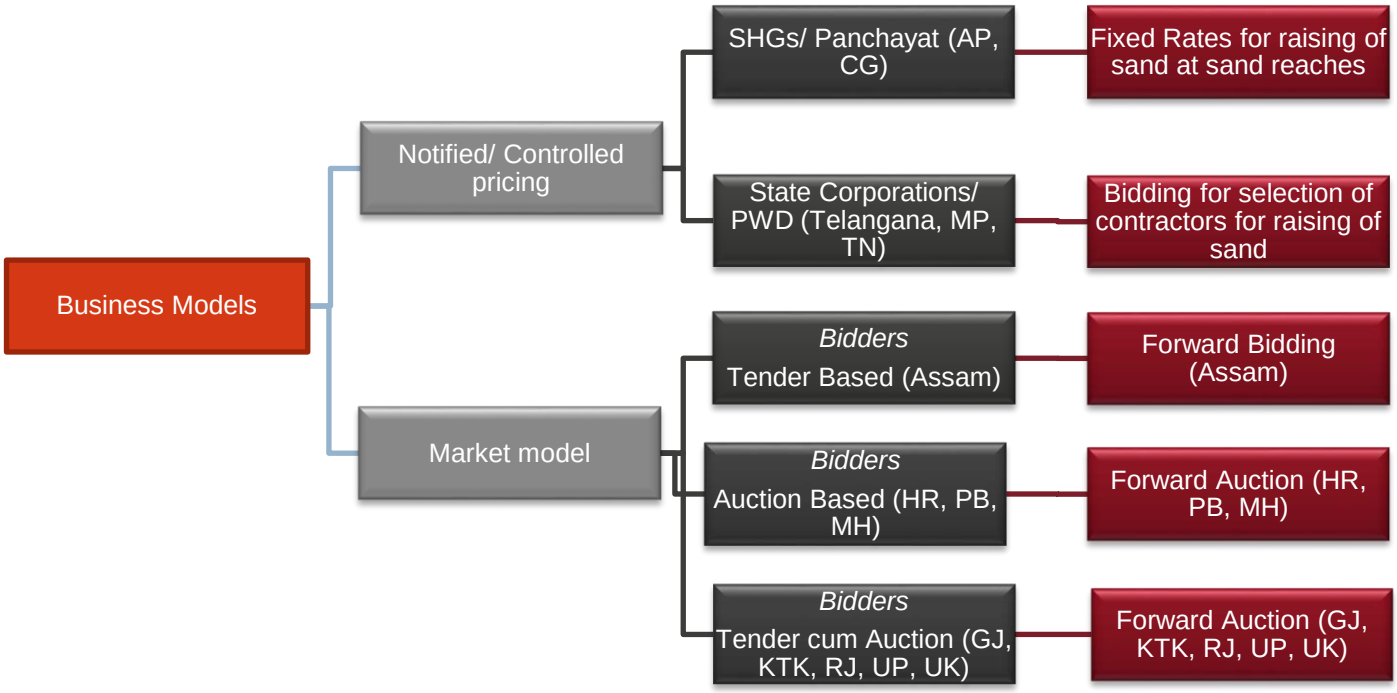
1.2.9.3 Market model

In market model, allocation is undertaken using one of the following methods:

a) Tender
b) Auction
c) Tender cum auction mode

i. In tender, the price or premium against the bidding parameter is quoted by the bidders and the highest bidder gets the mineral concession. In this model, the State earns a fixed amount quoted by the bidder.
ii. In auction, the bidder is aware of the ongoing or highest price or premium quoted by the other bidders and can continuously revise its bid till conclusion of the auction process. The bidder quoting the highest bid wins the sand block. The realization to the State in this model is high, as the State retains the royalty as well as the auction premium. However, the model also leads to increase in prices for the end consumers, as the State Government doesn't have any control on the prices at which the successful bidder sells the sand.
iii. The tender cum auction is a two stage process similar to the one followed in the case of major minerals auctions, where in the first stage, along with the technical bid an initial price offer is also submitted. Subsequently, only a selected number of bidders (50% of the technically qualified bidders or as per the notification inviting tender) go to the auction stage. The method has similar benefits and downsides as in the case of simple auctions discussed above. This allocation method is followed in the States of Gujarat, Karnataka, Rajasthan, Uttar Pradesh and Uttarakhand. This system has been stipulated for major mineral block auction and have been adopted by the States for auctioning of sand blocks as well.

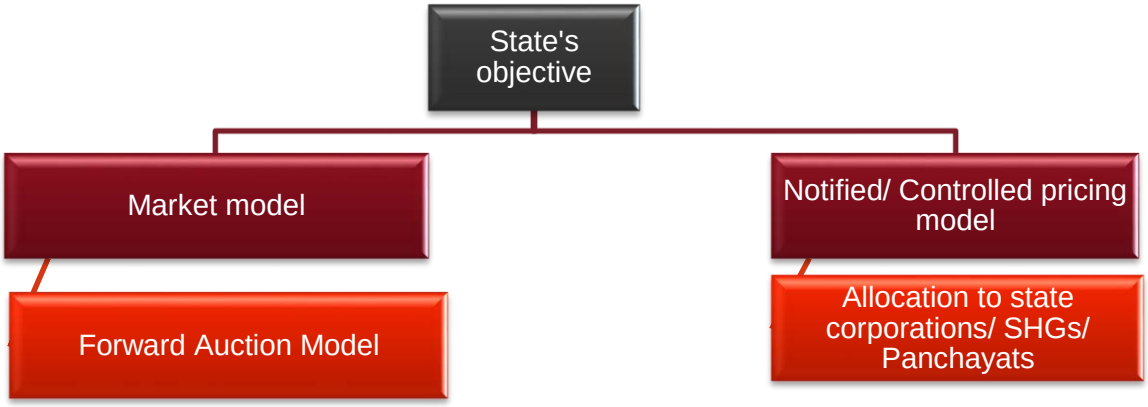
Figure 1- 5 Types of Business Models followed by the States



1.2.9.4 Suggested business models

It is suggested that the allocation model to be considered by a State should depend on the objectives of the State. If the State's objective is revenue maximization then it can follow the market model (simple forward auction), however if the State desires to keep the prices and operations under control, then it can follow the notified/ controlled price model.

Figure 1- 6 Suggested allocation model for sand mining



States are free to choose the model as per their demand-supply situation. In case of abundant supply, the auction model is best suitable.

1.2.9.5 Market Model adoption

States may adopt simple forward auction model, subject to technical and financial eligibility of the bidders. Bidding parameter can be any of the two a) revenue share or b) production linked payments. There should be a strict monitoring mechanism to compute the exact quantity of sand extracted and dispatched from the sand blocks.

1.2.9.6 Notified or controlled pricing model adoption

Sand blocks should be notified by the State only after getting the mining plan approved and obtaining the environment clearance. The blocks can be allocated to any relevant State corporation or co-operative societies of the village for the purpose of excavation and loading work with the main control being with the mining department/ State Corporation only. Prices and selling under this model remains with the State/ State nominated agencies. For this model also to be successful, strict monitoring of sand mining operations is required. Further, the State Government should also specify the rates of transportation, and keep the sand supplies sufficient so that the prices are not increased artificially by the transporters.

In this model if sand blocks are allotted to PSUs, there should be a robust disclosure mechanism devised by the department/ State Government for better monitoring and control over supply.

1.2.10 Clearances & approvals, Suggestions for MoEFCC

Clearances and approvals are procured by the State mining department/State Govt. Agency in Andhra Pradesh, Maharashtra and Telangana while in most of the other States it is left to the project proponents.

It is suggested that the responsibility seeking the clearances and approvals should be given to the lessee/contractors only and department should play the role of facilitator/ regulator only. A fixed time line should be attached for all the clearances required, and the responsible person should get it done within the specified timeline. Further, the applications for getting the clearances/ approvals should be online. In some States specifically where there are State departments/PSUs carrying out mining, obtaining clearances may continue as per the existing process.

1.2.10.1 Suggestions for faster clearances- Delegation of powers to DEIAA, SEIAA

As an administrative mechanism, projects for environment clearance are divided into sub-categories (B1, B2, A etc.) by MoEFCC based on the area of the lease. For minor minerals including sand and gravel, mining lease (in case of individual) for B2 categories (0-5 Ha.) the grant of EC will be done by the DEIAA headed by the District Magistrate or District Collector and for B2 (5-25 Ha.) and B1 (25-50 Ha.) (in case of individuals) categories the grant of EC will be done by SEIAA. Further the projects of A category (>=50Ha.) the EC is granted by MOEFCC. It is suggested to the MoEFCC that area limits for taking projects by committee e.g.

DEIAA/SEIAA/MoEFCC should be increased to double from the current i.e. 0-10Ha for DEIAA, 10-100 Ha for SEIAA and >=100 for MoEFCC. This will enable faster clearances for the mining projects. Further, considering the large number of projects related to all minerals, a single SEIAA is not sufficient to cater the current needs and MoEFCC may consider forming multiple **regional branches of SEIAA** in each State for faster clearances without impacting the protection of environment, as the guidelines are now available to guide the bodies/ authorities entrusted for grant of clearances. Criteria is suggested below:

- **Urban centers**: Urban centers having population of more than 10 Lakhs as per 2011 Census of India should be having one SEIAA regional branch to cater the needs of urban population and hence enabling faster clearances. E.g. Uttar Pradesh have large urban centers and only one SEIAA at State level may not be sufficient. Considering the same 5-6 SEIAA regional branches may be constituted in Uttar Pradesh based on the population of Urban Centers, which are major consumption centers and would have institutions and expertise to discharge the responsibilities of a branch of SEIAA.
- **Distance**: Few States where population concentration is low and distance between the capital where SEIAA headquarter is present are far away from the districts due to large distance. A regional branch of SEIAA may be proposed for easy access for these States. E.g. States like Arunachal Pradesh/ Rajasthan having large size and access to the capital city for many of the districts take multiple days to reach due to connectivity and economic issues. It is suggested that wherever the distance between the urban center and current SEIAA is more than 400 kms for plain areas and more than 250 kms for hilly States, a regional branch may be constituted in an appropriate place.

1.2.11 Operations

The control of operation in sand reaches depends on the model adopted for allocation of sand reaches. In competitive bidding model the control over operations is with the lessee/contractor who is the successful bidder. While in nomination model for allocation, the control of the operations depends on whether the nominated body excavates sand by itself or through a raising contractor.

It is suggested that irrespective of the allocation model and whoever has the control over operations, sand mining should take place only in accordance with the terms and conditions of the environmental clearance, conditions of the lease deed or license, and methods approved in the mining/ quarrying plan. Mechanized mining may be allowed in stream IV order and higher order rivers as per the approved environment clearance/ Mining Plan and as per notifications of the MoEFCC. MoEFCC guidelines should be reconsidered. Till then mining should be undertaken, as per the guidelines laid down in the *Sustainable Sand Mining Management Guidelines 2016* by the MoEFCC, and circular issued thereof.

1.2.12 Sales & Transportations

1.2.12.1 Sales

We propose two mechanisms for online sale of sand depending on whether there is a free market for sand in the State or the prices are regulated by the Government.

1.2.12.2 Under market model

In case of market model, all the lessees/ certified dealers in the State should register themselves on the online portal/ mobile app. For registering, lessee/ certified dealer will have to enter the details of its concession/ stockyard, location, quantity of sand expected on a weekly basis, as per the approved mining plan. Once registered, the online portal/ app will display the name of the reach/ stockyard and sand could be booked by the consumer from those leases/ stockyards and prices up to the delivery level. Further, the lessee/ certified dealer needs to regularly update the sand available in the reach/ stockyard, and they can decide the price at which they want to sell their sand. Anyone who wishes to purchase sand in the State will have the following options for buying:

1. Mobile app
2. Online portal
3. Customer care/ telephone call
4. Licensed traders

The consumer needs to register on the portal and login using his/her credentials (Aadhar card based only). After logging in, the portal will display the entire list of reaches/ stockyards along with the quantity of sand available in those reaches/ stockyards and the quality and price of sand. The consumer can filter/ sort the reaches/ stockyards based on such parameters as location, quality and price, and book from the lease/ stockyard he/she wishes to. The consumer should also have the option to purchase the sand by ordering at customer care. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

1.2.12.3 Controlled market prices

In case the prices are regulated by the State Government, the only difference from the previous model is that the price of sand at the river reach/ stockyard shall be uniform across the State/ district based on the quality and transportation lead. A consumer after logging in, may choose the reach/ stockyard from which he/she wishes to purchase the sand. The payment for booking the sand in both the cases should be made on the portal/ app so that proper accounting of the sale of sand can be maintained by the Government. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

1.2.12.4 Online Sale

Provision for online sale of sand should be made in case of municipality limits/cities/towns etc. as per definition of Urban Ministry/ Census. The States should try to adopt online ordering of sand in the next one year which may be extended further depending upon the State's infrastructure capabilities.

1.2.12.5 Offline Sale provisions

The exceptions for online sale need to be given to the consumption centers in villages/ smaller towns or low demand centers, for which States are free to decide based on either census (population density) or connectivity. These low demand centers should have the provision to be supplied by local licensed/registered traders/dealers through offline means who may in turn order sand online.

1.2.12.6 Transportation & Stockyards

Transportation is the last step in the process chain of sand mining, and it needs to be regulated to ensure supply of sand to consumers at reasonable prices. It is more important in States that are sand deficit and need to transport sand over long distances to reach the consumption hubs.

The supply of sand to consumers should be through stockyards that should be maintained by all individual leaseholders/ raising contractor/ State corporations etc. as the case may be. The stockyard should be established in the vicinity of the reach within a distance of 500 meters from the motor-able road/pucca road. In case of small size leases or cluster of leases, a single stockyard for a group of sand reaches may be established. The size of the stockyard should be such that it has the capacity to store the stock of 3 months of extraction from the reach, this would also help in maintaining supply during monsoon. The leaseholder/ raising contractor should be responsible for transportation of sand from excavation site/ reach to the stockyard through a limited number of GPS/ RFID enabled vehicles and those vehicles should be used only for transportation of sand from the reach to the stockyard.

The limited number of vehicles entering the reach is extremely important from the point of view of sustainability and environment as the riparian habitat is greatly affected by too many vehicles entering the sand reaches. The use of GPS/ RFID enabled dedicated vehicles for the purpose, will also help in evaluating the exact quantity of sand extracted from the reach. Further mandating the maintenance of stockyards by all individual leaseholders/ raising contractor will ensure continuous supply of sand to consumers even during monsoons and prevent price escalation during non-mining period.

For transportation of sand from stockyards to end consumer:

The stockyards should be delineated by fixing the geo-coordinates or by geo-fencing, to trigger an alarm in case of entry of any unauthorized vehicle in its premises. There should be provision

of weigh bridges at the stockyard and all the vehicles transporting sand to the consumers should pass through it to keep a track of exact quantity of sand in the vehicle as per the loading capacity of the vehicle prescribed by the transport department.

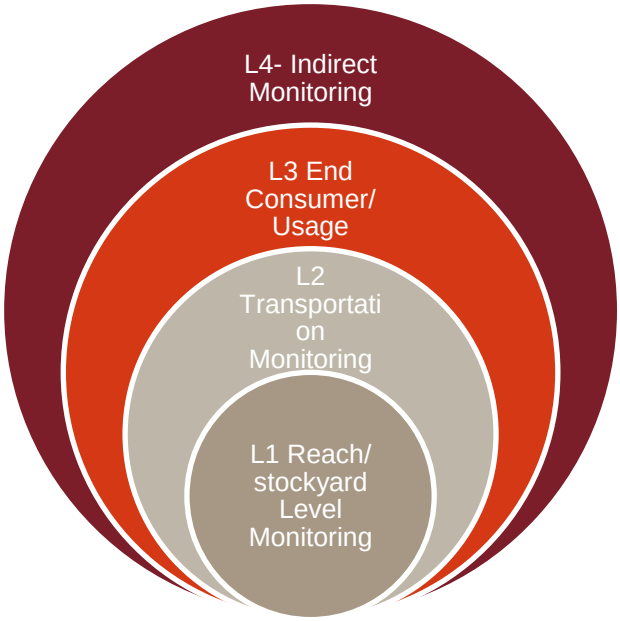
All sand carrying vehicles should have a valid transport permit. The transport permit for transportation of sand should be generated at the stockyard after verification of the payment. The transport permit should have a scan code to ensure that the single transport pass is not photocopied and used more than once. Further, the transport monitoring team should have a scanning device/mobile based app to scan the transport permits, and once scanned the entire detail, such as volume, origin point (reach/ stockyard), destination, previous scan detail, etc., should be available.

The responsibility of transportation of sand from the stockyard to end consumer should be handled to the stockyard owner. The States may fix up a time frame for delivery from the ordering period and the State departments need to establish grievance's portal and mechanism also for resolving complaints related to ordering and transportation of sand.

1.2.13 Monitoring

Monitoring is extremely crucial to ensure that sand mining operations are legal and environmentally compliant. Accordingly, the State / State agencies need to create and establish a robust system to monitor and measure the mined out mineral at each lease location and its transportation in the State. In that regard, a 360 degree monitoring mechanism should be put in place, as follows.

Figure 1- 7 Four-level monitoring mechanism



1.2.13.1 Level 1- Reach/ Stockyard level monitoring

For monitoring of the active reaches:

a. Quantity of sand to be extracted from the reach should be based on the quantity of sand assessed in the reach by the Joint Inspection Team.
b. The lease boundary should be demarcated with geo-coordinates or geo-fenced to ensure that sand extraction is going on only within the permitted area.
c. De-casting from river beds should be monitored on a regular basis to keep a track of excavated quantity.
d. After every two year, a mandatory audit of the quantity extracted and quantity permitted along with the replenishment rate.
e. Mandatory e-pass/ e-permit should be made available at reach level for transportation of any sand by any GPS enabled vehicle with provision of entering the vehicle number of the sand carrying vehicle and expected delivery address and customer name/ mobile number. Also provision should be made available for stockyards/ stockiest of sand. In case of nomination based (controlled pricing) business model, the margin of private stockist should be capped over a fixed percentage of notified prices.
f. At the stockyard, the stock supervisor should verify the authenticity of online payment receipt before issuing the transit pass. The loading of sand should be monitored electronically and all transporting vehicles should pass through an electronically monitored weigh bridge.
g. Real time data capture for transportation

1.2.13.2 Level 2 - Transportation monitoring

To make transportation monitoring effective and useful, all the sand carrying vehicles (tractors/ trucks) should be registered with the department and GPS equipment should be installed in all the sand carrying vehicles. Online weighbridges with CCTV should be installed at all the stockyards, active reaches to ascertain the exact quantity of sand being transported in the vehicle. Check posts with CCTV cameras should be established near all major consumption centers to check if all the transporting vehicles are carrying a valid transport permit. The transport permit generated should contain any of the security feature mentioned under section 5.11 so that one permit cannot be re-used by generating photocopies of the permit.

1.2.13.3 Level 3 - End consumer monitoring/ bulk consumer

For end consumer monitoring, a customer grievance redressal center should be established to enquire about the grievances faced by the sand consumers. The telephone number of the call center should be advertised so that it reaches the general public through which anyone in the State can register his/her complain related to the sand, be it in terms of price or any other grievance. Additionally, profiles of customers should be analyzed such as delivery of sand at the

same address, usage pattern and its comparison with the estimated usage, as mentioned in purpose, etc. Further, surprise checking should be conducted by the district level committee staff as per instructions of the monitoring agency.

1.2.13.4 Level 4 - Indirect monitoring

Indirect monitoring can be done by determining sand consumption through quantum of cement sales in the State, as sale of cement is quite organized and data is easily available at the State level and district levels for the same. From district-wise cement consumption, further trend of sand consumption can be derived. Any anomalies in the sand consumption/demand can be analyzed further.

Note: The above monitoring mechanism is just a suggestion and the States may visit Andhra Pradesh and Telangana to study the monitoring mechanism in greater detail.

1.3 Best practices across the process chain

1.3.1 Best practices in the notified or controlled pricing model

1.3.1.1 Demand Supply assessment

Of the 14 States surveyed for this study, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Tamil Nadu and Telangana follow controlled pricing model. Further, only Telangana and Tamil Nadu have undertaken demand estimation. The estimation by Telangana is within the range of estimation done using RBI data based method.

1.3.1.2 Alternates to natural sand

Out of the five States following notified pricing model, Andhra Pradesh and Telangana have separate M-sand policy. Tamil Nadu is in the process of drafting the M-sand policy.

1.3.1.3 Rules & Regulations

Andhra Pradesh and Telangana have well defined rules and regulations for sand mining and alternative materials such as M-sand. These States have separate policies for sand, distinct from other minor minerals. Further, the mining departments/ State agencies in these States handle the regulations and overall administration of sand mining operations. Lastly, these States have been regularly updating their policies for sand and other minor minerals taking into account the developments in the sector.

1.3.1.4 Identification

In States like Andhra Pradesh and Telangana identification process is detailed and joint inspection report is prepared and followed for identification of the concessions.

1.3.1.5 Clearances and approvals

Prior clearances and approvals before auctioning or allocating the blocks helps minimize risks for the bidders and reduces the lead time for development. In States such as Andhra Pradesh and Telangana, the mining department/ Corporation procures the environment clearance and mining plan approvals. Only well administered States may follow the model of obtaining clearances/approvals themselves.

1.3.1.6 Business model

If the objective is to keep prices affordable and accordingly regulated, then notified or controlled pricing model can be adopted as is the case with Telangana and Andhra Pradesh. States however miss out on revenue generation even where consumers have the capacity to pay.

1.3.1.7 Operations & Monitoring

Telangana is doing better in terms of control over sand mining operations, as TSMDC appoints raising contractors through competitive bidding to extract sand on its behalf, and it can mandate stricter compliance with environmental norms as part of its contracting.

The monitoring mechanism should not only be limited to physical checking by identified personnel but should include the use of technology in checking the transport permit, keeping the record of sand consumers for verification and monitoring the excavation sites. In view of this, Andhra Pradesh follows a 360^{o} monitoring starting from the reach level to delivery of sand to the end consumers.

1.3.1.8 Transportation

In Andhra Pradesh, all sand carrying vehicles are registered with the State mining department and are GPS enabled. Further, all the vehicles carrying sand have a valid transport permit generated online along with a scan code or a hologram mark to ensure that the single transport pass is not photocopied and used more than once. Further, the transport monitoring team has a scanning device to scan the transport permits, and once scanned the entire detail, such as volume, origin point (reach/ stockyard), destination, previous scan detail, etc., are displayed on the scanning device. The transit pass generated at the reach/stockyard also contains the route of delivery from the origin to the destination, and the same can be cross checked with the GPS device at the check points if there is any deviation in the route designated and the actual route followed. Further, through the GPS device, any unauthorized entry of a transportation vehicle near the reach/ stockyard can also be checked.

1.3.1.9 Sale of sand

Andhra Pradesh has constituted a five member district committee in all the districts which includes the Superintendent of Police, District Transport Commissioner, Executive Engineer of Irrigation

department and ADMG under the chairmanship of District Collector. The committee notifies the price of sand for the district including transportation, loading/unloading and ramp maintenance fee. There is a 24 hours operational call centre, which gives a call to all the consumers to enquire whether the amount that is charged for sand is within the Government's notified limit. Consequently, the landed price of sand in the entire State has been under control.

Apart from Andhra Pradesh, Telangana is also relatively well placed in terms of sale of sand in the State, where only TSMDC can sell the sand. Further, the sale can only be through the online portal developed by the mining corporation. Anyone who wishes to purchase sand in the State has to register on the online portal and subsequently login to place its order. After logging in, the portal displays the entire list of reaches/ stockyards along with the sand available in those reaches/ stockyards and the corresponding quality and price of sand. The consumer can filter/ sort the reaches/ stockyards based on location, quality and price and book based on the most suitable lease/ stockyard.

1.3.1.10 Consumer satisfaction and quality

Getting quality sand at reasonable prices is a major concern for consumers. Out of the States following nomination model, the consumer satisfaction is measured only in Andhra Pradesh by calling consumers through the call center for the delivery of sand at notified prices. However, regarding the quality aspect the consumers are not aware and infrastructure for testing facilities are not adequate.

1.3.2 Best practices in the market model

1.3.2.1 Demand Supply assessment

States following market model are Assam, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand. Out of these States Gujarat, Haryana, Karnataka, Punjab, Rajasthan and Uttar Pradesh have done demand estimation. The estimation of the Gujarat and Punjab is within range of estimation done using the RBI data based method.

1.3.2.1 Alternates to natural sand

Out of the nine States following market model Gujarat and Karnataka have M-sand units established. Karnataka has separate M-sand policy chapter in their minor mineral concession rules.

1.3.2.2 Rules & Regulations

Karnataka has well defined rules and regulations for sand mining and alternative materials such as M-sand. The State has separate policy for sand distinct from other minor minerals. Further, the mining department in the State handles the regulations and overall administration of sand

mining operations. Lastly, the State has been regularly updating its policy for sand and other minor minerals taking into account the developments in the sector.

1.3.2.3 Identification

Gujarat prepares a detailed geological report through a technically qualified person for each identified sand block and puts the sand blocks for auctions based on the quantity of resource established by the report. Apart from establishing the resource quantity, the report contains details of the area, DGPS Survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status, geological mapping, laboratory studies of the samples etc.

1.3.2.4 Clearances and approvals

The clearances and approvals need to be processed at a faster pace and in order to achieve that objective the applications for getting the clearances/ approvals should be made online.

1.3.2.5 Business model

If the objective of the State Government is revenue maximization, then simple forward tender cum auction model as is being followed in Gujarat can be adopted where the sand bearing areas are notified for auction after preparation of detailed geological report containing the estimated quantity of sand reserves in the block. Haryana received maximum revenues amongst the States following market model.

1.3.2.6 Operations & Monitoring

Operations in the market model is in the control of lessee/ contractors and the State Government has minimum control over it. Further the States following the market model are in the process of developing monitoring mechanism which is IT based. Few States have started issuing e-pass for transportation of sand and others are still under developing this system. Gujarat has developed applications for checking and has grievance cell for consumers from monitoring aspect.

1.3.2.7 Transportation

Transportation of sand in the market model is controlled by contractors and department/State Government has no control over it. The transport of sand may be integrated with the online sale mechanism.

1.3.2.8 Sale of sand

Sale of sand in the States following market model is direct by lessee/contractors and by offline means only. State Government has no control over the sale of sand or the prices of sand. The States should endeavor for the online sale of sand for doorstep delivery service.

1.3.2.9 Consumer satisfaction

Getting quality sand at reasonable prices is major concern for consumers. In the market model, market dynamics decide the sale prices of sand. In Haryana and Gujarat, prices are comparatively lower due to more supply.

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2. Introduction

This chapter briefly describes the background of the study, need and objectives for the sand mining framework as well as the approach of the study.

Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. It is one of the most widely used commodity for different purposes with majority in construction activities. Sand and gravel are mined world-wide and account for the largest volume of solid material extracted globally. It is used primarily in construction of houses, buildings and other infrastructure projects (e.g. bridges, roads, airports etc.) thereby provides both economic and social benefits to the country. Based on a rough estimation, the total sand consumption in India is around 700 million tonnes in 2016-17 which has been derived from the cement consumption. Sand is mainly found in the oceans, rivers, lakes & reservoirs, streams, flood plains, and hills & mountains. In India, the main source of sand is from river plains, in-stream mining, coastal areas and agricultural fields. Among all the sources, river bed is the most common and prevalent source of sand in the country. Sand is mined / removed from these areas either manually or through mechanical extractors.

2.1 Background

2.1.1 Regulatory provisions for sand (minor mineral)

Sand is classified as a minor mineral and it is defined in the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act), as follows:

"*minor minerals means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central Government may, by notification in the official gazette, declare to be a minor mineral"*.

The term `ordinary sand' used in clause (e) of Section 3 of the MMDR Act, 1957 has been further clarified in rule 70 of the MCR, 1960 as:

(iv) Purposes of stowing in coal mines,

(v) For manufacture of silvicrete cement,

(vi) Manufacture of sodium silicate and for

(vii) Manufacture of pottery and glass.

Further, Section 15 of the MMDR Act empowers State Governments to make rules for regulating the grant of mineral concessions in respect of minor minerals. The regulation of grant of mineral concessions and complete administrative control for minor minerals is, therefore, within the

legislative and administrative domain of the State Governments. Hence, under the power granted, the State Governments have framed their own minor minerals concession rules and policies related to the same. Further, Section 23C of the MMDR Act, 1957 empowers State Governments to frame rules to prevent illegal mining, transportation and storage of minerals.

It has been observed that the demand of sand has increased over the years due to significant infrastructure development in the country. The legitimate supply of sand is not enough to cater to the demand. There are many instances of illegal mining noticed and reported. Also constitutional bodies like Hon'ble Supreme Court, High Courts of the States and National Green Tribunal (NGT) have taken up illegal mining issues to prevent the damage to the environment. This has further constrained the supply of this commodity. Since in majority of the States, sale prices are not regulated, supply crunch makes the prices of sand to increase and in many cases exorbitantly.

Ministry of Environment, Forest and Climate Change (MoEFCC) has issued *Sustainable Sand Mining Management Guidelines, 2016*, in March 2016 which, inter-alia, addresses the issues relating to regulation of sand mining and provides a detailed program for ensuring that mining of river sand is done in a sustainable manner. The guidelines emphasize on the preparation of District Survey Report (DSR) which needs to be prepared for each district. The guidelines also present a set of rules to be followed for operations and monitoring part. These further emphasize on making resources available, mapping of these resources at the district level, identification of appropriate sites for extraction, appraisal of the extraction process, putting in place the required environmental safeguards, and rigorous monitoring of the volume of extracted material. Special emphasis is given on monitoring of the mined out material, which is key to the success of environment management plan. Usage of IT and IT enabled services for effective monitoring of the quantity of mined out material and transportation is also part of the guidelines issued by MoEFCC.

2.1.2 Executive Summary of MoEFCC's Sustainable Sand Mining Management Guidelines, 2016

Below is the executive summary of the *Sustainable Sand Mining Management Guidelines, 2016* issued by MoEFCC.

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Executive Summary

The sand and gravel are one of the most important construction materials. Ensuring their availability is vital for the development of the infrastructure in the country. There are different sources of sand and gravel, the most important among them is the river. As the requirement of these construction materials is on rise, they also are very vital for the health, physical character of the river and the different important functions of the river. The extraction of sand and gravel

from the river bodies has to be regulated and done with adoption of required environmental safeguards.

For making available these resources, a mapping of these resources at the district level, identification of appropriate sites for extraction, appraisal of the extraction process, putting in place the required environmental safeguards, and rigorous monitoring of the volume of extracted material is required to ensure sustainability of the entire process.

The district is the unit of administration which is best placed to do the mapping of these resources, adopt the best environmental practices for extraction of these materials and monitor its extraction and movement. The large number of leases which are awarded, the scattered geographical location of the availability of these materials and decentralized requirement and usage of the sand and aggregates also places districts in a unique position to play a vital role in adoption of environmental safeguards needed for sustainable extraction of river sand and gravel.

Recommendations for management of sustainable sand extraction are the key objective of the Guidelines. Emphasis is given to the setting up of monitoring plans that will provide data on profile changes and sediment transport capacity to enable the authorities to evaluate the long-term effect of the mining activities both upstream and downstream of sand extraction sites.

Special emphasis is given on monitoring of the mined out material, which is key to the success of environment management plan. So use of IT and IT enabled services for effective monitoring of the quantity of mined out material and transportation along with process reengineering has been made a part of the Guideliness. The Guidelines proposes delegation of responsibility and authority to the cutting edge level i.e. the District Environment Impact Assessment Authority along with streamlining the process of impact assessment, environment management plan and environment clearance in cluster situation.

Promotion of manufactured sand, artificial sand and alternative technologies in construction materials and processes are also required for reducing the dependence and demand on naturally occurring sand and gravel. Development of slag sand, sand from stone chips and there certification under BIS is an important step in this direction."

Following are the few references to the notification/circulars issued by MoEFCC which need to be referred by the States along with other notification/circulars/orders issued by MoEFCC.

a) The Environment (Protection) Act and Rules, 1986
b) MoEFCC Notification 27th Jan 1994
c) MoEFCC Notification 14th Sep 2006
d) Amendment of MoEFCC Notification (14Sep2006) dated 1st December 2009
e) MoEFCC OM dated 18.05.2012
f) MoEFCC Notification dated 24th June, 2013
g) MoEFCC Notification dated 9th September 2013
h) MoEFCC Notification dated 24th December 2013

i) MoEFCC Notification dated 7th October 2014

Despite the different measures taken by the Central Government and the State Governments, issues with regard to sand mining affecting the ecology of rivers, high sand prices and lack of availability, remains. There has been many instances of mining ban by the courts viz. Hon'ble Supreme Court, respective High Courts of the States and NGT. Following are some recent instances where courts had intervened e.g.:

- **Rajasthan:** In November 2017, the Supreme Court put a blanket ban on mining of sand and bajri in Rajasthan as the mines were operating without the environmental clearance.
- **Tamil Nadu:** In November 2017, Chennai High Court ordered to shut down the sand quarries in Tamil Nadu within a period of 6 months.
- **Uttar Pradesh**: In June 2017, the National Green Tribunal directed the Uttar Pradesh Government to ensure that no mechanized sand mining is carried out in the Yamuna riverbeds in Kanpur district. Further, in May 2016, the NGT banned illegal extraction of sand through mechanized mining in Gonda and Faizabad districts of Uttar Pradesh and ordered a probe into the unauthorized activities there.
- **Uttarakhand**: The Uttarakhand high court on 28th March 2017 put a four-month ban on mining in the State during which no fresh lease or prospective licence for mining can be issued.
- **Haryana**: The new rules in Haryana in 2012 were framed addressing the observation/directions of the Hon'ble Apex Court as contained in orders dated 27.02.2012 passed in the case of Deepak Kumar.
- **Maharashtra**: NGT order dated 30th May 2017 regarding illegal sand mining in the middle river Bhima, District Sholapur, Maharashtra

The issues related to sand mining are as under:

Figure 2- 1 Issues related to sand mining



i. Rampant mining of sand without regard for the resource

Since many years, sand and gravel have been used in the construction of roads and buildings; and their demand continues to increase. With the increased demand of sand, over exploitation of existing resources is taking place leading to adversely affecting the physical characteristic of the stream.

There have been several attempts by the Central Government, State Governments and judiciary to curb instances of illegal sand mining, most notably the Supreme Court order in 2012 that banned all sand mining, including that on land less than five Ha, without the approval of Ministry of Environment, Forest and Climate Change (MoEFCC) department. Hon'ble Apex Court in Deepak Kumar's case (supra) extensively examined the environmental concerns, in the context of mining of minor minerals, considering its impact on the environment. The Apex Court observed that extraction of alluvial material from within or near a streambed has a direct impact on the stream's physical habitat characteristics. These characteristics include bed elevation, substrate composition and stability, in-stream roughness elements, depth, velocity, turbidity, sediment transport, stream discharge and temperature. Altering these habitat characteristics can have deleterious impacts on both in-stream biota and the associated riparian habitat. NGT in 2013 issued notices against violators of SC orders, existing mining leaseholders to get environmental clearance from MoEFCC, giving them a time of 3 months to do so.

ii. Non-availability of sand in many cities

Construction is expected to grow at 6% during the years 2016-2020, as compared to 2.95% during 2011-2015*. Consequently, the demand for sand is poised to grow further at an expeditious rate. However despite the magnitude of the demand, supply of sand has been dwindling continuously over the past few years owing to environmental restrictions imposed by the Centre and other governing institutes. One of the major factors for unavailability of sand in some cities is that sand is not available near to some of the major consumption hubs and transportation of sand across long distances tends to be uneconomical.

**Source – India Brand Equity Foundation*

iii. Sky-rocketing prices and quality of sand

Non-availability of sand and sky-rocketing price of sand are two sides of the same coin. Due to the population growth and the resultant construction activity, there is a huge demand for sand in the country. In some of the cities, where there are no nearby sand reaches, it creates a huge demand-supply mismatch. This mismatch coupled with cartel formation among the miners & transporters and in absence of robust monitoring mechanism or regulation by the Government has led to sky-rocketing prices of sand in these cities, such as the prices of sand in Bangalore and Mumbai are in the range of Rs 70,000 to Rs.1,00,000 for a single truck of 30 tonnes. High sand prices, has led to mixing of low quality sand with the usable sand that is delivered to consumers who are generally not aware about the quality of sand. The low quality sand is not suitable for construction purpose and poses a risk to human lives using the structures made by it.

iv. Cartel formation in sand mining

Although State Governments have started allocating the blocks on auction basis to bidders in the States, but to manipulate the supply and to control the prices, bidders may form cartels to keep

their margins high. In absence of any robust mechanism, its tough to control cartelization unless the sale rights are with the State Governments.

There is a need for increased regulation and improved monitoring processes in sand mining. Some of the States have been able to restrict illegal mining or regulate the prices or improve the availability through different policy interventions. Further, some of the States have utilized IT systems in the process chain of sand mining for improving the sand mining and sales management system. However, to cater to the issues discussed above, it is extremely important to have a more focused policy framework across all the States. This includes adopting the best practices across the process chain by different States which may help to control illegal mining, improve sand availability and control prices in the market.

In view of the issues discussed above, a committee was constituted to study the existing system of sand mining in various States and to prepare a sand mining framework. The details of the committee are discussed in the following section.

2.2 Formation of a committee for sand mining framework

Due to various issues in sand mining and in pursuance to the deliberations of the State Mining Minister's Conference held on 4th May 2017 held at New Delhi, a committee chaired by the Secretary, Ministry of Mines, Government of India along with officials from State Governments was constituted by order dated 18th May 2017, to study the existing system of sand mining in various States and prepare a sand mining framework which addresses the concerns of this sector. The committee comprised of officials of the State Governments, Controller General of IBM and Director, Ministry of Mines as member-secretary. The notice for committee formation (Annexure-I) and extension of time period of the committee (Annexure II) is annexed. The terms of reference to the Committee was to suggest sand mining framework with a view towards a transparent and sustainable system for extraction of sand for ensuring supply of adequate sand at reasonable rates in the States. Initially committee was constituted for a period of 3 months. During the course of discussion in various meetings, the scope of work of the committee had been extended from what was envisaged initially, hence the period of the committee was extended upto 31st March 2018 on 1st March 2018.

The committee met on 2nd June 2017, 22nd August 2017, 13th Feb 2018 and 8th March 2018 in New Delhi and discussed on various matters related to the existing challenges in the sector, issues at hand, information required for the study, etc.

2.3 Understanding the objectives of the framework

Based on issues concerning the sand mining, review of various related documents and also discussion with various stakeholders, four main objectives are expected to be achieved through the framework, as depicted below.

Figure 2- 2 Objectives of the framework



2.3.1 Sustainable sand mining

Sand mining in India has reached to a level that it is threatening the environment and ecosystem. Hence, sustainable mining is extremely important to promote environmental protection, limit negative physiological, hydrological and social effects underpinning sustainable economic growth. This should be carried out for the following:

(i) To ensure the conservation of the river equilibrium and its natural environment by protection and restoration of the ecological system.
(ii) To ensure availability of adequate quantity of aggregate.
(iii) To improve the effectiveness of monitoring of mining and transportation of mined out material
(iv) To avoid aggradation at the downstream reach especially those with hydraulic structures such as jetties, water intakes etc. and to ensure the rivers are protected from bank and bed erosion beyond its stable profile
(v) To ensure there is no obstruction to the river flow, water transport and restoring the riparian habitats

(vi) To avoid pollution of river water leading to water quality deterioration
(vii) To prevent depletion of groundwater reserves due to excessive draining out of groundwater
(viii) To prevent ground water pollution by prohibiting sand mining on fissures where it works as filter prior to ground water recharge
(ix) And to maintain the river equilibrium with the application of sediment transport principles in determining the locations, period and quantity to be extracted.

2.3.2 Availability of sand

Sand and gravel have long been used as aggregate for construction of roads and building. Availability of sand to meet the growing pace of urbanization and infrastructure development has become an issue and a grave point of concern. Thus, the framework of sand mining should take into account the factors responsible for this scarcity and to implement control steps so as:

(i) To ensure that sand is available to suffice the needs of citizens & Government for construction activities throughout the year by sustainable mining practices only
(ii) To promote alternatives i.e. manufactured sand, artificial sand and alternative technologies in construction materials processing for reduced dependence on naturally occurring sand and gravel
(iii) To analyze the feasibility of imported sand from other countries such as Malaysia and Philippines

2.3.3 Affordability

Sand, a key construction material, has been a source of angst for developers. Booming construction activity and scarcity of sand has resulted in high prices. Hence, it is extremely important for the framework:

(i) To ensure availability of sand at reasonable prices throughout the year by increasing supply
(ii) To control the price from supply side rather than through administrative mechanism
(iii) To provide appropriate pricing models for keeping the prices under check
(iv) To reduce illegal mining, closure of quarries and smuggling of sand to neighboring States that are major factors influencing quick escalation of sand price
(v) To establish responsive check on these factors to make sand prices reasonable for use in construction activities
(vi) To create awareness for alternatives of river sand and to promote production and usage of alternatives of river sand through incentives.

2.3.4 Transparency

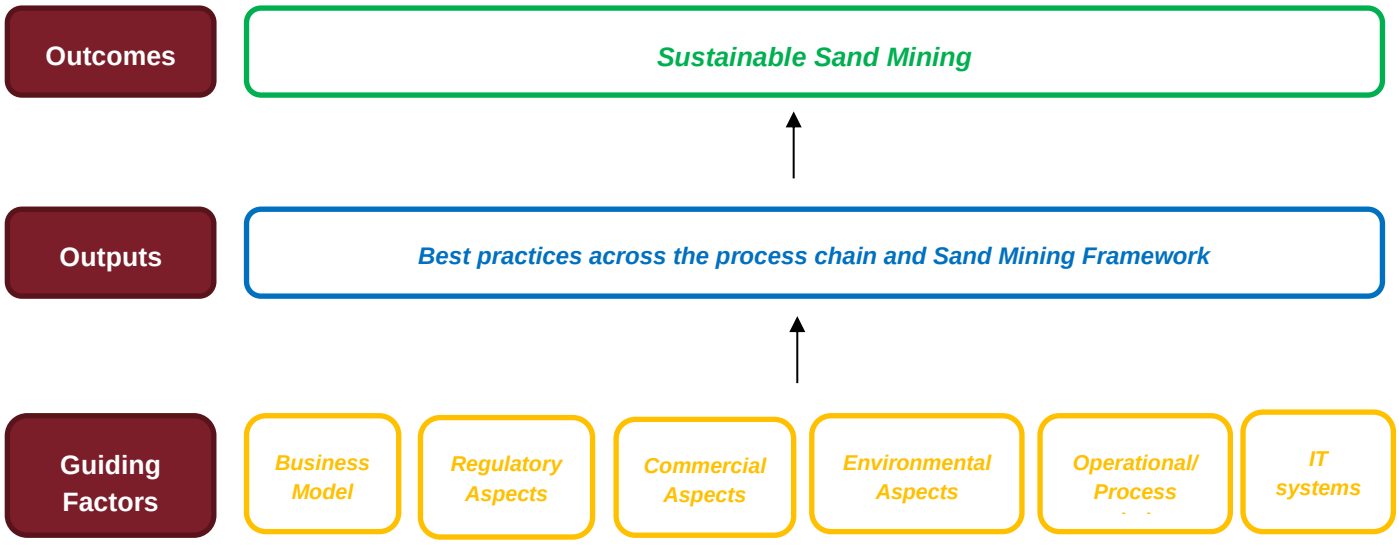
Transparency in any process is a measure of control of flaws in the system and also builds trust among the stakeholders. It is extremely important to have utmost transparency in the entire process including allocation, operations and sale of sand so as to tackle the challenges facing the sector. To enhance transparency, the states should consider increased usage of information technology systems in the sand mining process limiting human interventions and chances of discretion.

Based on understanding of the objectives, an approach and methodology towards execution of the study was devised and finalized in consultation with the relevant stakeholders. The same is discussed subsequently.

2.4 Approach and Methodology

The approach has been designed as a three-layered framework keeping in view the goal and objectives of the study. The approach identifies key guiding factors providing direction to the assignment and providing the right perspective for achieving the outputs/ deliverables. The following framework describes our overall approach.

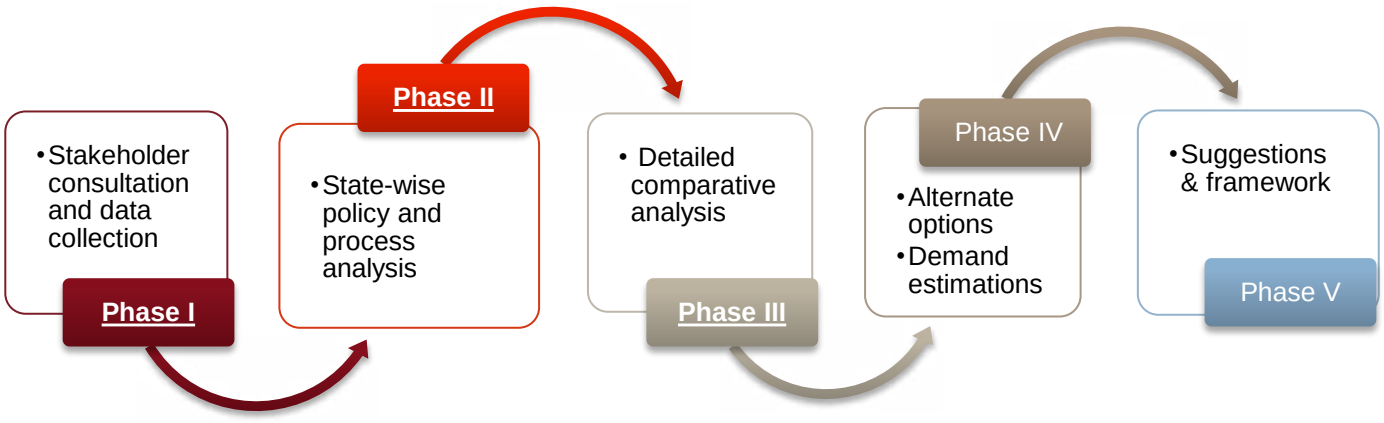
Figure 2- 3 Overall approach



2.4.1 Detailed approach and methodology

A systematic methodology was formulated to carry out the study. The below mentioned tasks were executed in a phased manner right from data collection and stakeholder consultations to the final suggestions. The phases of execution are shown in the figure below.

Figure 2- 4 Phases of execution



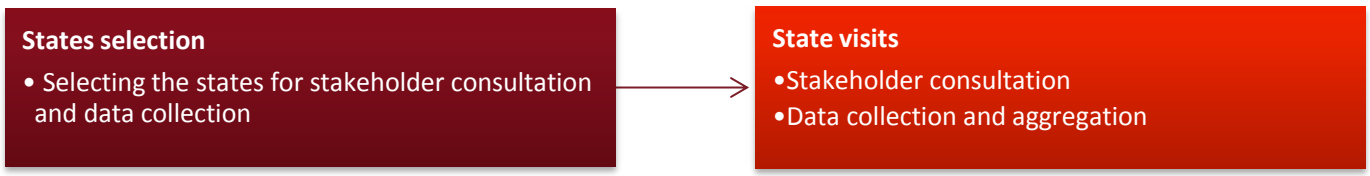
The approach and methodology was developed to comprehensively cover all required aspects of the study, as discussed below.

2.4.1.1 Phase I: Stakeholder consultation and data collection

Phase I: Stakeholder consultation and data collection
Objective: To understand the sand mining policies and procedures across the chain in different States and to collect relevant data for detailed review and analysis
Key Outputs: 1. ***State Visit Plan*** 2. ***Data and documents collected - Latest mineral concession rules, relevant Government orders, sand mining policies, policies and data related to alternatives of sand, sand mining and sales process related data, etc.***

The main activities carried out in this phase are shown in the figure below:

Figure 2- 5 Activities in Phase - I



2.4.1.1.1 States selection

This phase began with the preparation of a list of States for data collection and stakeholder consultations. The list was finalized to cover most of the regions of the country i.e. central, west, north, south and north-east. The following 14 States were selected:

Table 2 Details of state visits

Region	Name of the State			
South	Telangana	Andhra Pradesh	Tamil Nadu	Karnataka
Dates of visit	15th & 16th December	20th to 22nd November	13th & 14th December	11th & 12th December
West	Rajasthan	Maharashtra	Gujarat	
Dates of visit	19th to 21st November	8th & 9th November	22nd & 23rd November and 29th & 30th January	
North	Punjab	Haryana	Uttarakhand	
Dates of visit	13th to 15th November and 29th & 30th January	13th to 15th November	8th to 10th November	
Central	Chhattisgarh	Uttar Pradesh	Madhya Pradesh	
Dates of visit	13th & 14th November	6th & 7th December	27th to 29th November and 29th & 30th January	
North-east	Assam			
Dates of visit	13th to 15th December			

A detailed plan was prepared for each State visit that included stakeholders to be met, date of meeting, detailed discussion areas, list of data and documents required, etc. The detailed visit

plan is attached as Annexure – III. Two teams were formed having members from IBM and the consultant. Seven states were covered by each team as per the plan.

2.4.1.1.2 State Visits

Each State was visited by the respective teams as per the detailed State visit plan. The visit mainly covered stakeholder consultations and the data/ document collection for the detailed analysis in the subsequent phases. The discussion points covered the following areas:

- Applicable rules and regulations for sand mining
- Baseline and present condition of sand mining
- Issues and challenges facing the sand mining activity
- Problems related to sand mining that the policy has helped to resolve and those that still exist
- Process of award of sand reaches, and any gap/loophole in the process
- Understanding the roles of various stakeholders involved in sand mining like District Level Sand Committee members, State Level Committee members, Self Help Groups (SHG), if any, etc
- Views of stakeholders on the existing policy and how to fill the gaps, if any
- Status of royalty and taxes applicable for sand and M-sand, if applicable
- Status of illegal mining and efforts to stop the same.
- Information on the demand-supply assessment undertaken by the State and methodology adopted for the same
- Information on business models followed by the State
- Information related to transparency in the process of sand mining/ online methods
- Information on resource availability, production level and other technical details
- Information on pricing policy followed by States for deciding the sale prices of sand and revision interval for sand prices

2.4.1.2 Phase - II: State-wise policy and process analysis

Phase II: State-wise policy and process analysis
Objective: To understand the sand mining policies and procedures in different states based on study of the information received in the previous phase
Key Outputs: ***Detailed review of sand mining policies and procedures***

In this phase, a detailed study of the following aspects was carried out:

Figure 2- 6 Aspects covered in State wise analysis



The data obtained from the different States was analyzed in detail to present the existing sand mining and sales management systems for each State. The areas covered under each aspect are:

2.4.1.2.1 Legal and regulatory framework

In this section, the existing legal and regulatory framework of sand mining in the selected States was reviewed, focusing on two main aspects i.e. the presence of appropriate legal and regulatory measures and its effectiveness. The following aspects were looked into:

- applicable acts, rules and regulations governing the sector and the processes of sand mining and sales, amendments/ notifications/ Government orders, responsible authority for various provisions
- latest policy and legal changes brought-up/proposed in the States to carry out sand mining in a sustainable way
- internal as well as external environment that affects the functioning of sand mining and sales, directly or indirectly by analyzing the past trends and also from the view of various stakeholders discussed during phase-I
-
- steps taken to prevent adverse impact of mining of sand on the environment
- legal framework and steps taken to curb illegal mining and transportation of sand

2.4.1.2.2 Sand mining process mapping

Standardization of the processes are extremely important and brings efficiency in the system. However, the States follow different sand mining processes. Hence, our goal in this section was to map the complete process chain of sand mining in each State and use the information for formulation of the framework with standardized processes. To do the same, detailed information on the process chain was gathered during the States visit. In addition, a number of reaches were also visited. The whole section included mapping of the tasks being carried out right from the identification of the reaches to the sale of sand to the end user. In addition to this, a responsibility matrix was also prepared mapping the responsibilities of individuals within the process. Some of the details that have been captured are:

- Sand demand in the State
- Alternate sources of natural sand in the State

- Rules & regulations related to sand in the State
- Agencies involved in identification of sand reaches
- Process of allotment of sand reaches
- Process of appointment of contractors/excavators for sand mining (if required)
- Responsibility of monitoring & surveillance of sand mining
- Transportation mechanism of sand
- Mode of sale of sand in each State
- Use of technology in the processes such as allocation, monitoring, dispatch etc.

2.4.1.2.3 Sand pricing, royalty and taxes

Pricing

In this section, an in-depth study was conducted to understand the sand pricing mechanism being followed in different States. The team interacted with the stakeholders to assess the reasons of the pricing mechanism followed in the State as well as the prevailing prices of sand at the end-user level. The pros & cons and irregularity in the prices under different pricing mechanism was also assessed. The questionnaire developed in the previous phase was used for getting the information and views from different stakeholders.

Royalty

In this section, the data on royalty and taxes related to sand mining operations were collected from each State. An in-depth study on the royalty structure was conducted. This included study of trend in royalty and taxes to understand the impact on the demand, supply and prices of sand. In addition, the concept and method of royalty calculation in each of the States was focused upon and the pros and cons of every concept was analyzed from the perspective of the Government since royalty constitutes a major source of revenue for the States.

Since this is one major source of revenue collection for the States, the issues with the design of the royalty structure and its implementation in each State was also analyzed as this could hinder the realization of what could otherwise be achieved.

2.4.1.2.4 Monitoring Mechanism

In this phase, the team gathered information on the experience of each of the State in illegal mining. Information such as number of approved sand reaches, operational sand reaches, location and area of the reaches, etc. were collected for all the States. The reaches were shortlisted from where illegal mining activities have been reported and detailed analysis was done to understand the impact of illegal mining in the respective reach. Further, special emphasis was

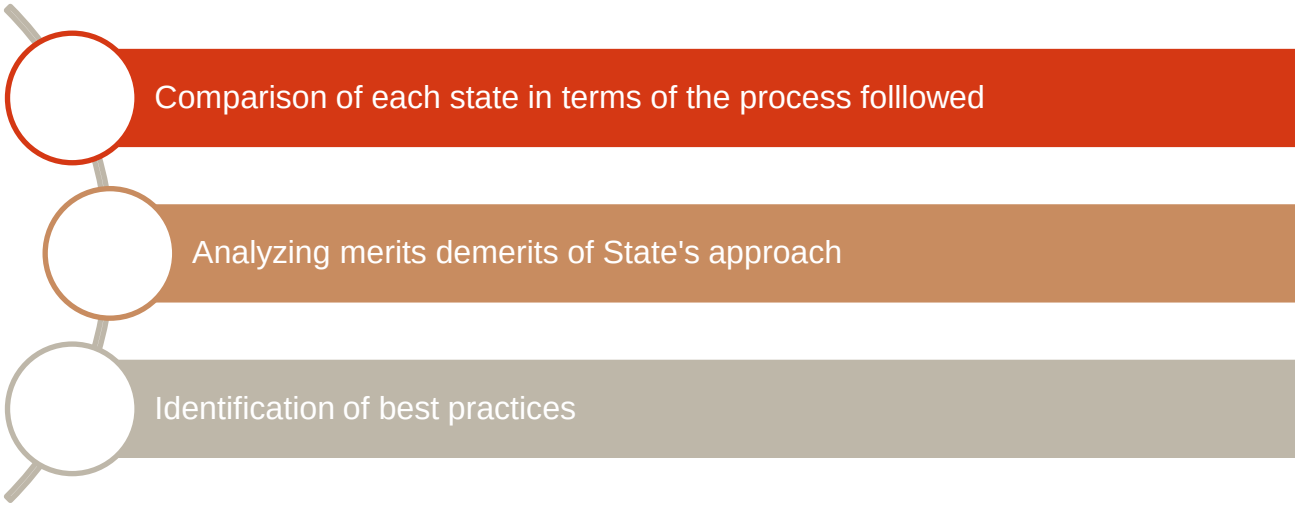
given on the steps taken by the respective authorities to curb illegal mining in the States and its effects. These outcomes play an important role in formation of the sand mining framework.

2.4.1.3 Phase - III: Detailed comparative analysis

Phase III: Detailed comparative analysis
Objective: To find best practices in sand mining policies and practices
Key Outputs: ***Comparison of the States and best practices***

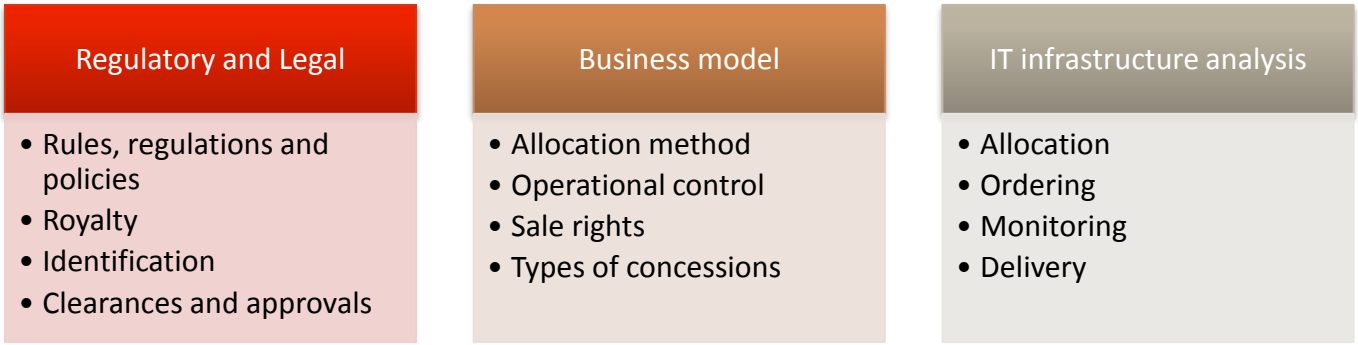
This phase involved comparison of States against different parameters across the sand mining chain to identify best practices.

Figure 2- 7 Approach of the analysis



The main areas that are used for comparison between the States' sand mining policies are:

Figure 2- 8 Areas covered for comparison



Key tasks carried out in this phase are:

- The team compared the rules and regulation followed by different States and assessed their impact on prices, demand and supply situation of the State.

- The team compared the entire process chain of sand mining from identification of sand reaches to sale of sand followed in different States. The team analyzed the data collected through State visits and benchmarked the practices. The information collected was compiled into standard templates and matrices.

- The team identified the technological requirements for different stages of sand mining including new generation technologies for transportation and tracking illegal sand mining. The level of transparency brought in the complete process of sand mining in the States because of the usage of technology was also evaluated. After finalization of areas where technical up-gradation is required, different business models for technical enablement were analyzed and the pros and cons were also captured to help the Government in selection of the appropriate business model that can best fit as per the requirements and functioning of the States.

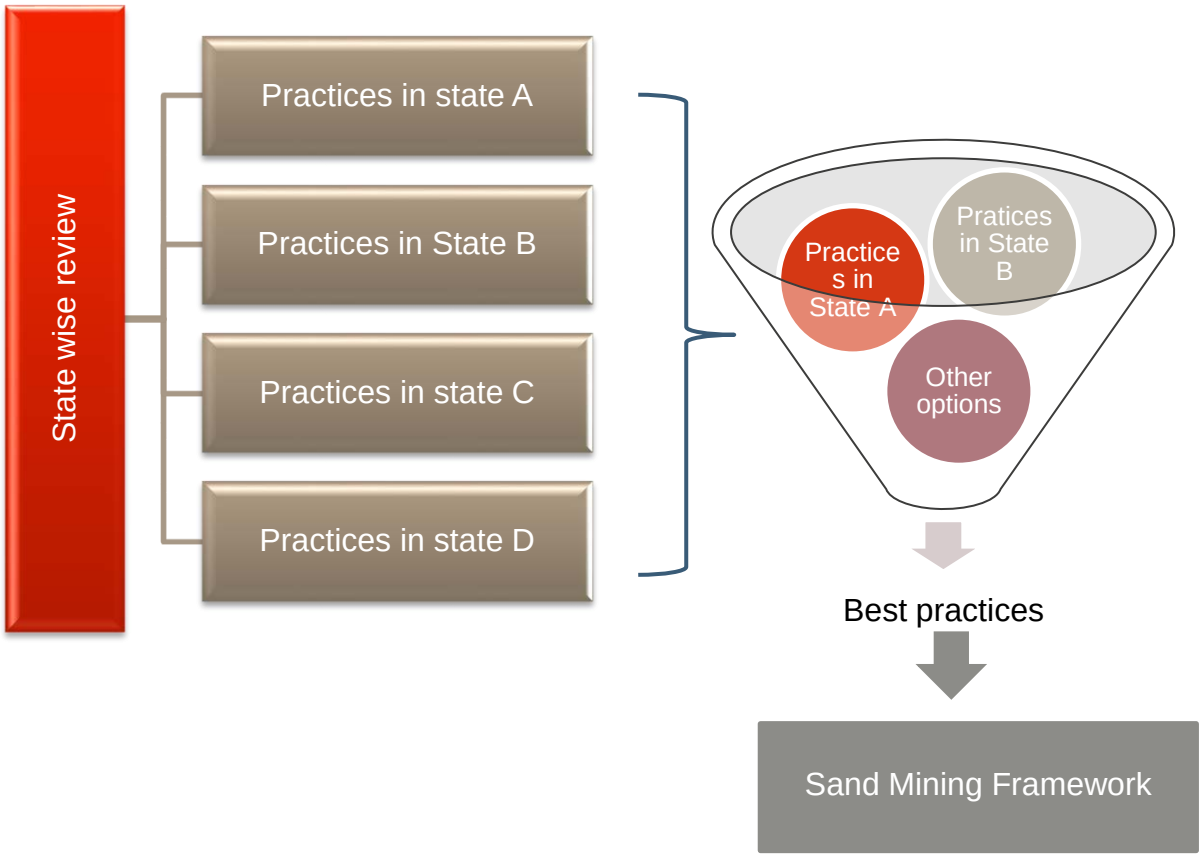
- Pricing mechanisms followed by different States including their royalty structures were analyzed. The team analyzed the different mechanisms followed by States and analyzed the factors which hinder and encourage the revenues of the Government from sand mining.

2.4.1.4 Phase - IV: Suggestions

Phase IV: Suggestions
Objective: To provide suggestions for the policies and practices to be followed by the States along with proposing alternatives of river sand and methods for demand estimation
Outputs: ***Sand Mining Framework***

Specific suggestions to act upon in order to control illegal mining, carry out mining in a sustainable and environment friendly way, ensure availability of sand, and make best utilization of available technologies have been made. Along with the above, the alternate options of river sand are analyzed and method to estimate the demand of sand in the State is proposed.

Figure 2- 9 Overview of Approach and Methodology



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3. State-wise policy and process analysis

This chapter provides an overview of the policies, procedures and practices being followed by the States visited. It discusses the types of concessions granted for sand, allocation methods, pricing & royalty rates, clearances and approvals, and overall operations and monitoring mechanism being followed in different states.

3.1 Andhra Pradesh

Regulatory provisions

The minor mineral rules applicable in the State are the *Andhra Pradesh Minor Mineral Concession Rules, 1966* and its amendments issued by the Government Orders from time to time. The responsibility of the minor mineral "sand" is with the Department of Mines & Geology. For sand, there is a separate policy, which was framed in 2015, *"New Sand Mining Policy*". Later on this was changed in 2016 to *"Free Sand Policy".*

Business Model

In the Free Sand Policy, the Government notifies the sand reaches from where sand can be excavated free of cost (i.e. without paying any royalty or other taxes but only payment of extraction cost, which has been fixed by the Government for each district). There are also various Self Help Groups (SHGs) working to load sand on the transporting vehicles at the notified reaches. The department has issued instructions to notify small reaches to facilitate public to get the sand. The time period for notified reaches is one year or till exhaustion of lease, whichever is earlier. Also the department has fixed maximum landed rates in each district including transportation cost for consumers.

Types of sand concessions	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Notified Sand reaches	No restriction	No restriction	No restriction	Till exhaustion of sand or one year period, whichever is earlier

Business Model	Sub-model	Process followed	Separate accounting	Production FY17	Revenue FY17

			for royalty (Yes/ No)	(MMT)	(Rs. Crores)
Notified or controlled pricing model	Notified sand reaches for extraction by public or by SHGs	Notification for extraction to SHGs or public on their own	Not Applicable	NA	Not Applicable

The Assistant Director, Mines and Geology, has the responsibility to prepare the Mine Plan for feasible sand bearing areas duly dividing the sand reaches having an extent of above 5 Ha into small reaches. Further the department has the responsibility to get the environmental clearance from the appropriate body based on the size of the notified area.

Monitoring

For monitoring, the department has deployed technical assistants (TAs) on all the active reaches who provide real time data from all the reaches with photographs of all the sand carrying vehicles. The technical assistant notes down the details of the driver of the sand carrying vehicle and the sand consumer. Further, these details get uploaded to the system on real time basis and software tracks the movement of GPS based vehicle. The software issues alerts in case of discrepancies between the consumer address and destination.

Sales

The State has already developed a mobile application for sand, which is expected to be operational very soon, and once it gets fully functional, all the bookings for sand in the State will be done through the app. All the sand carrying vehicles in the State are registered with the department and the State has also released a G.O. to mandate the installation of GPS in all sand carrying vehicles by February 2018.

The Government has constituted a five member district committee in each district which includes the Superintendent of Police, District Transport Commissioner, Executive Engineer of Irrigation department and ADMG, under the chairmanship of District Collector. The committee notifies the price for sand in the district including the transportation, loading/unloading and ramp maintenance fee. There is a 24 hours operational call center, which enquires all the consumers whether the amount charged for sand is within the Government's notified limit. Consequently, the landed price of sand in the State is under control.

DSR Status

District Survey Report is not being prepared in Andhra Pradesh. State prepare their own reports which are similar to DSR reports as per the department.

Demand-Supply Assessment

No proper demand-supply assessment has been carried out by Andhra Pradesh. However, since the State is sand deficit, it ensures through proper monitoring mechanism that no sand from Andhra Pradesh is transported across the border to other States. However, there is no restriction on import of sand from other States. Further, to take care of sand deficit, Andhra Pradesh has given industry status to M-sand producing units in the State and has granted certain incentives for production of M-sand to encourage the manufacturers of M-sand.

Online Portal

Andhra Pradesh maintains an online portal, namely pushkrishna.sps.ap.gov.in/sandapp/dashboard/aspx. The portal is an important part the monitoring mechanism of the State. The portal helps in real time governance of the active sand reaches.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 3 Summary of sand mining policy in Andhra Pradesh

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	District Level Committee	• Joint inspection to fix the boundaries • Assess the sand in terms of quantity • Study the environmental aspects	1 month	Offline
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	District Level Committee	• Preparation of feasibility report • Obtain clearance from Ground Water Department as per WALT Act & Rules • Clearance from River Conservator in case of underwater extraction • Preparation of mining plan, mine closure plan, environment plan (EIA/EMP)	2-3 months	Offline

		• Submission of approved mining and environmental study (EIA/EMP) to authority for issue of environmental clearance		
Notification of sand reaches	Department of Mines & Geology, Andhra Pradesh	• The department notifies the sand reaches for public after getting all the required clearances	1 month	Online
Operations and Monitoring	(Operations) SHGs/ Consumers	• After DGM notifies the area, anyone can excavate and load sand from the notified reaches • At some of the reaches, Self Help Groups are working to load sand on vehicles in lieu of the loading charges to be borne by the consumer	Continuous	Offline
	(Monitoring) Monitoring Committee	• Overall monitoring responsibility lies with Monitoring Committee	Continuous	Offline & Online
Transportation	Transporters	• Delivering sand to the consumer after paying loading charges • Collecting money from consumer after delivery of sand	Continuous	Offline
	Department of Mines & Geology, Andhra Pradesh	• Getting all the transportation vehicles registered • Issuance of “Weighment Slip” by the department. • Mandatory installation of GPS in all sand carrying vehicles	Continuous	Online
Sales	Department of Mines &	• Ordering is offline only and platform for booking of sand is being developed	Continuous	Offline

	Geology, Andhra Pradesh			

3.2 Assam

Regulatory Provisions

The minor mineral rules applicable in the State are *Assam Minor Mineral Concession Rules, 2013* and the responsibility lies with the District Forest Officers (DFOs) under the Department of Environment and Forest of the State. The types of concessions, which are allotted in the State are mining lease (ML), mining contracts (MC) and mining permit (MP). Assam is currently changing its rules and post amendments of the rules, the Directorate of Geology & Mining shall be handling the responsibility of the minor minerals as well.

Business Model

The allocation of concessions is through offline tender route with a reserve price equal to the royalty rate of the sand (Rs 140/cum from 2015 onwards). The highest amount discovered in bidding becomes the premium to be paid by the bidders. From 2018 onwards, the State will be adopting e-auction model for grant of concessions post amendments of its rules.

Mining lease is granted for a period of 10 to 20 years. Further, there is no restriction on the maximum area for allotment or holding of maximum area by any individual as per the State Rules. Mining Contract is granted for a period of 7 to 10 years and there is no restriction on the minimum area or the maximum area for allotment or neither there is any limit on holding maximum area by any individual. Mining permits are granted for a period of less than two years and for area of less than 5 Ha (maximum limit). However, there is no minimum limit for the area to be granted.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Mining Contracts, Mining Permits	1 Ha	No restriction	No restriction	Mining Lease: 10-20 years Mining contract 7-10 Years Mining Permit: 2 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Offline tender	NA	5.6	30-35*

**Rough estimate, as calculated from data provided for all the leases*

The lessee has the responsibility to prepare the mine plan and get the environment clearance from the relevant body depending on the size of the sand block, and to also procure consent for operation and consent for approval from Assam Pollution Control Board.

Sales

The sale price of sand at pit head is Rs 250-300 per cubic metre and the price in Guwahati at a distance of around 70-80Km from sand reach is around Rs 800 to 900 per cubic metre. However, during monsoon period, the sand price in Guwahati shoots up to Rs 1200 to1500 per cubic metre.

There is no significant use of technology in the entire process of sand mining in the State and even the monitoring is done by offline means.

DSR Status

Assam has still not started preparation of District Survey Report (DSR). There are 33 districts and sand mining is prevalent in all the districts.

Demand Supply assessment

No specific details are available with the State regarding the State's sand demand, consumption, replenishment, etc. Since export of sand is also allowed to other States, it is really difficult to assess the demand of sand. However, the production of sand in FY17 is estimated to be around 3 million cubic metres.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 4 Summary of sand mining policy in Assam

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	District Forest Officers of the Environment & Forest	• Identification of sand-bearing area and preparation of Initial Report	3-4 months	Offline

	Department, Assam	• Fixing boundary and assessment of quantity of sand		
Allotment of sand reaches	Environment & Forest Department, Assam	• Conduct of tender process and selection of successful bidder • Issuance of LoI to the successful bidder	1 month + 1 month for issue of final acceptance letter/ LoI	Offline
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Preparation of mining plan, mine closure plan, environment plans (through RQP) • Obtain approval of mine plan, mine closure plan from DMG and environment plan (EIA/EMP) • Submission of approved mining and environmental Study (EIA/EMP) to authority for issue of environmental clearance	1-2 month (if area is less than 5 Ha.) 6-12 months (If area is less than 25 Ha.) 12-36 months (If area is 25 Ha.)	Offline
	Lessee	• Application for Consent of for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board • Other relevant clearances and approvals	1 month	Offline
Operation and Monitoring	Lessee	• Mining and loading operations are conducted by the lessee	Continuous	Offline
	Environment & Forest Department, Assam	• Overall monitoring is being done by the Environment & Forest department of the State	Continuous	Offline

Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance	Continuous	Offline
	Lessee	• Issuance of “Permit” by the contractor/ permit holder	Continuous	Offline
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.3 Chhattisgarh

Regulatory Provisions

Chhattisgarh amended the Minor Mineral rules in the year 2015 and the current rules applicable in the State are *Chhattisgarh Minor Mineral Rules 2015*. The responsibility of the minor mineral “sand” is with the “Directorate of Geology & Mining, Chhattisgarh”, and as per article 3 (vi) of the CMMR 2015, sand mining in the State is governed by the *Chhattisgarh Minor Mineral Sand Excavation and Trade Regulation Order 2006*.

For sand mines, areas are notified by the State, however the time period is not defined. Extraction is permitted as long as the environment clearance permits. There is also no restriction on the size of the area that can be granted for sand concessions in the State.

Business Model

The allocation of sand reaches in Chhattisgarh is on nomination basis to the Gram Panchayats on submission of application by the Panchayat to the District Collector. The royalty applicable in the State is Rs. 50 per m^3 and the royalty collected in the State is retained by the panchayat department for development expenses.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Notified Areas	No restriction	No restriction	NA	As long as EC permits

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Notified or controlled pricing model	Nomination	Allocation to Panchayat	Yes	10.0	10.6

The Department of Mines and Geology gets the environment clearance and prepares the mine plan on behalf of the panchayat, which reduces the time for obtaining the clearances. The operations control and sales right, for sand is with the gram panchayat in the State.

Sales

There are no charges applicable on sand in the State apart from royalty, and anyone can go to reach with a vehicle and load sand at his own expense after paying the royalty amount to the panchayat. The State has sufficient sand available and the price which the consumers have to pay for sand varies from Rs 250 to 700 per cubic metre (i.e. around Rs 132 /tonne to Rs 370/tonne for a bulk density of 1.89 g/cm^3) depending on the distance of the consumption point from the reach. There is limited use of technology in any of the sand mining processes in the State but geo-tagging of the sand reaches is done which makes physical monitoring of the sand reaches easier.

Demand Supply assessment

No demand-supply assessment of sand is being done, however, the State has sufficient sand to meet the demand. Further, there is no restriction on transport of sand outside the State. However, a recent issue on transportation of sand to other State through railway wagon caught media attention, post which the State had issued a notification to discourage transport of sand to other states.

DSR Status

District Survey Report is prepared in all the 27 districts of Chhattisgarh.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 5 Summary of sand mining policy of Chhattisgarh

Activity	Responsibility	Sub-Activity	Timelines	IT Usage

Identification of sand reaches	Directorate of Geology & Mining, Chhattisgarh	• Identification of sand-bearing areas and preparation of Site Appraisal Reports • Fixing boundary and assessment of quantity of sand • Assessing feasibility of sand mining in the identified areas	Usually takes 1 month	Offline
Allotment of sand reaches	Directorate of Geology & Mining, Chhattisgarh	• On nomination basis to Gram Panchayats	Not defined, but after application, the collector immediately notifies the area	Offline
Clearances & Approvals (Mining Plan, Environment clearance)	Directorate of Geology & Mining, Chhattisgarh	• Preparation of mining plan, mine closure plan, environment study (EIA/EMP) • Obtain approvals of mine plans, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plans to authority for issue of environmental clearance.	Depending upon the area of the concession	Offline
Operation and Monitoring	Gram Panchayat	• Mining and loading operations are conducted by the Panchayat or the end user directly	Continuous	Offline
	District Collector	• Overall monitoring lies with the District Collector	Continuous	Offline
Transportation	Customer/ End user	• Hiring of transporting vehicle • Hiring of labourers for loading/unloading or payment to villagers working at the reach for the same	Continuous	Offline

Sales	Gram Panchayat	• Issuance of transport permit upon payment of royalty	Continuous	Offline

3.4 Gujarat

Regulatory Provisions

The minor mineral rules applicable in Gujarat are *Gujarat Minor Mineral Concession Rules, 2017* and the responsibility of the minor mineral "sand" is with the Commissioner of Geology & Mining (CGM) under the Industries and Mines Department. Sand is part of Part A of the Schedule III of the Rules.

Business Model

From 2017 onwards, the allocation of sand reaches in the State is based on competitive bidding/ open auctions. The business model used is "Tender cum forward auction model" with a base premium, which is 5-6% of value of the mineral dispatched. The bidders quote the premium to be paid in terms of % over and above the base premium with an increment of 0.5%. The value of mineral of sand published by the State Government is Rs 240/ tonne for the State. The period of the concession granted for sand is five years.

The mining operation and sale of sand in the State is undertaken by the lessee. The concession granted for sand is quarry lease for which the minimum area that can be granted is 1 Ha and maximum area to be granted is 50 Ha.

Types of sand concessions	Minimum Area	Maximum Area	Limit for holding maximum area by one individual in the State	Time period
Quarry Lease, Quarry Permit and Quarry Parwana	1 Ha	50 Ha for QL 0.2 Ha for QParwana	50 Ha	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)

Market Model	Competitive Bidding	Online tender cum forward auction	Yes	49.64	160.34

The Lessee has the responsibility of preparing the mine plan and taking the environment clearance from the relevant body depending on the size of the block and Consent to Operate from the pollution control board.

Most of the sand is transported through tractor and trucks and the State is in the process of making GPS installation in all sand carrying vehicles mandatory.

Sales

Sale rights are with the lessee with orders directly placed by consumers or agents. There is no provision of online purchase of sand for the consumers. There is restriction for the export of sand to other States and from others States to Gujarat. The sand prices vary in the State from Rs. 80/ tonne to Rs 800/ tonne depending upon the districts and infrastructure projects nearby.

DSR Status

Gujarat is in the process of preparation and finalization of DSRs for all the sand related districts (32 out of total 33 districts) for which data are being collected by the district level officer. DSR for Baroda district has already been approved and for rest of the districts, it is either under preparation or under approval.

Demand Supply assessment

No specific data is available with the State regarding the State's sand demand, consumption, replenishment, etc. However, there is no shortage of sand in the State and it is able to meet the demand of sand through natural sand excavated in the State.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 6 Summary of sand mining policy of Gujarat

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches/ Mines/concessions	CGM, Industries and Mines Department, Gujarat	• Identification of sand-bearing area and preparation of Geological report (GR) • Fixing boundary and assessment of quantity of sand	3-4 months	Offline

Allotment of sand reaches	CGM, Industries and Mines Department, Gujarat	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents • Conduct of auction and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder	T0 + 105 days from issue of final acceptance letter/ LoI	Online
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Preparation of mining plan, mine closure plan, environment Study (EIA/EMP) • Obtain approval of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance.	6 months or 1 year depending on the size of the sand reach	Offline
	Lessee	• Application for Consent for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board. • Other relevant clearances and approvals	1 month	Offline
Operations and Monitoring	Lessee	• Mining and loading operations are conducted by the lessee	Continuous	Offline

	CGM, Industries and Mines Department, Gujarat	• Overall monitoring lies with the District Monitoring Committee	Continuous	Offline & Online
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance.	Continuous	Offline
	Lessee	• Issuance of “royalty pass and permit”	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.5 Haryana

Regulatory Provision

The minor mineral rules applicable in Haryana are *Haryana Minor Mineral Concession, Stocking, Transportation of Minerals and Prevention of Illegal Mining Rules, 2012* and the responsibility of the minor mineral “sand” is with the Mines and Geology Department, Haryana.

Business Model

The allocation of sand reaches in the State is through forward e-auction, with a reserve price which is a lump sum amount based on the area of the block and based on the previous auctioned value of the same block/area. The rate of royalty in the State is Rs 40/ MT but there is no provision of royalty collection on per tonne of sand extracted in case of mining contract, as the highest bid offered in the auction becomes the annual contract money and the contractor is liable to pay monthly installment of that annual highest bid. The contract money expires after every three years period, and is enhanced by 25% of the previous contract money after the expiry. The time period of the contract granted in the State is 7 to 10 years.

There is no pre-defined annual limit of extraction of sand from sand blocks in the contracts which are auctioned. The limit for extraction of sand is defined in the mining plan/ environment clearance and the responsibility of preparing the mine plan and taking the relevant clearances and approvals lies with the contractor to whom sand mines are allocated/auctioned.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Mining Contracts, Quarrying Mineral disposal permit	1 Ha	Not defined	1000 Ha	7-10 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online Forward auction	No	9.8	265.9*

**Production data is for the calendar year 2017-2018.*

The operation and sale of sand in the State is done by the contractor with no regulation from the State Government. There is no restriction on the maximum size of the block that can be allocated through e-auction.

Other than the limited use of CCTVs and auction of the blocks, IT infrastructure has no major role in operations or monitoring of sand mining in Haryana. The State is in the process of developing an IT system for monitoring of its mines and implementing e-Ravana system on the lines of the notification of MoEFCC. Further, to check cases of illegal mining, the State has given its consent to the Government of India to implement MSS for minor minerals also for which the State has already provided the details of each mine as well as the cadastral maps/ khasra maps duly demarcated to the Bhaskaracharya Institute of Space Application and Geo Informatics (BISAG) at Gandhinagar.

Sales

There are no notified rates for the transportation of sand in the State and transportation is completely owned by private transporters and managed by the contractors only. Since sale and delivery rights are with the contractors, they are free to use own transporters for delivery of sand.

The price of sand in the State is around Rs 500 to 550 per metric tonne at pit head and is sold at Rs 600 per tonne in Karnal district which is at a distance of around 25 to 30 kms from mining

area, including the transportation charges. In Panchkula district, the rates of sand are Rs. 20-22/ft3 (i.e. around 600-650/ tonne) at a distance of around 20-25km from sand mines.

DSR Status

Haryana is in the process of preparation and finalization of DSRs for which data are being collected by the district level officer. District Survey Report is getting prepared for the sand bearing districts i.e. 15 out of total 23 districts. DSR report is yet to be approved from the authority. Once all the reports are ready and approved by the authority, total resource assessment of the State can be done.

There is no specific data available with the State regarding the State's sand demand, consumption. However, the State has surplus sand and also caters to sand requirements of Delhi to some extent. There is no restriction on the transport of sand to other States and from others States to Haryana. Based on production returns of contractors of sand mines in the State, the demand is estimated at 8.5 million tonnes in 2017.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 7 Summary of sand mining policy of Haryana

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Mines and Geology Department, Haryana	• Identification of sand-bearing areas and preparation of initial feasibility report • Fixing boundary and assessment of quantity of sand • Assessing feasibility of sand mining in the identified areas • Forest area demarcation and approval	2-3 months	Offline
Allotment of sand reaches	Mines and Geology Department, Haryana	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/Bid Documents • Conduct of auction and selection of successful bidder • Issuance of Letter of Intent to the successful bidder	1-2 Months +3 months for issue of Lease	Online

Clearances & Approvals (Mining Plan, Environment clearance, CFE/CFO)	Contractor	• Preparation of mining plan (by RQP), mine closure plan, environment plan (EIA/EMP) • Obtain approval of mine plan, mine closure plan and environment plans • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance • Application for Consent for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board. • Other relevant clearances and approvals	2-3 months for mining plan approval 6-12 Months (If area is less than 25 Ha.) 12-36 Months (If area is 25 Ha.)	Offline
Operations and Monitoring	Contractor	• Mining and loading operations are conducted by the contractor	Continuous	Offline
	Mines and Geology Department, Haryana	• Overall monitoring responsibility lies with the District Monitoring Committee	Continuous	Offline
Transportation	Contractor	• Selection of transporters	Continuous	Offline
	Contractor	• Issuance of “Mineral Transit Pass”	Continuous	Offline
Sales	Contractor	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.6 Karnataka

Regulatory Provisions

Karnataka undertook major amendments to its *Karnataka Minor Mineral Concession Rules, 1994* in 2016 and has added a separate chapter IV-B detailing the permission for quarrying of ordinary sand in river bed, patta land, removal of sand bars in Coastal Regulation Zone areas of coastal districts and special provisions for production of M-sand as well as for transportation of sand and M-sand.

The concessions granted in Karnataka are called quarry lease. There is restriction on the maximum area that can be granted for sand concessions in the State i.e. 50 acres (20 Ha.) for mineral based industry and 10 acres (4 Ha.) for others but the minimum area that can be granted is 5 acres (2 Ha.). The time period for sand concessions is less than 5 years.

Business Model

The responsibility of the minor mineral “sand” is assigned to the Department of Mines & Geology. The model used in Karnataka after amended rules is tender cum forward auction method. The base price is fixed at 20% of the royalty applicable (current rate of royalty in the State is Rs 60/ tonne) and a two stage auction method is followed to arrive at the final price. Prior to 2016, sand mining was carried out by Public Works Department in the State from 2011 onwards.

Further, temporary permit is granted to local communities to remove sand from the coastal area on application basis. The permit is renewed on yearly basis and the environmental official at the district level is responsible to monitor the removal of sand. The State Government studies the accumulation of sand bars and its removal with the help of satellite imageries, GPS, etc.

Apart from this, the State Government may permit sand quarrying in specified patta lands with such terms and conditions as may be specified by the State Government on recommendation of the District Committee regarding the quality of sand and its suitability for construction purposes, with adequate justification. The District Committee has the power to fix the maximum rate at which the holders of license can sell sand at the loading point and indicate this in the license condition, and can also allocate up to 25% of sand for low income housing or government works.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Quarry Lease and Temporary Permit (for local communities)	5 acre (2 Ha.)	20 Ha (mineral based industry)/ 4 Ha for others	20 Ha (mineral based industry)/ 4 Ha for others	< 5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online tender cum forward auction	Yes	4.0	25.2

The successful bidder has the responsibility to submit the approved quarry plan within two months of issuance of letter of intent by the concerned competent authority, and to get the Environment Clearance from the granting authority (DEIAA/SEIAA/MoEFCC) before commencement of quarrying operations.

The operation and sale of sand in the State is taken care of by the lessee with no regulation from the State Government. However, the District Collector may fix the maximum sale price of sand for each district in the tender document itself.

Karnataka has district level and taluk level sand monitoring committees that are responsible for identification and monitoring of sand in the State. The district committee is empowered to establish check post wherever necessary to regulate transportation of sand and make suitable arrangements for patrolling to monitor illegal transportation including river patrol wherever necessary. And the taluk committee is empowered to monitor sand excavation in all the concession areas and to enforce laws and regulate illegal quarrying, storage and transportation of sand.

Sales

The lessee has the responsibility of sale of sand with limited regulation by the State Government. Consequently, the price of sand is very high in the State, especially in cities which are far away from sand excavation areas. In Bangalore, consumers have to shell out Rs. 1 lakh for a 30 tonne truck of sand (i.e. Rs 3500/ tonne).

The State is using technology in allocation of sand reaches as well as in delivery, and all the sand transporting vehicles are GPS enabled. The minor mineral rule applicable in the State mandates the lessee to install the office, computer facility, electricity supply, CCTV camera, weigh bridge, security at dump yard or stock yard of the sand.

DSR status

As per MoEFCC notification No.So:141, dated 15th January 2016, surveys have been carried by DEIAA of the concerned districts and District Survey Reports for all the 30 districts have been prepared. The expenses for the preparation of DSRs comes from the District Corpus Fund, after approval of the District or Taluk committee.

Demand Supply assessment

The estimated production of river sand in the State is only 4 million tonnes out of the total demand of 30 million tonnes (based on DMG data), which has led to deficit of sand in the State and extremely high price. Majority of the deficit is met by the M-sand production in the State. Karnataka is the leading State in production of M-sand. The State has 164 M-sand production units that produce 20 million tonnes of M-sand per annum and 95% of the sand consumed in Bangalore is M-sand only. Further, to take care of sand scarcity, the State has notified a policy through amendment in KMMCR in 2017 for import of sand from other countries. The imported sand is sold only in 50 and 100 kg sealed packets.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 8 Summary of sand mining policy of Karnataka

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Department of Mines & Geology, Karnataka	• Identification of sand-bearing areas and preparation of Site Appraisal Reports • Fixing boundary and assessment of quantity of sand • Assessing feasibility of sand mining in the identified areas	1-2 month	Offline
Allotment of sand reaches	Department of Mines & Geology, Karnataka	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/Bid Documents • Conduct of auction and selection of successful bidder • Issuance of provisional acceptance letter and final	1 month + 1 month for issue of final acceptance letter	Online

		acceptance letter to the successful bidder		
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Preparation of mining plan (by RQP), mine closure plan, environment plan (EIA/EMP) • Obtain approvals of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental Study (EIA/EMP) to authority for issue of environmental clearance.	Depending upon the area	Offline
Operation and Monitoring	Lessee	• Mining and loading operations are conducted by the Lessee	Continuous	Offline
	Department of Mines & Geology, Karnataka	• Overall monitoring responsibility lies with the District Monitoring Committee	Continuous	Offline & online
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance	Continuous	Offline
	Lessee	• Issuance of “Weighment Slip”	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.7 Madhya Pradesh

Regulatory Provisions

The minor mineral rules applicable in the State are *Madhya Pradesh Minor Mineral Rules, 1996* and the responsibility of the minor mineral "sand" lies with the Directorate of Geology and Mining, Madhya Pradesh. Earlier, sand mining in the State was governed by the Sand Mining Policy 2015, however the State has notified a new sand policy by the name, "Madhya Pradesh Sand Mining Policy 2017" in which the sand reaches are allocated to the gram panchayats for sand excavation.

Business Model

The allocation of sand reaches in the State is on application by the gram panchayat to the District Collector and the sale price applicable is Rs 125 per m3 at sand reaches, out of which Rs 50 will go to panchayat department, Rs 50 to the District Mineral Foundation and Rs 25 to MPSMC as processing fee. Further, the royalty collected in the State is retained by the panchayat department for development expenses.

There is no restriction on the upper limit of size of concessions that can be granted. However, the minimum area that can be granted is 1 Ha. The time period for the blocks allotted to Gram Panchayats is five years.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Quarry Lease, Trade Quarry	1 Ha	No restriction	No restriction	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Controlled pricing model	Nomination	Allocation to Gram Panchayat	Yes	49.14	240

The Department of Mines and Geology gets the environment clearance and an RQP prepares the mine plan on behalf of the panchayat, which reduces the time for getting the clearances. The operations control and sales right for sand lies with the gram panchayat in the State. The clearances and approvals are taken in the name of gram panchayat.

Under the recently released sand policy, the State has mandated that no monitoring of sand will take place while transportation and consequently no transport permit is required for transportation of sand in the State.

Sales

The sale price of sand in the State is fixed at Rs 125/m3 at pit head. The sand can be booked through the online portal maintained by MPSMC. Any consumer registered on the portal can book sand though the portal after payment of amount for the sand, excluding transportation and loading/unloading charges. After payment, the consumer receives an entry pass through SMS on his registered mobile number through which he can visit and offtake the booked quantity.

Transportation is provided by private transporters and the State has no role in it. However, the State provides an online platform where all the sand transporting vehicles need to be registered. The State has also mandated that all sand transporting vehicles should be GPS enabled within a period of 6 months post which no vehicle without GPS will be allowed to enter the sand reach. Around 90% of the illegal mining cases closed in the previous year in the State was related to illegal transportation of sand.

DSR Status

District Survey Report is prepared in all the 51 districts of Madhya Pradesh. DSR is prepared as per the notification of the MoEFCC, but the Sustainable Sand Mining Management Framework 2016 released by MoEFCC which prescribes the method, is not followed.

Demand Supply assessment

Madhya Pradesh has not carried out any demand-supply assessment for sand in the State. As per a Government estimate, the demand for sand in the year 2016-2017 was 26 million $m^{3.}$ However, the production figure reported on the e-khanij portal was short of the demand mentioned above by a huge margin. The State does not have any restriction on inter-border transport of sand to and from other States.

Online Portal

Madhya Pradesh maintains an online portal by the name E-khanij for online monitoring of sand production and sale data. The online ordering of sand is done at https://ekhanij.mp.gov.in/AppPrevious/sandmp.aspx.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 9 Summary of sand mining policy of Madhya Pradesh

Activity	Responsibility	Sub-Activity	Timelines	IT Usage

Identification of sand reaches	District Collector	• Joint Inspection of the area with representative of Revenue, Water Conservation, Public Works, Environment, Forest and Mining, Departments • DGPS survey of the area • Assessing feasibility of sand mining in the identified areas	1-2 months	Offline/ online
Allotment of sand reaches	Directorate of Geology and Mining, Madhya Pradesh	• On nomination basis • Notification of the sand reach in the name of the Gram Panchayat	Not defined, but after application, the collector immediately notifies the area	Offline
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	District Collector	• Preparation of Mine Plan by a RQP • Approval of the Mine Plan on recommendation of Mining Officer/ Mining Inspector • Environmental Clearance (EC) from State Environment Impact Assessment Authority • Consent for Establishment (CFE)/Consent for Operation (CFO) from	2 months	Offline

		the State Pollution Control Board		
Operations and Monitoring	Gram Panchayat	• Mining and loading operations are conducted by the Panchayat or the end user directly	Continuous	Offline
	State level and District Level, task force team	• Overall monitoring lies with the task force team formed under the chairmanship of District Collector. Some of the initiatives taken by the team are: - Installation of check post and weigh bridges at check post on PPP model. - Mobile app for reporting of illegal mining/ transportation by making a video of the same.	Continuous	Offline & online
Transportation	Transporters	• Setting of transportation charges based on travel distance • Delivering the sand to customers	Continuous	Offline
	Directorate of Geology and Mining, Madhya Pradesh	• Registration of transporting vehicles	Continuous	Online
Sales	Directorate of Geology and	• Getting orders through the online portal	Continuous	Online

	Mining, Madhya Pradesh	• Sending the entry pass on the registered mobile number of customers		

3.8 Maharashtra

Regulatory Provisions

The Minor Mineral rules applicable in Maharashtra are Maharashtra Minor Mineral Extraction (Development and Regulations) Rules, 2013. The responsibility of all the minor minerals in the State is handled by the Revenue and Forest Department, Maharashtra. The State has separate set of rules for sand excavation called, Amended Sand Excavation Policy.

The concessions of sand mines are called quarry lease. The time period for quarry lease is one year. The size of concession in Maharashtra is not pre-defined, and every year after monsoon, in the month of October, assessment of the quantity of sand is done and based on the assessment the size of concessions is decided. Further, there is no minimum or maximum restriction on the area that can be granted for sand concessions in the State, neither any restriction on the area held by an individual.

Business Model

Under the policy, the allocation of sand reaches in the State is through e-tender i.e. forward premium method to be quoted by the bidder. For fixation of off-set price, if the auction of that particular sand block was done in previous year, then the highest bid offered in previous year is accepted. The highest bid divided by quantity available in previous year, multiplied by the quantity available this year is used as off-set price. If the auction was not done for the said block in the previous year, then details of the group auctioned in the previous year on the same river bed is accepted. And if the auction was not carried out in the previous year even in the same river bed, then the Collector shall propose the off-set price by giving justification.

Apart from river sand mining, creek mining is also done in the State where use of dredgers and suction pump is permitted. The blocks for creek mining is allocated through applications by issuing licenses to the person or society of such persons doing such business traditionally by hatpati or dubi means, and the sand extracted by creek mining is auctioned by the collector of the district.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period

Quarry Lease	NA	NA	NA	1 year, ending on 30th September

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online forward tender	No	NA	NA

Currently, royalty rate in the State is Rs 400 per brass but following the allocation method after 2016 rules, the royalty collected is inclusive of the auction premium.

Before conducting the auction of river basin; approval of the Gramsabha in which the river basin lies is required with at least 50% voting in favour of the allocation of the block. Opinion of Ground Water Survey and Development agency is also taken to ascertain the sand stock available in the concerned sand group and whether the excavation of sand under water is necessary to avoid creation of flood condition, and in case of creek area, the opinion from Maharashtra Maritime Board has to be obtained through survey regarding the approximate sand stock available in the concerned sand group, how much deep the excavation has to be done and whether the use of technical equipment for excavation shall be permitted or not. After the auction process, the successful bidder has the responsibility to get the environmental clearance from the concerned body. Mining plan is not followed in the State, as a result, NGT has banned sand mining in Gondia district.

The District Collectors in the State are empowered to make decisions to curb illegal mining and some of them use drones and CCTV cameras to monitor the reaches. However, the overall monitoring in the State is done by a team of Tehsildars, Sub-divisional level officers, RTOs and Revenue department officers by way of physical inspections.

Sales

The use of machinery has been struck down by the NGT in the State. The control of operations as well as sales is with the lessees and the price of sand is market determined. Because of the lack of control of the Government over the sale of sand coupled with the forward auction method of allocation, the price of sand is high and the sale price (landed cost) of sand in Mumbai is around Rs 70,000 for a 30 tonne truck i.e. around Rs 2400/tonne.

DSR Status

District Survey Report is being prepared in all the 36 districts and DSR for all 36 districts is already released. However, the replenishment study has not been taken up in the DSR. Further, the same reach is granted year after year for sand extraction without giving significant time to the reaches for replenishment which may create ecological issues.

Demand Supply Assessment

Maharashtra has not conducted any demand-supply assessment for sand, but overall the State is sand deficit which has led to very high prices for sand in the State, and is therefore considering import of sand from other countries such as Malaysia and Philippines.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 10 Summary of sand mining policy of Maharashtra

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches/ Mines/concessions	District Collector	• Identification of sand-bearing areas, fixing the boundary and assessment of sand in reaches.	1 month	Offline
Allotment of sand reaches	District Collector	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents • Conduct of tender and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder	1 Month + 1 month for issue of final acceptance letter/ LoI	Online

Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Department of Revenue & Forest	• Other relevant clearances and approvals such as recommendation of Gramsabha, opinion of Ground Water Survey and Development agency	15 days for approval of gram sabha, 10 days for ground water survey and development agency	Offline
	Department of Revenue & Forest	• Approval of environment plan (EIA/EMP) • Submission of approved environmental plan (EIA/EMP) to authority for issue of environmental clearance	Depending upon the area of the concession	Offline
Operation and Monitoring	Lessee	• Mining and loading operations are conducted by the lessees	Continuous	Offline
	District Collector	• Overall monitoring lies with the District Collector	Continuous	Offline & Online
Transportation	Lessee	• Selection of transporters	Continuous	Offline
	District Collector	• Issuance of necessary permit/pass-book having bar-coding to the auction holder to the extent of sand stock available for excavation	Continuous	Offline
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.9 Punjab

Regulatory Provisions

The minor mineral rules applicable in Punjab are *Punjab Minor Mineral Rules, 2013* and the responsibility of the minor mineral "sand" is handled by the Mining Department which is under the Department of Industries and Commerce.

Business Model

The allocation of sand concessions in the State is through forward e-auction method from 2017 onwards and the reserve price applicable is Rs. 86 per tonne which includes royalty figure of Rs. 60 per ton, 10% as Environment Management Fund (Rs. 6 per tonne) and 1/3 of royalty as District Mineral Foundation Fund (Rs. 20 per tonne). The bidders quote lump sum amount to be paid annually by them to the Government (inclusive of the royalty) and it increases by 10% every year. Further, the successful bidder also has to pay quarterly compensation to the land owners which is pre-defined in the tender document. The period of a mining contract is minimum of 2 years and maximum 5 years, and there are no restrictions on the area for grant of contracts as well as the maximum area which a person can hold.

Apart from mining contracts, the State also offers short term permit for sand which is granted to excavate a fixed quantity of sand and the permit is granted for a period of less than one year. Short term permit is offered on application by the Director of the mining department and in case more than one applicant proposes to extract the sand quantity, all parties submit their bid through sealed cover tender and the permit shall be given to the highest bidder. The maximum area for which short term permit is granted is 4 Ha.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Grant of Contracts, Short term Permit	No restriction	For short term contracts – 4 Ha	5 Sq km	2-5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online forward e-auction	No	NA	43.8

The State offers reservation to the local community and for the Government works and in case sand is extracted by the land holder in case of private land.

Till last year, the department held the responsibility of preparation of mine plan and getting the environment clearance, but now the responsibility has been given to the project proponent. Further, the lessee has the responsibility of only getting the Consent for Establishment and Consent for Operation from the State Pollution Control Board.

Mining operations are managed by the lessee and there are no notified rates for transportation of sand in the State. Since delivery and sale rights are with the lessee, they are free to use own transporters for delivery of sand. Consequently, the price of sand are quite volatile in Punjab.

Sales

Monitoring mechanism for illegal mining is not very stringent in the State, and no CCTV cameras or check posts are available for the monitoring of illegal sand extraction. The department takes assistance of PESCO (Punjab Ex Servicemen Cooperative organization) for physical checking.

The price of sand in Bathinda district is around Rs 1100/m3 (Rs 500-600 /tonne) for washed (coarse) sand sourced from a distance of around 200+ Km (from Pathankot) and Rs 800/m3 (400-500/tonne) for fine sand (sourced from Zira/ Ferozpur) from distance of 100+ KM. However, the prices escalate during the monsoon period by 20-25%.

DSR Status

Punjab is in the process of preparation and finalization of DSRs for all the sand related districts for which data are being collected by the district level officer. DSR has already been approved for Pathankot District and for rest of the districts, it is either under preparation or under approval.

Demand Supply Assessment

A rough estimate given by the department shows demand of 16 MTPA in the State with supply of around 11.5 MTPA. The net deficit is around 4.5 MTPA.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 11 Summary of sand mining policy of Punjab

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Mining Department, Department Of Industries and	• Identification of sand-bearing areas and preparation of Site Appraisal Reports	1-2 months	Offline

	Commerce, Punjab	• Fixing boundary and assessment of quantity of sand • Assessing feasibility of sand mining in the identified areas		
Allotment of sand reaches	Mining Department, Department Of Industries and Commerce, Punjab	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents • Conduct of auction and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder	1 Month + 1 month for issue of final acceptance letter	Online
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Responsibility of preparation of mining plan (by Qualified Person), mine closure plan, environment plan (EIA/EMP) • Transfer of Environment Clearance (if any with the previous allottee) • Application for Consent for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board • Other relevant clearances and approvals	1-2 month 1-2 month	Offline

	Mining Department, Department Of Industries and Commerce, Punjab	• Approval of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance.	2-3 Months for mining plan preparation and approval 6-12 Months (If area is less than 25 Ha.) 12-36 Months (If area is greater than 25 Ha.) •	Offline
Operations and Monitoring	Lessee	• Mining and loading operations are conducted by the Lessee	Continuous	Offline
	Mining Department, Department Of Industries and Commerce, Punjab	• Overall monitoring lies with the District Level Committee	Continuous	Offline
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance	Continuous	Offline
	Lessee	• Issuance of “Weighment Slip” in Form T	Continuous	Online

Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.10 Rajasthan

Regulatory Provisions

The Minor Mineral rules applicable in Rajasthan are *Rajasthan Minor Mineral Concession Rules, 2017* and the responsibility of the minor mineral "sand" is with the Department of Mines & Geology, Rajasthan.

Business Model

the Sand is allocated in the State though online tender cum auction and the concession applicable in the State is mineral lease which is granted for five years. Reserve Price for the auction is 20% of the royalty payable on river sand, and currently the royalty for sand in the State is in the range of Rs 30 per tonne/ Rs 35 per tonne.

There is no maximum limit of the area to be held by a particular individual/company/firm.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mineral Lease, Quarry License, Short Term Permit	5 Ha	No restriction	No restriction	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online Tender cum forward auction	No	56.8	235.9

Mining is responsibility of the lessee and the department has no control over the operations of the mines. The Government does not regulate transportation or sale of sand. There is limited use of IT in operations or monitoring. Monitoring is done using check posts and physical checking of material under transportation for valid permits.

Sales

Overall, sand prices are quite volatile in the State due to supply constraints, which tends to increase the prices of sand. Sand is available at around Rs 300 to Rs 400 per tonne in cities like Udaipur which are around 40 to 50 km away from sand leases. After ban by the Hon'ble Supreme Court in Nov 2017, the prices have shot upto Rs. 1000-1200/tonne.

DSR Status

The District Survey Report is ready for 23 districts out of 28 sand bearing districts. As per the DSRs, production potential has been calculated which is around 40 MTPA from 23 districts.

Demand Supply Assessment

As per the assessment carried out by the State, a total of 56 MTPA of sand is required in the State. However, demand methodology is not known.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 12 Summary of sand mining policy of Rajasthan

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Department of Mines & Geology, Rajasthan	• Identification of sand-bearing areas and preparation of Mauka Reports • Fixing boundary and co-ordinates, area identification, etc. • Assessing feasibility of sand mining in the identified areas.	1-2 months	Offline
Allotment of sand reaches	Department of Mines & Geology, Rajasthan	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents	1 month + 1 month for issue of Letter of Intent	Online

		• Conduct of online tender cum auction and selection of successful bidder • Issuance of Letter of Intent to the successful bidder		
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee/ Lessee	• Preparation of mining plan (by RQP), mine closure plan environment plan (EIA/EMP) • Obtain approval of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance. • Other relevant clearances and approvals	1 month 3 months 6-12 Months (If area is less than 245 Ha.) 12-36 Months (If area is more than 25 Ha.)	Offline
Operations and Monitoring	Lessee	• Mining and loading operations are conducted by the lessee	Continuous	Offline
	Department of Mines & Geology, Rajasthan	• Overall monitoring lies with the Department	Continuous	Offline
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance	Continuous	Offline

	Department of Mines & Geology, Rajasthan	• Issuance of "Transit Pass" by the department	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivering the sane to respective customers	Continuous	Offline

3.11 Tamil Nadu

Regulatory Provisions

The Minor Mineral rules applicable in Tamil Nadu are *Tamil Nadu Minor Mineral Concession Rules, 1959* and the State has introduced rule 38-A in the concession rules vide G.O.Ms. No. 95 dated 1st October 2003. The responsibility of the minor mineral "sand" is handled by the Public Works Department, Tamil Nadu.

Business Model

PWD is responsible for identification of sand bearing areas in the river stretches and they send a proposal to the District Collector for seeking quarrying permission. The collector conducts a joint inspection of the proposed area and on recommendation of the Joint Inspection Team instructs the PWD to prepare the mine plan.

PWD has the responsibility to prepare the mine plan and the get the environment clearance from the relevant body depending upon the size of the area. After the approval of mine plan and environmental clearance, the district collector grants permission to PWD for sand quarrying on nomination basis. There is no restriction on the size of the concessions and the time period for extraction is up to 3 years.

PWD calls for tenders for selection of contracts from private parties for extraction and loading of sand. All the existing quarries have an area less than 25 Ha and currently only 12 quarries are functioning after the high court ban. In stream sand mining is not allowed in the State. Private persons are allowed to establish stockyards to store sand purchased from PWD.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Sand Quarry	NA	NA	NA	1- 3 years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Notified or controlled pricing model	Nomination	Allocation to PWD	Yes	15.12	86.33

Sand quarrying operations are under the control of the State and the supply of sand to the public is done directly by the Government at the quarry. The PWD is supplying sand to the common public at a notified price of Rs. 540 per unit at pit head, where one unit equals three cubic metres, i.e. Rs 180 per cubic metre but landed rates including transportation cost is much higher than the notified rates.

Sales

The State has constituted District Level and Taluk Level task Force under the chairmanship of District Collector/ Taluk Tahsildar to curtail illegal quarrying and transportation of sand. Further, three regional flying squads have also been formed by the DMG for monitoring. The online Mining Tenement System has already been implemented for the existing sand quarries and the State has released an order to mandate the registration of all sand carrying vehicles in the State with the PWD. The State has also implemented a QR code system to examine the validity of the online transport permit.

After the ban of high court on sand mining in the State, the sale price for sand in Chennai including the transportation fare has increased to more than Rs. 40,000 for a truck of sand of around 30 tonnes i.e. Rs 1300-1400/tonne. Before the ban, sand was available for Rs 20,000 for a truck of sand. The State is in the process to develop a policy for promotion of M-sand in the state.

DSR Status

The District Survey Report has been prepared in co-ordination with the Geological Survey of India for 18 districts. The preparation of report for the remaining 12 districts is in progress.

Demand Supply Assessment

As per the PWD estimate, the demand of sand in the State is estimated at 53.71 MTPA. The total supply of sand in 2016-2017 was 18.36 MT with 15.12 MT from river sand and 3.24 MT from M-sand. And the deficit in the State is estimated at 35.56 MT. Further, recently due to court order, 32 sand quarries have stopped and the deficit is expected to further increase. The Government

is planning to meet this deficit through promotion of M-sand and a proposal has already been sent to the Government for framing M-sand policy in the State.

Online Portal

Tamil Nadu has developed an online portal for ordering and delivery of sand i.e. www.tnsand.in

A summary of other key aspects of sand policy of the State is tabulated below:

Table 13 Summary of sand mining policy of Tamil Nadu

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Public Works Department	• Identification of sand-bearing areas	1-2 month	Offline
	Joint Inspection Team (under District Collector)	• Fixing boundary and assessment of quantity of sand • Recommendation to the District Collector on grant	1 month	Offline
Allotment of sand reaches	District Collector	• Notification of the sand reach in the name of PWD	Not defined but immediately after getting the environment clearance	Online
Clearances & Approvals (Mining Plan, Environment clearance)	Public Works Department	• Preparation of mining plan (by RQP), mine closure plan, and getting them approved by the Deputy/ Assistant Director of the concerned district. • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance.	Depends on the size of the concession	Offline

		• Other relevant clearances and approvals		
Operation and Monitoring	Contractor	• Mining and loading operations are conducted by the contractor raised by PWD through competitive bidding	Continuous	Offline
	Department of Geology & Mining, TN/ District Collector	• Constitution of District Level and Taluk Level Task Force to curtail illegal quarrying and transportation of sand. • Constitution of regional flying squads for arresting for illegal quarrying/ transportation	Continuous	Offline/ Online
Transportation	Transporter	• Setting of transportation charges based on travel distance	Continuous	Offline
	Public Works Department	• Issuance of online transport permit with QR scan code.	Continuous	Online
	Public Works Department (PWD)	• Registering all the sand carrying vehicles in the State	Continuous	
Sales	Public Works Department (PWD)	• Getting orders through the sand portal • Delivery of sand	Continuous	Online

3.12 Telangana

Regulatory Provisions

Telangana after bifurcation from Andhra Pradesh in 2014, adopted the Andhra Pradesh Mineral Concession Rules, 1966 for minor minerals. The responsibility of the minor mineral “sand” is with the Department of Mines & Geology, Telangana. For sand, there is separate policy i.e. *New Sand Mining Policy 2014*.

Sand extraction and sales in the State other than in respect of I and II order streams and patta lands, is done through Telangana State Mineral Development Corporation Limited (TSMDC). TSMDC Ltd. extracts and supplies sand from III order and above order streams (Sand reaches near the river), and by de-silting of reservoirs and tanks.

Business Model

The allocation of sand blocks is done on nomination basis to TSMDC and further TSMDC selects contractor to carry operations through competitive bidding process. There is no restriction on the size of the concessions and the time period for extraction is one year. However, the period of sand extraction from the allotted area is as per the local conditions, reflected in the Approved Mining Plan and CFO.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease	NA	NA	NA	1 Year

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Notified or controlled Pricing Model	Nomination	Allocation to TSMDC	Yes	13.23	434

The Chairman, District Level Sand Committee allots the specified sand bearing area to Telangana State Mineral Development Corporation Limited for extraction of sand on submission of approved mining plan by the Deputy Director of Mines & Geology of the Region concerned, Environmental Clearance from State Environment Impact Assessment Authority, and Consent for Establishment (CFE)/Consent for Operation (CFO) from Telangana State Pollution Control Board.

In case of the sand cast in pattalands, the pattadar is allowed to de-cast sand to make the land fit for agriculture on application to the Assistant Director of Mines & Geology concerned. No one other than the pattadar is allowed to be involved in de-casting process. Before grant of permission to extract sand in patta land the Assistant Director of Mines & Geology takes up joint inspection

of the pattaland with the Tahsildar, to identify the pattaland possessor/ occupier, Mandal Agriculture Officer, to certify that without de-casting the pattaland is not fit for agriculture, Ground Water Department, to record the geo-coordinates of the pattaland as per boundaries fixed by the Tahsildar, assess the thickness, quantify the sand to be de-casted and give specific recommendation on the mode of de-casting i.e. manual or mechanized, Executive Engineer, Irrigation Department, to report on the location of patta land with reference to river course/bed, and the Asst. Director of Mines & Geology certifies the suitability of sand for construction.

In case of I and II order streams, sand extraction is permitted for local use in villages or towns bordering the streams for bonafide purposes other than commercial operations/public trading/stocking etc. The sand extraction from I and II order stream is as per the WALTA Rules 2004, provided that sand extraction is not be permitted in notified over-exploited areas, sand extraction is free of cost, sand extraction for local use in Government projects is on payment of seigniorage fee, and transportation is only by means of bullock carts/tractors within the jurisdiction.

The department takes care of monitoring with the help of the administrative mechanism put in place for enforcement of extraction and transportation of sand. The sand extraction is under electronic surveillance. The transit pass generated online after making payment has the security seal of Telangana State Mineral Development Corporation stamp with date, time and indicates the destination/route for tracking by way of GPS facility which will be developed.

The Government is getting revenue in the form of royalty / tax, DMF, road damage fee, etc. for the extracted sand on actual basis and Telangana is a leading State in terms of revenue collection from sand.

Sales

The booking of sand is done through an online portal www.sand.telangana.gov.in , which ensures transparency in the sale of sand. The Government has notified the stockyard price of sand in all the districts which varies from Rs 550 to Rs 600 per cubic metre of sand, and the notified price is inclusive of Rs 40 per cubic metre of royalty applicable in State.

TSMDC has the responsibility to obtain Mineral Dealer License for the stockyard under Mineral Dealer Rules, 2000 from the competent authority and establish a stockyard near to the lifting point having good road facilities and also additional stockyards near urban habitations, especially the municipal corporations. The validity of Mineral Dealer License is coterminous with the period of agreement.

Transportation is with private transporters. TSMDC provides an online platform where all the sand transporting vehicles are registered and any consumer can book sand on the online portal provided payment for the sand is made, excluding transportation and loading/unloading charges.

DSR Status

Telangana has evolved a system for identification and assessment of sand resources as per the existing WALT Act 2002 and WALT Rules, 2004 in place of the DSR. No Separate DSR is prepared in the State.

Demand Supply Assessment

On an average, sand consumption in the State is 12.5 million cubic metres (~ 22.5 MMT) per annum, while the supply of sand by TSMDC is 7 million cubic metres (~13.23 MMT) only, and there is deficit of 5.5 million cubic metres (~10.5 MMT). The deficit of river sand in the State is being met by use of M-sand (4 million cubic metres, ~7.56 MMT) and import from neighboring States (1.5 million cubic metres, ~2.83 MMT).

A summary of other key aspects of sand policy of the State is tabulated below:

Table 14 Summary of sand mining policy of Telangana

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	District Level Sand Committee (Under chairmanship of District Collector)	• Identification of sand-bearing area as per the WALTA Act & Rules and demarcating the area with definite co-ordinates and depth to be permitted • Examination of the JIR prepared by the Joint Inspection Team • Assessing feasibility of sand mining in the identified areas	1-2 months	Offline
Allotment of sand reaches	Department of Mines & Geology, Telangana	• Allotment of the sand bearing area on submission of statutory clearances on nomination basis		Offline
	TSMDC	• Execution of lease deed in Form-S1 with Assistant Director of	1 month	Offline

		Mines and Geology concerned • Selection of mining contractors to carry out operations through competitive bidding		
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	TSMDC	• Obtain approval of the mining plan from the Deputy Director of Mines & Geology of the Region concerned • Obtain Environmental Clearance (EC) from State Environment Impact Assessment Authority • Obtain Consent for Establishment (CFE)/ Consent for Operation (CFO) from Telangana State Pollution Control Board	3 – 6 months	Offline
Operations and Monitoring	Contractor	• Mining and loading operations are conducted by the mining contractors appointed by TSMDC	Continuous	Offline
	Department of Mines & Geology, Telangana	• District Level Task Force under the chairmanship of District Collector periodically review quarrying and transportation of sand.	Continuous	Offline

		• District Collector nominate officers to form check squads to conduct quarry inspection, surprise route checks and imposition of penalty.		
Transportation	Transporters	• Setting of transportation charges based on travel distance • Delivering the sand to customers	Continuous	Offline
	TSMDC	• Registration of transporting vehicles • Issuance of "Weighment Slip" by the department	Continuous	Online
	State Government	• Recently introduced Sand taxi concept: an online mechanism for booking sand with delivery to customer door step		Online
Sales	TSMDC	• Getting orders through online sand portal of TSMDC	Continuous	Online

3.13 Uttar Pradesh

Regulatory Provisions

The minor mineral rules applicable in the State are *Uttar Pradesh Minor Mineral (Concession) Rules 1963* and the responsibility of the minor mineral "sand" is with the Directorate of Geology & Mining, Uttar Pradesh. The said rules were amended from time to time and many amendments have been issued till date. On 14th June 2017 a new "Mineral Policy 2017" was notified which mandates auction of all minerals in the State.

Business Model

The allocation of mineral concession for sand in the State is through tender cum auction model (forward). The base price for the tender is annual royalty applicable for the sand. The lump-sum amount in e-auction is on yearly basis irrespective of the quantity to be extracted and for every consecutive years amount to be paid is enhanced by 10 percent from previous year. Other than premium, the successful bidder has to pay 10% of royalty as DMF, 2% TDS and applicable GST. Dead Rent and Surface rent are subsumed within the premium to be paid by the bidder. The period of a quarry lease concession is five years. Apart from quarry lease, short term permits are also issued in the State for specific purposes, which are valid for a period of six months. Further temporary permits are granted for specific purposes for a period of 90 days only. The royalty applicable for sand in the State is Rs 65 per cubic metre.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Temporary Permit	5 Ha	NR	400 Ha	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MTPA)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online tender cum forward auction	No	5.9	47.7

Training has been given to the team of officers of DGM and the State remote sensing department as per the direction of Ministry of Mines, Government of India to implement mining surveillance system in the State. Five short term mining permits of sand of Sonbhadra district have been digitized and uploaded in the MSS System during the training sessions.

Sales

Sale and transportation of sand in the State is with the lessees and private transporters and there are no notified rates for transportation of sand in the State. Further, there is no restriction on export of sand to other States or import of sand from other States.

DSR Status

As per the MoEFCC notification, DSR is being prepared by the concerned districts. Out of 68 sand bearing districts of the State, DSRs for 35 districts have been prepared and approved. For the rest of the districts, the report is being prepared and expected to be released shortly.

As estimated by the department, the price of sand is around Rs 40,000-50,000 per 10 tyre truck (30 tons) around Lucknow and during the monsoon season, since there is a blanket ban on sand mining, it reaches to around Rs. 1300-1600 per tonne for good quality of sand.

Demand Supply Assessment

A rough estimate given by the department shows demand of 45-50 MTPA in the State against the supply of around 18-20 MTPA from existing leases. However, the supply is expected to increase after production starts from the new leases that were recently auctioned.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 15 Summary of sand mining policy of Uttar Pradesh

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Directorate of Geology & Mining, Uttar Pradesh	• Identification of sand-bearing areas and preparation of Valuation Reports • Fixing boundary and assessment of quantity of sand	1 month	Offline
Allotment of sand reaches	Directorate of Geology & Mining, Uttar Pradesh	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents • Conduct of two stage forward auction and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder	1 month + 1 month for issue of final acceptance letter/ LoI	Online
Clearances & Approvals	Successful Bidder	• Preparation of mining plan, mine closure plan, environment plan (EIA/EMP)	1 month for Mining Plan	Offline

(Mining Plan, Environment clearance, Consent to operate)		• Approval of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plans to authority for issue of environmental clearance	3- 6 Months (If area is less than 25 Ha.) 12-36 Months (If area is greater than 25 Ha.)	
Operations and Monitoring	Lessees	• Mining and loading operations are conducted by the lessees	Continuous	Offline
	Directorate of Geology & Mining, Uttar Pradesh	• Overall monitoring lies with the District Monitoring Committee.	Continuous	Offline cum Online
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance.	Continuous	Offline
	Directorate of Geology & Mining, Uttar Pradesh	• Issuance of “royalty Pass/E-rawana by the department	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.14 Uttarakhand

Regulatory Provisions

The Minor Mineral rules applicable in the State of Uttarakhand are *Uttarakhand Minor Minerals (Concession) Rules, 2001* and sand is governed by the Uttarakhand Minor Mineral (sand, bajri, boulder, brisk etc.) Policy, 2015. The responsibility of the minor mineral "sand" is with the Geology and Mining unit under the Directorate of Industries, Uttarakhand.

There are two types of sand concessions in the State:

Mining Lease - A mining lease is granted for revenue land for a period of five years and for private land for a period of one year. Size of the concessions vary from 5 Ha to 50 Ha, however, the maximum limit of area of mining lease which a person can hold in the State is five mining leases or 400 acre.

Mineral picking works - The short terms contracts are allotted for temporary period from 1st Oct to 15th June. These are allotted through lottery process. Size of concessions allotted for mineral picking works can be more than 5 Ha.

Business Model

Allocation of the mining leases for sand reaches in the State is planned through online tender cum forward auction model. Reserve price is based on the quantity of sand available in the area multiplied by the royalty applicable, which is lump sum in "Rs/annum" which is calculated based on the extractable quantity of sand from the particular area. The auction and tender documents are still not available and are expected to be released shortly.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Short term picking contracts	5 Ha	50 Ha	400 acres or 5 MLs	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MTPA)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online Forward auction	No	NA	335.3*

**Revenue figures are for total RBM (River Bed Material).*

Sales

Operations and sale of sand is with the lessees. There are no notified rates for transportation of sand in the State. There is no restriction for export of sand to other States and from other States to Uttarakhand.

DSR Status

The State is in the process of preparation and finalization of DSRs for all the sand related districts for which data are being collected by the district level officer. DSR has been prepared approved for one district i.e. Tehri Garwal District and for rest of the districts it is either under preparation or under approval.

Demand Supply Assessment

There are no specific details/data available with the State regarding the State's sand demand, consumption, replenishment etc. Since there is surplus sand available in the State, the prices are not very high with the sale price being around Rs. 260 per tonne at the sand ghat and Rs. 1000 to Rs. 1200 in Dehradun. However, during the monsoons when the sand availability is scarce, the price shoots up to Rs. 1500 to 1700 per tonne.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 16 Summary of sand mining policy of Uttarakhand

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Geology and Mining unit under Directorate of Industries, Uttarakhand	• Identification of sand-bearing areas and preparation of Joint Inspection Reports • Fixing boundary and assessment of quantity of sand	1-2 months	Offline
Allotment of sand reaches	Geology and Mining unit under Directorate of Industries, Uttarakhand	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/Bid Documents	1 month + 1 month for issue of final acceptance letter	Online

		• Conduct of auction and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder		
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Preparation of mining plan (by RQP), mine closure plan, environment plan (EIA/EMP) • Getting approved mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plans to authority for issue of environmental clearance	6-12 Months (If area is less than 25 Ha.) 12-36 Months (If area is greater than 25 Ha.)	Offline
	Lessee	• Environment clearance • Application for Consent for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board • Other relevant clearances and approvals	1 month	Offline
Operations and Monitoring	Lessee	• Mining and loading operations are conducted by the lessee	Continuous	Offline
	Geology and Mining unit under Directorate of Industries, Uttarakhand	• Overall monitoring responsibility lies with District Monitoring Committee	Continuous	Offline

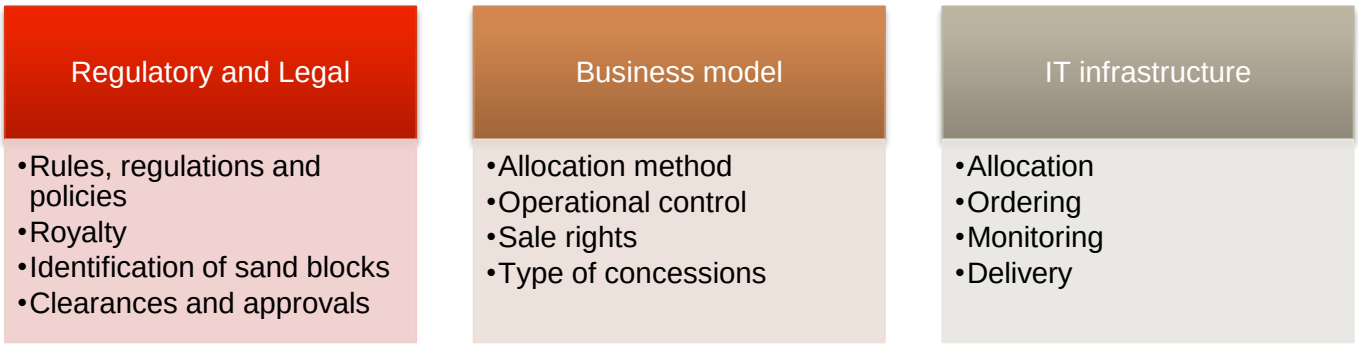
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance.	Continuous	Offline
	Contractor	• Issuance of “e-rawana” by the contractor	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

4. Detailed Comparative Analysis

This chapter presents a comparison of the sand mining policies and practices followed by different States across a range of related parameters such as regulatory framework, types of concessions, pricing mechanism and royalty structure, operations and monitoring, sales and transportation and usage of IT in the process.

Based on information presented in the preceding chapter, a detailed comparison of mining polices of different states has been carried out, and best practices identified accordingly. The different parameters selected for comparison are listed below.

Figure 4- 1 Parameters for comparison



4.1 Regulatory and Legal

4.1.1 Rules, regulations and policies

In exercise of powers conferred by section 15 of the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act), the State Governments have made rules for regulating minor minerals in their respective States. The rules defined and followed by States along with the entities/ departments responsible for sand mining activities in the States are mentioned in the table below. In addition, the table also presents whether there is a separate sand policy available in the State.

Table 17 Rules followed by the States

State	Latest rule applicable	Department controlling sand mining activities	Separate Sand Mining Policy
Andhra Pradesh	Andhra Pradesh Minor Mineral Concession	Department of Mines & Geology, Andhra Pradesh	Free Sand Policy, 2016

	Rules, 1966 and its amendments.		
Assam	Assam Minor Mineral Concession Rules, 2013	Department of Environment and Forest, Assam	No
Chhattisgarh	Chhattisgarh Minor Mineral Rules, 2015	Directorate of geology & Mining, , Chhattisgarh	Chhattisgarh Minor Mineral Sand excavation and Trade Regulation Order 2006
Gujarat	Gujarat Minor Mineral Concession Rules, 2017	Industries and Mines Department, Gujarat/ Commissioner of Geology & Mining ((CGM)	No
Haryana	Haryana Minor Mineral Concession, Stocking, Transportation of Minerals and Prevention of Illegal Mining Rules, 2012	Mines and Geology Department, Haryana	No
Karnataka	Karnataka Minor Mineral Concession (Amendment) Rules, 1994 and amendments in August' 2016, and 2017	Department of Mines & Geology, Karnataka	Separate chapter in KMMCR for sand
Madhya Pradesh	Madhya Pradesh Minor Mineral Rules, 1996 and its amendments. Latest amendment issued in 2013.	Directorate of Geology and Mining, Madhya Pradesh	Sand Mining Policy 2017
Maharashtra	Maharashtra Minor Mineral Extraction (Development and Regulations) Rules, 2013	Revenue and Forest Department Government of Maharashtra	Amended Sand Excavation Policy 2017
Punjab	Punjab Minor Mineral Rules, 2013	Department of Industries and Commerce, Mining Department, Punjab	No
Rajasthan	The Rajasthan Minor Mineral Concession Rules, 2017	Department of Mines & Geology, Rajasthan	No

Tamil Nadu	Tamil Nadu Minor Mineral Concession Rules, 1959 and its amendments. Latest amendment: Rule 38-A introduced vide GOMs 95 in 2003	Department of Geology & Mining / Public Works Department, Tamil Nadu	No
Telangana	Andhra Pradesh Minor Mineral Concession Rules, 1966 and its amendments. The latest amendment issued on 26.07.2016	Department of Mines & Geology, Telangana/ TSMDC	New Sand Mining Policy 2014
Uttar Pradesh	Uttar Pradesh Minor Mineral (Concession) Rules 1963 and its amendments. The latest (42nd) amendment issued in 2017.	Directorate of Geology & Mining, Uttar Pradesh	No
Uttarakhand	Uttarakhand Minor Minerals (Concession) Rules, 2001	Geology and Mining unit under Directorate of Industries, Uttarakhand	Uttarakhand Minor Mineral (sand, bajri, boulder, etc.) Policy - 2015

Minor Mineral Concession Rules

It is observed that most of the States have amended the rules from time to time. Many of the States surveyed have changed their concession rules in the last three to four years including after amendments in the MMDR Act in 2015.

Department controlling sand mining activities

Except for a few states, sand is governed by the Department of Mines and Geology in most of the States. In Assam, Environment and Forest Department regulates sand mining activities. However, Assam is in the process of amendment of its minor mineral rules and once notified, the control will be with its Department of Mines and Geology. In Maharashtra, Revenue and Forest Department has control over sand mining. In Gujarat, Tamil Nadu, Uttarakhand and Punjab, matters related to sand mining are handled by the Industries Department. The disadvantage of not having the control with the mining department is that the staff in other department are not well versed with technical aspects of mining and related environmental concerns, and consequently there is a gap between the regulating body and those taking care of operations.

Specific Sand Mining Policy

Some of the States have a separate policy applicable for sand mining. Despite being a minor mineral, the processes involved in sand mining are very different from those in other minor

minerals considering high demand-supply deficit. Also sand is different from other minor minerals in its usage by the general public. Keeping these in mind, many States have formed a separate policy of sand such as Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Maharashtra, Telangana, Uttarakhand and Karnataka. Andhra Pradesh has framed a separate sand policy in the year 2015 and since March 2016, free sand policy is applicable in the State. Sand mining in Chhattisgarh is governed by the Chhattisgarh Minor Mineral Sand Excavation and Trade Regulation Order 2006. Madhya Pradesh brought a separate policy for sand in 2015 and has again notified a new policy to regulate sand mining in the State. Maharashtra has Amended Sand Excavation Policy. Telangana has separate Sand Policy 2014 and related GO. Uttarakhand has separate policy for the river bed material. Karnataka has introduced a separate chapter (IV-B) in its minor mineral concession rules for sand mining.

Separate M-sand policy

A few States have separate policies to promote M-sand such as Andhra Pradesh, Telangana and Karnataka. Andhra Pradesh and Telangana have granted industry status to M-sand producing units in their State. Karnataka has reserved few blocks for M-sand plants only as end user category. Tamil Nadu's M-sand policy is under formulation. Recently, Gujarat has also reduced royalty for M-sand units to promote production of M-sand.

4.1.2 Royalty Collection and units applicable

Royalty forms a vital part of the fiscal regime for mining and is an important means of revenue realization for the Government. However, it also increases the price of sand for consumers. The royalty being collected by different States is shown in the table below.

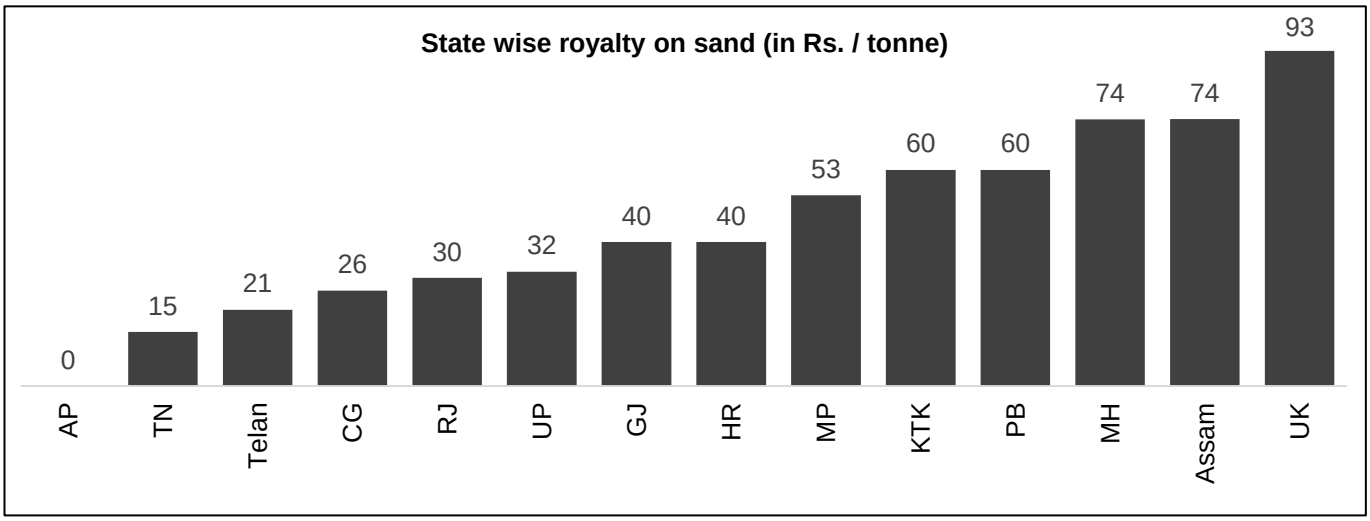
Table 18 Royalty applicable in different States

State	Royalty applicable	Unit applicable in the State	Royalty in Rs. per tonne[1]
Andhra Pradesh	No royalty	Per cubic metre	0
Assam	Rs. 140 per m^3	Per cubic metre	74
Chhattisgarh	Rs. 50 per m^3	Per cubic metre	26.45

[1] *The unit has been changed to per tonne using bulk density of 1.89 gram per cubic metre, Source: MoEFCC's Sustainable Sand Mining and Management Guidelines 2016*

Gujarat	Rs. 40 per tonne	Per tonne	40
Haryana	Rs. 40 per tonne	Per tonne	40
Karnataka	Rs. 60 per tonne	Per tonne	60
Madhya Pradesh	Rs. 100 per m^3	Per cubic metre	52.9
Maharashtra	Rs. 400 per brass (100 ft^3)	Per brass	74
Punjab	Rs. 60 per tonne	Per tonne	60
Rajasthan	Rs. 30 per tonne	Per tonne	30
Tamil Nadu	Rs. 8.5 per 10 ft^3	Per Unit (1Unit=100 $feet^3$)	15.7
Telangana	Rs. 40 per m^3	Per cubic metre	21.2
Uttar Pradesh	Rs. 60 per m^3	Per m^3	31.7
Uttarakhand	Rs. 154/176/187 per m^3	Per m^3	81.5/ 93.1/ 98.9

Figure 4- 2 Royalty comparison across States (Rs per tonne)



The royalty for sand varies from Rs 0 to Rs 93 in different States. There is a significant difference in the royalty structure from one State to other and the bulk density used for conversion of units of royalty is also different in different States. Some States use 1.5 tonnes per cubic metre while others use 1.89 tonnes per cubic metre, as mentioned in the MoEFCC's Sustainable Sand Mining and Management Guidelines 2016. Andhra Pradesh is the only State that does not charge any royalty for sand.

It is suggested that the unit used for royalty calculation should be uniform across the country as it will help in comparison of the royalty collected from sand mining and also in estimating the production and demand of sand in the State. Further, the unit used should be Rs. per tonne as weighing of sand is easier than measuring the volume of sand. By installation of weigh bridges, the quantity of sand in each vehicle can be measured whereas in measuring volume, the capacity of the vehicle is used without considering the over loading factor.

4.1.3 Identification

The process of identification of sand reaches in most of the States is taken up by the relevant department responsible for sand mining in the State. The report prepared during identification of sand reaches also varies from State to State, where most of the States go for joint inspection report or site appraisal report. Gujarat is the only State, which prepares a geological report for blocks. Geo-tagging of the block is also a common practice in many States.

The methodology followed by most of the States for identification of sand mining areas is described as follows:

- Based on information available with the department, the relevant person authorized for the job obtains the map of the area from the revenue officer or the tehsildar and conducts a spot inspection regarding availability of area to check whether the area is reserved for some other purpose or not. If he finds sufficient availability of sand in the area, the area is demarcated and put up for either auction or allotment on nomination basis, as deemed fit by the State.
- Many States have taken up geo-tagging of the demarcated area, which can be useful while conducting physical inspection, as the boundary of the demarcated area can be checked using the coordinates recorded in GPS device, and the monitoring team can be sure of any illegal mining activity outside the permitted area.
- In Uttar Pradesh, the district mining officer prepares the valuation report to assess the quantity of sand available in the block during the identification of sand blocks. However, actual quantity to be mined is as per environment clearance.
- In Karnataka, Taluk Level Sand Committee is formed which is responsible for site inspection and identifying sand blocks for the purpose of tender cum auction or for reservation. The committee estimates approximate extractable sand available in each

identified block by restricting quarrying to three meters depth or water level whichever is less, with the assistance of the Officers of the Revenue, Public Works, ports and Inland Water Transport Department, Water Resources, Mines and Geology and Forest, and the identified blocks are incorporated using the co-ordinates in the certified sketch. The committee also submits joint inspection report and documents with a clear recommendation report to the district committee for the purpose of notification of sand blocks and their extent, which may be either individual blocks or cluster of blocks, for tender- cum- auction or for reservation for Government works or for extraction of sand by Central Government or State Government or body corporation owned or controlled by the Central Government or State Government.

- In Gujarat, a geological report of each sand reach is prepared by the respective district's Assistant Geologist before putting it for auction. The potential areas of the quarry lease are identified and demarcated using DGPS and topographic and geological maps are prepared using total station. With reference to the rules, evidence of mineral resources are established using geological report. The geological report contains estimated resources in the blocks along with other information e.g.: details of the area, DGPS survey, details of infrastructure and environment, geology of the area, drainage and geomorphology, exploration status, geological mapping, laboratory studies of the samples etc.

The responsible party for identification of the reaches along with the reports being generated by the responsible authorities are mentioned in the table below:

Table 19 Identification details for each State

State	Identification responsibility	Reports prepared	Geo-Tagging or co-ordinates mapping	Standard Template Available as per Rules/ Regulations/ GOs
Andhra Pradesh	District Level Committee	Site Appraisal Report	Yes	No
Assam	District Forest Officer	Initial valuation report	Yes	No
Chhattisgarh	Mining Inspector & Revenue Officer	Joint Inspection Report	Yes	No
Gujarat	Assistant Geologist	Geological Report	Yes	No
Haryana	Department of Mines & Geology	Initial Survey Report, Joint Inspection report	Yes	No

Karnataka	Taluk Sand Monitoring committee	Joint Inspection Report	Yes	No
Madhya Pradesh	District Office	NA	Yes	No
Maharashtra	NA	NA	Yes	No
Punjab	District Level Committee	Site Appraisal Report	Yes	No
Rajasthan	District Committee	Joint inspection Report/ Mauka Report (for private land)	Yes	No
Tamil Nadu	Department of Mines & Geology/ PWD	NA	Yes	No
Telangana	District Level Sand Committee	Joint Inspection Report	Yes	No
Uttar Pradesh	District Mining Officer & Surveyor	Valuation Report	Yes	No
Uttarakhand	District Committee	Site Appraisal Report	Yes	No

However, there are multiple issues with the existing models of identification. One of the major issue with the existing model is that in none of the States, the officer responsible for spot inspection has standard template available in compliance with the Rules and MoEFCC Guidelines, so as to check across all parameters.

Preparation of geological report in Gujarat for each block and putting the blocks for auction based on that geological report is by far the best practice followed in identification process. Geological Report is prepared by the District Assistant Geologist of the concerned district. And the quantity of mineral resources are established using geological assessment. The report contains details of the area, DGPS Survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status, geological mapping, laboratory studies of the samples etc.

4.1.4 Clearances and approvals

Clearances and approvals required in most of the States are more or less similar with little variations from one State to another. First of all, no-objection certificate is required from the Revenue Department that the land is not reserved for other purpose or does not come under forest land or is under any litigation. Mining plan and environment clearance report is required to be submitted in all the States before commencing the mining operations. And the granting authority for environmental clearances is based on the size of the block, as mentioned in the table below:

Table 20 Environment clearance approving authority for mining lease

Size of the block	Category	Approving authority
0-5 Ha	B2	DEIAA/ DEAC
>5 and <25 Ha	B2	DEIAA/ DEAC (In case of cluster)/ SEIAA/ SEAC (Individual)
>=25 and <50 Ha	B1	SEIAA/ SEAC
>= 50 Ha	A	MoEFCC

Other clearances required in many States are Consent to operate (CTO) and consent for approval (CFA), from the State Pollution Control Board and it is the responsibility of the Lessee to get the clearance for the same. Apart from these, Maharashtra seeks approval from the Gram Sabha and the opinion of the Ground Water Survey and Development Agency, and in case of Creek Mining, approval from the Maharashtra Maritime Board. The details of the types of clearances required and the responsibility of taking the clearances are mentioned in the table below:

Table 21 Clearances and responsibility

State	Types of Clearances	Responsibility
Andhra Pradesh	MP, EC	Department of Mines and Geology
Assam	MP, EC, CFE, CTO	Lessee
Chhattisgarh	MP, EC, approval of Gram Sabha	Department does it on behalf of Gram Panchayat
Gujarat	MP, EC, CTO	Lessee
Haryana	MP, EC	Lessee
Karnataka	MP, EC	Lessee
Madhya Pradesh	MP, EC	Department does it on behalf of Gram Panchayat

Maharashtra	EC, Approvals from Maharashtra Maritime Board, Opinion of Ground Water Table and Development Agency	Department of Revenue & Forest
Punjab	MP, EC, CTO	Lessee
Rajasthan	MP, EC, CTO	Lessee
Tamil Nadu	MP, EC	PWD
Telangana	MP, EC, CFE/CFO	TSMDC
Uttar Pradesh	MP, EC	Lessee
Uttarakhand	MP, EC, CTO	Lessee

The responsibility of preparation of mine plan and obtaining environment clearance is with the lessee in most of the States. However in Andhra Pradesh and Chhattisgarh, it is the responsibility of the mining department. In Punjab, till 2017, the department had the responsibility of obtaining the clearances and in Madhya Pradesh, after notification of the new Sand Mining Policy, the department has the responsibility of getting the clearances.

The Department of Mines and Geology in Andhra Pradesh and Chhattisgarh have the responsibility of preparation of mine plan.

However, there are issues with handing over the responsibility of clearances to the mining department:

- The department will have the responsibility of preparation as well as approval of the mine plan which may not be ideal in case of auction model.
- The mining department which may already have a limited technical workforce will be overloaded with work, which might delay the process.

Therefore, it may augur well for the project proponent to procure the clearances and approvals.

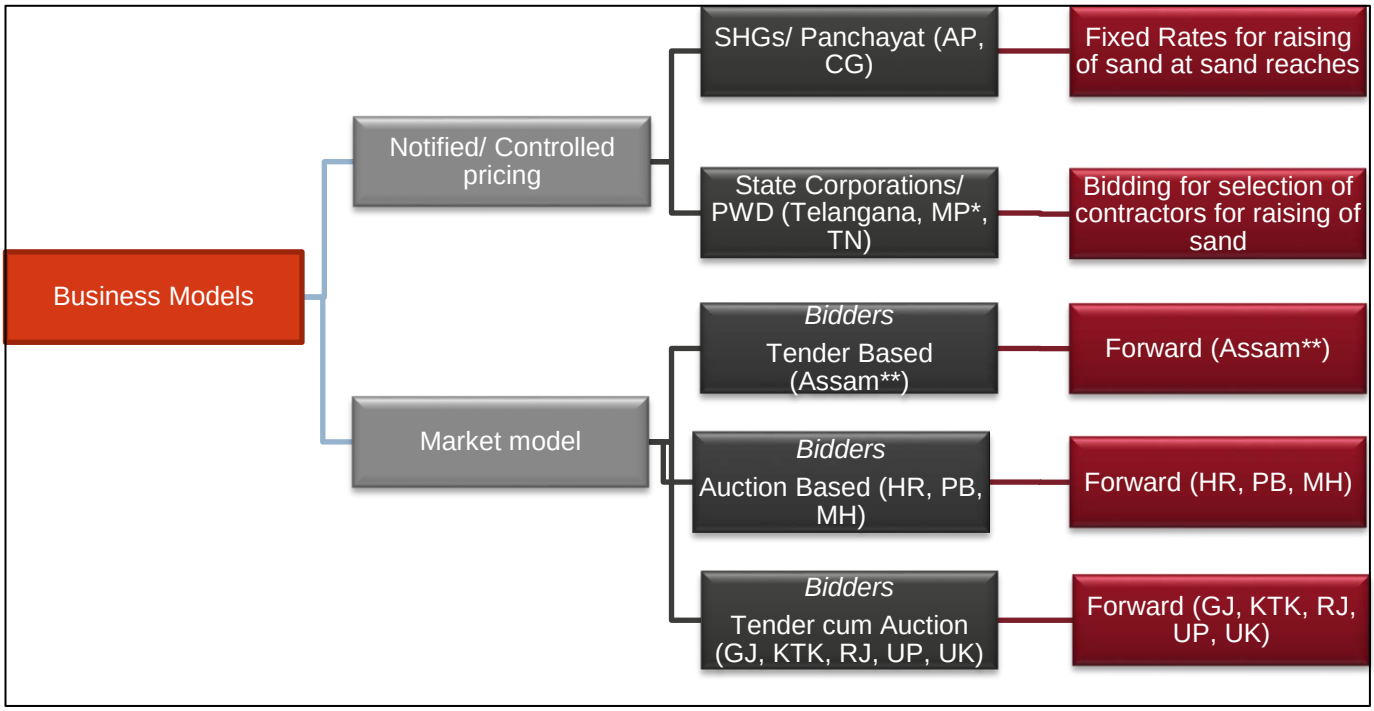
4.2 Business Model

4.2.1 Allocation model and realization to State Government

The mode of allocation of concession for sand varies from State to State. The allocation model adopted depends on the objective of the State Government. States that want to maximize revenue

go for market model (allocation through competitive bidding) i.e. forward auction with no intervention from the State in sale of sand, while others that want to keep prices under control go for a controlled or notified pricing model while keeping the sale right with themselves.

Figure 4- 3 Different models for allocation



**MP followed the market model earlier in which allocation was on nomination basis to MPSMC, which appointed raising contractors (through competitive bidding) who were free to decide the sale prices. However, as per the new Sand Mining Policy 2017, the sale prices in MP are now controlled at the sand reaches and are fixed at Rs.125/m3.*

***Assam is undergoing changes in its Rules*

Table 22 Summary of Pros and Cons of business models followed in different States

Model	Notified Pricing/ Controlled Pricing	Market Model
Key merits	• Uniform and notified Sale Price • Profit with State Govt. • Relatively better operations and monitoring control	• Higher revenues for the Govt. • Minimum Governmental resources • Transparent method of allocation

Key demerits	• Lesser revenue for Govt. in case of lower sale prices • Significant govt. resources required • Sale prices may still be higher in case of deficits in supply	• Prone to Illegal mining/over exploitation • Environmental Concerns • Higher sale prices for consumers • Chances of cartelization during bidding • Chances of cartelization by bidders for supply and prices control

A summary of the models followed by different States and their productions & revenues is tabulated below:

Table 23 Summary of business models followed in different States

State	Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MTPA)	Revenue FY17 (Rs. Crores)
Andhra Pradesh*	Notified or controlled pricing model	None	Notification of identified reaches for sand extraction is published in Gazette	Not Applicable	NA	Not Applicable
Assam**	Market model	Competitive Bidding	Offline tender	No	5.6	30-35
Chhattisgarh	Notified or controlled pricing model	Nomination	Allocation to Panchayats	Yes	10.0	10.6

Gujarat	Market model	Competitive Bidding	Tender cum forward auction	Yes	49.64	160.34
Haryana* **	Market model	Competitive Bidding	Forward e-auction	Yes	9.8	265.9
Karnataka	Market model	Competitive Bidding	Tender cum forward auction	Yes	4	25.2
Madhya Pradesh** **	Notified or controlled pricing model	Nomination	Allocation to Gram Panchayats	Yes	49.14	240
Maharashtra	Market model	Competitive Bidding	Forward e-auction	No	NA	NA
Punjab	Market model	Competitive Bidding	Forward e-auction	No	NA	43.1
Rajasthan	Market model	Competitive Bidding	Tender cum forward auction	No	56.8	235.9
Tamil Nadu	Notified or controlled pricing model	Nomination	Allocation to PWD	Yes	15.12	86.33
Telangana	Notified or controlled	Nomination	Allocation to TSMDC	Yes	13.23	434

	pricing model					
Uttar Pradesh	Market model	Competitive Bidding	Tender cum forward auction	No	5.9	47.7
Uttarakhand ***	Market model	Competitive Bidding	Tender cum forward auction	No	NA	335.3

**In Andhra Pradesh, the State notifies sand reaches from where sand can be extracted by the consumers without paying any royalty or tax for the extracted sand. There is accordingly no realization to the State Government from sale of sand.*
***For Assam, as per current business model. Assam is undergoing a change in allocation system for sand blocks. As per the new system, sand blocks will be allocated through e-auction method.*
****Haryana production data is for the Calendar year 2017-2018.*
*****MP followed the market model earlier in which allocation was on nomination basis to MPSMC, which appointed raising contractors (through competitive bidding) who were free to decide the sale prices. However, as per the new Sand Mining Policy 2017, the sale prices in MP are now controlled at the sand reaches and are fixed at Rs.125/m^3*
******inclusive of revenue from RBM (River Bed Material) together.*

In Andhra Pradesh, the State notifies sand reaches from where sand can be extracted by the consumers without paying any royalty or tax for the extracted sand. The realization to the State Government from sand in this model is zero. However, the model is considered good in terms of keeping the price of sand under check in the State. Further, the model adopted by Telangana where notified prices of sand and delivery of sand is also available for the consumers, is suitable for both keeping the prices under control as well as revenue for the department which may be used for the development of the resources and area related to resources.

4.2.2 Operations control

The control of operations in sand reaches depends on the model adopted for allocation of sand reaches. In competitive bidding, the control over operations is with the lessee/contractor who won the reach in the bid. While in nomination model for allocation, the control of the operations depends on whether the nominated body excavates sand by itself or by a raising contractor.

In Chhattisgarh, the allocation is on nomination basis to the Gram Panchayat and the Panchayats are to employ local villagers for excavation and loading of sand, in lieu of daily wages. While in Tamil Nadu and Telangana, the allocation of sand reaches is with the State mining corporations/PWD, who in turn hire contractors to do the job on their behalf.

The advantage of giving the control of operations to Government agency is that it does not have much incentive in over-exploitation of resources, and the State can be relatively assured that the regulations laid down by the Government are completely followed. Whereas in the other model

where the control of operations is with the lessee, the main motive for the business is to make as much money as possible. So despite the fact that regulations are laid down by the State Governments, in absence of proper and robust monitoring mechanism, the lessee can escape from complying with the regulations and this has been the primary reason for various bans imposed by the NGT, and courts in different places. It has been observed that in the past, the ban on sand mining has been mainly due to violation of regulations imposed by the Government or the MoEFCC.

Table 24 Operational control of sand mining

State	Operations control
Andhra Pradesh	SHG/ Consumer
Assam	With Lessee
Chhattisgarh	With Gram Panchayat
Gujarat	With Lessee
Haryana	With Mining Contractors
Karnataka	With Lessee
Madhya Pradesh	With Gram Panchayat
Maharashtra	With Lessee
Punjab	With Lessee
Rajasthan	With Lessee
Tamil Nadu	PWD
Telangana	TSMDC
Uttar Pradesh	With Lessee
Uttarakhand	With Lessee

For operations control, the best practice is the one followed in Telangana, where the operations control is given to TSMDC by the DMG, and TSMDC in turn raises a contractor by competitive bidding to extract sand on its behalf. The advantage of this practice is that a Government agency

has control over operations which relatively ensures that the regulations laid are properly followed under monitoring by TSMDC.

4.2.3 Sales rights

The next step in the process chain of sand mining is sale of sand. This is one of the most important steps in the process chain of sand mining as the price of sand in a State, is one of the crucial factors. There are various models followed by the States and the model followed determines the control of sales right. In States such as Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Tamil Nadu and Telangana, where sand reaches are allocated on nomination basis to the State mining corporations, the State Government has complete control over the sale of sand. Also, to an extent, transporters do not have monopoly, thus the price of sand for consumers is under check. Similarly in Chhattisgarh, sand reaches are allocated on nomination basis to Gram Panchayats, the sale right is with the relevant Panchayat. And consequently, the price of sand cannot be increased artificially through cartel formation.

In States that follow competitive bidding for allocation of sand reaches, the sales right is with the successful bidder with no or limited control/ regulation of the State Government over the sale of sand. In such a situation, the participating bidders may try to quote more and more to win the sand blocks, with the intention to increase the market price of sand artificially so as to recover the money that they pay to the State for the allocation of blocks. Besides increase in sale price of sand, this also leads to over exploitation of sand reaches to extract more quantity over the notified quantity.

State-wise details of sales rights, regulation on prices, landed sand price and status of supply (deficit or surplus) are mentioned in the table below.

Table 25 State-wise details of sales rights

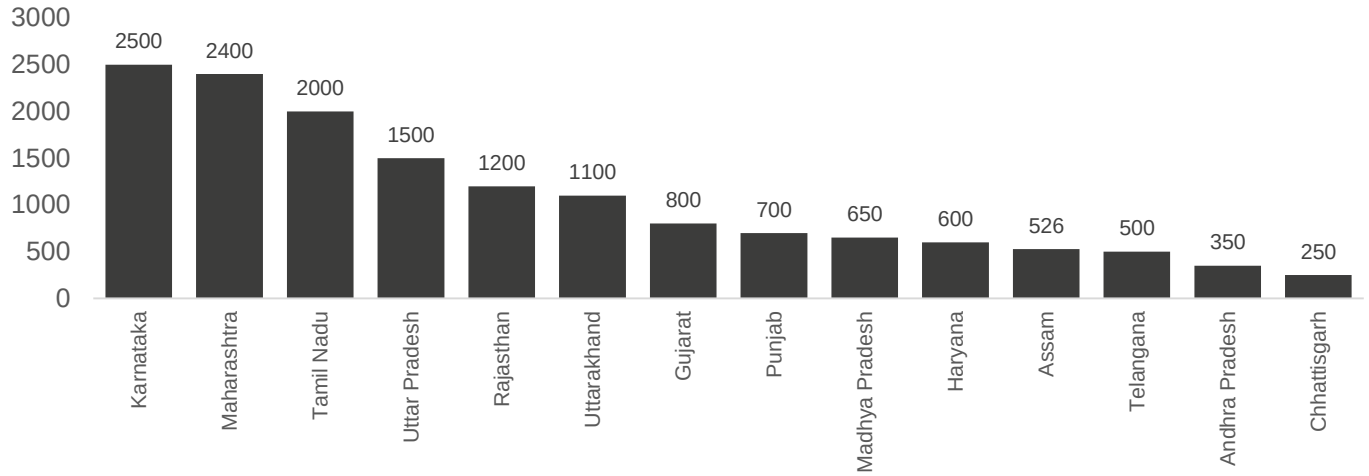
State	Sales Right	Sand Prices (Market determined / Regulated)	Business Model followed	Landed price of sand (Converted to Per tonne Basis) in normal season	Landed price of sand (Converted to Per tonne Basis) during monsoon	Sand Deficit*
Andhra Pradesh	With Department	Free of cost (only	Notified or controlled pricing	Government notified price in all districts	Government notified price in all districts	Yes

		extraction cost)		Varies from Rs 200 to 350		
Assam	With Lessee	Market determined	Market model	Rs 500 to 600 per tonne in Guwahati	Rs 635 to Rs 795 per tonne in Guwahati	Yes
Chhattisgarh	Panchayat	Regulated	Notified or controlled pricing	Rs 132 to 370 per tonne, depending on the district	Rs 175 to 550 per tonne, depending on the district	Yes
Gujarat	With Lessee	Market determined	Market model	Rs 80 to 800 per tonne, depending on the district	NA	Yes
Haryana	With Lessee	Market determined	Market model	Rs 500 to 600 per tonne	NA	Yes
Karnataka	With Lessee	Market determined	Market model	Rs 2400-2500 per tonne in Bengaluru	Rs 2500 per tonne in Bengaluru	Yes
Madhya Pradesh	with Raising Contractor	Regulated	Notified or controlled pricing	600 -700 per tonne in Bhopal	Rs 1500+ after ban on sand mining on Narmada rivers	No
Maharashtra	With Lessee	Market determined	Market model	2000-2200 per tonne in Mumbai	Rs 2400 per tonne in Mumbai	Yes

Punjab	With Lessee	Market determined	Market model	Rs 600-700 per tonne (Mansa)	Rs 850 per tonne (Mansa/ Bhatinda)	Yes
Rajasthan	With Lessee	Market determined	Market model	Rs 400 to 500 per tonne (Udaipur)	Rs 1000 to 1200 per tonne after the SC ban	No
Tamil Nadu	With PWD	Regulated	Notified or controlled pricing	Rs 1500+ per tonne (Chennai)	Rs 2000+ per tonne (Chennai)	Yes
Telangana	TSMDC	Regulated	Notified or controlled pricing	Rs 400-500 per tonne	NA	No
Uttar Pradesh	With Lessee	Market determined	Market model	Rs 1300-1500 per tonne	NA	Yes
Uttarakhand	With Lessee	Market determined	Market model	Rs 1000-1100 per tonne	Rs 1500+ per tonne	No

***Sand deficit analysis has been considered as per demand estimation using RBI methodology and production data available with the State Departments/concerned Department.**

Figure 4- 4 Average Sale price comparison across States in Rs/ tonne*



**based on the consumers feedback*

*** The prices were collected from consumers during Oct - Nov 2017 during field visits. The price of sand varies during different periods of the year and at different places in the same State.*

It can be seen from the chart that the sale price of sand is maximum in the State where competitive bidding for allocation of sand reaches is followed with limited intervention by the State Government in operations or sale of sand, for instance in Karnataka and Maharashtra. Further, it should be noted that the prices cannot be compared directly across the sates, but the fact that whether the State is sand deficit or not has to be taken into account. For instance, in Haryana or Uttarakhand which are not sand deficit States, the price of sand is more than that in Andhra Pradesh and Telangana, where both the States are sand deficit.

It can interpreted that the model in which the sales right is with the Government or the price is regulated by the Government is better in terms of keeping the price of sand under check as the prices cannot be raised artificially through cartelization by the contractors. However, to keep the prices under check, price regulation is not sufficient. A robust monitoring mechanism is also required along with sufficient sand supply.

The best practice in sale of sand is the one followed by Andhra Pradesh where the committee notifies the price for sand in the districts of the State including the transportation, loading/unloading and ramp maintenance fee. There is 24 hours operational call center which gives a call to the consumer to enquire whether the amount that is charged for sand is within the Government's notified limit.

4.2.4 Types of Sand Concessions

The types of concessions offered for sand is each in different States and so are the restrictions on area and the time period. While in some of the States, there is no restriction on the size of the block that can be allotted, in others there are restrictions on the minimum as well the maximum area that can be given. The same is true for the time period of the concession in different States.

The details of the types of concession, restriction on area and time period of concession for all the States are mentioned in the table below:

Table 26 State-wise details of the types of concessions

State	Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Andhra Pradesh	Notified Sand Reach	No restriction	No restriction	No restriction	Till exhaustion of sand or one year period, whichever is earlier
Assam	Mining Lease, Mining Contracts and Mining Permits	1 Ha	No restriction	No restriction	Mining Lease: 10-20 years Mining contract 7-10 Years Mining Permit: 2 Years
Chhattisgarh	Notified Sand Reach	No restriction	No restriction	No restriction	As long as EC permits
Gujarat	Quarry Lease, Quarry Permit and Quarry Parwana	1 Ha	No restriction	50 Ha	5 Years

Haryana	Mining Lease, Mining Contracts, Quarrying Mineral disposal permit	1 Ha	No restriction	1000 Ha	7-10 Years
Karnataka	Quarry Lease and Temporary Permit (for local communities)	5 acre (2Ha.)	50 Acre (20 Ha/ 10 Acre (4 Ha)	20 Ha (Mineral Based Industries)/ 4 Ha for others	5 Years
Madhya Pradesh	Quarry Lease, Trade Quarry	1 Ha	No restriction	No restriction	5 Years
Maharashtra	Quarry Lease	NA	NA	NA	1 year, ending on 30th September
Punjab	Mining Lease, Grant of Contracts, Short term Permit	No restriction	For short term contracts – 4 Ha	5 Sq km	2-5 Years
Rajasthan	Mining Lease, Quarry License, Short Term Permit	5 Ha	No restriction	No restriction	5 Years
Tamil Nadu	Sand Quarry	NA	NA	NA	
Telangana	Mining Lease	NA	NA	NA	1 Year

Uttar Pradesh	Mining Lease, Temporary Permit	5 Ha	NA	400 Ha	5 Years
Uttarakhand	Mining Lease, Short term picking contracts	5 Ha	50 Ha	400 acres or 5 Nos. ML	5 Years

Area of concession:

It is observed that providing concessions of very large size is not suitable as the related clearances may take a lot of time (more than a year). It also can create a concentrated market in the hands of a few suppliers. Similarly, providing concessions of very small size is also not suitable as it affects the efficiency and impacts the economies of scale. The other drawback of allotting very small sizes of sand blocks is that there may be chances that bidders in the district get the blocks on the edges, which have access to pathways, and create impediment for auction of other blocks. Such a situation may result in the excavation of sand in the non-notified area by the leaseholders of the outer blocks, including those blocks which could not be auctioned.

The size of blocks should preferably be more than 5 Ha so that clearances can be received at a faster pace. Notwithstanding, States are free to decide minimum and maximum area limits as per their local conditions in the districts. The maximum area limit for allocation should allow for sufficient number of blocks in a district to enable sufficient competition e.g.: minimum three contractors in a district.

Duration of concession:

It has been observed that smaller time periods of concessions is not suitable as getting clearances takes significant amount of time and also no sand can be extracted during the monsoon season i.e. approximately for 3-4 months. So, overall the leaseholder loses a period of around 6-7 months from the period of concession. So in the months left, the lessee may do rampant sand mining with no regard for the norms leading to a situation of environmental damage.

Therefore, it is suggested that the duration of concession should be five to ten years wherein the lessee gets sufficient time for sand extraction and at the same time, there should be a gap of sufficient period between two consecutive allotments of a sand block so that the block can be provided sufficient time to replenish itself. Further, the States may provide short term permits for a period of around one year for specific needs of the Government projects/ Government department/contractors or for any other infrastructure project as the State may deem fit. The

duration of concession mentioned is recommendatory only and the States are free to decide the time period of concession based on their local conditions.

4.3 IT System Analysis

Technology always plays an important role in process improvement, process monitoring and control and in any course of action that aims to increase transparency. In the process chain of sand mining, technology can be leveraged in each of the steps to make the system more transparent and to eradicate corruption. Hence, the objective of this section is to study the technical aspects in the existing sand mining process in different States to find out the best possible use of IT in different processes and find out areas for improvement for the States. Detailed study of the existing IT systems was carried out for major areas as mentioned below:

- Allocation of sand reaches
- Ordering of sand (by customers)
- Monitoring of sand extraction (monitoring agency), and
- Delivery process (customers/monitoring agency).

Different types of technology instruments are being used in different States to make the process more efficient and to monitor the whole operation. Starting from the allocation of sand bearing areas, monitoring of the extraction process, ordering of sand, generation of online transport permits, tracking of order, transportation of sand at the designated address, monitoring of sand stockyards, monitoring of transportation to tracking the delivery and capturing the customer feedback; each step in the process chain incorporates information technology. Use of technology is a very common practice in allocation of sand reaches in the country after introduction of auction system of allotment. However, the use of IT in ordering, monitoring and delivery is limited only in a few States. The southern States are doing relatively well in use of technology in sand mining. Utilization of IT systems in different processes are mentioned subsequently.

4.3.1 Use of IT in Allocation

Most of the States allot reaches through the process of e-auction through competitive bidding through online portal. Out of the fourteen States, Andhra Pradesh is the only State which does not allot its sand reaches to any department or contractor but simply notifies the sand reaches for sand extraction by the common public/SHGs without charging any royalty. Four States namely, Chhattisgarh, Madhya Pradesh, Tamil Nadu and Telangana, allot their sand bearing areas to the Panchayats, the State Mining Corporations or Public Works Department on nomination basis. The State Mining Corporation in Telangana and the PWD in Tamil Nadu, in turn raise the contractor for sand extraction through competitive bidding by offline means. However, the State Mining Corporation in Madhya Pradesh raise the contractor for extraction and sale of sand through online tender.

Nine states viz. Assam, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand allot sand bearing areas through competitive bidding/ auctions. Out of these, only Assam allots the sand bearing areas through offline tender route while the remaining eight States allot through online mode. However, Assam is in the process of shifting to an online system for allocation of sand reaches once amendments of its rules are notified. Five States namely Gujarat, Karnataka, Rajasthan, Uttar Pradesh and Uttarakhand allot sand bearing areas through two stage forward online auction method while the remaining three namely Haryana, Maharashtra and Punjab follow single stage forward auction/ tender route for allotment.

An online tender/auction offers complete transparency and ensures participation from the widest possible range of prospective bidders reducing the scope for unfair practices such as bid rigging and other unfair means. It also ensures fair market price for the natural resource. The table below shows the use of technology in allotment of sand bearing areas in different States.

Table 27 Use of technology in allocation of sand concession across the States

State	Business Model	Use of Information Technology
AP	Notification of identified reaches for sand extraction	Not applicable
Assam*	Offline tender	Limited use of IT
CG	Allocation to Panchayats	Not applicable
GJ	Tender cum forward auction	Good use of IT
HR	Forward e-auction	Good use of IT
KTK	Tender cum forward auction	Good use of IT
MP**	Allocation to Gram Panchayats (earlier to MPSMC)	Good use of IT
MH	Forward e-auction	Good use of IT
PB	Forward e-auction	Good use of IT
RJ	Tender cum forward auction	Good use of IT
TN	Allocation to PWD	Limited use of IT

Telangana	Allocation to TSMDC	Limited use of IT
UP	Tender cum forward auction	Good use of IT
UK	Tender cum forward auction	Good use of IT

**As per the current process*

4.3.2 Use of IT in Ordering

Use of technology in ordering is gaining acceptance in recent times. Few of the States namely Andhra Pradesh, Tamil Nadu, Madhya Pradesh and Telangana have developed an online portal for booking sand. Andhra Pradesh has taken a leap ahead and besides developing an online portal as well as app for sand booking, the State also captures the feedback of all consumers in the State through the People First Grievance Redressal centre.

Before going into the benefits of use of technology in ordering, let us look at the system of ordering using Information Technology. For ordering, a website is created for booking of sand. Anyone who needs to purchase sand, needs to register on the website. After registration, a user has to login using his/her credentials and select the district from the dropdown menu from which he/she is willing to order. Once the district window opens, the list of active reaches with sand is displayed along with the sand prices at those reaches. After selecting the reach, the user has to enter the customer information, vehicle information along with the delivery address. Subsequently, the system redirects the user to payment gateway for online payment of amount. After successful transaction an online receipt is generated. Further, an online waybill is generated at the stockyard after submitting the receipt.

The benefit of the system is that it ensures transparency in the process of sand booking without any artificial inflation in sand prices for the consumers. The system also ensures that the Government gets the actual royalty and taxes for the sand consumed in the State. The amount of sand available at the beginning and end of each day at each reach can be viewed on the system, which will help in analyzing the sand consumption pattern in the State and at the same time keeping a note of the demand of sand in the State.

Table 28 Use of technology in sand ordering across the States

State	Ordering mechanism	website
Andhra Pradesh	Online (Web/App) (Few districts only)	www.apsand.com
Assam	Offline	NA

Chhattisgarh	Offline	NA
Gujarat	Offline	NA
Haryana	Offline	NA
Karnataka	Offline	NA
Madhya Pradesh	Online	https://ekhanij.mp.gov.in/AppPrevious/Sandmp.aspx
Maharashtra	Offline	NA
Punjab	Offline	NA
Rajasthan	Offline	NA
Tamil Nadu	Online (Web/APP)	www.tnsand.in
Telangana	Online (Web/APP)	www.sand.telangana.gov.in
Uttar Pradesh	Offline	NA
Uttarakhand	Offline	NA

4.3.3 Use of IT in Monitoring

Monitoring is a critical part of the sand mining process and use of technology is utmost important here. However, unfortunately use of technology is limited for monitoring in most of the States.

Most of the States are using technology in generation of online transit passes on payment, which can be checked by the monitoring team in the State. However, this alone cannot serve the purpose because it is not possible to check all the sand carrying vehicles physically. Hence, some of the States have taken a step further and have installed CCTV cameras at both the sand reaches as well on the check posts. The installation of CCTV cameras ensures that all the active reaches are monitored. This installation in the way is useful in tracking the vehicles carrying sand from a reach which has not been notified.

Andhra Pradesh, Karnataka, Gujarat and Telanagana are doing relatively better in the process of monitoring by the use of technology.

In Andhra Pradesh, the State Government has a strict vigilance on sand reaches and transportation:

- Task force is constituted by the collectors with line departments for periodic inspection to comply with EC and mine plan.
- Border check posts established with multi-disciplinary departmental Task Force, to prevent transportation of sand to other States.
- The superintendent of Police/Commissioner of Police ensures that no transportation takes place to other State.

Apart from this, the State has:

- appointed Reach Level Officers in order to monitor sand quarrying and transportation; District Collectors have nominated VROs/Panchayat Secretaries as reach level officers for each sand reach. Wide publicity has been given about names and mobile numbers of reach level officers through newspaper advertisement.
- deployed technical assistants to support the reach level officers and monitor sand activities on real time basis. A total of 139 technical assistants are present in the reaches as on 25th Sep 2017.
- developed sand mobile app with the help of Real Time Governance Group (RTG) for monitoring of the sand activities on real time basis. The State does real time monitoring of sand activities with the help of technical assistants. The technical assistants are provided with tabs to upload details of the sand excavation, loading and transportation vehicle details on real-time basis from the reaches in the sand app developed by RTG.
- Apart from this, a 24 hour call centre (People First Grievance Redressal Center) working in 3 shifts with over 2000 employees, makes call to all the sand purchasers in the State to know about the price for which they purchased the sand and/or any problem faced by them during the purchase of sand. At present, the satisfaction level of sand consumers in the State is over 90%. And the few cases that arise are also not related to prices or availability but related to delay in delivery or other minor issues.

Table 29 Use of technology in monitoring across the States

State	In Monitoring			
	Electronic Monitoring of Extraction/ CCTV	Electronic weighing /measurement of extracted sand	GPS tracking in transit	Registering reach/ stockyard level sand availability data on portal

Andhra Pradesh	Yes	No	In some of the districts	Yes
Assam	No	No	No	No
Chhattisgarh	No	No	No	No
Gujarat	No	Yes	No	No
Haryana	In some of the districts	No	No	No
Karnataka	No	Yes	Yes	No
Madhya Pradesh	No	No	No	No
Maharashtra	In some of the districts	No	In some of the districts	No
Punjab	No	No	No	No
Rajasthan	No	No	No	No
Tamil Nadu	No	No	No	Yes
Telangana	Yes	Yes	No	Yes
Uttar Pradesh	No	No	No	No
Uttarakhand	No	No	No	No

4.3.4 Use of IT in delivering

Monitoring of delivery is crucial in sand mining in terms of ensuring that illegal transportation of sand in the State does not take place and the sand reaches the customer within the prescribed time frame and at affordable rates. The best use of technology to monitor the delivery process is to ensure that only transit passes for transport of sand should be used in the State and the delivery of sand is allowed only through GPS enabled vehicles. In the combined system of use of e-permit as well as GPS enabled vehicle, as per the address mentioned in the e-permit, route map and estimated time for delivery gets loaded in the system for tracking purpose. Logic related to alerts

are embedded in the system for monitoring purpose. In case of any deviation (mentioned below), the alarm gets activated and information is passed to the local police/district committee for quick action.

Only six of the fourteen States namely, Gujarat, Karnataka, Madhya Pradesh, Punjab, Tamil Nadu and Telangana have the provision of online transport permits in their States, and Andhra Pradesh does not issue permit for transportation for sand. The remaining seven States still follow the manual passes for transportation of sand in their States. However, even in most of the States where sand is transported using online permit, the online transit pass alone is not sufficient for full proof monitoring as the transporters get photocopies of the pass and transport sand multiple time on a single pass. The State should ensure that online permits issued for transportation of sand are printed on a secure paper and the permit should have QR code/ bar code along with a hologram.

Karnataka has mandated to install GPS and online permits in all sand carrying vehicles in the State through the amendment of the KMMCR amended in August 2016. Andhra Pradesh is in the process of installing GPS in all sand carrying vehicles and as per the G.O. issued, by February all the vehicles will be GPS enabled. Telangana is planning to install GPS in all the sand carrying vehicles in the State. In these four States, all the sand carrying vehicles are registered with the department. Further, the Telangana Government recently introduced 'Sand Taxi Service' - an online mechanism for booking sand with delivery at the consumer doorstep. Initially, as pilot project, the District Administration started the sand taxi service in Peddapalli, Mahabubnagar, Gadwal districts and the same is being extended to all the (30) districts in the State with due linkage to the sand sources. The concept will be further extended at the State level to have consumer feedback as part of further improving the system.

Table 30 Use of technology in sand delivery across the States

State	In Delivery		
	Permit type	Vehicles registered with department	GPS installed vehicles
Andhra Pradesh	Not Applicable	Yes	Currently installed in some districts (G.O. released for installation in all districts)
Assam	Offline	No	No
Chhattisgarh	Offline	No	No

Gujarat	e-permit	No	No
Haryana	Offline	No	No
Karnataka	e-permit	Yes	Yes
Madhya Pradesh	e-permit	Yes	No
Maharashtra	Offline	No	No
Punjab	Online	No	No
Rajasthan	Offline	No	No
Tamil Nadu	e-permit	Yes	No
Telangana	e-permit	Yes	No
Uttar Pradesh	Offline	No	No
Uttarakhand	Offline	No	No

Apart from the processes discussed above, there are still some areas in terms of identification of reaches, resource estimation and operations where technological interventions can make the process more robust. Below is the table where the use of technology has been mapped in the entire process chain of sand mining in different States.

Table 31 Use of technology across the process chain of sand mining

State	Mapping the use of technology in sand mining			
	Allocation	**Ordering**	**Monitoring**	**Delivery**
Andhra Pradesh	Not applicable	Online (Web/App) (Few districts only)	High	Medium
Assam	Limited use of IT	Offline	Low	Low
Chhattisgarh	Not applicable	Offline	Low	Low

Gujarat	Good use of IT	Offline	Medium	Medium
Haryana	Good use of IT	Offline	Low	Low
Karnataka	Good use of IT	Offline	Medium	Medium
Madhya Pradesh	Good use of IT	Online	Low	Low
Maharashtra	Good use of IT	Offline	Low	Low
Punjab	Good use of IT	Offline (Web)	Low	Medium
Rajasthan	Good use of IT	Offline	Low	Low
Tamil Nadu	Limited use of IT	Online (Web/APP)	Medium	Medium
Telangana	Limited use of IT	Online (Web/APP)	High	Medium
Uttar Pradesh	Good use of IT	Offline	Low	Low
Uttarakhand	Good use of IT	Offline	Low	Low

It can be seen from the above chart that the process in which the use of technology is most common is allocation of sand reaches. Further, Andhra Pradesh, Telangana and Tamil Nadu are making good use of IT in ordering, monitoring and transportation of sand in their States. Andhra Pradesh, Tamil Nadu and Telangana have developed web portals for ordering of sand in their States. All the sand carrying vehicles are registered with the State mining department. However, overall, Andhra Pradesh and Telangana have used IT relatively more intensely as compared to other States.

4.4 District Survey Report

Most of the States are lacking in terms of preparation of the District Survey Report which has been mandated by the MoEFCC through its 2016 notification. District Survey Report is a document that needs to provide the estimates of total sand available in a district based on the annual deposition rate.

If DSR is properly prepared, it could give the total sand resources available in a district. Further, with the help of a scientific replenishment study the data on the amount of sand resource that can

be extracted in the district without harming the balance of sand deposition in rivers can be derived. Further, if the DSRs of all the districts clubbed together can give us total resource estimation of sand in a State. And based on the resource and the estimated demand of sand, the State Governments can take a call on the number of sand bearing areas to be allotted for sand mining to meet the demand in the State.

Assam, Andhra Pradesh and Telangana have not prepared DSRs at all, however Andhra Pradesh and Telangana have evolved a system for identification and assessment of sand resources as per the existing WALT Act 2002 and WALT Rules, 2004. Chhattisgarh, Maharashtra and Tamil Nadu prepare the DSR but do not conduct resource assessment in the DSR. However, some of the States such Gujarat, Karnataka, Madhya Pradesh, Rajasthan and Uttarakhand prepare the DSR and conduct resource estimation as well. But none of the States has anything related to replenishment study in their DSRs. Below is the table, depicting the DSR status in the States.

Table 32 Status of District Survey Reports

State	Total No. of Districts	No of Sand Related Districts	DSR Status	Resource Estimation in DSR	Replenishment Study in DSR
Andhra Pradesh	13	12	0/13	No DSR	NA
Assam	33	33	0/33	No DSR	Not Applicable
Chhattisgarh	27	27	27/27	NO	No
Gujarat	33	32	32/33	Yes	No
Haryana	23	16	16/23	NA	NA
Karnataka	30	10	30/30	Yes	No
Madhya Pradesh	51	51	51/51	Yes	No
Maharashtra	36	34	36/36	NO	No
Punjab	22	16	22/22	Yes	No
Rajasthan	33	28	23/33	Yes	No

Tamil Nadu	32	30	30/32	NO	NA
Telangana	31	27	0/31	No DSR	NA
Uttar Pradesh	75	68	68/75	NA	NA
Uttarakhand**	13	13	13/13	Yes	No

**No DSR means DSR is not prepared by the State*

***Uttarakhand's Forest Development corporation (UAFDC) has done replenishment study for some mines through Forest Research Institute (FRI), Dehradun.*

Replenishment study should done across the States in all districts as per the method prescribed in the *Sustainable Sand Mining Guidelines 2016* of MoEFCC**. Some of the points that should be taken care of while conducting replenishment study are:**

- *The cross-section survey should cover a minimum distance of 1.0 km upstream and 1.0 km downstream of the potential reach for extraction.*
- *The sediment sampling should include the bed material and bed material load before, during and after extraction period.*
- *Development of sediment rating curve at the upstream end of the potential reach using the surveyed cross- section.*
- *Using the historical or gauged flow rating curve, determination of suitable period of high flow that can replenish the extracted volume.*
- *Calculation of the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.*

The Apex Court has mandated the replenishment study to be conducted by all the States, however the States which are sand deficit should put more thrust on it as chances of environmental damage are more in those States.

One of the reasons for absence of replenishment study from the District Survey Reports in all the States is the lack of manpower to conduct the study.

4.5 Illegal Mining

India's sand mining issues tend to revolve around efforts to curb illegal mining. A number of steps have been taken by different State Governments to control illegal mining in sand.

Illegal mining in sand is basically of two types:

- Illegal extraction from the un-notified areas

- Illegal extraction over the permissible limits

Majority of the registered cases of illegal mining are related to illegal transportation where the transportation of sand is without a valid transport permit. Another way of illegal mining is through illegal transportation of sand from one State to other in cases where the inter-state transportation of sand is banned.

Table 33 Status of inter-state transport by State Governments

State	Inter-State transport permissibility (from State to outside)	Inter-State transport permissibility (from Outside to State)
Andhra Pradesh	No	Yes
Assam	Yes	Yes
Chhattisgarh	Yes	Yes
Gujarat	No	No
Haryana	Yes	Yes
Karnataka	No	Yes
Madhya Pradesh	Yes	Yes
Maharashtra	Yes	Yes
Punjab	Yes	Yes
Rajasthan	Yes	Yes
Tamil Nadu	No	Yes
Telangana	No	Yes
Uttar Pradesh	Yes	Yes
Uttarakhand	No*	Yes

**Uttarakhand allows transportation after processing of RBM material*

The key reason for not allowing transport of sand from one State to other is to avoid shortages of supply in the home State and thereby avoid spiraling prices of sand. However, the State

Governments may view the situation of sand scarcity in totality across the country and consider inter-state movement of sand.

The concern of States regarding sand demand of host State not being met can be taken care of by mandating the sale of sand through online portal only. Once the sale of sand is through online portal only, anyone who has to purchase sand will pay the exact same amount to the lessee on the portal, either the consumer being a resident of host State or neighboring State. Also the States should ensure that lessee does not have any incentive to supply sand to consumers in other States over consumers in host State.

4.6 Production and Revenue comparison

The production and revenue data as provided by the States has been shown in the following chart.

Table 34 Production and Revenue from Sale of Sand

State	Production from river sand (in MMT*)			Revenue (Rs Crore)		
	2014-15	**2015-16**	**2016-17**	**2014-15**	**2015-16**	**2016-17**
Andhra Pradesh	NA	NA	NA	NA	NA	NA
Assam	NA	NA	5.6	NA	NA	32.5
Chhattisgarh	11.7	8.3	10.0	12.34	8.8	10.6
Gujarat**	NA	59.71	49.64	NA	98.4	160.3
Haryana***	NA	4.8	19.2	NA	104.5	266
Karnataka	5.5	6.6	4	32.5	39.4	25.2
Madhya Pradesh	26.36	23.73	49.14	238.6	211.5	240
Maharashtra	NA	NA	NA	NA	NA	NA
Punjab	NA	NA	NA	86.5	46.5	43.0
Rajasthan	62.8	48.4	56.8	206.3	231.7	236
Tamil Nadu	8.5	6.14	15.1	125.2	91.03	86.33

Telangana	NA	NA	13.23	10	375	434
Uttar Pradesh	40	22.8	5.9	165.7	115.2	47.7
Uttarakhand****	NA	NA	NA	173.5	272.5	335.3

**For conversion of production from volume to weight, bulk density of 1.89 has been used.*

***Only royalty data captured for Gujarat. Also production data is for calendar year.*

****Production and revenue of sand and BGS*

***** Revenue and production data includes river bed material (RBM)*

#NA: Data not available.

States need to follow practices similar to major minerals for data capturing related to revenue and production at each reach level for better planning and demand-supply analysis of the State. This will also enable better monitoring by the States in case of illegal mining and transportation.

4.7 Reservations offered in States

Reservations in sand mining are a way to help some of the communities to earn their livelihoods. Most of the States offer some form of reservation in their States. While some of States such as Chhattisgarh notify sand blocks to be operated only by the Panchayat, others such as Karnataka, Gujarat and Rajasthan offer reservation in allocation of sand blocks in scheduled areas to SC/ST/ Specific communities. Some States such as Assam, Chhattisgarh, Haryana and Punjab offer reservations in terms of waiving the royalty on sand extraction to hereditary artisans manufacturing artefacts in traditional way, and some States such as Telangana waive off the royalty on sand extracted from III or below order streams if consumed within the district. Below is a table, depicting the reservation offered in sand mining in different States.

Table 35 Reservations in Sand Mining in different States

State	Reservations available	Details
Andhra Pradesh	Yes	District Collector can allot a sand reach for any project if it is time-bound and prestigious and for the State
Assam	No	Some relaxations in terms of : No royalty applicable for hereditary artisans for manufacturing of earthen pots/ artifacts in traditional way.
Chhattisgarh	No	Some relaxations in terms of :

		No royalty applicable for: • Hereditary Kumhars working in traditional way. • Farmers, village artisans and labours living in the village where the sand mine • Sand used by Gram panchayat, Janpad Panchayat, Jila Panchayat or Nagariya Nikay
Gujarat	Yes	Quarry Parwana - Allocated to Khaniyas/Oad community Quarry Lease - Government may identify sand blocks in schedule areas to be allotted to ST only.
Haryana	No	Some relaxations in terms of : No royalty applicable for: • extraction by hereditary potter, for use in manufacturing of earthen pots/ artefacts on a cottage industry basis, and whose turnover < Rs 1 LPA • mining, transportation or storage by hereditary Kumhars for making tiles, pots or bricks by traditional means • levelling of any agricultural fields by a landowner within his own land
Karnataka	Yes	District Committee may reserve sand blocks for low income housing and/ or for Government works or for sand extraction by Government agencies or Boards or Corporations owned by the Central Government or State Government. District Committee reserves the sand blocks identified for grant through tender cum auction, by way of lottery to the following categories as per percentage mentioned against each category: • SC/ST – 24% • PH – 2% • Others – 74%
Madhya Pradesh	No	Not Applicable

Maharashtra	Yes	Creek mining by hatpati and dubi means to be done only by societies involved in the business traditionally
Punjab	No	Some relaxations in terms of : No royalty applicable for: • extraction by hereditary 'Ghumiars', who prepare earthen pots on a cottage industry basis, whose turnover < Rs 2 lakhs per annum
Rajasthan	Yes	Land owners are given preference who have their own land during auction by rights of first refusal in the auction. In notified scheduled areas, priority is given to the registered society of domicile schedule tribe in allocation of sand blocks
Tamil Nadu	No	Not Applicable
Telangana	No	Some relaxations in terms of : No royalty applicable on sand extracted from I, II and III order streams if consumed within the district. If I, II and III order streams are not available, the Government may demarcate 5 or above Ha area from IV and above order streams. Sand used in the weaker section housing programme exempted from payment of seigniorage fee and sale price for IV to VI and above orders and sand extracted from de-siltation by the construction authorities; and cost of loading and transportation shall be borne by the concerned construction authorities.
Uttar Pradesh	No	Not Applicable
Uttarakhand	No	Not Applicable

In lower order streams where commercial mining is not possible, royalty on extraction has been waived off if the extracted sand is consumed within the district by local village communities/traditional communities, etc. The process of sand extraction and transportation should be by tractor or bullock carts. Further, proper monitoring mechanism should be put in place to ensure that sale of sand through carts does not occur.

The States may reserve certain sand blocks for reserved categories, local or traditional communities and the allocation of sand blocks to these categories may be without auction by following a simplified process. The States shall be free to decide the percentage of sand blocks to be reserved based on the local conditions prevalent in the State.

4.8 Type of Mining (Manual/ Mechanized) across the States

The practices followed for type of mining i.e. manual or mechanized is shown below in the table.

Table 36 Types of Mining (Manual/ Mechanized)

State	Type of Mining (Manual/ Mechanized)
AP	As per Mining Plan/ Environment Clearance
Assam	As per Mining Plan/ Environment Clearance
CG	As per Mining Plan/ Environmental Clearance
GJ	As per Mining Plan/ Environmental Clearance
HR	As per Mining Plan/ Environmental Clearance
KTK	As per Mining Plan/ Environment Clearance
MP	As per Mining Plan/ Environmental Clearance
MH	As per Environmental Clearance
PB	As per Mining Plan/ Environmental Clearance
RJ	As per Mining Plan/ Environmental Clearance
TN	As per Mining Plan/ Environmental Clearance
Telan.	As per Mining Plan/ Environmental Clearance
UP	Mechanized mining allowed with the permission of District Magistrate
UK	Manual Mining

In most of the States, use of machinery/ mechanical excavators in sand mining is permitted based on the approved mining and environmental plans. However, for further clarity on manual v/s

mechanical mining, a clarification seeking the permission to semi-mechanised mining has been sent to MoEFCC.

4.9 Best practices across the process chain

4.9.1 Best practices in the notified or controlled pricing model

4.9.1.1 Demand Supply assessment

Of the 14 States surveyed for this study, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Tamil Nadu and Telangana follow controlled pricing model. Further, only Telangana and Tamil Nadu have undertaken demand estimation. The estimation by Telangana is within the range of estimation done using RBI data based method.

4.9.1.2 Alternates to natural sand

Out of the five States following notified pricing model, Andhra Pradesh and Telangana have separate M-sand policy. Tamil Nadu is in the process of drafting the M-sand policy.

4.9.1.3 Rules & Regulations

Andhra Pradesh and Telangana have well defined rules and regulations for sand mining and alternative materials such as M-sand. These States have separate policies for sand, distinct from other minor minerals. Further, the mining departments/ State agencies in these States handle the regulations and overall administration of sand mining operations. Lastly, these States have been regularly updating their policies for sand and other minor minerals taking into account the developments in the sector.

4.9.1.4 Identification

In States like Andhra Pradesh and Telangana identification process is detailed and joint inspection report is prepared and followed for identification of the concessions.

4.9.1.5 Clearances and approvals

Prior clearances and approvals before auctioning or allocating the blocks helps minimize risks for the bidders and reduces the lead time for development. In States such as Andhra Pradesh and Telangana, the mining department/ Corporation procures the environment clearance and mining plan approvals. Only well administered States may follow the model of obtaining clearances/approvals themselves.

4.9.1.6 Business model

If the objective is to keep prices affordable and accordingly regulated, then notified or controlled pricing model can be adopted as is the case with Telangana and Andhra Pradesh. States however miss out on revenue generation even where consumers have the capacity to pay.

4.9.1.7 Operations & Monitoring

Telangana is doing better in terms of control over sand mining operations, as TSMDC appoints raising contractors through competitive bidding to extract sand on its behalf, and it can mandate stricter compliance with environmental norms as part of its contracting.

The monitoring mechanism should not only be limited to physical checking by identified personnel but should include the use of technology in checking the transport permit, keeping the record of sand consumers for verification and monitoring the excavation sites. In view of this, Andhra Pradesh follows a 360^{o} monitoring starting from the reach level to delivery of sand to the end consumers.

4.9.1.8 Transportation

In Andhra Pradesh, all sand carrying vehicles are registered with the State mining department and are GPS enabled. Further, all the vehicles carrying sand have a valid transport permit generated online along with a scan code or a hologram mark to ensure that the single transport pass is not photocopied and used more than once. Further, the transport monitoring team has a scanning device to scan the transport permits, and once scanned the entire detail, such as volume, origin point (reach/ stockyard), destination, previous scan detail, etc., are displayed on the scanning device. The transit pass generated at the reach/stockyard also contains the route of delivery from the origin to the destination, and the same can be cross checked with the GPS device at the check points if there is any deviation in the route designated and the actual route followed. Further, through the GPS device, any unauthorized entry of a transportation vehicle near the reach/ stockyard can also be checked.

4.9.1.9 Sale of sand

Andhra Pradesh has constituted a five member district committee in all the districts which includes the Superintendent of Police, District Transport Commissioner, Executive Engineer of Irrigation department and ADMG under the chairmanship of District Collector. The committee notifies the price of sand for the district including transportation, loading/unloading and ramp maintenance fee. There is a 24 hours operational call centre, which gives a call to all the consumers to enquire whether the amount that is charged for sand is within the Government's notified limit. Consequently, the landed price of sand in the entire State has been under control.

Apart from Andhra Pradesh, Telangana is also relatively well placed in terms of sale of sand in the State, where only TSMDC can sell the sand. Further, the sale can only be through the online

portal developed by the mining corporation. Anyone who wishes to purchase sand in the State has to register on the online portal and subsequently login to place its order. After logging in, the portal displays the entire list of reaches/ stockyards along with the sand available in those reaches/ stockyards and the corresponding quality and price of sand. The consumer can filter/ sort the reaches/ stockyards based on location, quality and price and book based on the most suitable lease/ stockyard.

4.9.1.10 Consumer satisfaction and quality

Getting quality sand at reasonable prices is a major concern for consumers. Out of the States following nomination model, the consumer satisfaction is measured only in Andhra Pradesh by calling consumers through the call center for the delivery of sand at notified prices. However, regarding the quality aspect the consumers are not aware and infrastructure for testing facilities are not adequate.

4.9.2 Best practices in the market model

4.9.2.1 Demand Supply assessment

States following market model are Assam, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand. Out of these States Gujarat, Haryana, Karnataka, Punjab, Rajasthan and Uttar Pradesh have done demand estimation. The estimation of the Gujarat and Punjab is within range of estimation done using the RBI data based method.

4.9.2.2 Alternates to natural sand

Out of the nine States following market model Gujarat and Karnataka have M-sand units established. Karnataka has separate M-sand policy chapter in their minor mineral concession rules.

4.9.2.3 Rules & Regulations

Karnataka has well defined rules and regulations for sand mining and alternative materials such as M-sand. The State has separate policy for sand distinct from other minor minerals. Further, the mining department in the State handles the regulations and overall administration of sand mining operations. Lastly, the State has been regularly updating its policy for sand and other minor minerals taking into account the developments in the sector.

4.9.2.4 Identification

Gujarat prepares a detailed geological report through a technically qualified person for each identified sand block and puts the sand blocks for auctions based on the quantity of resource established by the report. Apart from establishing the resource quantity, the report contains details

of the area, DGPS Survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status, geological mapping, laboratory studies of the samples etc.

4.9.2.5 Clearances and approvals

The clearances and approvals need to be processed at a faster pace and in order to achieve that objective the applications for getting the clearances/ approvals should be made online.

4.9.2.6 Business model

If the objective of the State Government is revenue maximization, then simple forward tender cum auction model as is being followed in Gujarat can be adopted where the sand bearing areas are notified for auction after preparation of detailed geological report containing the estimated quantity of sand reserves in the block. Haryana received maximum revenues amongst the States following market model.

4.9.2.7 Operations & Monitoring

Operations in the market model is in the control of lessee/ contractors and the State Government has minimum control over it. Further the States following the market model are in the process of developing monitoring mechanism which is IT based. Few States have started issuing e-pass for transportation of sand and others are still under developing this system. Gujarat has developed applications for checking and has grievance cell for consumers from monitoring aspect.

4.9.2.8 Transportation

Transportation of sand in the market model is controlled by contractors and department/State Government has no control over it. The transport of sand may be integrated with the online sale mechanism.

4.9.2.9 Sale of sand

Sale of sand in the States following market model is direct by lessee/contractors and by offline means only. State Government has no control over the sale of sand or the prices of sand. The States should endeavor for the online sale of sand for doorstep delivery service.

4.9.2.10 Consumer satisfaction

Getting quality sand at reasonable prices is major concern for consumers. In the market model, market dynamics decide the sale prices of sand. In Haryana and Gujarat, prices are comparatively lower due to more supply.

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5. Framework

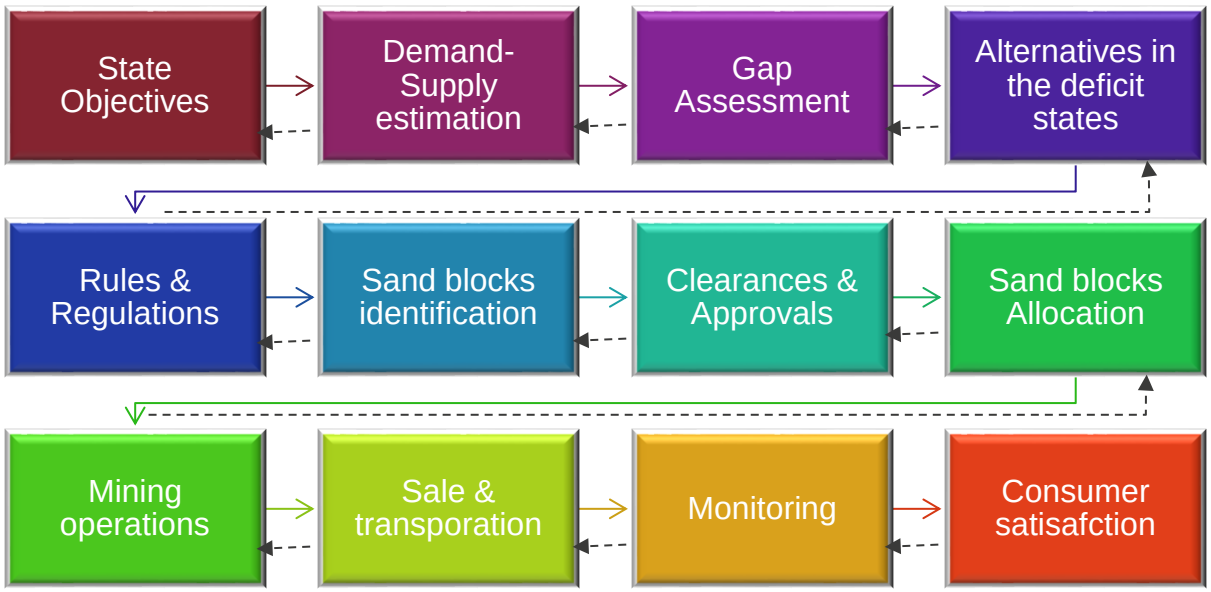
This chapter presents the suggestions for the States on the analysis and best practices identified in the preceding chapters.

The suggestions are divided into four major heads:

1. Defining the objectives of the State
2. Demand supply estimation and assessment of gap
3. Formulation of Alternative options in sand deficit States
4. Process chain wise suggestions

The suggestions are structured as follows:

Figure 5- 1 Key elements in the process chain of sand mining



5.1 State objective

The policies of the State, rules and regulations thereof, shall be dependent upon the objectives, demand-supply assessment and alternatives available for natural sand. Objectives of the States drive the policy formulation for sand mining. States should define their own objectives for the policy related to sand mining depending upon the various factors such as demand supply situation in the State, resources available with the State in terms of manpower and related infrastructure, revenue targets of the State, etc.

While some of the States aim to maximize revenues from sand resources e.g.: Haryana, Gujarat, Karnataka, Punjab, Uttar Pradesh, Uttarakhand, Assam, Maharashtra, Rajasthan; others aim to

keep the sand prices controlled for the public and they are ready to forego the potential revenues from sand e.g.: Andhra Pradesh, Madhya Pradesh, Chhattisgarh and Tamil Nadu. There are a few States that are earning reasonable amount of revenues from sand and at the same time keeping the pricing controlled for the public e.g.: Telangana.

5.1.1 Demand – Supply estimation

5.1.1.1 Demand Assessment

Different States follow different methodologies for sand demand estimation. From the 14 States surveyed for this study only few States such as Haryana, Gujarat, Karnataka, Punjab, Rajasthan, Tamil Nadu, Telangana and Uttar Pradesh have carried out demand assessment. However, even where States estimate demand, the methodology adopted does not appear to be robust and estimates vary except in case of four States. Also there are huge variations in estimations undertaken by majority of these States, as compared to estimation using scientific methods.

5.1.1.2 Demand estimation methodologies

Scientific demand-supply assessment and the resultant gap can help the State Government to frame policy for allocation of sand reaches and to adopt business models along with framing policy for alternatives of sand. Further, the following two methods are suggested for estimation of sand demand:

5.1.1.3 RBI Index based methodology

The State-wise demand of sand in India for FY17 has been estimated based on the following factors:

- India's construction GVA [RBI's Handbook of Statistics on Indian Economy]
- India's State-wise construction GVA [RBI's Handbook of Statistics on Indian Economy]
- Conversion factor- Normative cement to sand mixture ratio of 1:2.5

In this method, based on the data released by RBI *(Handbook of Statistics on Indian Economy)*, ratio of construction GVA of State with construction GVA of India is calculated. Further, that number is multiplied by the cement sales in India. Once cement consumption of the State is known, the same is multiplied by the factor of 2.5 to derive the sand consumption. Further, normalization has been done based on the population of the States.

Accordingly, the following process can be used for estimating the demand of sand in the State:

1. India's construction GVA from RBI's *Handbook of Statistics on Indian Economy.*
2. States construction GVA from RBI's *Handbook of Statistics on Indian Economy*
3. Calculate ratio of 1 and 2 above
4. Actual consumption of cement in India is 292 million tonnes in FY17.
5. Cement consumption of the State considering the ratio arrived in step# 3 above

6. Using the normative cement to sand mixture ratio of 1:2.5, the total sand consumption in the State can be computed.
7. Normalization factor has been considered based on population of the State.

Conversion factor

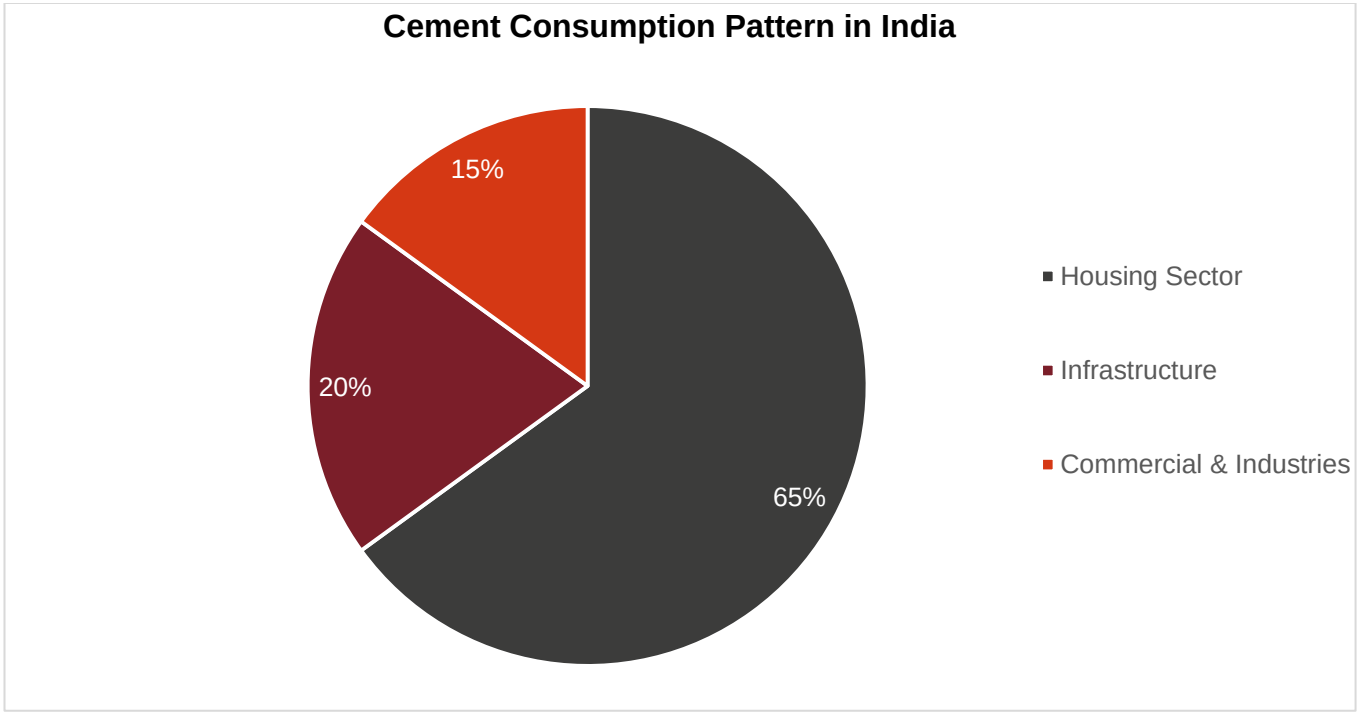
A rough estimate shows that sand consumption factor is around 2.5 for each unit of cement consumed, i.e. if cement consumption in the district is 1 Million Tonnes, then the sand consumption shall be around 2.5 million tonnes.

To arrive at the conversion factor for sand consumption from cement data, we need to have the following two data:

i. The list of sectors in which cement is used and the proportion of cement used in those sectors
ii. The ratio in which cement is mixed with sand in different sectors

Housing sector is a major consumer of sand in India followed by infrastructure and commercial sector. Majority of the consumers of sand are retail consumers and medium enterprises. The sectoral mix for cement consumption in Indian is shown in the following graph:

Figure 5- 2 Sectoral Mix of cement consumption in India



In housing sector, the proportion of cement used out of the total cement consumed across the country is 65%, and in infrastructure and commercial & industries, sectors, it is 20% and 15%, respectively.

The following assumptions have been considered for cement to sand ratio in each sector:

Sector	Ratio of Cement: Sand being used
Housing Sector	1:2
Infrastructure Sector	1:4
Commercial and Industries	1:8
Weighted Average	1: 2.5

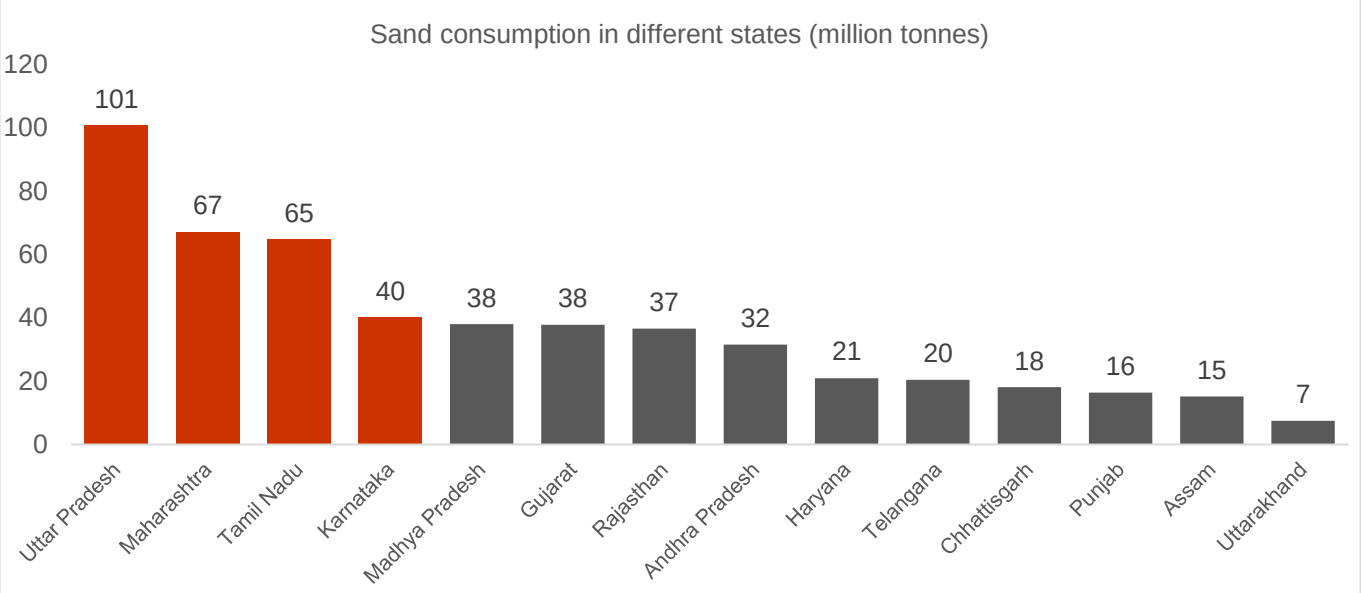
The ratio of sand and cement is different in different sectors depending on strength of concrete required to meet the standards. In housing sector, the average ratio in which cement and sand are mixed is 1:2, in infrastructure sector it is 1:4 and it is 1:8 in commercial & industries sector. Using the two data points provided above and taking the weighted average of the two, the overall cement to sand mixture can be arrived at and it comes out to be 1:2.5.

Normalization Factor

Normalization factor has been considered as per population of the State i.e. per capita Cement consumption has been calculated based on the percentage of population of the State as compared to the total population of the country. Sand consumption has been calculated based on per capita cement consumption multiplied by 2.5. The sand consumption derived, has been apportioned a weightage of 50% and the remaining 50% weightage has been apportioned to sand consumption derived using GVA based methodology. Eg: State A has population proportion of 4% and per capita cement consumption of the State is 4%X292 million tonnes = 12.2 million tonnes. Hence sand consumption of State A is 30 million tonnes (12.2 X 2.5). Also, sand consumption using GVA methodology as explained above is 33 million tonnes. Hence net sand consumption calculated using weightage of 50% for both shall be 30x50%+33X50% = 31.5 million tonnes.

Based on the RBI methodology explained above, sand demand of each State has been calculated.

Figure 5- 3 Estimation of State-wise sand consumption in FY17



Source: RBI, Analysis

Rest of the States viz. J&K, Himachal Pradesh, Arunachal Pradesh, Goa, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Andaman & Nicobar, Chandigarh have demand of less than 8 million tonnes. Data for West Bengal and Tripura is not available. Further to refine the estimate, another methodology can be adopted, as described below, which can be used for calculating district wise demand as well.

5.1.1.4 Cement consumption based methodology

In this method, the demand of sand in a State or district is based on cement consumption in that State/ district multiplied by a conversion factor in terms of assuming a normative cement to sand consumption ratio. Following inputs are required for estimation.

Inputs:

1. Cement consumption in the State/ district
2. Conversion factor - cement to sand consumption ratio

Cement consumption in the State can be obtained from cement sales considering any of the following sources:

1. Sales data from sales tax officials/ GST officials (State Revenue department/ Tax Department)
2. Cement companies for the sales data of the districts and the State
3. Sales data from cement dealers present in the State

Conversion factor has been considered, as 2.5, as explained in detail in the previous methodology using RBI data. Based on this, a district-wise demand of sand can be derived.

E.g.: Cement consumed in a State is 10 million tonnes, which is based on cement sales by the companies, and hence the sand consumption shall be 25 million tonnes multiplying cement by the conversion factor of 2.5.

5.1.1.5 Supply Assessment

Data related to supply of sand is being maintained by all the States surveyed as part of this study. Some of the States consolidate the data captured by the district officers based on returns filed by the lessees, while some States use IT tools to capture the supply data. Other States calculate the supply data based on the royalty collected. Also few States estimate the resources available in the district/ State based on District Survey Reports (DSRs) prepared.

5.1.1.6 Supply estimation methodology

Estimation of accurate supply in the State is necessary for better planning by the State. States need to develop process flow for data collection from different sources of sand supply using IT tools e.g. every sand lessee in the State shall upload online return every month in the portal which needs to be developed by the State Government. This will enable States to analyse the production trend in the State, lease wise, month wise, district wise, etc. Further, for estimation of resources available in the State and production potential for each year, DSR data of districts need to be consolidated.

5.2 Gap Assessment

Based on analysis of demand supply situation in the State, a gap assessment should be done and accordingly policy and rules/regulations need to be framed. Based on the gap assessment, a State can be classified as follows:

a. Sand surplus State
b. Sand sufficient State
c. Sand deficit State

It is crucial for the State to conduct gap assessment since sand sufficient States shall soon turn into deficit states as the natural availability of sand shall not increase. Therefore, these States need to plan activities for future years to enable sufficient supply either through natural sand or alternatives and should frame policies accordingly.

5.3 Alternate Options

After estimation of gap derived from demand supply assessment, States need to analyse the alternate options for sand, available with them. Considering the large deficits in demand and supply of sand, alternate options need to be promoted. Even globally, major consumers of sand have moved towards alternatives of river sand to meet the requirement in construction activities. In China, crushed stone and offshore marine sand deposits present the most viable substitutes for fine aggregate.

Environment impacts of river sand

Some of the environmental effects of excessive sand mining without regard for the natural resource are:

- Change of morphology of the river destroys the riparian vegetative cover. Riparian habitat helps in controlling erosion, providing nutrient inputs into the stream and prevents intrusion of pollutants in the stream through runoff.
- Bed degradation due to sand mining is also responsible for channel shifting, causing loss of properties and degradation of landscape.
- Undermining of bridge supports, pipe lines or other structures.
- The in-stream habitat is highly affected by the increase in river gradient, suspended load, sediment transport and sediment deposition.
- Excessive sediment deposition increases turbidity which lowers light required for photosynthesis and reduces food availability of aquatic fauna.
- Change in morphology of the river bed which is an important part of aquatic habitat.
- Excessive mining can deplete the gravelly bed material thereby causing harm to the aquatic habitat.
- Ground Water table could be lowered.
- Depletion of ground water for the purpose of irrigation and drinking.
- Increase in channel bank scouring and erosion.
- Bank collapse and erosion due to rapid bed degradation.
- Pollution of ground water by reducing the thickness of the filter material.
- Increased concentration of suspended sediment in the river which in turn causes siltation of water resources projects.
- Increase in health hazards such as degradation of air quality and dust fog.
- The biodiversity and pest risks also increases due to excessive mining.
- Excessive in-stream sand mining results in destruction of aquatic and riparian habitat through changes in channel morphology.

Consequently, to conserve the natural eco-system, use of alternates of river sand such as M-sand and sand produced from coal overburden should be encouraged. Further, there are multiple benefits of promotion of alternates of river sand such as:

- Uninterrupted supply of sand can be ensured throughout the year without any seasonal effect
- Employment can be generated through the processing plant
- Revenue can be generated from an otherwise waste product (over burden)
- Over exploitation of river sand can be minimized
- Price of river sand/ ordinary sand can be kept under check

After estimation of gap derived from demand-supply assessment, States need to analyse the alternatives options of natural sand available with them. Considering large demand-supply deficit, alternate options need to be promoted for below reasons:

- ✓ Alternate supply option will reduce pressure on river sand
- ✓ Supply of alternatives may reduce prices of river sand
- ✓ Alternate options can cater to the needs of monsoon season/ peak season

Each of the alternatives of river sand are discussed subsequently.

- ➢ M-sand
- ➢ Sand from Overburden of coal mines
- ➢ Import of sand

Figure 5- 4 Alternate options for river sand

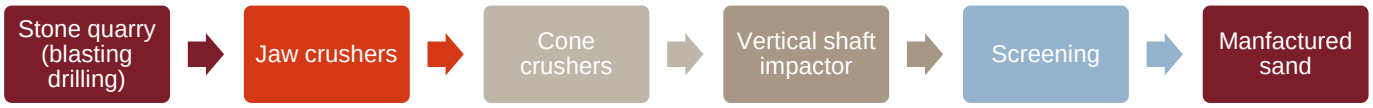


** Another option can be construction & demolished (C&D) waste.*

5.3.1 M-Sand

M-sand is the most common alternate of river sand which has already gained prominence in some of the southern States. It is produced by crushing of rocks, quarry stones to a stipulated size of 150 microns. To arrive at the required grain size, existing coarser hard rock deposits are crushed in a series of crushers and the crushed material is segregated in different fractions as suited to various construction activities. The sand obtained through this process is further refined by removing fine particles and impurities through sieving and washing. In the final stage, the sand is tested for various quality aspects, which is considered better for construction. As per IS-383, the chemical characteristics are similar to the river sand with similar strength and same type of applications. **M-sand concrete has a marginally higher bond strength, and mortar made of M-sand shows higher compressive strength and modulus for masonry, over those of river sand. M-sand is economically feasible, cheaper and is superior as compared to river sand in many of the urban centers in India e.g. Bangalore.**

Figure 5- 5 Process flow for an M-sand manufacturing unit



NCCB conducted Rapid Chloride permeability test to test the durability of M-sand mixes, Water permeability test to test the dense structure of concrete, and Drying Shrinkage test to check the shrinkage in M-sand, and all the tests indicate that the parameters of concrete mix with M-sand are satisfactory, and it can be accepted as a better ingredient as fine aggregate in place of natural sand.
Further, technical analysis conducted by the Department of Civil Engineering, Indian Institute of Science, Bangalore, shows that the properties of M-sand are suitable for application in mixtures such as mortar and concrete, and performs better than riverbed sand.

It has been observed that the use of M-sand has increased significantly especially in the cities. Since it can be crushed from hard granite rocks, it can be readily available at the nearby place, reducing the cost of transportation from far-off river sand bed. Another significant advantage that M-sand provides is that it can be dust free as the sizes/grades of M-sand can be controlled easily as per the requirement of the type of construction.

Although the use of M-sand has increased over the years, it is being used only in some States as:

- River sand is easily available in those States; and

- M-sand has not gained the acceptance among the citizens.

However, there is a significant potential of usage of M-sand in the future. The details of M-sand policy in the State, number of M-sand manufacturing units and the production of M-sand in the State is mentioned in the table below.

Table 37 State-wise details for M-Sand

State	M-Sand Policy available in State	No. of M-sand manufacturing units	Production of M-sand (MMT)
Andhra Pradesh	Yes	6	<1
Assam	No	--	--
Chhattisgarh	No	--	--
Gujarat	No	2	<1
Haryana	No	--	--
Karnataka	Yes	164	20
Madhya Pradesh	No	--	--
Maharashtra	No	--	--
Punjab	No	--	--
Rajasthan	No	--	--
Tamil Nadu	Under development	--	3.24
Telangana	Yes	44	7.2
Uttar Pradesh	No	--	--
Uttarakhand	No	--	--

The detailed analysis of M-sand as an alternative to river sand along with the benefits extended to M-sand manufacturers in different States are annexed in Annexure VII onwards.

It is observed that Karnataka, Telangana and Tamil Nadu are the only States which are producing considerable amount of M-sand in India. The main reason for acceptance of M-sand in Karnataka is due to extremely high price of river sand in Bangalore. The price of river sand in Bangalore is around Rs 70,000 to Rs 1,00,000 for a 30 tonne lorry. It was therefore important to promote M-sand by giving incentives to M-sand manufacturing units and also create awareness among the

consumers about the benefit of M-sand. Karnataka has also done relatively well in creating awareness among the consumers regarding the benefits of M-sand. The State has prepared jingles for the same and has advertised the benefits of M-sand to the citizens of the State through print and digital media. The guidelines and incentives for M-sand production in the State of Karnataka as mentioned in the Karnataka Minor Mineral Concession Rules, has been annexed in Annexure IX.

Some other States are also trying to promote M-sand manufacturing like Andhra Pradesh, Tamil Nadu and Gujarat. Andhra Pradesh has released a GO highlighting the incentives that will be offered for establishment of M-Sand Units in the State, subject to the sale within the State and the incentives shall be apportioned in the ratio of M-sand produced to the total unit production. All M-sand units will be accorded industry status. The list of incentives offered in the State are enclosed as Annexure X.

Telangana has taken up the promotion of M-sand and is working towards the same. The State has accorded industry status to M-sand manufacturing units as long as the unit manufactures 100% sand. The incentives for promotion of M-sand in the State are enclosed as Annexure XI and Annexure XII.

There is a need to promote M-sand units on pan-India basis and create awareness for M-sand usage given the overall environmental and illegal mining concerns associated with river sand mining. Any further reduction in cost and prices of M-sand will make it a more attractive alternative. Accordingly, there is a need to ensure that M-sand units are less capital intensive to further reduce the production cost, create awareness towards usages of M-sand and to attract investments in the sector. The grant of “Industry” status to M-sand units has the following benefits:

- M-sand units can avail facilities and benefits at par with other industries
- M-sand units can avail commercial sources of finance for longer terms
- M-sand/alternates units can be recognized as priority sector, especially by RBI, banks and other financial institutions
- M-sand can be cheaper for end consumers assuming lower rates of interest by the lenders/ bankers
- Industry status will open the sector for FDI, which can expand production and can also enable latest technology adoption
- Industry status can enable faster and easier approvals process
- Industry status will overall reinforce the awareness of M-sand as an alternate option
- Government projects/ CPWD/ State PWDs should be mandated to use M-sand with specific percentage e.g.: 25% in starting years and gradually increasing to 50% of total consumption.
- Soft loans should be granted to M-sand production units, where M-sand producers need to pay only a certain portion of the interest on loan availed, the remaining will be borne by the State Government.

- Royalty should not be charged for the stone but for the sand (It would be beneficial in States where royalty for sand is very low)
- Power subsidy should be provided to M-sand producing units.
- Public awareness campaigns with the assistance of industry bodies like CMA (as they have greater reach up to ground level user) should be designed to inform citizens about the benefits of M-sand to increase its penetration and acceptability.

At present in Udyog Aadhar Memorandum, which is a simple and entrepreneur-friendly online system introduced by MSME Ministry, an entrepreneur can file for MSME status of “M-sand Units” under the NIC 5 digit activity code 08106. Which is defined as operation of sand or gravel pits, basalt porphyry, clay (ordinary), crushing and breaking of stone for use as a flux or raw material in lime or cement, manufacture or as building material, road metal or ballast and other material for construction.

5.3.2 Sand from Overburden of coal mines

The overburden spread over in situ coal seam needs to be removed for extraction of coal to an external dump till sufficient space is created for internal back filling by acquisition of land nearby coal bearing area. Further, this overburden dump needs to be re-handled at the time of closure of mine for land reclamation. As per mine closure plan 80% of the extracted overburden will be used for backfilling the excavated area up to ground level and remaining 20% overburden can be used for producing sand.

Studies conducted by Central Institute of Mine and Fuel Research show that processing of overburden yield 60 to 65% sand, 30 to 35% clay and 5% pebbles. The theoretical tradeoff between sand recovery and its quality should be quantified through laboratory tests. Western Coalfields Limited has already taken the initiative to segregate sand from the overburden. WCL has committed to supply sand at one fourth of the market price to NIT Nagpur, which has entered a memorandum of understanding to supply sand for the low cost housing projects under Pradhan Mantri Awas Yojna (PMAY). Further, WCL has proposed to set up a sand segregation plant of 200 cubic metre per day capacity near Nagpur.

WCL removes 200 million cubic metres of overburden every year. Out of which, 20% (40 million cubic metres) can be made available for segregation of sand, and based on the recovery factor of 60%, 24 million cubic metres of sand can be produced by WCL alone in a year. If the entire overburden removed in the country is used for sand segregation, a substantial portion of sand demand can be met through an otherwise waste material.

The following estimations have been carried out to understand the possibility of sand production by segregation of overburden of coal mines.

Approx. OB removal every year	**200 MM^3**
Approximate OB available for processing every year	20% of total quantity = 40 MM^3
Likely quantity of Sand production every year	60% of available quantity = 24 MM^3
Revenue generation every year by sale of sand @ Rs. 410.69 / m^3	Rs 985.6 Crores

The quantity of sand that can be produced by processing the overburden left from Western Coalfields Limited alone is 24 million cubic metres. If all the seven subsidiaries of Coal India Limited are instructed by the Government to process and segregate sand from the overburden left out, around 150 million cubic metres (283 million tonnes) of sand can be processed, which is around 35% of the total sand consumed in the country at present. And besides meeting the requirement of sand, this would also ensure that a productive use of otherwise waste material is done.

Initiatives therefore need to be taken to commercialize the same in sync with the State's policy related to sand. A separate policy is required for formulation of sand from OB. Along with this, an awareness campaign is required for consumer to shift some demand to this alternative.

5.3.3 Import of sand for coastal cities

Another way to meet the demand of sand in the country could be to import sand from other countries. This method can especially be beneficial in States which do not have deposit rocks from which M-sand can be manufactured or the coal deposits, from the overburden of which sand could be processed. But this will be only economical for the States near coastal regions.

Some of the south-east Asian countries such as Malaysia and Indonesia have ample sand available in their country, which if not removed could lead to floods. The sand could be sourced from those countries and imported to Indian ports to meet the deficit.

It need to be considered while importing sand from other countries that the sand should qualify for the IS 383 quality standard as well be free from any phyto-sanitary issues. To ensure this, the imported sand should have quality checks at two points.

a. In the country from where the sand is sourced. The supplier should provide this certificate for the ISO standard and phyto sanitary certificate. The supplier should also provide a certificate that the imported sand is free of any metal.
b. At the port where the sand comes, before packing the sand in sealed packets. A third party hired by the State should conduct this test to ensure that there is no conflict of interest.

Karnataka has already formed rules to allow for sale of imported sand in the State through which anyone in the State can import sand from other countries. Right now, Mysore Sales International Limited is importing sand from Malaysia under a tripartite agreement with a supplier in Malaysia and Carry & forwarding agent in Karnataka. Under the agreement, the C&F agent has to pay the entire amount in advance for the quantity of sand required by him to MSIL, which in turn releases the money to the supplier in Malaysia after deducting a commission of Rs 150 per tonne. The sand comes at the Krishnapatnam port from where it is transported in railway wagons after sealing it in bags of 50 and 100 kgs to Bangalore. From the railway siding, the sealed sand is transported in trucks to the stockyards which is near Bangalore city. The C&F agent is issued permit for the quantity of sand imported by it and it in turn sells it at the stockyard and issues the transport permit along with the GST bill to whoever purchases sand from the stockyard. In Bangalore, cement dealers have been hired as booking agents who are paid Rs 100 per tonne for the booked sand. Relevant department in Maharashtra is also interested to import sand from Philippines which gives incentives to remove sand from their country. However, the sand available in Philippines is volcanic sand and is greyish is color, so acceptance by the citizens could be a big challenge in case of import from Philippines.

Tamil Nadu is preparing to import sand. Kerala also has permitted imports of sand from Malaysia and the imported sand is sold in loose at the port at a price of Rs. 2300 per tonne. Imported sand, however, tends to be costly and is therefore suitable only for high deficit areas.

5.4 Rules & Regulations

Rules and regulations and policies related to sand form a very important part of the process chain of sand mining. In some of the States there are separate policies and rules specifically for sand or M-sand e.g. Andhra Pradesh, Chhattisgarh, Karnataka, Madhya Pradesh, Maharashtra, Telangana, Uttarakhand have separate sand policy or special rules related to sand mining. Further, Andhra Pradesh, Telangana and Karnataka have separate M-sand policy or rules.

5.4.1 Administrative control of sand mining

The mining department in most of the states except in a few states regulates the sand mining. The advantage of having the control with the mining department is that the staff in the technical department are well versed with mining and consequently there is no operational gap between the regulating body and those taking care of operations. A department has technical capabilities to do its primary job in the best possible way and the primary job of Forest, Revenue or Public Works Departments that have been handling sand mining in some states is not mining. Thus, it is suggested that the only the mining departments can be entrusted for regulating sand mining in the State.

5.4.2 Separate Policy

Despite being a minor mineral, the processes involved in sand mining are very different from those in other minor minerals. Also sand is different from other minor minerals in its direct usage by the general public. A separate policy for sand mining is extremely crucial considering the volume of sand consumed every year and its socio-economic significance. States that have separate Sand Mining Policy and Rules are better able to manage this sector. It is suggested to the State to have separate Sand Mining Policy. It is further suggested that only the State Mining Department should be entrusted for regulating sand mining in the State.

5.4.3 Area and timelines

States should define the area limits in their rules and policies. Mining methods shall be as per the approved environment clearance/ Mining Plan and as per notifications of the MoEFCC. Also, the minimum area can be fixed at 5 Ha for better supply and better control from State Government's point of view. States should take care of the factor that minimum three lease holders/ contractors to be there in each districts for a healthy competition. Notwithstanding, States are free to set their own limits for the minimum and maximum area depending upon the local conditions. Sand deficit States offering large areas may result in delay the process of clearances and approvals and hence may offer smaller areas as per limits of DEIAA and SEIAA.

Table 38 Suggested threshold area for sand mining in a State*

S. No.	Parameter	Minimum area	Time period of allotment
1	For Individual	5 Ha.	5-10 Years
2	For Co-operative society	5 Ha.	5-10 Years

**In case State Government need to allot smaller or larger areas depending upon the river, States are free to do so as per their minor mineral concession rules.*

5.5 Identification of Resources

5.5.1 Classification of the rivers

Before identification, States need to classify the rivers based on the Stream Orders i.e. Stream Orders I, II, III, IV and above. Stream order is a measure of the relative size of streams. The smallest tributaries are referred to as first-order streams. When two first order streams come together, they form a second order stream and with each successive downstream junction, stream order increases. Telangana and Andhra Pradesh do the classification of the rivers based on the

streams i.e. I, II, III, IV etc. order streams. Other States are also suggested to follow the below process for classification for different stream and sand extraction:

5.5.1.1 I, II and III order streams

If the order of the stream is I, II and III, sand may be allowed to extract by manual means for local use in villages or towns bordering the Streams for bonafide purposes other than commercial operations/public trading/stocking etc. States need to frame the operational rules or guidelines for stream I to III. The State Government may notify over exploited areas from where no sand can be extracted even for local use. The extracted sand can be transported only through a bullock cart or a tractor within the jurisdiction, and the block/ district shall be treated as a unit for free movement of sand within the jurisdiction. The sand extraction for local use may adopt the following payment structure:

a. Free of cost (without royalty)
    i. For weaker section housing schemes on a certificate issued by the District Collector or any authorized officer
    ii. For own use basing on the actual requirement to be certified by Panchayat Secretary concerned
    iii. Not to be used for commercial purpose, for selling, trading etc.
b. By payment of royalty/fees
    i. In Government works only.

The District Collector may put in place proper administrative mechanism for enforcement of extraction and transportation of sand in I, II and III order Streams comprising of:

i. Revenue Divisional Officer concerned
ii. Tahsildar concerned
iii. Representative of Deputy Director, Ground water Department
iv. Executive Engineer (concerned), RWS/Irrigation Department
v. Sub-Divisional Police Officer
vi. Motor Vehicle Inspector (concerned) from Transport Dept.

For IV and V order rivers, mechanized means of extraction is appropriate, though one is aware that there is certain lack of clarity of mechanized mining.

5.5.2 Identification of river sand sites/ blocks

Identification is one of the important activities in sand mining. The department should estimate the demand of the particular district and State and hence come out with the requirement of further allotment. Based on the requirement, the process of identification of sand reaches should be taken up by the relevant department responsible for sand mining in the State. The relevant department/ person needs to obtain the Khasra map of the area and conduct a spot inspection

and confirm from other departments regarding availability of area to check if the area is not reserved for some other purpose and can be allotted for sand mining. Further, if the inspector finds that the block is not lying in the restricted zone based on the above parameters and that the area is available for sand extraction, the area should be geo-referenced and pillars should be erected at the corners.

Figure 5- 6 Process to be followed during identification of sand bearing areas



5.5.2.1 District Survey Report

The District Survey Report (DSR) shall be prepared by the State Government as per the MoEFCC Sustainable Sand Mining Management Guidelines 2016. As per the guidelines, States need to undertake replenishment study which shall give the following outputs:

- Annual Deposition rates of sand from a river
- Deposition stretch of the rivers
- Total Resources available in the State for sand

The above outputs shall be the inputs for deciding the annual available quantity in a particular district.

- The cross-section survey should cover a minimum distance of 1.0 km upstream and 1.0 km downstream of the potential reach for extraction.
- The sediment sampling should include the bed material and bed material load before, during and after extraction period.
- Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross- section.
- Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume.
- Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.
- Flood discharge capacity of the rivers based on cross section history

While the need for undertaking the replenishment study is well understood, such assessments are presently not being undertaken in a comprehensive manner at the State level. It is envisaged that there is a need to inter-alia build capacity at the State level that trains the relevant staff in undertaking replenishment studies. As a short term measure, States need to identify colleges/ institutions with expertise related to Geology/ Environment/ Hydrology, and these colleges/ institutions could be handed over the responsibility of capacity building for replenishment study as well as conducting the first few rounds of replenishment studies.

For the long term, a preliminary suggestion in that regard is depicted below:

Design of Team	Design of course	Implementation
Technical Capabilities required for Replenishment Study	Skill Development Options for State Departments as per course design	Conduct of Study
Team of following • Geology specialist • Hydrology specialist • Environment specialist • Surveyor	Option 1 • Training of replenishment study by IITs/ NITs/ colleges (Special training)	State Departments/ District Dept. to conduct study for all the state rivers in Phases and priority for at least 2 monsoon seasons
Degree course required in related fields for conducting the study	Option 2 • Training of replenishment study by skill development centers through subject specialist (Special Course)	Study to be completed within 18 months from the start date and report to be approved by the Inter-departmental committee (DMG, Irrigation, Environment)

5.5.2.2 Joint Inspection Report

A Joint Inspection Report (JIR) (Annexure IV) should be prepared by the officers based on the need of the identification by the following departments/concerned officials:

- District Collector (Chairperson)
- Revenue department
- Public Works department
- Water Resources department
- Mines and Geology department

- Geologist
- Environment & Forest department
- any other relevant departments as per State's requirement

The purpose of JIR is to give comprehensive assessment of the sand available in each identified block and decision for go-no go area by assessment of pre-defined parameters.

The JIR team responsible for identification should fill the format containing the various parameters of sand mining as prescribed in the State rules and MoEFCC guidelines. During the identification itself, the details should be noted down and based on the details and internal considerations of the State, it should be decided whether the block should be allocated for mining or not. The responsible officers should submit the joint inspection report with clear recommendations to the concerned authority in charge of sand mining in the State.

5.5.2.3 Technical Report/ Geological Report

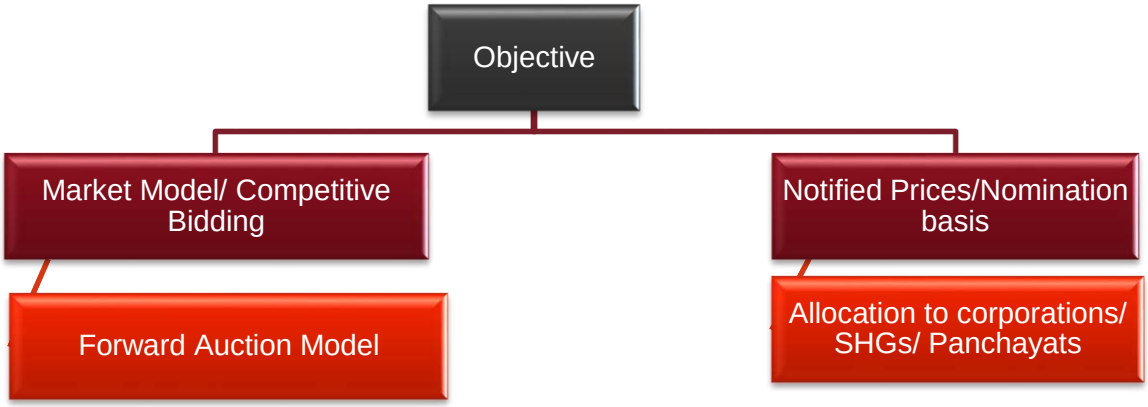
A detailed technical report/ geological report containing details of the area, DGPS survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status (if any), geological mapping, laboratory studies of the samples etc. of each sand block should be prepared by the Assistant Geologist/ Geologist, before putting it for auctions/ allotment. The potential areas of the quarry lease should be identified and demarcated using DGPS, topographic and geological maps prepared using Total Station. The area thus identified should be physically demarcated preferably by erecting boundary pillars.

5.6 Allocation

The allocation model that should be adopted by the States depends on the objective of the respective State. If State's objective is revenue maximization then the State needs to follow Market Model/ competitive bidding model. However, if the State's objective is to keep the prices under control then the notified prices model needs to be followed.

States are free to choose the model as per their demand-supply situation. In case of abundant supply, the auction model is best suitable. Following are the details of each model:

Figure 5- 7 Recommended Allocation Model based on the objectives of the State



5.6.1.1 Market Model

5.6.1.1.1 Forward Auction Model adoption

States may adopt simple forward auction model, subject to technical and financial eligibility of the bidders. Bidding parameter can be any of the two a) revenue share or b) production linked payments. There should be a strict monitoring mechanism to compute the exact quantity of sand extracted and dispatched from the sand blocks.

In the forward auction model most of the states generally have a mix of technical and financial qualifications as eligibility criteria. Further the interested bidders have to submit an Earnest Money Deposit (EMD) and Bid Security money to participate in the bidding process, which is refunded or converted to performance security (as the case may be) on completion on completion of auction process. The NIT shall also contain at least the following:

1. Information Memorandum (IM) having details of the mines
2. Eligibility criteria (technical and financial eligibility criteria)
3. Reserve price against the bidding parameter above which all eligible bidders have to quote. The calculation of reserve price needs to be based on the % of royalty payable by the bidder
4. Bid Security/ EMD to be submitted along with the tender
5. Other affidavits/ annexures/supporting documents to be submitted

Allocation of sand reaches can be completed within the month of March and September of each year so that the operations can begin from April and October of each year. The practice should be followed across the year, which will streamline the process of allocation efficiently.

Royalty collection and other funds: The royalty calculation in this model should be on ad-valorem basis and not to be collected as a lump sum amount on annual basis. Further, there should be a strict monitoring mechanism to compute the exact quantity of sand extracted from sand blocks.

5.6.1.2 Notified Sand Pricing Model

If the objective of the Government is to make sand affordable or make available at controlled rates, the States can adopt this model.

5.6.1.2.1 Nomination Basis

Sand reaches should be notified by the State after getting the mine plan approval and environment clearance, and should be given to either State corporations or Co-operative societies of the village for purpose of excavation and loading work. The main control to be with department/ corporation only. The fixation of selling price and selling rights shall be with the department only. State corporation/SHGs/co-operative societies will only facilitate the department in operations. In case of allocation of sand reaches to the State department on nomination basis, the nominated State department may further award the excavation and loading work to private companies through transparent reverse auction method. For this model also to be successful, strict monitoring is required. Further, the Government should also specify the rates of transportation and increase the supply as per demand so that the prices are not increased artificially by the transporters. Further, there should be a robust disclosure mechanism devised by the department/ State Government for better monitoring and control over supply.

Table 39 Summary of the business models followed by the States

Model ->	Notified Pricing/ Controlled Pricing	Market Model
Selection Method	**Nomination Basis**	**Competitive Basis**
Sale Pricing Methodology of Sand	**Fixed Rates**	**Market Rates**
Operations control	SHGs/ Panchayats/ State Corp./PWD	Lease holder/ Private Contractor
Selling rights	State Govt./ Department	Lease holder/ Private Contractor
Profit from sale of sand	State Govt./ Department	Lease holder/ Private Contractor
Profit basis	Sale Price *minus* Mining related exp.	Sale Price *minus* Premium *minus* *m*ining related exp.
Mining expenses to be borne by	State Govt.	Lease holder/ Private Contractor

Revenue sources for Govt.	From sale of sand	From auction premium, royalty

Depending upon the State's objectives, States are free to adopt any of the above model along with a robust monitoring mechanism.

5.7 Clearances and approvals and suggestions for MoEFCC

Clearances and approvals are procured by the State mining department/State Govt. Agency in Andhra Pradesh, Maharashtra and Telangana while in most of the other States it is left to the project proponents. Only well administrated State may follow this model.

It is suggested that the responsibility seeking the clearances and approvals should be given to the lessee/contractors only and department should play the role of facilitator/ regulator only. A fixed time line should be attached for all the clearances required, and the responsible person should get it done within the specified timeline. Further, the applications for getting the clearances/ approvals should be online. In some States specifically where there are State departments/PSUs carrying out mining, obtaining clearances may continue as per the existing process.

Below is the suggested list of clearances, their approving authority and their timelines

Table 40 Proposed clearances and their approving authority & timelines

Clearance	Preparation by	Approving authority	Time period for approval	Mode of process
Mining Plan & Reclamation Plan	To be prepared by a technically qualified person and shall have validity of five years. However the bidder/ lease holder may revise the mining plan subject to approval by approving authority.	Mining Department	45 days + 1 month extension	online filing and approval
Environment Clearance (EIA, EMP, Mining Plan)*	As per existing guidelines and notification of MoEFCC	As per existing guidelines and notification of MoEFCC	As per existing guidelines and notification of MoEFCC	

CTO/ CFE	By Lease Holder/ Permit Holder/ Contractor	State Pollution Control Board	1 month	online filing and approval
Reclamation Plan (Implementation)	By Lease Holder/ Permit Holder/ Contractor	Competent Authority	As per Plan	

** Exemptions shall be applicable for the environment clearances as per MoEFCC's notification dated 15.01.2016; MoEFCC's Sustainable Sand Mining Management Guidelines 2016, other circulars/notification issued.*

Modification of the mining plan during the operations stage shall also need approval of the competent authority. In the case of sand concessions for riverbed sand mining, specific river stretches should be identified and mining permits/lease should be granted stretch wise so that the requisite safeguard measures are duly implemented and are effectively monitored by the respective regulatory authorities.

5.7.1 Suggestions for faster clearances – delegations of power to DEIAA/SEIAA

As an administrative mechanism, projects for environment clearance are divided into sub-categories (B1, B2, A etc.) by MoEFCC based on the area of the lease. For minor minerals including sand and gravel, mining lease (in case of individual) for B2 categories (0-5 Ha.) the grant of EC will be done by the DEIAA headed by the District Magistrate or District Collector and for B2 (5-25 Ha.) and B1 (25-50 Ha.) (in case of individuals) categories the grant of EC will be done by SEIAA. Further the projects of A category (>=50Ha.) the EC is granted by MOEFCC. It is suggested to the MoEFCC that area limits for taking projects by committee e.g. DEIAA/SEIAA/MoEFCC should be increased to double from the current i.e. 0-10Ha for DEIAA, 10-100 Ha for SEIAA and >=100 for MoEFCC. This will enable faster clearances for the mining projects. Further, considering the large number of projects related to all minerals, a single SEIAA is not sufficient to cater the current needs and MoEFCC may consider forming multiple regional branches of SEIAA in each State for faster clearances without impacting the protection of environment, as the guidelines are now available to guide the bodies/ authorities entrusted for grant of clearances. Criteria suggested below

- **Urban centers**: Urban centers having population of more than 10 Lakhs as per 2011 Census of India should be having one SEIAA regional branch to cater the needs of urban population and hence enabling faster clearances. E.g. Uttar Pradesh have large urban centers and only one SEIAA at State level may not be sufficient. Considering the same 5-6 SEIAA regional branches may be constituted in Uttar Pradesh based on the population of Urban Centers, which are major consumption centers and would have institutions and expertise to discharge the responsibilities of a branch of SEIAA.

- **Distance**: Few States where population concentration is low and distance between the capital where SEIAA headquarter is present are far away from the districts due to large distance. A regional branch of SEIAA may be proposed for easy access for these States. E.g. States like Arunachal Pradesh/ Rajasthan/ Uttar Pradesh having large size and access to the capital city for many of the districts take multiple days to reach due to connectivity and economic issues. It is suggested that wherever the distance between the urban center and current SEIAA is more than 400 kms for plain areas and more than 250 kms for hilly States, a regional branch may be constituted in an appropriate place. .

5.8 Operations

The control of operation in sand reaches depends on the model adopted for allocation of sand reaches. In competitive bidding model the control over operations is with the lessee/contractor who is the successful bidder. While in nomination model for allocation, the control of the operations depends on whether the nominated body excavates sand by itself or through a raising contractor.

It is suggested that irrespective of the allocation model and whoever has the control over operations, sand mining should take place only in accordance with the terms and conditions of the environmental clearance, conditions of the lease deed or license, and methods approved in the mining/ quarrying plan. Mechanized mining may be allowed in stream IV order and higher order rivers as per the approved environment clearance/ Mining Plan and as per notifications of the MoEFCC. MoEFCC guidelines should be reconsidered. Till then mining should be undertaken, as per the guidelines laid down in the *Sustainable Sand Mining Management Guidelines 2016* by the MoEFCC, and circular issued thereof.

5.9 Sale

The State mining department should create a website and/ or app for sand ordering in each of the States. The sale of sand in the State should be only through that portal and direct booking of sand through offline means should be discouraged. The exceptions for online sale should be given to the consumption centers in villages/ smaller towns or low demand centers, for which States are free to decide based on either census (population density) or connectivity etc. These low demand centers should have the provision to be supplied by local licensed traders through offline means.

We propose two mechanisms for online sale of sand depending on whether there is a free market for sand in the State or the prices are regulated by the Government.

Market Model

In case of market model, all the lessees/ certified dealers in the State should register themselves on the online portal/ mobile app. For registering, lessee/ certified dealer will have to enter the details of its concession/ stockyard, location, quantity of sand expected on a weekly basis, as per the approved mining plan. Once registered, the online portal/ app will display the name of the reach/ stockyard and sand could be booked by the consumer from those leases/ stockyards and prices up to the delivery level. Further, the lessee/ certified dealer needs to regularly update the sand available in the reach/ stockyard, and they can decide the price at which they want to sell their sand. Anyone who wishes to purchase sand in the State will have the following options for buying:

1. Mobile app
2. Online portal
3. Customer care/ telephone call
4. Licensed traders

The consumer needs to register on the portal and login using his/her credentials (Aadhar card based only). After logging in, the portal will display the entire list of reaches/ stockyards along with the quantity of sand available in those reaches/ stockyards and the quality and price of sand. The consumer can filter/ sort the reaches/ stockyards based on such parameters as location, quality and price, and book from the lease/ stockyard he/she wishes to. The consumer should also have the option to purchase the sand by ordering at customer care. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

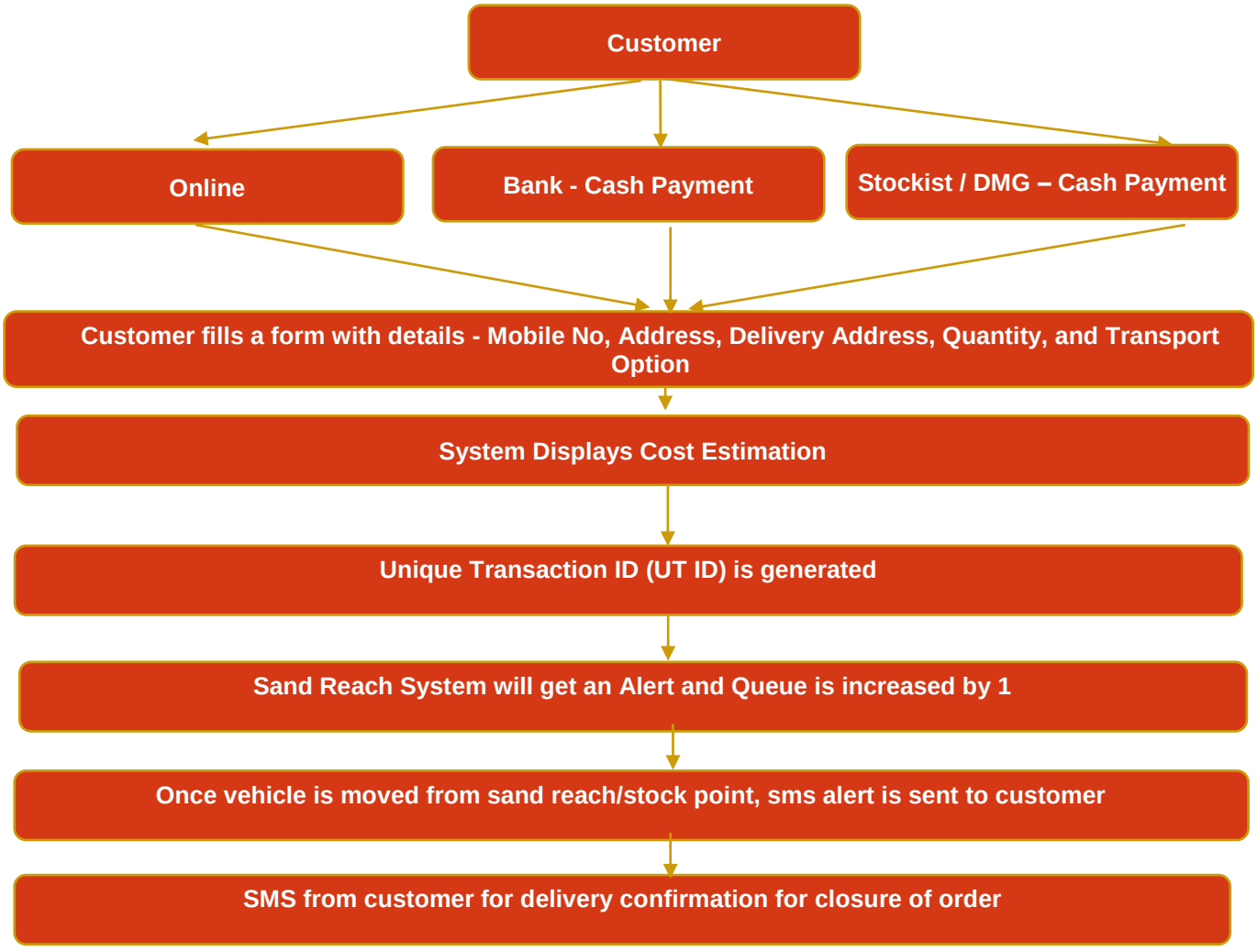
Controlled Market Prices

In case the prices are regulated by the State Government, the only difference from the previous model is that the price of sand at the river reach/ stockyard shall be uniform across the State based on the quality. A consumer after logging in, may choose the reach/ stockyard from which he/she wishes to purchase the sand. The payment for booking the sand in both the cases should be made on the portal/ app so that proper accounting of the sale of sand can be maintained by the Government. A payment receipt should be generated online after payment on the portal/ app and the transit pass should be generated at the reach/ stockyard after showing the online payment receipt. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

Note: The payment while ordering of sand (including transportation cost) can be made online or on delivery of sand to his doorsteps. In case the consumer chooses the option of payment of cash on delivery, the stockyard owner has to ensure that the sand gets delivered to the consumer who has booked sand on the portal through any of the transporters registered on the portal.

Below is a pictorial representation of the step by step process that should be followed for online sand ordering.

Figure 5- 8 Suggested online sand ordering procedure



Stockyards should be made around all the major consumption hubs in the State based on the demand estimated based the procedure mentioned in the next section. Further, the State can get the supply potential across those major consumption hubs from the District Survey Report prepared by the mining department. And if any gap exists in the demand and supply of sand across those hubs, leading to increased sand prices, the State can allocate more sand reaches around the hubs or try to promote alternates of river sand.

Provision for online sale of sand should be made in case of municipality limits/cities/towns etc. as per definition of Urban Ministry/ Census. The States should adopt online ordering of sand within next one year. For village level consumers, offline sales should be allowed for easy access.

The States may put a cap on the pit head sale price to keep the price of sand in check. Further to ensure sufficient competition, there should be at least 2-3 different sand mineral concessionaires areas in each district.

Note: The exceptions for online sale should be given to the consumption centers in villages/ smaller towns or low demand centers, for which States are free to decide based on either census (population density) or connectivity etc. These low demand centers should have the provision to be supplied by local licensed traders through offline means.

Quality Aspects of the sand

Getting quality sand at reasonable prices is a major concern for consumers. There has been instances when low quality sand is supplied to the consumers and consumers due to lack of awareness of sand quality are cheated. Low quality sand which is not suitable for construction poses risk to the buildings/houses and could be dangerous for human life. States need to promote the quality aspects of sand by creating awareness and help in developing the required testing facilities for sampling and testing of sand even at smaller towns at reasonable prices.

5.10 Transportation & Stockyard

Transportation is the last step in the process chain of sand mining, and it needs to be regulated to ensure supply of sand to consumers at reasonable prices. It is more important in States that are sand deficit and need to transport sand over long distances to reach the consumption hubs.

The supply of sand to consumers should be through stockyards that should be maintained by all individual leaseholders/ raising contractor/ State corporations etc. as the case may be. The stockyard should be established in the vicinity of the reach within a distance of 500 meters from the motor-able road/pucca road. In case of small size leases or cluster of leases, a single stockyard for a group of sand reaches may be established. The size of the stockyard should be such that it has the capacity to store the stock of 3 months of extraction, which would ensure supply during monsoons as well. The leaseholder/ raising contractor should be responsible for transportation of sand from excavation site/ reach to the stockyard through a limited number of GPS/ RFID enabled vehicles and those vehicles should be used only for transportation of sand from the reach to the stockyard.

The limited number of vehicles entering the reach is extremely important from the point of view of sustainability and environment as the riparian habitat is greatly affected by too many vehicles entering the sand reaches. The use of GPS/ RFID enabled dedicated vehicles for the purpose, will also help in evaluating the exact quantity of sand extracted from the reach. Further mandating

the maintenance of stockyards by all individual leaseholders/ raising contractor will ensure continuous supply of sand to consumers even during monsoons and prevent price escalation during non-mining period.

For transportation of sand from stockyards to end consumer:

The stockyards should be delineated by fixing the geo-coordinates or by geo-fencing, to trigger an alarm in case of entry of any unauthorized vehicle in its premises. There should be provision of weigh bridges at the stockyard and all the vehicles transporting sand to the consumers should pass through it to keep a track of exact quantity of sand in the vehicle as per the loading capacity of the vehicle prescribed by the transport department.

All sand carrying vehicles should have a valid transport permit. The transport permit for transportation of sand should be generated at the stockyard after verification of the payment. The transport permit should have a scan code to ensure that the single transport pass is not photocopied and used more than once. Further, the transport monitoring team should have a scanning device/mobile based app to scan the transport permits, and once scanned the entire detail, such as volume, origin point (reach/ stockyard), destination, previous scan detail, etc., should be available.

The responsibility of transportation of sand from the stockyard to end consumer should be handled to the stockyard owner. The States may fix up a time frame for delivery from the ordering period and the State departments need to establish grievance's portal and mechanism also for resolving complaints related to ordering and transportation of sand.

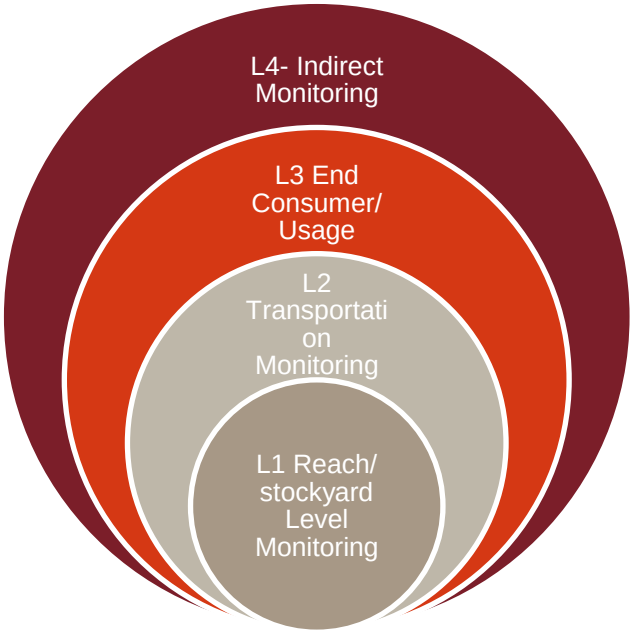
5.11 Monitoring

Monitoring is the most crucial in the entire process chain of sand mining. Any of the business models to be successful, a robust monitoring plan should be in place. The Environment Clearance indicates the quantity of material which can be mined in a year. If this quantity is not measured, and much more mineral than envisaged in the EC is mined out then the entire process of EC is rendered futile. Keeping the above objective in mind, it is required of the State / State Agencies to create and establish a robust system to monitor and measure the mined out mineral at each lease location and its transportation in State. In that regard, a 360 degree monitoring mechanism should be put in place, as follows.

Four Level monitoring mechanism

A four-level monitoring mechanism related to extraction, transportation, selling and usage of sand is suggested as follows:

Figure 5- 9 Four-level monitoring mechanism



Level 1- Reach/ Stockyard level monitoring

For monitoring of the active reaches:

a. Quantity of sand to be extracted from the reach should be based on the quantity assessed by the Joint Inspection Report.
b. The lease boundary should be demarcated with geo-coordinates or geo-fenced to ensure that sand extraction is going on only within the permitted area.
c. De-casting from river beds should be monitored on a regular basis to keep a track of excavated quantity.
d. After every two year mandatory audit of the quantity extracted and quantity permitted along with the replenishment rate.
e. Mandatory e-pass/ e-permit should be made at reach level for transportation of any sand by any GPS enabled vehicle with provision of entering the vehicle number of the sand carrying vehicle and expected delivery address and customer name/ Mobile number. Also provision should be made available for stockyards/ stockiest of sand in each business model. However in case of nomination based (controlled pricing) business model, the margin of private stockist should be capped over a fixed percentage of notified prices.
f. At the stockyard, the stock supervisor should verify the authenticity of online payment receipt before issuing the transit pass. The loading of sand should be monitored electronically and all transporting vehicles should pass through an electronically monitored weigh bridge.
g. Real time data capture for transportation

The security feature of online generated transport permit should be either of the following options:

- Printed on Indian Banks' Association (IBA) approved Magnetic Ink Character Recognition (MICR) Code paper.
- Unique Barcode.
- Unique Quick Response (QR) code.
- Fugitive Ink Background.
- Invisible Ink Mark
- Void Pantograph
- Watermark.

Level 2 - Transportation monitoring

To make transportation monitoring effective and useful, all the sand carrying vehicle (Tractors/ Trucks) should be registered with the department and GPS equipment should be installed in all the sand carrying vehicles. Online weigh Bridges with CCTV should be installed at all the stockyards, active reaches to ascertain the exact quantity of sand being transported in the vehicle. Check posts with CCTV cameras should be established at all major consumption centers to check if all the transporting vehicles are carrying a valid transport permit. The transport permit generated should contain any of the security feature mentioned above so that one permit cannot be re-used by generating photocopies of the permit. This mandatory e-pass will help monitoring in the following ways:

- GPS/ RFID tagging can track location discrepancies in the delivery address of customer vs mentioned in the e-pass
- System can generate alarm in case of delivery of sand or particular quantity for same client/ same address as registered on online portal and relevant officers can accordingly physical check
- Mobile App enabled devices can check the e-pass during physical checking at check posts or surprises checks. After scanning the e-pass, invoice should be generated to show the starting point and destination of the vehicle along with the validity date & time of the e-pass.
- Trucks carrying sand without any e-pass/ e-permit may be confiscated as per the State rules and laws.

In case of inter-State transportation of sand, the transit pass shall be printed in two languages; in the languages which is widely understood/ spoken in both the States.

Level 3 - End consumer monitoring/ bulk consumer

A call center should be established to give a call to all the consumer of sand in the State to enquire about the amount that is charged for sand which will keep the State Government updated about the price of sand in the State and further it will help to check if there is any discrepancy in the sale price of sand within the same district. The mobile number of the consumers can be obtained from

the e-pass/e-permits generated. The number of the call center should be advertised so that it reaches the general public through which anyone in the State can register his/her complain related to the sand, be it in terms of price or any other grievance. Profile of consumers should be analyzed such as delivery of sand at same address, more than the estimated usage as mentioned in purpose, etc. Further surprise checking should be conducted by District Level Sand Committee staff as per instructions of monitoring agency.

- Grievance system for checking prices & supply
- Call center for checking landed prices of sand
- Mobile Vans and Surprise checks by DMG/ Monitoring Committee.

Level 4 - Indirect monitoring:

Indirect monitoring can be done by determining sand consumption through quantum of cement sales in the State, as sale of cement is quite organized and data is easily available at State and district levels for the same. From district-wise cement consumption, further trend of sand consumption can be derived. Any anomalies in the sand consumption/demand can be easily analyzed.

Note: The above monitoring mechanism is recommendatory only. The States may visit Andhra Pradesh to study the mechanism in greater detail.

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6. Annexures

6.1 Annexure I: Formation of Sand Mining Committee

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No.16/23/2017-M.VI
Government of India
Ministry of Mines

New Delhi, Shastri Bhawan
Dated, the 18th May 2017

ORDER

In pursuance of the deliberations of the State Mining Ministers' Conference held on 4th May, 2017 at New Delhi it has been decided to constitute a committee chaired by the Secretary, Ministry of Mines, Government of India alongwith officials drawn from State Governments, to study the existing system of sand mining in various States and prepare sand mining guidelines which addresses concerns in this sector. The committee shall also look into the way forward in implementation of MSS & Star Rating of mines. The committee will comprise of the following officials:-

1	Shri Arun Kumar	Secretary, Union Ministry of Mines	Chairman
2	Shri R P Singh	Additional Chief Secretary (Geology and Mining), Govt. of Uttar Pradesh	Member
3	Shri Ravi Kapoor	Principal Secretary, Commerce and Industry, Govt. of Assam	Member
4	Shri R K Kataria	Secretary, Commerce & Industries (Mines & MSME), Govt. of Karnataka	Member
5	Shri Subodh Kumar Singh	Secretary, Commerce & Industries and Mining Department, Govt. of Chhattisgarh	Member
6	Shri B R V Susheel Kumar	DGM, Govt. of Telangana	Member
7	Shri Ranjan Sahai	Controller General, Indian Bureau of Mines	Member
8	Shri Prithul Kumar	Director, Union Ministry of Mines	Member Secretary

2. The terms of reference of the Committee shall be to suggest –

i. Sand mining guidelines, with a view towards a transparent and sustainable system for extraction of sand for ensuring supply of adequate sand at reasonable rates in the states; and

ii. The way forward for effective implementation of the Mining Surveillance System (MSS) and the Star Rating of Mines for major and minor minerals.

...

3. For the purposes of its deliberations the Committee may invite such officers/persons as it deems fit.

4. The Committee shall submit its report to the Union Ministry of Mines within a period of three months.

(P. Vinay Kumar)
Under Secretary to the Govt. of India
Telephone No: 011-23384070
pv.kumar70@nic.in

To

1. Chief Secretaries of States concerned with reference to the letter dated 5.5.2017*.
2. All the members of the Committee*
3. Secretaries in-charge of mining departments of all States/UTs

*With enclosure of the Ministry of Mines' letter No.16/23/2016-M.VI dated 5.5.52017

Copy for information to:

DS to Hon'ble Minister of Mines/Sr. PPS to Secretary (Mines)/PS to JS(SC)/PS to JS(NKS) /PS to Dir (P)

6.2 Annexure II: Extension notice for Sand Mining Committee

F. No. 16/23/2017-M.VI
Government of India
Ministry of Mines

New Delhi, Shastri Bhawan
Dated, the 1st March, 2018

NOTIFICATION

In Pursuance of the deliberations of the State Mining Minister's Conference held on 4th May, 2017 at New Delhi, a committee chaired by the Secretary, Ministry of Mines, Government of India along with official drawn from State Governments, was constituted on 18.5.2017 (copy enclosed) to study the existing system of sand mining in various States and prepare sand mining guidelines. During the course of discussion in various meetings, the scope of work of the committee has been extended more than what was envisaged earlier. Initially, the committee was constituted for the period of 3 Months. Now, it has been decided to extend the period of the committee up to 31.3.2018 for submission of its final report to Ministry of Mines.

(A.K Mallik)
Under Secretary to the Government of India
Phone-011-23384743
Email-ak.mallik@nic.in

To

(i) Chief Secretaries of States concerned with reference to the letter dated 18.5.2017.
(ii) All the members of the committee.
(iii) Secretaries in-charge of Mining Departments of all States/UTs.

Copy for information to:

OSD to Hon'ble Minister of Mines/Sr. PPS to Secretary (Mines)/PA to JS (NKS)/ PA to Dir (PK)

6.3 Annexure-III: States visit plan

6.3.1 Meeting Schedule

Date	State
8th - 9th November 2017	Maharashtra (Team 1)
8 – 10th November 2017	Uttarakhand (Team 2)
13th – 15th November 2017	Punjab (Team 2)
13th – 15th November 2017	Haryana (Team 2)
13th – 15th November 2017	Chhattisgarh (Team 1)
19th - 21st November 2017	Rajasthan (Team 2)
20th – 22nd November 2017	Andhra Pradesh (Team 1)
27th – 29th November 2017	Madhya Pradesh (Team 1)
13th -15th cember 2017	Assam (Team 2)
22nd -23th November 2017	Gujarat (Team 2)
11th – 12th December 2017	Karnataka (Team 1)
6th – 7th December 2017	Uttar Pradesh (Team 2)

13th – 14th December 2017	Tamil Nadu (Team 1)
15th – 16th December 2017	Telangana (Team 1)

6.3.2 List of documents required from the States

Sl. No	Name of the document	Status
1.	Minor Mineral Rules applicable in the State (Latest). Please attach if not available in public domain.	
2.	Applicable Sand Mining Policy (if any separate policy) & other related regulations/Government Orders (GOs) in the State. Please attach if not available in public domain.	
3.	Any M-sand or alternate sand policy in the State available. Please attach if not available in public domain.	
4.	DSR followed in the State as per MoEFCC 2016 guidelines. Please attach sample DSR report if any.	
5.	What are the reports initially prepared before allotment of sand e.g.: Joint Inspection report/ etc. Please attach a sample report/format.	

6.3.3 List of data required from the States

Sl. No.	Data Required	Status
1.	No. of leases granted till Sep' 2017 in the State (type wise). i. Total leases granted by this policy ii. No. of leases operationalized iii. No. of leases pendency for operationalization. Reasons for pendency if any.	
2.	Production of sand in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2016-17, 2017-18 (till Sep 2017) (in MT/m3/ft3 etc.) Also mentioned avg. density of the material in the State.	

3.	Revenue of sand in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2016-17, 2017-18 (till Sep 2017)
4.	Royalty collection of sand in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2016-17, 2017-18 (till Sep 2017)
5.	Premium collection from sand (if auctioned) in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2015-16, 2016-17, 2017-18 (till Sep 2017)
6.	Estimated production of M-sand or alternate sand in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2015-16, 2016-17, 2017-18 (till Sep 2017)
7.	DSR preparation Status. i. No. of Districts in which sand mining is done ii. No. of DSRs prepared iii. Total sand resources in the State as per the DSRs iv. Estimated demand of Sand v. Demand deficit vi. How is the deficit being met with? vii. Action Plans for meeting the deficit
8.	Are there any CCTVs camera available in sand reaches? How many camera total in States and sand reaches?
9.	Are delivery vehicles GPS enabled? How many GPS enables trucks/tractors registered with the concerned department in the State.

6.3.4 List of questions for discussion with the States

Sr. No.	Description	Response
1.	Method of grant of ML/ lease/license for sand mines/ reaches (Auction/first come first served/ Application/ Reservation/ Tender etc.). Please attached Model Tender Document for the same, as applicable.	

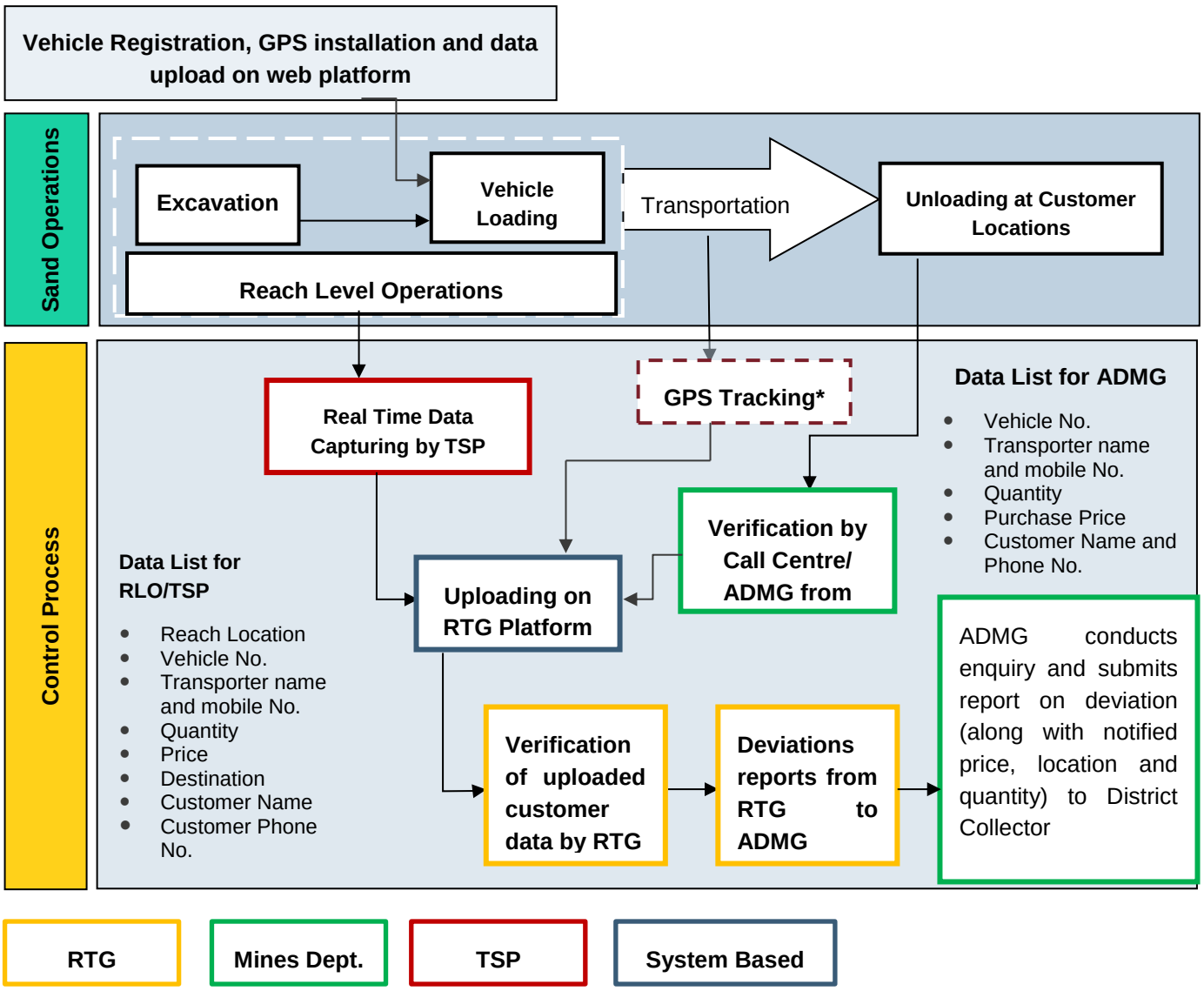
2.	Types of concession for sand mining and minimum and maximum size of the concession (area wise) in the State
3.	Are mines allocated using e-tenders/e-auction etc. or used offline method.
4.	Estimated time for identification up to starting of the mine.
5.	Estimated time taken for clearances and approvals in the State.
6.	What are the environment clearance/clearance/CFE etc. to be taken in the State for starting of sand mine and from which authority (DEIA/SEIA/MoEFCC-etc.)
7.	What is the time period for which Quarry Lease/Quarry license is granted in the State
8.	What is the % of reservation available in the State for sand mining concessions to SC/ST/Local community/Patta land holders etc.
9.	Are there any separate provisions for patta land/ local community for sand mining? Please elaborate.
10.	What is the method of mining allowed as per regulations e.g.: Manual/ Semi Mechanized/ Mechanized etc.
11.	What is the estimated production cost of sand by Lessee / Department / Raising contractor etc. (Rough estimate only as per local rates)
12.	What is the Sale Price of sand sold by Lessee or by State's own department (if any notified rates available)? Also mention units of sand.
13.	What is the monitoring method used currently by the States.
14.	Is sand availability and/or prices (Sale price or transportation etc.) an issue in the State from consumers perspective?
15.	During monsoon period is there any shortage of sand.
16.	Is Import of sand allowed from other State/countries? If allowed, is this beneficial for the State
17.	Is inter State transport of sand allowed?
18.	Are there sand depots in the States?
19.	Any demand-supply assessment done by States for sand.
20.	What is method being used by States for demand-supply assessment.
21.	Is there any online/App based method of ordering of sand in the State. If no, how normal public orders sand (Agents/ Lessee etc.)
22.	Are there separate provisions of sand ordering for Bulk consumers e.g.: Builders etc.
23.	Any other alternatives of river sand e.g. M-sand or any other sand.

24.	Average Cost of production of M-Sand per tonne. a) Incentives for production of M-Sand b) Action plan for substitution through M-Sand
25.	What are the different mechanisms used for curbing illegal mining of sand : c) Use of IT d) Task force deputation e) MSS type application
26.	What are the provisions of sand mining in the Coastal Regulation Zone (CRZ) area?
27.	Provisions for quality assurance of M-sand and River Sand in the State.

6.4 Annexure IV Joint Inspection Format

Sl. No	Description	Detail	In Compliance with State Rules (Yes/No)	In Compliance with MoEFCC Guidelines. (Yes/No)
1	Sand Concession File No.			
2	Area of the concession for inspection (in Ha/ Acre)			
3	Type of area (River bed/ Agricultural land/ others/ Patta Land/ Dam desiltation area)			
4	District, Tehsil, Village			
5	Geo-Co-ordinates of the concession (closed polygon)			
6	Type of Land (Revenue/ Forest) & Area under each			
7	Type of minor minerals (Sand/ Others)			
8	Distance from River Bank (in Meters) as per GPS			
9	Distance from National Highway & Number			
10	Distance from State Highway & Number			
11	Distance from Any other major road			
12	Distance from nearest railway line			
13	Nearest Road distance, name and Type of road			
14	Distance from nearest Bridge,			
15	Distance from nearest drinking water bodies, wells, hydraulic structure, reservoir			
16	Distance from nearest canal or other public works			
17	Distance from nearest public structures			
18	Extractable sand available (rough estimate as per DSR			

6.5 Annexure V Monitoring Mechanism of Andhra Pradesh



* - Currently implemented in Nellore.

RTG – Real Time Governance
RLO – Reach Level Officer
TSP – Technical Staff Personnel
ADMG – Assistant Director Mines & Geology

6.6 Annexure VI: State Introduction

Sr. No.	State	Capital	No of Districts	% of total area of India	Population density (per sq km)	Population as per census 2011	GSDP (2014-15) at factor cost (Base 2011-12) (in billion)	Major Minerals (examples)	Minor Minerals (examples)
1	Andhra Pradesh	Vijayawada	13	4.95	308	4.94 crore	4417.41	Iron ore, Copper, Lead, Limestone, Manganese, Sepentine	Ball Clay, Baryte, Calcite, China Clay, Dolomite, Feldspar, Fire Clay, Gravel, Granite, Laterite, Limekankar, Marble, Mica, Natural Clay, Ordinary Sand, Pyrophillite, Quartz, Quartzite, Road Metal, Steatite, Slate, Slate Stone, etc.
2	Arunachal Pradesh	Itanagar	23	2.5	17	0.13 crore	135.40	Limestone, Coal, Iron Ore	Dolomite
3	Assam	Guwahati	33	2.5	397	3.1 crore	1667.08	Limestone and Coal	Building stones, Gravel, Ordinary clay, Ordinary sand other than sand used for prescribed purposes, Boulder, Shingle, Chalcedony or impure quartz pebbles, Limeshell, Kankar, Limestone, Murram, Brick-earth, Fuller's earth, Bentonite, Road metal, Reh-

									matti, Slate and Shale, marble, Stones, Quartzite and sandstone, Salt – petre
4	Bihar	Patna	38	2.8	1102	10.38 crore	3047.66	Limestone, Asbestos, Softstone	Brick, Clay, Murram, Sand, Stone/ Crusher, Silica sand
5	Chhattisgarh	Raipur	27	4.1		2.8 crore	1960.23	Iron ore, Limestone, Dolomite, Bauxite, Tin	Agate, Ball clay, Baryte, Calcite, China Clay, Chalk, Dolerite, Felspar, Fire Clay, Granite, Marble, Gypsem, Jasper, Kaolin, Limekankar, Mica, Ochre, Pyrophyllite, Quartz, Quartzite, Sand, Shale, Silica Sand, Slate, Talc, etc
6	Goa	Panaji	2	0.11	490	0.18 crore	346.10	Iron ore	Lime stone, Lime kankar, Lime shells, Boulder, shingle, gravel, Ordinary sand, Ordinary clay, Murram, Mitti, Brick-earth, Ordinary earth.
7	Gujarat	Gandhinagar	33	6	308	6 crore	7915.69	Limestone, Bauxite, Manganese Ore, Marl, Fluorspar, Base metal ore	Quartzite, Sandstone, Granite, Other building Stone, Gravel Quartzite pebbles, Dolerite, Murrum, Brick Earth, Red Clay, Ordinary Clay, Ordinary Sand, Hard Phylite, Carbonaceious Shale, Brick Clay, Naliya, Brick,

									Black Stone, Agate, Ochre, Natural Clay, White Clay, Quartz, Calcite, Calcarious Sand, China Clay, Chalk, Gypsum, Dolomite, Pipe Clay, Fire Clay, feldspar, Ball Clay, Molding Sand, Silica Sand, Diatomaceous Earth, Soap Stone, Laterite, Talc
8	Haryana	Chandigarh	22	1.5	573	2.54 crore	3666.35	Limestone, Kynite	Sand, Boulders, Stones, Silica Sand, China clay, Quartz Stone, School Slate, Slate Stone
9	Himachal Pradesh	Shimla	12	1.67	123	0.68 crore	890.31	Limestone	Marble, bajri, Ordinary sand, Building stone, Masonry Stone, Boulders, Shingles, Brick earth, Kankar, Road Metal, Marble, Ordinary Stone, Shale, Brick Earth, Rock salt, Gypsum, Silica-sand and Baryte
10	Jammu & Kashmir	Srinagar/ Jammu	22	6.67	56	1.25 crore	852.67	Bauxite, Limestone, Magnesite, Sapphire	Limestone, Gypsum, Marble, Slate, Dolomite, Quartz, China Clay

11	Jharkhand	Ranchi	24	2.39	414	3.29 crore	1864.91	Iron ore, Bauxite, Chromite, Manganese ore, Gold,	Ochre, Statite, Silica sand, Mica, Talc/ Stealite/ Soapstone, Vermiculate (t), Felspar
12	Karnataka	Bangalore	30	5.8	320	6.1 crore	7602.82	Gold, Silver, Copper, Iron ore, Bauxite, Lime Stone, Manganese, Magnasite, Chromite	Agate, Ball clay, Barytes, Brick and Tile clay, Calcareous Sand, Calcite, chalk, Chalcedony, Clay (others), Diaspore, Fire clay, Fuller's Earth, Gypsum, Lime Kankar, Corrundum, Dolomite, Dunite or Pyroxenite, Felsite, Feldspar, Fuchsite Quartzite, Jasper, Marble or crystalline Limestone, Mica, Building stone, Sandstone, Steatite, Silica Sand, Kaolin, China Clay, etc
13	Kerala	Thiruvananthapuram	14	1.2	860	3.33 crore	4322.36	Gold, Iron ore, Basalt, Graphite, Limestone	Kankar, Limestone, Ordinary Clay, Ordinary Sand, Ordinary Earth, Laterite, Fireclay
14	Madhya Pradesh	Bhopal	51	9.38	236	7.3 crore	3839.93	Diamond, Limestone, Manganese, Copper, Bauxite, etc.	China Clay, Dolomite, Felspar, Fire Clay, Granite, Marble, Ochre, Pyrophillite, Quartz, Quartzite, Sand, Sand Stone, Steatite, Talc, etc
15	Maharashtra	Mumbai	36	9.34	370	11.2 crore	15248.45	Limestone, Manganese, Iron	Clay, Baryte, Illmenite, Fluorite, Dolomite, Feldspar, Quartz,

								Ore, Kyanite – Sillimanite, Bauxite, Tungsten	Soapstone, Agate (Semiprecious Stones), Granite, Pyrophillite
16	Manipur	Imphal	16	0.67	130	0.22 crore	150.30	Chromite	-
17	Meghalaya	Shillong	11	0.67	140	0.32 crore	211.51	Limestone, Iron ore	Granite, Quartzite, Felsper, Clay
18	Mizoram	Aizwal	8	0.63	52	0.10 crore	96.33	Limestone	
19	Nagaland	Kohima	11	0.50	119	0.19 crore	141.15	Limestone	Slate, Marble
20	Odisha	Bhubaneshwar	30	4.67	270	4.19 crore	2747.20	Iron ore, Bauxite, Nickel, Graphite, Copper, Lime stone	Agate, Ball Clay, Barytes, Calcareous Sand, Calcite, Chalk, China clay, Clay, Corundum, Diaspore, Dolomite, Dunite or Pyroxenite, Felsite, Feldspar, Fireclay, Fuschite, Quartzite, Gypsum, Jasper, Kaolin, Laterite, Lime Kankar, Mica, Ochre, Pyrophyllite, Quartz, Quartzite, Sand, Shale, Silica Sand, Slate, Steatite, bajri, Road Material, Boulders, metals, chips, ballast, sandstone, laterite, slab,

									Limestone, lime shell, lime, bentonite, fuller's earth,
21	Punjab	Chandigarh	22	1.53	550	2.7 crore	3132.75	None	Building Stones, Lime Kankar, Marble, Gravel, Kankar, Road Metal, Brick Earth, Quartz, Quartzite, Silica Sand, etc.
22	Rajasthan	Jaipur	33	10.4	200	6.8 crore	5120.9	Gold, Iron Ore, Limestone, Manganese, Silver, Tungsten, etc.	Bajri, Brick Earth, Chert, Diorite, Dolerite, Gneisses, Granite, Kankar, Lime Kankar, Lime Stone, Marble, Masonry Stone, Murram, Ordinary Clay, Phyllites, Sandstone, Shale, Slate Stone, etc.
23	Sikkim	Gangtok	4	0.21	86	0.06 crore	128.82	Lead, Copper	Dolomite, Quartzite, Talc
24	Tamil Nadu	Chennai	32		550	7.2 crore	9006.2	Iron ore, Bauxite, Copper, Lead, Zinc, Silver, Gold, Magnesite, Titanium, etc.	Felspar, Firclay, garnet, Granite, Quartz, Silica Sand, Talc, China Clay, Ordinary sand, etc.
25	Telangana	Hyderabad	31	3.4	307	3.52 crore	4239.71	Chromite, Copper, Gold, Iron ore, Manganese, Molybdenite, etc.	Asbestos, Building Stone, Clay, Mica, Baryte, Felspar, Fuller;s Earth, Mica, Quartz, Quatrzite, Steatite, Talc, etc.
26	Tripura	Agartala	8	0.29	350	0.36 crore	250.86	Iron Ore,	Kaolin, Limestone

								Limestone	
27	Uttar Pradesh	Lucknow	75	7.3	820	20 crore	8538.72	Limestone, Rockphosphate, Potash, Andalusite, Calcite, Bauxite, Copper, Gold, Iron, Platinum, Sillimanite etc	Silica Sand, Dolomite, Granite, Dolostone, Sand stone, Granite dimensional stone, river sand, river bed material, China Clay, Quartzite, Marble, Ordinary Sand etc.
28	Uttarakhand	Dehradun	13	1.6	189	1 crore	1407.90	Copper, Lead, Zinc, Silver, Magnesite, Limestone, etc	Dolomite, Talc, Ordinary Sand, Bajri, Gravel, Mica, Gypsum, Phyllites, Slate, Quartzite, etc.
29	West Bengal	Kolkata	23	2.66	1029	9.13 crore		Iron ore, Lead, Silver, Limestone, Copper, Manganese,	Fire clay, Dolomite, Quartz, Kaolin, Barytes, Moulding Sand, Glass Sand,

6.7 Annexure VII: Note on M-sand

An Alternate Solution to River Sand

Rivers, Forests, Minerals and such other resources constitute Nation's natural wealth. These resources are not to be frittered away and exhausted by any one generation. Every generation owes a duty to succeeding generations to develop and conserve the natural resources of the Nation in the best possible way in the larger public interest. The Principle of Intergenerational Equity is recognized world over, as one generation of human kind has an obligation to conserve and pass on the natural resources to the succeeding generation.

River systems in the State shall not be treated as the sole source of Sand, as conservation of Water-bodies is paramount obligation of the State which is an essential resource for survival of the mankind. There is no alternate for Water but there is alternate for River Sand in the form of Manufactured Sand (M-sand) which is fine aggregate produced by crushing hard Rock to a required size of 150 microns by using crushing, shaping, screening and classifying methods. Manufactured sand is produced by crushing rocks, quarry stones or larger aggregates pieces into sand sized particles. Rocks or quarry stones are blasted and subjected to a series of crushing cycles to reduce the particles to the size of naturally occurring sand. The produced sand is then sieved and washed to remove fine particles and impurities, and tested for various quality aspects before it is deemed fit as a construction aggregate. Manufactured Sand is produced from crushing of the rock to required size and gradation suitable for construction industry. Such Manufactured Sand obtained must confer to IS Code- 383:2016, and should be suitable for construction activity. Fine particles of less than 150 Microns size shall not be present in excess quantity than the percentage specified in the IS code 383:2016. Stone dust obtained in conventional crushing units shall not be treated as Manufactured Sand as it is detrimental for use in construction and is not eligible for claiming incentives.

The use of Manufactured Sand is steadily growing due to the scarcity for natural sand and the environmental issues related therewith. Injudicious sand mining and continuous depletion of natural aggregate sources have led to the implementation of new environmental/land use legislations which has made the procurement of natural sand difficult and expensive. In addition, presence of silt and clay in natural sand is another reason for increased use of Manufactured sand. Natural sand is inherently high in silt and clay. It can be damaging for screed and concrete, if the sand is not sufficiently processed to bring down clay and other impurity content to acceptable levels. Manufactured sand also reduces the wastage of low-value by-products in the quarries. The low value aggregates formed as a by-product of rock crushing can be utilized efficiently to create a high value product.

M-Sand also offers higher flexural strength, better abrasion resistance, higher unit weight and lower permeability. Due to these advantages, manufactured sand is being used on a large scale

by the Southern States of India mainly in construction sector. However, its acceptability and use in the Northern part of country is yet to rise.

General Terminology

As per the **IS Code 383:2016,** for the "Course and fine aggregates for concrete" the definition of Fines and Coarse aggregates as defined under item 3 of the code (Terminology), is furnished below,

- **Fine Aggregate** – Aggregates most of which passes 4.75mm IS Sieve and contains so much coarser material as permitted in 6.3.
  - **Natural Sand** – Fine aggregates resulting from the natural disintegration of rock and which has been deposited by streams or glacial agencies. This may also be called as **Uncrushed Sand.**
  - **Crushed Sand**
  - ✓ Crushed Stone Sand: Fine aggregates produced by crushing hard stones.
  - ✓ Crushed Gravel Sand: Fine aggregates produced by crushing natural gravel.
  - **Mixed Sand**–Fine aggregates produced by blending natural sand and crushed stone sand or crushed gravel sand in suitable proportions.
  - **Manufactured Fine Aggregate (Manufactured Sand)**: Fine aggregate manufactured from other than natural sources, by processing materials, using thermal or other processes such as separation, washing, crushing and scrubbing. Manufactured fine aggregate may also be Recycled Concrete Aggregates. Examples of manufactured sand are; Iron slag aggregate, steel slag aggregate, copper slag aggregate, Construction and Demolition (C&D) waste etc. Fine aggregates produced by blending natural sand and crushed stone sand or crushed gravel sand in suitable proportions is called Mixed sand.

- **Coarse Aggregate** – Aggregate most of which is retained on 4.75mm IS sieve and containing only on much finer material as is permitted for the various types described in this standard. Coarse aggregate may be,
  - Uncrushed gravel or stone which results from natural disintegration of rock.
  - Crushed gravel or stone when it results from crushing of gravel or hard stone: and
  - Partially crushed gravel or stone when it is a product of the blending of (a) and (b).
  - Manufactured from other than natural sources, by processing materials, using thermal or other processes such as separation, washing, crushing and scrubbing. Manufactured coarse aggregate may be Recycled Concrete Aggregate (RAC) or Recycled Aggregate (RA).

For the purpose of this paper the Crushed Stone Sand (as defined in the IS code) is refereed as M-Sand, as it is the most popular and commercially accepted name in the market.

General Requirements of M-Sand

1. All the sand particles should have higher crushing strength.
2. The surface texture of the particles should be smooth.
3. The edges of the particles should be grounded.
4. The ratio of fines below 600 microns in coarse sand (zone I) should be between 15% and 34% as per IS:383.
5. There should not be any organic impurities
6. Silt in sand should not be more than 2%, for crushed sand.
7. In manufactured sand the permissible limit of fines below 75 microns shall not exceed 15%.

Technical specifications for M-Sand

Sand is mainly used for the preparation of mortar and concrete. It is also required to manufacture the building blocks. The standard terminology used for sand is ***fine aggregate***. We all know that Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand is silica (silicon dioxide, or SiO_2), usually in the form of quartz. Fine Aggregate (Sand and/or crushed stone) are those which are less than 4.75 mm in size.

Quality of aggregates: Aggregates shall consist of naturally occurring (crushed or uncrushed) stones, gravel and sand or combination thereof. They shall be hard, strong, dense, durable, clear and free from veins and adherent coating; and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious substances. As far as possible, flaky, scoriaceous and elongated pieces should be avoided.

Deleterious Materials -Aggregates shall not contain any harmful material such as pyrites, coal, lignite, mica, shale or similar laminated material, clay, alkali, soft fragments, sea shells and organic impurities in such quantity as to affect the strength or durability of the concrete.

Aggregates to be used for reinforced concrete shall not contain any material liable to attack the steel reinforcement. Aggregates which are chemically reactive with alkalies of cement are harmful as cracking of concrete may take place.

Table 1 and 2 as furnished below depicts the different gradation zones based on the fineness of the aggregate and the significance of grading.

TABLE 1 : TECHNICAL SPECIFICATION FOR FINE AGGREGATES IS:383-1970 (Reaffirmed 2016 Clause 6.3)	
IS SIEVE DESIGNATION	**PERCENTAGE PASSING FOR**

	Grading Zone 1	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100
4.75mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

Significance of grading

Table 2 of IS 383:2016

IS Sieve Designation	Percentage passing by weight Grading			
	Zone-I (Coarse Sand)	Zone-II Most Suitable/Desirable	Zone-III	Zone-IV (Fine Sand)
10mm	100	100	100	100
4.75mm	90-100	90-100	90-100	95-100
2.36mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600µm	15-34	35-59	60-79	80-100
300µm	5-20	8-30	12-40	15-50
150µm	0-10	0-10	0-10	0-15
Fineness Modulus	4.0-2.71	3.37-2.10	2.78-1.71	2.25-1.35

The percentage passing through 600µm sieve will decide the zone of the sand,

• Zone-I: Coarse Sand, (Suitable for concreting)

• Zone-II; III and Zone-IV : Fine Sand. (Suitable for plastering)

Fineness Modulus (FM): The result of aggregate sieve analysis is expressed by a number called Fineness Modulus. It is obtained by adding the sum of the cumulative percentages by mass of a sample aggregate retained on each of a specified series of sieves and dividing the sum by 100.

The specified sieves are: 150 µm (No. 100), 300 µm (No. 50), 600 µm (No. 30), 1.18 mm (No. 16), 2.36 mm (No. 8), 4.75 mm (No. 4), 9.5 mm , 19.0 mm , 37.5 mm , 75 m , and 150 mm.

The latest Indian Standard IS: 383- 2016 “Coarse and Fine Aggregates for Concrete- Specification (Third Revision)” covers the requirements for aggregates, crushed or uncrushed, derived from natural sources, such as river terraces and riverbeds, glacial deposits, rocks, boulders and gravels, and manufactured aggregates produced from other than natural sources, for use in the production of concrete for normal structural purposes including mass concrete works.

M- Sand Quality

Aggregates strongly influence concrete's freshly mixed and hardened properties, mixture proportions, and economy. Consequently, selection of aggregates is an important process. Although some variation in aggregate properties is expected, characteristics that are considered include:

●Grading

●Durability

●Particle shape and surface texture

●Abrasion and skid resistance

●Unit weights and voids

●Absorption and surface moisture

Crushed Sand should adhere to the highest standards and must undergo the following quality tests:

● Test for silt and clay
● Sieve analysis

● Optical Microscopic Study to check the particle shape

● Workability (slump test by slump cone method)

● Cube test for compressive Strength

Tests for Silt and clay

Aggregates shall consist of naturally occurring (crushed or uncrushed) stones, gravel and sand or combination thereof. They shall be hard, strong, dense, durable, clear and free from veins and adherent coating; and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious substances. As far as possible, flaky, scoriaceous and elongated pieces should be avoided.

Size and Grading of Aggregates

Grading refers to the determination of the particle-size distribution for aggregate. Grading limits and maximum aggregate size are specified because these properties affect the amount of aggregate used as well as cement and water requirements, workability, pumpability, and durability of concrete. In general, if the water-cement ratio is chosen correctly, a wide range in grading can be used without a major effect on strength. For a good

Concrete mix, aggregates need to be clean, hard, strong particles free of absorbed chemicals or coatings of clay and other fine materials that could cause the deterioration of concrete. Where the grading falls outside the limits of any particular grading zone of sieves other than 600-micron IS Sieve by a total amount not exceeding 5 percent for a particular sieve size,(subject to a cumulative amount of 10 percent), it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600-micron IS Sieve or to percentage passing any other sieve size on the coarse limit of Grading Zone.

Deleterious Materials

Aggregates shall not contain any harmful material such as pyrites, coal, lignite, mica, shale or similar laminated material, clay, alkali, soft fragments, sea shells and organic impurities in such quantity as to affect the strength or durability of the concrete. Aggregates to be used for reinforced concrete shall not contain any material liable to attack the steel reinforcement. Aggregates which are chemically reactive with alkalies of cement are harmful as cracking of concrete may take place.

Limits of Deleterious Materials

The maximum quantity of deleterious materials shall not exceed the limits specified in Table 2 of IS 383:2016. However, the engineer-in charge at his discretion may result of some further tests and evidence of satisfactory performance of the aggregates.

Aggregate Crushing Value

The aggregate crushing value, when determined in accordance with IS: 2386 (Part IV)-1963 shall not exceed 30 percent for concrete for wearing surfaces, such as runways, roads and pavements. 30 percent for aggregate used for concrete other than for wearing surfaces. Other parameters to be checked for quality are:

- Aggregates Impact Value,
- Aggregate Abrasion Value and
- Soundness of Aggregate.

Benefits of M-Sand

Sustainable Supply

There is growing shortage of natural sand in many cities. The severity varies from market to market, and in some cases this may not appear to be a priority topic. Eventually, pressure from environmentalists and sand conservationists worldwide will continue to encourage both legislators

and construction engineers to look for viable alternatives to natural sand. Cubical sand manufactured from crushed rock is the most desirable fine material for concrete production. It is generally accepted that particle shape depends on the rock type, breakage energy and the type of crusher used.

The rocks are crushed using crushers to manufacture coarse aggregates and the fines which are produced are usually flaky and has been used in filling, asphalt etc. Manufactured sand is defined as purpose made crushed fine aggregate produced from a suitable source material.

In many places within the country, the problem of non-availability of natural sand is increasing with each passing day. It is further aggravated by the seasonality, inconsistency and volatility that are associated with extraction and supply of natural sand. In the market, the need for good quality manufactured sand is evident and the market has started to move towards the same. The Government has banned sand dredging in many parts of the country.

Optimum Shape

The optimum shape of manufactured sand is spherical, next best being cubical. Similarly, an even gradation of the total coarse aggregate fraction is desirable so that the smaller particles can fit between the larger particles, thereby minimizing the voids. Well-shaped aggregates also minimize the incidence and degree of segregation. It has been proven that more than 20kg of cement can be saved for every cubic meter of concrete that is made by replacing a poorly shaped aggregate with a cubical aggregate. In addition, both compressive strength and flexural strength are improved by using cubical aggregates, which also increases workability and reduces bleeding and shrinkage. The impact of the physical characteristics of the sand used in concrete mix is even greater than that of the coarse aggregate fractions, both in the concrete's plastic and hardened States.

Minimum void concent

The principles of total internal friction and void content apply equally to the fine fraction, but because of the vastly smaller particle size and therefore the greatly increased surface-area-to-volume ratio, any detrimental or undesirable shape or texture properties will be greatly amplified. Similarly, manufactured sand presents an opportunity to control the mineral content in the particles. Natural sand often contains undesirable minerals and clays, and the effect of these materials on both the fresh and the hardened States of concrete can be extremely harmful. For example, the effect of clay particles in fresh concrete is not obvious, as the particles absorb disproportionate volumes of water and hence swell to many times their original size. This swelling occupies a volume in the cement paste in its fresh State. When it hardens, however, the clay particles contract and leave minute voids, which in turn increase the shrinkage and permeability and hence reduces the concrete's chemical resistance and compressive strength. Other undesirable materials, ranging from basic chlorides to harmful chemicals, can exist in this fine material fraction. The use of manufactured sand, however, reduces the risk of impurities.

Comparison between Natural Sand and M-Sand

It is understandable that sand from river, due to natural process of attrition, tends to possess smoother surface texture and better shape. It also carries moisture that is trapped in between the particles. These characters make concrete's workability better.

However, silt and clay carried by river sand can be harmful to the concrete. Another issue associated with river sand is that of obtaining required grading with a Fineness Modulus of 2.4 to 3.1. It has been verified and found, at various locations across South India, that it has become increasingly difficult to get river sand of consistent quality in terms of grading requirements and limited silt /clay content. It is because we do not have any control over the natural process.

In case of Manufactured Sand, the process of attrition through VSI and washing makes the Crushed- Stone- Sand particles good enough to be compared with shape and surface texture of natural sand.

Well-designed screening system the required grading (Zone II) and Fineness Modulus (2.4 to 3.1) can also be achieved consistently in the case of Manufactured Sand.

When there is a need to control micro fines as in the case of the not-so-hard rocks, Manufactured Sand facilities can be equipped with Filter System and/or Washing System that can remove the micro fines.

It must be noted that properly processed Manufactured Sand can improve both compressive strength and flexural strength through better bond when compared to river sand.

Usage of good quality river sand with consistency to manufacture concrete has become increasingly difficult in India. Depletion of resources has not only made good quality river sand a scarce material but also directs Technocrats decisively, to look for better alternative in order to prevent ecological damage.

The technology to manufacture sand through VSI crushers has evolved through series of research and development works abroad. Though this technology found acceptance in developed countries like European Union, Australia, New Zealand and Japan quite a sometime ago, other Asian countries like China, India, Singapore, Malaysia and Vietnam have started adopting this Technology for the past 5 to 6 years.

Hundreds of thousands of cubic metre of concrete from normal grade to high grade is being produced worldwide, with good consistency with Manufactured Sand as an important ingredient. It is found out through various studies, including this one that Concrete Manufacturing, with optimal Cement and Admixture content and consistency in quality, is becoming cost effective when these processed or Manufactured Coarse and Fine Aggregates are used. The cost paid to the Technology in comparison with savings obtained is lesser. Most importantly savings of cement by enhancing the properties of aggregates through a manufacturing process is a big contributing factor to ecology. The Technology of Manufactured Sand and Coarse Aggregates could well be the solution for the Indian Concrete Industry.

Manufacturing Process of M-Sand

Crushed stone sand (M-Sand) is produced by crushing hard stone or natural gravel. It is produced by rock-on-rock or rock-on-metal impact in the Vertical Shaft Impactor (VSI). Proper particle size reduction and achieving equi-dimensional shape is critical to get desired properties. If rock is crushed in compression lot of inherent properties exhibited by natural river sand are lost. If proper technique of manufacturing is not adopted aggregates are bound to become flaky and elongated. Improvements to sand by way of washing, grading and blending may have to be done before use at the consumer end.

In case of Crushed Stone Sand all the processes mentioned above can be done at manufacturing plant itself and controls are much better in producing quality fine aggregates. Fine aggregates (Crushed Sand) proposed to be used shall be produced from a Vertical Shaft Impact (VSI) crushers and shall conform to the requirements of Zone- II (in most of the cases) as per IS 383-2016. Special efforts on the part of Crushed Sand manufacturers (such as washing of sand by water or dry washing by air) are required to restrict particles finer than 75 µm. Crushed Sand can also be used for making masonry mortar and shall conform to the requirements of IS 2116-1980 (Reaffirmed 1998) - “Specification of sand for Masonry mortars”.

The various processes involved in manufacturing of M-Sand, is given below,

❖ **QUARRYING**

Like in any other Mining industry, Quarry serves as the raw material source to boulders – which are fed to the plant for further processing. Quarrying activity is superset to the following activities:

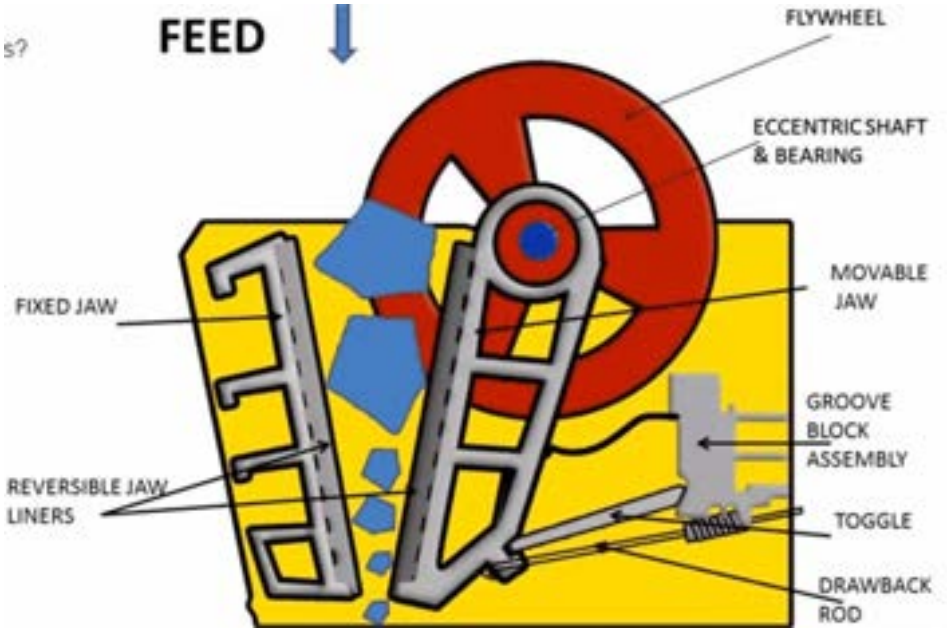
1. **Drilling & Blasting**- The foremost activity in quarrying is the Drilling. It consists of Drill machine with drill a bit powered with compressor with range of 6 – 12 bars of pressure. Diameter of the drill bit is typically varies between 105 mm – 115mm. Holes are drilled perpendicular to the ground surface in pre-conceived geometric pattern which generally varies from rock to rock and feed size of the crusher. And Second activity that follows Drilling is the Blasting. Holes drilled are loaded with explosives of sufficient energy which can dislodge the in-situ rock and produce desired fragmentation of the rock.

2. **Loading & Transportation**: - Post blasting, the blasted rock is loaded with Back hoe(Excavators) of suitable bucket capacity. Generally 0.9 cum to 1.1 cum of bucket capacity is used. These Back hoes are crawler mounted and diesel operated machines. Number of Excavators deployed is dependent on the installed crushing capacity of the Plant and Transportation: Usually tippers ranging from 6 tyre to 10 tyre are deployed for rock transportation from quarry to crushing plant. Excavators load the tippers with boulders of desired size and are transported to the crushing plant.

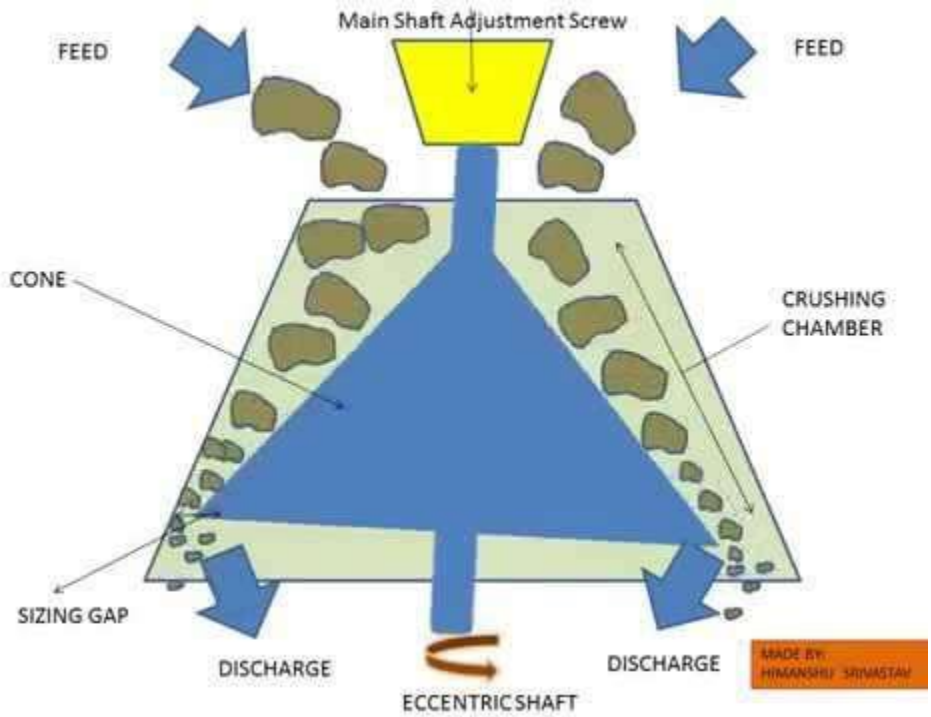
❖ **Crushing**

The Blasted rock from quarry transported through tippers are finally unloaded in the crushing unit and Crushing is primarily divided into three stages:

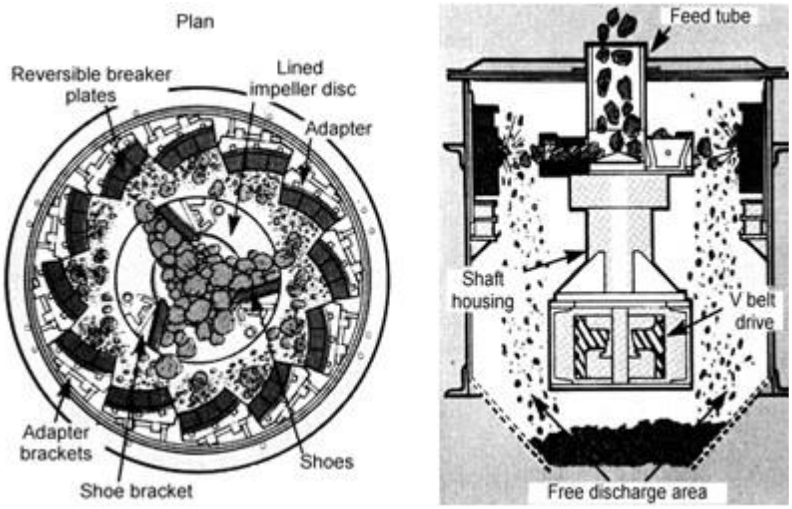
Primary Crusher – Jaw Crusher



Secondary Crusher – Cone Crusher



Tertiary Crusher – Vertical Shaft Impactor(VSI)



Primary Crusher: This is the portal for Quarry and Plant and primary crusher is Jaw Crusher. Feed size generally varies from -400mm to -550mm. Boulders from quarry transported via tippers are unloaded into jaw crusher hopper (receiving bin for raw material from quarry) and from there is fed in to the mouth of Jaw crusher.

Secondary Crusher: The output of Jaw crusher is fed to Secondary crusher i.e a Cone Crusher via a set of belt conveyors and screens. The feed size -150mm rock is crushed to -40mm size. Cone crusher consists of two truncated cones with different diameters. These two truncated cones are called as Concave and Mantle which is made of Manganese alloy. Rocks are crushed in between the chamber of Concave and Mantle.

Tertiary Crusher: This is the final stage crushing where the output of Cone Crusher is fed to Vertical Shaft Impactor (VSI) through a series of belt conveyors and screens. M-sand is produced from the output of VSI as end products. Natural inheritance of River sand formation is replicated inside the chamber of VSI where rock on rock hitting and attrition takes place thus leading to well graded particle shape. The VSI crusher by means of its unique design and action produces well shaped fine aggregate particles. The process of attrition also enables the removal of surface roughness of the fine aggregate particles to a good extent. The cubicle structure of particles is imparted in the sizing chamber of VSI thus making the product most amenable for construction. Usually the rock of -40mm size is reduced to varied sizes ranging from -20mm to -2mm.

When the stones are processed through Vertical Shaft Impact (VSI) Crusher, not only fine aggregates, but the coarse aggregates, another end product, also acquire improved particle shape and reduced surface roughness.

Manufactured Sand plants ensure better grading of fine aggregates for better particle size distribution. Also some of the plants possess Air Filter System and/or washing facility through which the percentage of micro fines (passing 75 micron) is controlled below 3% by weight.

The washing facility provides another benefit of keeping the Manufactured Sand in wet or partially wet condition. This will help to reduce the absorption rate of Manufactured Sand during concrete manufacturing and in turn will contribute to the better workability and workability retention. Test results in South India has shown that if the Manufactured Sand is produced by processing through VSI crusher and washing system, it exhibits much reduced water absorption character in comparison with Crusher Dust (CRF).

Raw Material for M-Sand

Deposits of Granite, Sand stone, Basalt, Quartzites, Pegmatites, Charnokite, and Khondalites etc. are the suitable source rocks for manufacturing of M-Sand. Accordingly each State can identify and reserve the source rocks exclusively for the production of M-sand, and leases of these deposits canthen be granted on preferential basis to the M-Sand manufacturers.

The growing demand for sand, provides the potential for encouraging the M-Sand plants in various States.

Economics of M-Sand

The landed cost of M-sand is comparable with the landed cost of the river sand under normal circumstances. For this analysis detailed study of one such M-sand unit located in Chikkballapura district of Karnataka, was carried out. The plant is located about 80kms from Bengaluru. The plant has a capacity to produce 360 tonnes per hour. Assuming the plant operates for 20 hours a day and 300 days a year, the following are the production details:

Total Plant capacity = 360 tph x 20 hrs a day= 7200 tpd

Operational capacity = 2500 tpd x 300 days a year = 10,50,000 or ~1 mtpa

The M-sand cost would typically have five cost components: Basic price, Royalty, DMF, Transportation cost and GST

Cost comparison of types of sand

S. No.	Component	Description
1	Key assumptions (M-sand)	a) Manufacture 30 tonne of sand b) Manufacturing cost of 1 ton of M- sand is Rs. 500 c) Royalty charged on a ton of M-sand = Rs.60 /ton d) DMF charged = 30% of royalty = 30% x 60 = Rs.18/ ton

		e) Transportation cost per kilometre is Rs 3- 3.5 per km per ton f) Bangalore city is 80 kms from the plant location g) GST is 5% on all the other components i.e. Basic price, Royalty,DMF, Transportation cost
2	**Computation (M-sand)**	a) Manufacturing cost (Including margins): = 500 x 30 = Rs. 15000 b) Royalty : = 60 x 30 = Rs. 1800 c) DMF : = 18 x 30 = Rs. 540 d) Transportation cost : = 80 x 3.3 x 30= Rs. 7920 e) GST = 5% x (15000+1800+540+7920) = Rs. 1263 f) Total landed cost of 30 tonne of M-sand at Bengaluru = a + b +c + d +e = Rs. 26,523 g) Per ton sale price of sand=Rs 883/ton h) Actual sale price of sand= Rs 900-950/ton
	Computation (River sand at Bengaluru)	a) Actual Sales Price of river sand at Bengaluru (35 ton) = Rs.70, 000 to 1,00,000 ~ Rs. 2000 – 2850 per ton
3	Result (M-sand)	Per ton sale price of M-Sand at Bengaluru = Rs. 900-950/ton (under ideal conditions)
4	Result (river sand)	Per ton sale price of river sand at Bengaluru = Rs. 2000-2850/ton (as per market demand)

The manufacturing cost of Rs 500 per ton, which is around 55-60% of total landed cost (Rs 883/ton) is high for M-sand. There is a potential to reduce the M-sand cost further by looking into the capital cost towards plant and machinery and the financing expenses related thereof.

Demand and Supply Scenario of Sand (River and M-sand)

The estimated annual demand and supply of sand on Pan India basis, based on the collection of data from various State Governments, during the study of sand mining is furnished below.

Annual demand (estimated by the States) and supply of Sand in the country

Name of the State	Total demand (estimated by the States) of sand in 2016-17 (in MMT) (Bulk density = 1.89 t/cbm)	Total supply of sand in 2016-17 (in MMT, B.D.= 1.89 t/cbm)		Sand deficit/surplus based on State data (- / +)	Sand situation based on our analysis
		River sand	**M-Sand**		
AP	NA	NA	NA	NA	NA
Assam	NA	5.6	0	NA	NA
CG	NA	10.0	0	NA	NA
GJ	70	49.64	-	-12	+
HR	8.5	9.8*	0	+	+
KTK	30	4	20	-4	-
MP	NA	49.14	0	NA	NA
MH	NA	NA	NA	NA	-
PB	16	NA	0	NA	NA
RJ	56.8	56.8	0	0	+
TN	53.7	15.12	3.24	-35.34	-
Telangana	22.5	13.23	7.56	-2.83	-
UP	45.0	5.9	0	-39.4	-
UK*	71.2*	NA	0	-	NA

NA: information not available

**Haryana demand and production data are for the calendar year 2017-2018*

Source: Data as collected from various State Governments, during the study.

Availability of M-Sand units and production

State	M-Sand Policy available in State	No. of M-sand manufacturing units	Production of M-sand (MMT)
Andhra Pradesh	Yes	6	<1
Assam	No	--	--
Chhattisgarh	No	--	--
Gujarat	Yes	2	<1
Haryana	No	--	--
Karnataka	Yes	164	20
Madhya Pradesh	No	--	--
Maharashtra	No	--	--
Punjab	No	--	--
Rajasthan	No	--	--
Tamil Nadu	Under development	--	3.24
Telangana	Yes	44	7.56
Uttar Pradesh	No	--	--
Uttarakhand	No	--	--

From the above tables it is clear that most of the States have not assessed the annual demand of sand as at present there are no direct methods for assessing the demand for sand. The demand mostly depends upon the development activities going on in the State, which is dynamic in nature. However, it can be inferred that there is a vide gap in demand and supply of sand, which can be bridged by increasing the production of M-Sand. Thus there is an urgent need to mull upon the various possibilities for incentivizing the production of M-Sand.

Basic Objectives for Promoting M-Sand

The main objectives for promoting the M-Sand, are:

i. To prevent damage to eco system by rationalizing the use of river sand in a conserved manner without causing damage to environment.
ii. To promote the use of M-Sand as an alternative to River Sand, given the increasing demand of sand for domestic consumption as well as the scarcity of river sand.

iii. To meet out the deficit in demand and supply scenario of sand in the States.
iv. To encourage the MSME sector in setting up of Manufactured Sand units across all districts, generate employment and effective utilization of resources.

Proposed Steps for Promoting M-Sand

For promoting the use of M-sand, the need of the hour is to provide the **Industry Status** to all such M-Sand manufacturing Units and to provide suitable provisions in the Minor Mineral Concession Rules of each of the State for facilitating the availability of requisite type of stone/boulder quarries for M-Sand units as a backward linkage, and for giving preference in allocation of such quarries to the interested M-Sand manufacturers.

By giving them Industry Status each of such units will be facilitated by the incentives and the concessions to be given to the Industry, in each of the States, as per their Industrial Policy or Micro Small & Medium Enterprises Policy (MSME Policy).

To study the advantages of giving the Industry Status to such M-Sand Units the Industrial Policy and the Government orders of the States of **Andhra Pradesh, Telangana, Karnataka** were studied in details, as the M-sand production and utilization is most popular in these southern States. Following are the findings in each of such State,

(A) ANDHRA PRADESH

Estimated annual demand for sand in Andhra Pradesh is about 200 Lakh Cbmt and is projected to go upto 250 Lakh cum. Estimated annual production of River Sand is about 100 Lakh Cbmt. Hence, quantity required to meet the present surplus annual demand is 100-150 Lakh Cbmt.

Government of Andhra Pradesh has its Micro Small and Medium Enterprises (MSME) Policy, 2015-20, for according top priority to development of Micro, Small and Medium Enterprises for catalyzing growth. This policy proposes a holistic package of interventions encompassing fiscal incentives, capital and interest subsidies, incentives on land and power, financial aid for skill development and quality improvement and marketing assistance. As per this policy the definition of Micro, Small and Medium Enterprises in manufacturing sector in terms of investment in Plant and Machinery is as,

- Micro : Investment does not exceed Rs. 25 lakhs
- Small : Investment is more than Rs.25 lakhs but does not exceed Rs. 5 crore
- Medium: Investment is more than Rs. 5 Crore but does not exceed Rs. 10 cr.
- Large Industry: means an industry in which the investment on plant and machinery is less than Rs 500 crores except Micro, Small and Medium Enterprises.

Facilitation of Industries

- Strengthening of existing Single Window Clearance System by the Telangana State Industrial Project Approval and Self Certification System (TS-iPASS).
- Creation of “Investment Promotion Cell”

- A Cell would be created in the Commissionerate of Industries to facilitate the investors in effective manner with adequate infrastructure and outsourcing the support services to facilitate investors by providing pre-investment services and also to facilitate them to get requisite clearances under the TS-iPASS till the project is commissioned.

(B) KARNATAKA

The Government of Karnataka has announced the New Industrial Policy 2014-19, vide **Government Order No. CI 58 SPI 2013 Bengaluru Dated: 1-10-2014.**

The **objectives** of the Karnataka Industrial Policy 2014 -19 are as follows:

(i) To maintain an industrial growth rate of 12 % per annum

(ii) To enhance the contribution of manufacturing sector to the State GDP from present level of 16.87 to 20% by the end of the policy period

(iii) To attract investment of Rs. 5 lakh crore

(iv) To create employment opportunities for 15 lakh persons

(v) To create an environment to enhance ease of doing business in the State.

Government desires to achieve these objectives through various policy measures and one of these is providing attractive package of incentives and concessions to various categories of MSMEs, Large, Mega, Ultra Mega and Super Mega enterprises. The above industrial policy and package of incentives and concessions shall come into effect from 01.10.2014 and will have a span of five years i.e. up to 30.9.2019.

As per the Industrial policy of Karnataka State, the classification of various Manufacturing Enterprises (defined under item 1.0 of the policy) based on the investment in plant and machinery and as per the MSMED Act, 2006, is furnished below,

- **Micro Enterprises** : Investment is up to Rs. 25 lakhs
- **Small Enterprises** : Investment above Rs.25 lakhs and up to Rs.500 lakhs (5 Crores)
- **Medium Enterprises**: Investment above Rs. 500 lakhs (5 Crore) and up to Rs. 1000 lakh (10 Crores)
- **Large Project/Industry/Enterprises** :An Industrial Enterprise which is not classified as Micro, Small and Medium Enterprise and with investments uptoRs. 250 Crores is classified as Large Enterprise.

Investment / capital investment:

For the purpose of package of incentives and concessions, investment/capital investment shall mean investment made in fixed assets of the Enterprise.

In order to create a strong industrial base and for the overall development of the State, the taluks are grouped as different zones in order to provide different incentives and concessions. The zones are as follows,

- The Hyderabad Karnataka area is grouped into two zones viz, HK-1, HK-2
- Area other than Hyderabad Karnataka area is grouped into three zones viz, OHKZ-1, OHKZ-2, OHKZ-3
- The projects under implementation at the time of announcement of this policy in the above specified zones shall be required to commence commercial production before 31st August, 2

A) <u>Investment Promotion Subsidy</u>

Investment promotion subsidy shall be available to Micro, Small Enterprises and Medium Manufacturing and eligible service sector Enterprises as per Annexure-X as detailed below. However the study has been confined only to the General category Entrepreneurs.

A	Micro Enterprises	***i) Other than Hyderabad Karnataka Area***
		Zone 1: 25% Value of Fixed Assets (VFA) (max. Rs. 15.00 lakh)
		Zone 2: 20% Value of Fixed Assets (VFA) (max. Rs. 12.00 lakh)
		Zone 3: 15% Value of Fixed Assets (VFA) (max. Rs. 9.00 lakh)
		Zone 4: Nil
		ii) Hyderabad Karnataka Area
		HK Zone 1: 30% Value of Fixed Assets (VFA) (max. Rs. 18.00 lakh)
		HK Zone 2: 25% Value of Fixed Assets (VFA) (max. Rs. 15.00 lakh)
B	Small Enterprises	***i) Other than Hyderabad Karnataka Area***
		Zone 1: 20% Value of Fixed Assets (VFA) (max. Rs. 40.00 lakh)
		Zone 2: 15% Value of Fixed Assets (VFA) (max. Rs. 30.00 lakh)
		Zone 3: 10% Value of Fixed Assets (VFA) (max. Rs. 20.00 lakh)
		Zone 4: Nil
		ii) Hyderabad Karnataka Area
		HK Zone 1: 25% Value of Fixed Assets (VFA) (max. Rs. 45.00 lakh)
		HK Zone 2: 20% Value of Fixed Assets (VFA) (max. Rs. 40.00 lakh)
C	Medium	***i) Other than Hyderabad Karnataka Area***

[manufacturing Enterprises (as defined in MSMED ACT and those who provide minimum 25 direct employment)]		Zone 1 : Rs. 50.00 lakh Zone 2 : Rs. 40.00 lakh Zone 3 : Rs. 30.00 lakh Zone 4 : Nil ***ii) Hyderabad Karnataka Area*** HK Zone 1 : Rs. 55.00 lakh HK Zone 2 : Rs. 50.00 lakh

B) Exemption from Payment of Stamp Duty & Concessional Registration Charges

Stamp duty to be paid in respect of (i) loan agreements, credit deeds, mortgage and hypothecation deeds executed for availing loans from State Government Including VAT loan from C&I Department and/or State Financial Corporation, National Level Financial Institutions, Commercial Banks, RRBs, Co-operative Banks, KVIB/KVIC, Karnataka State SC/ST Development Corporation, Karnataka State Minority Development Corporation and other institutions which may be notified by the Government from time to time for the initial period of five years only, and

(ii) for lease deeds, lease-cum-sale and absolute sale deeds executed by industrial enterprises in respect of industrial plots, sheds, industrial tenements by KIADB,KSSIDC, KEONICS, Industrial Co-operatives and approved private industrial eStates shall be exempted as below:

I. <u>MSME</u>

CATEGORY OF ENTREPRENEUR	AREA AND ZONE	RATE OF STAMP DUTY EXEMPTION	CONCESSIONAL REGISTRATION CHARGES
General	Other than Hyderabad Karnataka Area-Zone 1,2	100%	Re. 1 per Rs. 1000
	Zone 3	**75%**	Re. 1 per Rs. 1000
	Zone 4	**Nil**	**Nil**

	Hyderabad Karnataka Area-Zone 1,2	**100%**	Re. 1 per Rs. 1000

II. <u>Large, Mega, Ultra Mega, Super Mega Enterprises</u>

AREA AND ZONE	RATE OFSTAMP DUTYEXEMPTION	CONCESSIONAL REGISTRATION CHARGES
Other than Hyderabad Karnataka Area-Zone 1 & 2	100%	Re. 1 per Rs. 1000
Zone 3	**75%**	Re. 1 per Rs. 1000
Zone 4	**Nil**	**Nil**
Hyderabad Karnataka Area-Zone 1 & 2	**100%**	Re. 1 per Rs. 1000

The exemption of stamp duty and concessional registration charges are also applicable to lands purchased under Section 109 of the KLR Act 1961, and also for direct purchase of industrially converted lands for the projects approved by SHLCC/SLSWCC/DLSWCC. This incentive will also be applicable for the land transferred by KIADB to land owners as compensation for the land acquired.

The exemption of stamp duty and concessional registration charges are also available for registration of final sale deed in respect of lands, sheds, plots, industrial tenements after the expiry of lease period at the rate as specified in the Industrial Policy which was in vogue at the time of execution of lease-cum-sale deed.

C) Reimbursement of Land Conversion Fine

The payment of land conversion fee for converting the land from agriculture use to industrial use will be reimbursed as detailed below:

<u>I. MICRO, SMALL AND MEDIUM ENTERPRISES</u>

CATEGORY OF ENTREPRENEUR	AREA AND ZONE	RATE OF REIMBURSEMENT
General	Other than Hyderabad Karnataka Area-Zone 1,2	100%
	Zone 3	**75%**

Zone 4	**Nil**
Hyderabad Karnataka Area-Zone 1,2	**100%**

II. LARGE, MEGA, ULTRAMEGA AND SUPER MEGA ENTERPRISES

AREA AND ZONE	RATE OF REIMBURSEMENT
Other than Hyderabad Karnataka Area-Zone 1,2	100%
Zone 3	**75%**
Zone 4	**Nil**
Hyderabad Karnataka Area-Zone 1,2	**100%**

Reimbursement of Land Conversion fine is available only to Manufacturing MSMEs and Large, Mega, Ultra Mega and Super Mega and Selected Service Enterprises. The waiver of conversion fine will be reimbursed to the eligible enterprises after implementation of projects i.e. after commencement of the commercial production by the enterprises.

D) Exemption from Payment of Entry Tax

I. MICRO, SMALL AND MEDIUM ENTERPRISES

Category of entrepreneur	Area and zone	During implementation	During operational phase
General	Other than Hyderabad Karnataka Area Zone 1, 2 & 3 and HK Zone 1 & 2	100% Exemption from payment of Entry Tax on ***'Plant &Machinery and capital goods'*** for an initial period of three(3) years from the date of commencement of	On raw materials, inputs, component parts & consumables (excluding petroleum products) [wherever applicable] for a period of Five (5)

		project implementation. For this purpose, the term Plant & Machinery and Capital Goods also includes Plant & Machinery and Equipments procured for captive generation of electricity.	years from the date of commencement of commercial production.
	Zone 4	NIL	NIL

II. LARGE, MEGA, ULTRA MEGA AND SUPER MEGA ENTERPRISES

In other than HK Zone 1, 2 & 3 and HK Zone 1 & 2 these units are eligible for 100% exemption from payment of Entry Tax on ***'Plant & Machinery and Capital Goods'*** for an initial period of three years for Large and Mega and five years for Ultra Mega and Super Mega enterprises from the date of commencement of project implementation. For this purposes, the Plant and

Machinery and Capital Goods also includes Plant & Machinery and Equipment procured for captive generation of electricity / power.

On raw materials, inputs, component parts & consumables (excluding petroleum products) [wherever applicable] for a period of five years from the date of commencement of commercial production. In respect of Mega, Ultra Mega and Super Mega Enterprises, additional One, Two and Three years will be allowed respectively for operational period.

E) Interest Subsidy for Micro Enterprise

Interest subsidy at 5% to General category entrepreneurs and 6% to SC/ST, Women, Minority, Backward Class (category 1 & 2A only), Physically challenged & Ex-servicemen entrepreneurs on term loans shall be provided to micro manufacturing enterprises who avail term loan from bank/financial institutions subject to prompt repayment of the loan installments. The interest subsidy is payable only on the interest actually paid to financial institutions and not defaulted in payment of principle or interest installments. The amount of interest subsidy will be effective rate of interest (after deducting interest subsidy receivable by any institutions/ under any Government of India scheme) or 5% / 6% per annum whichever is less.

The period of interest subsidy is 6 years, 5 years and 4 years in other than HK Zone-1, Zone-2and Zone-3 and 7 years and 6 years in HK Zone 1 and 2, respectively. Interest subsidy shall be applicable/ eligible from the date of 1st loan released by Bank/Financial institution. However the enterprises has to claim the benefit only after commencement of commercial production.

F) Exemption from Tax on Electricity Tariff

I. MSME for General Category Entrepreneurs

100% exemption of tax on electricity tariff for the initial period of six years, five years, four years in Zone 1, Zone 2 and Zone 3 other than HK area and seven and six years in HK Zone 1 and HK Zone 2 area respectively.

G) Incentives to Micro and Small Enterprises for obtaining ISO Certification

In order to enhance the competitive strength of the Micro and Small Enterprises, the Government introduced an incentive scheme for their quality improvement and environment management. The scheme provides incentive to those micro and small enterprises that have acquired ISO 9000/ISO 14001/HACCP certifications/Other Nationally and Internationally recognised Certifications. The scheme for reimbursement of ISO series Certification Charges in operation since 1998 has now been enlarged so as to include reimbursement of expenses for acquiring ISO 14001 certification also.

H) Incentives to Micro and Small Enterprises obtained BIS Product Certification:

Based on Karnataka Industrial Policy 2014-19, KARNATAKA COUNCIL FOR TECHNOLOGICAL UPGRADATION (KCTU) is providing incentives to MSEs obtained BIS Product Certification. The monitory benefit will be as under.

Schemes envisages reimbursement of fees payable to BIS and reimbursement of testing equipment as per the above table.

The incentive is extended to The New or the existing Micro and Small Manufacturing Enterprises which undertakes Expansion/ Modernisation/ Diversification programme (Both own and financed enterprises) in all the zones in the State.

I) Interest free loan to Large, Mega, Ultra Mega and Super Mega Enterprises onNet VAT and CST

All Large, Mega, Ultra Mega & Super Mega Enterprises established in Zones 1, 2, 3 and HK Zone 1 & 2 will be eligible for an interest free loan on Net VAT and CST, subject to industries providing minimum number of direct employment as specified.

Investment range on fixed assets	Interest free loan in other than Hyderabad Karnataka area	Interest free loan in Hyderabad Karnataka area

<table>
<tr>
<td>Large Enterprises:

(i.e. investment on fixed assets above Rs. 10 crore to Rs. 250 crore)

Minimum direct Employment 20Number for first Rs.10 crore& additional35 employment for every additional investment of Rs.50crore proportionately.</td>
<td>100% of Net VAT + CST will be sanctioned as interest free loan from the date of commencement of commercial production as follows,
<table>
<tr><td>Zone</td><td>Max. period</td><td>Investment limit</td></tr>
<tr><td>1</td><td>9</td><td>65% of VFA</td></tr>
<tr><td>2</td><td>8</td><td>50% of VFA</td></tr>
<tr><td>3</td><td>7</td><td>40% of VFA</td></tr>
</table>
The loan shall be repaid as follows :
The loan availed in the first year shall be repaid in the 11th year and the second year in the 12th year & so on.
This incentive is limited to either the period or loan limits whichever is reached earlier and no carry forward is permitted.</td>
<td>100% of Net VAT + CST will be sanctioned as interest free loan from the date of commencement of commercial production as follows
<table>
<tr><td>Zone</td><td>Max. period</td><td>Investment limit</td></tr>
<tr><td>1</td><td>10</td><td>75% of VFA</td></tr>
<tr><td>2</td><td>9</td><td>60% of VFA</td></tr>
</table>
The loan shall be repaid as follows:
The loan availed in the first year shall be repaid in the 11th year and the second year in the 12th year & soon.
This incentive is limited to either the period or loan limits whichever is reached earlier and no carry forward is permitted.</td>
</tr>
</table>

Provision in the Central Act and Rules

As per Section 3(e) of the **Micro, Small and Medium Enterprises Development Act, 2006**,

"enterprise" *means an industrial undertaking or a business concern or any other establishment, by whatever name called, engaged in the manufacture or production of goods, in any manner, pertaining to any industry specified in the First Schedule to the Industries (Development and Regulation) Act, 1951 (55 of 1951) or engaged in providing or rendering of any service or services;*

Further, the Section 7 of the Act prescribers the classification of enterprises which is reproduced below,

Classification of enterprises*.—(1) Notwithstanding anything contained in section 11B of the Industries (Development and Regulation) Act, 1951 (65 of 1951), the Central Government may, for the purposes of this Act, by notification and having regard to the provisions of sub-sections (4) and (5), classify any class or classes of enterprises, whether proprietorship, Hindu undivided*

family, association of persons, co-operative society, partnership firm, company or undertaking, by whatever name called,—

(a) *in the case of the enterprises engaged in the manufacture or production of goods pertaining to any industry specified in the First Schedule to the Industries (Development and Regulation) Act, 1951 (65 of 1951), as—*

*(i) a **micro enterprise**, where the investment in plant and machinery does not exceed twenty five (25) lakh rupees;*

*(ii) a **small enterprise**, where the investment in plant and machinery is more than twenty-five lakh rupees but does not exceed five crore rupees; or*

*(iii) a **medium enterprise**, where the investment in plant and machinery is more than five crore rupees but does not exceed ten crore rupees;*

(b) *in the case of the enterprises engaged in providing or rendering of services, as—*

(i) a micro enterprise, where the investment in equipment does not exceed ten lakh rupees;

(ii) a small enterprise, where the investment in equipment is more than ten lakh rupees but does not exceed two crore rupees; or

(iii) a medium enterprise, where the investment in equipment is more than two crore rupees but does not exceed five crore rupees.

A closure look of the First Schedule reveals that the Sand as manufactured from artificial crushing and processing of stones/boulders is not considered as a product or article which in turn does not give a recognition of Sand manufacturing unit as an INDUSTRY.

Conclusion

The artificial sand produced by proper machines can be a better substitute to river sand. The sand must be of proper gradation (it should have particles from 150 microns to 4.75 mm in proper proportion). When fine particles are in proper proportion, the sand will have fewer voids. The cement quantity required will be less. Such sand will be more economical. Demand for manufactured fine aggregates for making concrete is increasing day by day as river sand cannot meet the rising demand of construction sector. The particle shape of the aggregates is very important for making concretes. The grains should be of durable material and the size of the grains must be such that it should give minimum voids. The presence of clay and slit is avoided since it retards the setting of the cement and making mortar. It is not possible in river sand that all particles should be of higher strength.

This can be achieved only by making sand with the help of machines. In machine-made sand, we can use the raw material of higher strength. The manufactured sand produced by proper machines can be better substitute to river sand. M-Sand is ready-to-use-sand with no wastage since it do not have organic impurities. The superior shape and gradation of M-Sand ensures high strength concrete with significant savings in cement. Looking into all the above qualities of M-

Sand it is the high time to promote its use. This in turn will preserve our water bodies and ecological system for survival of the mankind and for ensuring the intergenerational equity.

6.8 Annexure VIII Assessment of M-Sand as an alternate to river Sand

Parameter	Assessment
Technically Acceptable	• As per IS-383, the chemical characteristics of M-sand are similar to that of river sand having similar strength. • The product is moisture free, as it is made of crushed Granite stone (or other raw materials) • The silt content in river sand is around 0.45% whereas in M-sand it is about 0.2%. • There is no shrinkage or reduction in the quantity due to the absence of moisture. • Grading curve of river sand as well as M-sand falls within the IS 383 zone II limits. • Bulk density and specific gravity of M-sand are comparable to those of river sand. • Bond strength of M-sand concrete is marginally higher than that of river sand concrete. • The mortar made of M-sand shows higher compressive strength and modulus for masonry when compared with the values for masonry using river sand. • Water absorption in M-sand is higher, 1.6% as compared to 1.15% in river sand. • About 7.8 % of particles of natural sand pass through 150 micron sieve, whereas 18 % of M-sand particles pass through the same. As per IS 383:1970 limit is 0-20% for crushed stone sand **Tests Carried on M-sand** • Rapid Chloride Permeability Test (RCPT) conducted to test the durability of M-sand mixes indicate the RCPT values for concrete with M-sand are less than 1000 coulombs , which indicate a very low Chloride permeability and good quality dense concrete. • Water permeability test with M-sand are 14 mm and 11 mm depth of penetration for M25 and M40 grade respectively which indicate very good dense structure of concrete. • Drying Shrinkage of M25 and M40 grades concrete samples with M-sand are 0.043% & 0.048% respectively, which indicate shrinkage are within values estimated from Drying Shrinkage estimation curve.

Economically Feasible	It is economically feasible
Implementable option in States	As of now, only around 180 plants are operational in States like Karnataka, Andhra Pradesh, Gujarat and Telangana.
Scalable Option	Yes, in States such as Andhra Pradesh, Telangana, Maharashtra, Gujarat, Odisha, Karnataka

6.9 Annexure IX - M-sand policy of Karnataka as mentioned in the KMMCR

Rule 31-ZC: SPECIAL PROVISIONS FOR M-SAND

1. Notwithstanding anything contained anywhere in these Rules, Manufactured Sand (herein after called as M-sand) units commissioned or operational as on the date of commencement of these rules producing M-sand of the quality that meet the standards for being used in building construction for use in masonry and concrete shall be granted quarry lease, following the procedure prescribed hereunder, to enable them to produce M-sand for the next twenty years at a capacity that may go up to two times their present average annual production in the last three years or up to two times the capacity shown in the environmental clearance of the quarry lease that they may have.

2. M-sand units commissioned or operational as on the date of commencement of these rules shall, if they are in requirement of quarry blocks apply to the Commissioner or Director, Department of Mines and Geology for their requirement with exact area, sketch and DGPS readings of the boundary points of quarry blocks identified by these units within a distance of ten kilometres of the present location of the M-sand unit.
   Provided that in case of the M-sand unit is owned by a company or firm then the application shall be made by the said company or firm that owns the M-sand unit, and in case the M-sand Unit is owned by an individual then the application shall be made by the concerned individual who owns the M-sand unit.
   Provided further that an application under Form AQL shall be made within a period of six months of the commencement of these rules.

3. The Commissioner or Director, Department of Mines and Geology shall satisfy himself through getting necessary tests done in laboratories or institutes notified by Government that the concerned unit is producing M-sand of quality that meets the standards for being used in building constructions for masonry and concrete.

4. The Commissioner or Director, Department of Mines and Geology shall assess the requirements of quarry blocks size to be allotted to the applicant to enable him to produce M-sand for the next twenty years at a rate up to two times the annual average production done in the past three years or up to two times the capacity shown in the environmental clearance in case the applicant undertakes to enhance the production of M-sand within a period of six months from the date of grant of quarry lease.

5. The Commissioner or Director as the case may be shall then issue a letter of intent for grant of quarry lease for the M-sand unit clearly specifying the area to be allotted with DGPS readings of the boundary points.

6. Based on the letter of intent, the applicant of the M-sand unit shall proceed to procure the necessary No Objection Certificates from the Revenue Department and the Forest Department, environmental as well as pollution board clearances and any other necessary statutory clearances that may be needed as under existing applicable law.

7. On submission of the No Objection Certificates and other necessary clearances the Commissioner or Director of Mines and Geology, as the case may be, shall grant quarry lease to the applicant for a period of twenty years, clearly specifying the extent of grant with the DGPS readings of the boundary points of the lease, the period of the grant and the minimum annual production of M-sand that the lessee shall produce.

   Provided that the M-sand unit granted quarry lease under these rules shall pay in addition to Royalty, and additional sum which shall be equal to fifty per cent of the Average Additional Periodic Payment by the holders of quarry lease or license through auction within the Taluk if such average is available for the Taluk, or within the District, if such average is not available for the Taluk, or within the neighboring Districts if such average is not available for the District, and if such average is not available, within the neighboring Districts, such Average Addition Periodic Payment shall be deemed to be fifty per cent of Royalty. This deemed percentage shall be reset after three years based on average obtained in auction by 31-3-2019, and if no auctions have taken place by 31-3-2019 for deriving the average from Taluk , district or neighboring districts, as the case may be, then the deemed rate will become the final rate for the Average Additional Periodic Payment.
   Provided further that when such Royalty and additional Periodic Payment is paid as provided above, the payment to District Mineral Foundation by the lessee shall be as payable by holders of lease in an auction.

8. In case the grantee fails to enhance the production as indicated in the lease within six months of the signing of quarry lease deed, the grant made under these rules shall be liable to be cancelled.
   Provided that in case the grantee is able to show genuine reasons for not being able to enhance production within the above prescribed period of six months the Commissioner shall have the power to extend the period up to another six months.

9. In case market conditions are such that demand for M-sand has come down substantially, then the minimum annual production that has been indicated in the quarry lease conditions can be suspended by the Commissioner for a period that would be indicated in an order issued by the Commissioner in this regard and during such period the M-sand units shall produce as per the quantity shown in the said order.

10. M-sand units shall produce M-sand of the quality that meets the specified standards for being used in building construction for use in masonry and concrete and failure to do so will make the lease liable for cancellation:

    Provided that M-sand units shall keep a stock register of M-sand as well as by-products in a format prescribed by the Commissioner and update the stock register on a daily basis. Such stock register shall be kept in the premises of the concerned M-sand unit.
    Provided further that M-sand units shall declare to the Authorised Officer every month the quantity of M-sand and by products in opening balance, produced during the month, sold or disposed-off during the month and in closing balance at the end of the month.
    Provided also that the M-sand unit shall keep the M-sand and the by-products always physically separate in stock.

11. Any officer authorized by the Commissioner or Director of Mines and Geology or by the Deputy Commissioner of the District in this regard, by a general or special order, or a member or the District or Taluk Committee shall be competent to draw samples of M-sand produced by the lessee and get it tested in laboratories or institutes notified by the Government and if the sample fails to meet the standards for M-sand to be used in building construction for use in masonry and concrete, the Competent Authority shall issue a notice to the M-sand unit to stop production forthwith and suspend supply of M-sand and on receipt of such notice the M-sand unit shall comply with the order forthwith.

12. The Competent Authority shall give a period of sixty days to the M-sand unit to comply with the standards for M-sand to be used in building construction for use in masonry and concrete standards and if the unit fails to comply with these standards, the Quarrying Lease shall be cancelled.

13. The stock of M-sand in the M-sand unit that does not meet the standards for M-sand to be used in building construction for use in masonry and concrete shall be seized and confiscated by the Competent Authority and disposed-off in a manner that it cannot be used for building construction for use in masonry and concrete.

14. The quarry lease shall be liable to be cancelled if the M-sand unit is found to be producing for the third consecutive time M-sand of quality that does not meet standards for M-sand to be used in building construction for use in masonry and concrete.

15. Whoever produces and or supplies, for construction purpose, M-sand that does not meet the specified standards for M-sand to be used in building construction for use in masonry and concrete shall be punished and imprisonment of up to two years or fine that may extend up to rupees five lakh or both.

6.10 Annexure X- G.O. of Andhra Pradesh for promotion of M-sand

GOVERNMENT OF ANDHRA PRADESH
ABSTRACT

MINES & QUARRIES – Promotion of Manufactured Sand in place of River Sand in construction activity - Manufactured Sand Policy-2016 – Orders – Issued.

---------- INDUSTRIES AND COMMERCE (MINES-II) DEPARTMENT

G.O.Ms.No.38 Date: 17-03-2016.

Read the following:

1) DM&G Letter No. 3337/P/2014, dt: 27.10.2015.
2) G.O.Ms.No. 19, Ind. & Com. (M.II) Dept., dt: 15.01.16.
3) G.O.Ms.No. 20, Ind. & Com. (M.II) Dept., dt: 15.01.16.
4) G.O.Ms.No.53, Ind. & Com. (Prog-I) Dept., Dt: 23-07-2015.

Order:-

*****In the reference 1st read above, the Director of Mines & Geology, Hyderabad submitted the proposal for issuance of a Policy to promote the development of Manufactured Sand industries since the Manufactured Sand (M-Sand) is an alternative to the River Sand in construction activity in view of the increase in demand of sand for domestic consumption as well as the scarcity of River Sand.

2. In the G.O 2nd and 3rd read above, the Government committed to encourage Manufactured Sand as an alternative to River Sand in order to conserve River Sand in the State.

3. Hence, the present policy for promoting Manufactured Sand industries in the State to utilize Manufactured Sand in place of River Sand in construction activity is issued.

A) PREAMBLEMANUFACTURED SAND POLICY – 2016a) Rivers, Forests, Minerals and such other resources constitute a Nation's natural wealth. These resources are not to be frittered away and exhausted by any one generation. Every generation owes a duty to succeeding generations to develop and conserve the natural resources of the Nation in the best possible way in the larger public interest. The Principle of Intergenerational Equity is recognized world over, as one generation of human kind has an obligation to conserve and pass on the natural resources to the succeeding generation.

River systems in the State shall not be treated as a source of Sand as conservation of Water-bodies is paramount obligation of the State which is an essential resource for survival of the mankind. There is no alternate for Water but there is alternate for River Sand in the form of M-sand, which is produced from crushing of the Rock to a required size of 150 microns. Manufactured sand is produced by crushing rocks, quarry stones or larger aggregates pieces into sand- sized particles. Rocks or quarry stones are blasted and subjected to a series of crushing cycles to reduce the particles to the size of naturally occurring sand. The produced sand is then sieved and washed to remove fine particles and impurities, and tested for various quality aspects before it is deemed fit as a construction aggregate. Manufactured Sand is produced from crushing of the rock to required size and gradation suitable for construction industry.

The use of Manufactured Sand is steadily growing due to various reasons. Global scarcity for natural sand exists. Injudicious sand mining and continuous depletion of natural aggregate sources have led to the implementation of new environmental/land use legislations which has made the procurement of natural sand difficult and expensive. In addition, presence of silt and clay in natural sand is another reason for increased use of Manufactured sand. Natural sand is inherently high in silt and clay. It can be damaging for screed and concrete, if the sand is not sufficiently processed to bring down clay and other impurity content to acceptable levels. Manufactured sand also reduces the wastage of low-value by-products in the quarries. The low value aggregates formed as a by-product of rock crushing can be utilized efficiently to create a high value product.

M-Sand also offers higher flexural strength, better abrasion resistance, higher unit weight and lower permeability. Due to these advantages, manufactured sand is being used on a large scale by the construction sector.

a) **Environmental concerns regarding River Sand Quarrying:**

i) Sand quarrying is desirable only up to permissible limits as it prevents channel shifting, progress of flood plain and erosion effects on opposite banks of river bed.

ii) However, indiscriminate sand quarrying ultimately results in lowering of fresh water table and draught conditions.

B) Objectives of M-Sand Policy:

The main objectives are:

i) To prevent damage to eco system by rationalizing the use of river sand in a conserved manner without causing damage to environment.

ii) To promote the development of the Manufactured Sand industry as an alternative to River Sand, given the increasing demand of sand for domestic consumption as well as the scarcity of river sand.

iii) To encourage the MSME sector in setting up of Manufactured Sand units across all districts, generate employment and effective utilization of resources within Andhra Pradesh.

C) Demand and Supply of Sand:

Estimated annual demand for sand in Andhra Pradesh is about

200 Lakh Cbmt and is projected to go up to 250 Lakh cum. Estimated annual production of River Sand is about 100 Lakh Cbmt. Hence, quantity required to meet the present surplus annual demand is 100-150 Lakh Cbmt.

D) Future demand for sand:

i) Visakhapatnam, Guntur, Nellore, Tirupathi, Vijayawada& Kurnool are major centers of urbanization, and consume about 50-

60% of the sand produced in the State. These cities would continue to be major drivers for sand consumption in the State.

ii) The proposed capital of the State at Vijayawada would also be a major demand driver for sand consumption and in fact other building materials also, due to the construction boom and other major civil works expected in the city.

iii) There are plans for upgrading the domestic airports of Visakhapatnam, Rajahmundry, Gannavaram, Kadapa & Tirupathi to international airports – this will also entail major construction works which will in turn drive demand for sand.

iv) The road connectivity within the State and with adjacent States is expected to improve along with the widening of roads – this will also drive demand for sand.

E) Manufactured Sand and Potential for establishment of Manufacturing Units:

1) (a) **Manufactured Sand (M-Sand)** is fine aggregate produced by crushing hard rock by using crushing, shaping, screening and classifying methods. Such Manufactured Sand obtained must confer to IS Code and should be suitable for construction activity. Fine particles of less than 150 Microns size shall not be present in excess quantity than the percentage specified in the IS code. Stone dust obtained in conventional crushing units shall not be treated as Manufactured Sand as it is detrimental for use in construction and is **not eligible for claiming incentives**.

(b) M-Sand unit for the purpose of availing incentives is defined as a unit which produces atleast 50% of its total produce as Manufactured Sand.

2) Availability of Raw Material for Manufactured Sand in the State:

(i) Vast deposits of Charnokite suite of rocks and Khondalites, which are suitable to establish Manufactured sand units in Visakhapatnam, Srikakulam, and Vizianagaram Districts.

(ii) Vast tracts of Quartzites, Pegmatites in addition to Granite Rock deposits are source rocks to setup Manufactured sand units in Chittoor, Kadapa and Anantapuramu Districts.

3) Presently there are about six Manufacturing Sand units in the State.

It is estimated that 30 or more such units of 1000 Cbm per day are needed just to meet the current unmet demand of 100 Lakh Cbm. The growing demand for sand provides the potential for further units to be established based on the vast Raw material source available in the State.

F) <u>Incentives to be provided for the Manufactured Sand Industry in A.P:</u>

1) For establishment of Manufactured Sand Units, the following incentives will be provided, subject to the sale happens within the State and the incentives **shall be apportioned in the ratio of Manufactured sand produced to the total unit production**.

All manufacturing sand units will be accorded industry status.

In addition to the above, the following incentives will be extended to different category of industries as per MSME Policy 2015-20.

1. Micro and Small Enterprises

i) <u>Stamp Duty:</u>

100% of stamp duty and transfer duty paid by the industry on purchase or lease of land meant for industrial use shall be reimbursed.

100% of stamp duty for lease of land/ shed/ buildings, mortgages and hypothecations shall be reimbursed.

ii) <u>VAT/CST/ SGST:</u>

100% of net VAT/CST/SGST shall be reimbursed for a period of 5 years from the date of commencement of commercial production.

iii) <u>Power</u>:

Fixed power cost reimbursement is proposed to be provided @ Rs.1/- per unit for 5 years from the date of commencement of commercial production. This will apply to open access units as well.

Reimbursement of power incentive will be provided subject to condition of installation of separate electric meter for measuring power consumed by M-Sand manufacturing unit, excluding coarse aggregate producing machinery.

The units generating power from captive power plant will not be eligible for the subsidy.

iv) Interest Subsidy:

Interest subsidy on the term loan taken for fixed capital investment by new Micro and Small enterprises in excess of 3% per annum subject to a maximum of 9% per annum for 5 years from the date of commencement of commercial production.

v) All other incentives as per the MSME Policy 2015-20.

1. Medium Enterprises

i) Stamp Duty:

100% of stamp duty and transfer duty paid by the industry on purchase or lease of land meant for industrial use shall be reimbursed.

100% of stamp duty for lease of land/ shed/ buildings, mortgages and hypothecations shall be reimbursed.

ii) VAT/CST/SGST:

75% of net VAT/CST/ SGST shall be reimbursed for a period of 7 years from the date of commencement of commercial production or up to realization of 100% fixed capital investment, whichever is earlier.

iii) Power:

Fixed power cost reimbursement is proposed to be provided @ Rs.1/- per unit for 5 years from the date of commencement of commercial production. This will apply to open access units as well.

Reimbursement of power incentive will be provided subject to condition of installation of separate electric meter for measuring power consumed by M-Sand manufacturing unit, excluding coarse aggregate producing machinery.

The units generating power from captive power plant will not be eligible for the subsidy.

iv) Interest Subsidy:

Interest subsidy on the term loan taken for fixed capital investment by new Medium M-Sand units enterprises @5% per annum for 5 years from the date of commencement of commercial production.

v) All other incentives as per the MSME Policy 2015-20.

1. Large Enterprises

All the Large Enterprises will be provided incentives as per the Industrial Development Policy 2015-20.

Special incentives:

a. Interest subsidy for Micro and small sand Manufactured units shall be applicable as per MSME Policy-2015 and for medium units, 5% subsidy on interest shall be provided.

b. 10% reduction of VAT on purchase of machinery/ equipment used in Manufactured Sand units.

c. 50% concession on seigniorage fee on raw materials used in the process of Manufacturing Sand shall be extended both for the new and existing industries.

2) **For all existing M-Sand units**, Special teams will be constituted to study each unit on scientific lines in terms of the Technology adopted, investments made, the production and sales details and P&L accounts of the units since inception, etc., and suggest a customized package of measures both financial and non-financial, for units competitive, as a one off measure delinked from the incentive policy. The said process shall be completed within 60 days from the date of representation made by the existing M-Sand unit holder.

3) All M-Sand units availing incentives from Government shall supply at least 1/3rd of their production to Govt., works at a rate decided by the District Collector.

4) All existing M-Sand units are eligible for Seigniorage fee concession, power cost reimbursement and VAT/CST/SGST reimbursement as mentioned above based on the category of the industry.

5) Concessions for Conversion of existing stone crushers into M-Sand Units:

1. 10 % Concession on VAT for purchase of machinery to convert existing crushers into M-Sand units or a Green field M-Sand unit will be claimed only on the machinery required for Manufacture of M-Sand.

2. 5% interest subsidy for conversion of crusher units into M- Sand units in case of Medium units and 9% interest subsidy in case of Micro and Small units as stipulated in MSME policy on the Term loan taken for fixed capital investment on M-Sand manufacturing activity.

3. Reimbursement of power incentive will be provided subject to condition of installation of separate electric meter for measuring power consumed by M-Sand manufacturing unit, excluding coarse aggregate producing machinery.

G) Assurance from Govt., to purchase 50% of M-Sand production by the Units:

All Government Engineering Departments consuming sand in their civil works shall insist on the following:

i) Imposition of a condition in their contracts that at least 50% of the total quantity of sand required in such works shall be met by Manufactured sand produced from the Units located within 50 Km radius of the works.

ii) This condition will be extended in phased manner depending on the increase of establishment of Manufactured sand units.

H) <u>Proposed implementation approach:</u>

i) 88 potential mineral areas have been provisionally identified for allotment to Manufactured Sand units. Director of Mines & Geology is directed to indentify new mineral bearing areas for manufacturing Sand.

ii) The Director of Mines & Geology is directed to take action for issuance of RFP for the provisionally identified mineral bearing areas and also for the new mineral bearing areas for allotment to M-Sand units.

iii) The Director of Mines & Geology is also directed to issue RFP in 30 days with the suitable technical and financial parameters for selection of entrepreneurs duly obtaining prior approval of the Government.

4. This orders issues with the concurrence of the Finance Department vide this Department e-file No.15471/M.II(1)/2015, dt.11.01.2016.

5. The Director of Mines & Geology, Hyderabad shall take necessary action in the matter.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

M. GIRIJA SHANKAR,

SECRETARY TO GOVERNMENT (MINES & FP) (FAC)

To

The Director of Mines & Geology, Hyderabad. All District Collectors in the State.

All Joint Directors of Mines & Geology. }

All Deputy Directors of Mines & Geology } through Director of

All Assistant Directors of Mines & Geology } Mines & Geology

All Departments of Secretariat, Hyderabad.

The Commissioner of Panchayat Raj, Hyderabad

The Commissioner and Director of Municipal Administration, Hyderabad. The Panchayat Raj & Rural Development (Pts.III) Department.

The Engineer-in-Chief, Water Resource Department, The Engineer-in-Chief, TR&B Departmnet,

The Engineer-in-Chief, Panchayath Raj Dept.,

The Managing Director, A.P.Housing Corporation.

The Managing Director, A.P.Police Housing Corporation.

Copy to:

The Secretary to Government of India, Ministry of Mines, New Delhi. The Law (H) Department.

The Industries and Commerce (M.I/M.III) Department. The P.S. to Hon'ble Chief Minister.

The P.S. to Hon'ble Minister for Mines and Geology. The P.S. to C.S.

The P.S.to Secretary to Government, Industries & Commerce Department. Sf/Sc

//FORWARDED :: BY ORDER//

SECTION OFFICER

6.11 Annexure XI – Section 9 of G.O. 3 of Telangana dated 08.01.2015

Section 9: Crushed Stone Sand as alternative to natural sand:

Alternate to River sand in the form of Crushed Stone Sand (Manufactured Sand) shall be encouraged from the conservation point of view to River bed/in-Stream sand quarrying operations at affordable cost be made available to meet the requirement of bulk consumers by following:

I. By according industry status as long as the unit manufactures 100% sand for availment of VAT and power subsidy prospectively.
II. Regular incentives will be extended for new units.
III. Preference in quarry lease allotment
IV. Existing Stone Crushers will be accorded ancillary status subject to crushed stone sand certified by ISO/NAC/NCCBM
V. The Government Departments shall be mandated to use at least 50% of manufactured sand in Government constructions.

6.12 Annexure XII – M-Sand related bullet points in G.O. 38 of Telangana dated 12.12.2014

3 (xvi) Rock sand manufactured can be accorded industry status as long as the unit manufactures 100% rock sand. Right now only 20% of the capacity is being used for manufacture of Rock Sand. VAT and power subsidy can be extended prospectively. Regular incentives can be given for new units.

(xvii) In addition, preference in quarry lease allotment will be given for units manufacturing Rock Sand. Existing Stone Crushers can be accorded ancillary status provided the crusher rock sand is certified by ISO/NAC/NCCMB.

(xvii) Government Departments shall be mandated to use at least 50% of Rock Sand in Government constructions.

6.13 Annexure XIII Assessment of Sand obtained by segregation of Coal Overburden as an alternate to river sand

Parameter	Assessment
Technical Acceptable	Studies conducted by Central Institute of Mine and Fuel Research show that processing of overburden yield 60 to 65% sand, 30 to 35% clay and 5% pebbles
Feasibility	WCL has committed to supply sand at one fourth of the market price to NIT Nagpur, which has entered a memorandum of understanding to supply sand for the low cost housing projects under Pradhan Mantri Awas Yojna (PMAY). Telangana State is also trying to check feasibility of suppling OB from The Singareni Collieries Company Limited (SCCL)
Implementable option in States	All Coal bearing States e.g. Jharkhand, Bihar, Madhya Pradesh, Chhattisgarh, Andhra Pradesh, Maharashtra, Gujarat etc.
Scalable Option	WCL has proposed to set up a sand segregation plant of 200 cubic metre per day capacity near Nagpur. Approx. OB removal every year is 200 million m3 and Can supply 20% of total quantity = 40 MM3 for processing. Further recovery factor is 60% and hence 24 MM3 (60%X40) can be prepared.

1987

1988

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सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Department of Water Resources,
River Development
and Ganga Rejuvenation







National Framework for Sediment Management

1990

1991

`FOR OFFICIAL USE ONLY

सत्यमेव जयते

जल बचत – जल संचय

NATIONAL FRAMEWORK FOR SEDIMENT MANAGEMENT

MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION

NEW DELHI

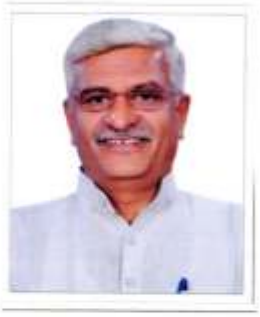
October, 2022

1992

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गजेन्द्र सिंह शेखावत
Gajendra Singh Shekhawat

जल शक्ति मंत्री
भारत सरकार
Minister for Jal Shakti
Government of India



FOREWORD

Rivers are extremely valuable natural resource and important part of human life. They are a major source of fresh water; a source of sustenance and featuring strongly in our cultures and religious practices. Rivers also act as agents of rich deposits of sediment which forms the flood plains and valleys. Often dams are constructed on rivers to store water and manage it for human use.

In present times, due to rapid urbanization and development, many new issues are coming up, leading to change in the river dynamics. Reservoirs are also loosing their storage capacity because of sedimentation. Hence, comprehensive sediment management has how become the need of the hour for the sustainable development of the water resources of the country.

Ministry of Jal Shakti (MoJS) is actively involved in overall planning, policy formulation, coordination and management of the water resources of the country. MoJS has taken several policy initiatives and enacted legislations for managing the rivers from time to time. In yet another milestone, MoJS has come up with the Framework for Sediment Management, for managing the sediments in a holistic manner. This framework lays emphasis on sediment management through integrated river basin management plan. It provides reference of all existing guidelines/policies dealing with the various aspects of the sediment management.

The Framework will facilitate the concerned stakeholders such as the State Governments, other Ministries, departments etc. in planning strategies and implementation of projects giving due consideration to environment and ecology.

(Gajendra Singh Shekhawat)

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1994

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पंकज कुमार
PANKAJ KUMAR
सचिव
SECRETARY

सत्यमेव जयते

भारत सरकार
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जल संसाधन, नदी विकास
और गंगा संरक्षण विभाग
GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION



PREFACE

Rivers are our lifelines. They are enablers of human development. Rivers serve as an important source of drinking water, provide pathways for navigation as well as sediments to the floodplains. These sediments enrich the soil with nutrients. Deltas and river banks, where much sediment is deposited, are often the most fertile agricultural areas in a region. Areas rich in sediments are often rich in biodiversity. Sediments carried by the rivers include good quality sand which is extensively used in the construction industry.

However, rapid urbanization and development, impact natural processes of the river. Dams and barrages constructed across the river for various uses alter the flow dynamics and sediment distribution pattern. The impact of climate change on river flows presents another challenge. Sediment transport being a complex phenomenon, integrated sediment management in a river basin should be the way forward for sustainable management of sediment.

Ministry of Jal Shakti has prepared a "National Framework for Sediment Management". The formulation of the National Framework on Sediment Management is the result of the efforts put in by various officers of Department of Water Resources, River Development & Ganga Rejuvenation (DoWR,RD&GR) and Central Water Commission (CWC). The document has been prepared after extensive discussion and consultation with the State Governments/Union Territories and stakeholding Ministries/Departments.

The National Framework document will serve as a guidance document for management of sediment across the river basin. It is hoped that the National Framework will be made use of by stakeholders in line with other existing guidelines/policies for efficient and sustainable sediment management in the country.

(Pankaj Kumar)

आज़ादी का
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1996

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Abbreviations

BC Ratio	:	Benefit Cost Ratio
BIS	:	Bureau of Indian Standards
CWC	:	Central Water Commission
DoWR, RD & GR	:	Department of Water Resources, River Development and Ganga Rejuvenation
DPR	:	Detailed Project Report
DRIP	:	Dam Rehabilitation and Improvement Project
EPC	:	Engineering, Procurement and Construction
GIS	:	Geographic Information System
GoI	:	Government of India
GSI	:	Geological Survey of India
HKKP	:	Har Khet Ko Pani
IWAI	:	Inland Waterways Authority of India
MCM	:	Million Cubic Meter
MoEF&CC	:	Ministry of Environment, Forest and Climate Change
MoPSW	:	Ministry of Ports, Shipping and Waterways
MoRTH	:	Ministry of Road Transport and Highways
NHAI	:	National Highways Authority of India
NHIDCL	:	National Highways & Infrastructure Development Corporation Limited
NOC	:	No Objection Certificate
O&M	:	Operation and Maintenance
PMKSY	:	Pradhan Mantri Krishi Sinchayee Yojana
PSU	:	Public Sector Undertaking
RRR	:	Repair, Renovation and Restoration
SLUSI	:	Soil & Land Use Survey of India
SPCB	:	State Pollution Control Board
TAC	:	Technical Advisory Committee
ToR		Terms of Reference
UTPCC	:	Union Territory Pollution Control Committee

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Glossary of Terms

Aggradation	:	to raise the level of (a river valley, a stream bed, etc.) by depositing sediment, or the like.
Appurtenant structure	:	consists of spillways, low level outlet structure and water conduits, hydro-mechanical equipment, energy dissipation and river training structure and other associated structures acting integrally with the dam.
Bathymetry	:	a type of hydrographic survey that allow us to measure the depth of a water body as well as map the underwater features.
Bed Load	:	the sediment which is in almost continuous contact with the bed, carried forward by rolling, sliding or hopping.
Channel	:	a feature that conveys surface water and is open to the air.
Channelization	:	the straightening and deepening of a stream channel to permit the water to move faster or to drain a wet area for farming.
Contour Bunding and Trenching	:	the hill side is split up into small compartments on which the rain is retained and surface run-off is modified with prevention of soil erosion.
Degradation	:	process of lowering of channel bed due to the erosion of sediment
Density Current	:	as clear water of reservoir comes in contact with muddy inflow, due to the difference in densities a "stratified flow" condition occurs and the underflow is called as "density current".
Dredging	:	process that removes deposited sediment from the bottom of rivers/reservoirs using different techniques.
Estuary	:	an area where a freshwater river or stream meets the ocean.
Lateral connectivity	:	connectivity between channel-riparian and floodplain
Longitudinal connectivity	:	upstream and downstream connectivity
NOC	:	No Objection Certificate.
Riparian	:	pertaining to the banks of streams, wetlands, lakes or tidewater.
Sediment Budgeting	:	an accounting of the inflow, outflow, and storage changes of sediment in a river/reservoir system.

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Suspended Load	:	part of the total sediment transport which is maintained in suspension by turbulence in the flowing water for considerable periods of time without contact with the stream bed.
Trap efficiency	:	the ratio of total deposited sediment to the total sediment inflow.
Wash Load	:	consists of fine particles, which do not exist on the bed of the reach under consideration, which remain in suspension throughout the reach.
Watershed	:	an area of land that contains a common set of streams and rivers that all drain into a single larger body of water, such as a larger river, a lake or an ocean.

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2004

NATIONAL FRAMEWORK FOR SEDIMENT MANAGEMENT

PREAMBLE

Sediment transport, bank erosion and associated channel mobility represent key physical processes of rivers; their understanding is of crucial importance for defining river restoration and management strategies. Most alluvial rivers have experienced increased sedimentation or bed load deficit, both due to natural processes and series of human interventions in the river catchment along the river bank or on river itself and in the riparian zone. Rapid urbanization and industrialization in flood plains, encroachment of river beds, changes due to various human activities and deforestation in catchment area of rivers etc are the main causes of increased sedimentation in rivers. Problem of sedimentation in rivers is somewhat moderated by trapping sediment in reservoirs. However, it results in loss of reservoir storage thereby reducing its benefits and serviceable life.

Sediment management in reservoirs and dams is becoming crucial to water resources development and management. Reservoirs have been used worldwide to provide reliable water supply for irrigation, domestic, industrial, hydro power generation, and flood management etc. Dams have contributed significantly towards economic development, food production security, resilience building against natural disaster (droughts and floods) and mitigation of ill effects of climate changes. Old dams have traditionally been designed with a certain "design life", typically 50 or 100 years, which were determined by sedimentation rate, trap efficiency, provision of sediment storage pool volume (dead storage). Most reservoirs are therefore gradually being filled up. The annual reservoir storage loss globally due to sedimentation is around 0.5 to 1 % in average but varies easily between 0 and 5% depending on the location. Half of the dams in India are more than 25 years old. As the ageing dams approach the end of their original design lives and depletion of their storage capacity due to sedimentation, water scarcity will be more widespread. Thus, there is an urgent need to update policies and guidelines for exploring all options for alleviating the impact of reservoir sedimentation.

Common practices carried out by river management agencies demonstrate that sediment management has rarely been based upon best practices developed on scientific knowledge. For these reasons, a different approach to sediment management is desirable, incorporating: (i) knowledge and management of sediments at the basin scale; (ii) a wider application of available scientific knowledge.

While keeping rivers in pristine condition is the ultimate goal, development of civilization has always been on the banks of the rivers, to utilise blessings of the rivers and their water. Dams and barrages have to be constructed across the river to utilise the water resources for overall development of the country and the society. Therefore, sediment issues in dams, barrages and rivers cannot be dealt separately. For a sensible sustainable sediment management in rivers and reservoirs, it is necessary to adopt a scientific framework for sediment management at national level. This national framework document highlights the key issues related to sediment management and recommendations for policy-makers and stakeholders. The document is prepared to take appropriate actions and measures by the concerned Departments and other stakeholders.

1.0 COMPOSITION OF SEDIMENT AND TRANSPORT:

Sediment transport is the movement of organic (humus, decomposing material such as algae, leaves etc.) and inorganic particles by water. This is related with the total energy available with water, composition of the river bank material/catchment soil composition & topography along with other factors like seismic/tectonic activity and anthropogenic factors. In other words, greater the quantity of flow and velocity, the more sediment will be conveyed. Water flow can be strong enough to suspend particles in the water column as they move downstream, or simply push them along the bottom of a waterway. The intermediate type of movement where particles move downstream in a series of bounces or jumps, sometimes touching the bed and sometimes carried along in suspension until they fall back to the bed is called saltation. Transported sediment may include mineral matter, chemicals, pollutants and organic material. The total transported sediment load includes all particles moving as bed load, suspended load and wash load (very fine particles). As per BIS Code IS: 6339 (as been revised in 2013), the classification of coarse, medium and fine sediment is as under:

Sediment type	Particle size
Coarse sediment	D> 0.25 mm
Medium sediment	D = 0.062 mm to 0.25mm
Fine sediment	D < 0.062 mm

1.1 Sedimentation in Rivers and Reservoirs

Deposition and erosion of sediment along the length of river is a natural phenomenon. However, sediment deposition at any place in river depends on many factors such as the stages of rivers, catchment/ watershed/ drainage characteristics, its size, geological disposition along the course of the river and human interventions, whereas erosion of soil in the catchment of a river is greatly governed by rainfall & its intensity, slope, soil characteristics, forestation etc. of the catchment area.

Siltation is a natural process through which river tries to reach to a stable regime condition.

Similarly, sedimentation in reservoirs is also a natural process. The detailed process of siltation/sedimentation in rivers and reservoirs is given at **Annexure-I.** Policy intervention requires due attention in the reaches where human settlement and economic activities are extended. Sediment is a socio-economic, environmental and geo-morphological resource, as well as a tool of nature. However, changes in sediment quantity and quality can have a significant impact both in rivers and reservoirs and prove to be resource as well as menace in its own manner.

1.1.1 Rivers:

Sediment in rivers mainly contains boulders, cobbles, pebbles, sand, silt and clay. Sand has high economic value and is a valuable material largely used in construction works. Due to huge demand of sand, MoEF&CC, Govt. of India has come up with "Sustainable Sand Mining Management Guidelines – 2016 and supplemental document "Enforcement and monitoring guidelines for sand mining-2020".Boulders, cobbles and pebbles are also very important for construction industry.

However, when sediment in rivers is deposited at undesirable place, it turns into a menace. It may cause aggradation and degradation. Further, it also causes meandering, braiding and widening of rivers, which in turn causes erosion of river banks and endangers the embankments and settlements on the banks of rivers. Sedimentation in rivers also causes reduction of navigable depth and rising of river beds causing drainage congestion. In such cases, it becomes necessary to remove the sediment by suitable means at selected places.

1.1.2 Reservoirs:

Due to reduction of velocity of water in reservoirs, part of incoming sediment gets trapped. Sedimentation in reservoir results in loss of capacity, impacts dam safety, risk to downstream habitation etc. as sedimentation in reservoirs is generally accumulative. By removal of sediment, the capacity and life of a reservoir can be extended, planned operational benefits can be ensured, and minimise the risk to downstream stakeholders.

2.0 BASIC PRINCIPLES OF SEDIMENT MANAGEMENT

2.1 Sediment Management in Watershed

It is imperative to minimise the sediment intake to a minimum level for a dam or reservoir for its optimal functionality and longevity. This involves a two-pronged approach: catchment area treatment and appropriate land use planning to address unsustainable land use to reduce soil erosion & sediment production. Catchment area interventions need to be given priority as it arrests silt within the boundary of a watershed which will help in minimizing siltation in river bed & reservoirs. Details on catchment area treatment/intervention are given in **Annexure II.** The steps to reduce sediment inflow must include determination of inflow of silt into the river/reservoir. Sediment inflow assessment may be based on soil erosion modelling and silt monitoring along with assessment of agronomic practices and other land-based activities, point& non-point source of pollutions, agriculture run-off in the catchment, which is essential to determine quantity and quality of sediment and the reservoir's rate of sedimentation.

To reduce sediment production in the watershed sustainably, the following actions should be taken:

(i) study watershed characteristics
(ii) current status of watershed management activities
(iii) assess the vulnerability of watershed in terms of soil erosion by using available observed sediment data at various streams G&D sites, water reservoirs (if hydrographic survey data available), soil loss modelling, to identify and prioritise the degraded micro-watershed for treatment with biological and engineering measures for erosion control,
(iv) stream bank erosion control using various river training works
(v) trapping sediment upstream in river before entering into reservoir and
(vi) planting trees to provide vegetation cover and retention to the soil for preventing erosion.

To start with, the Digital Micro Watershed Atlas of India- 2019 of Soil and Land Use Survey of India (SLUSI), Ministry of Agriculture can be followed for delineation & management planning. The "Common Guidelines for Watershed Development Projects", Department of Land Resources, 2008, Ministry of Rural Development, Govt. of India may be referred for development of watershed

projects. For implementation of the watershed programme, a synergy is required to ensure the convergence of various programs implemented by the various central ministries and State Governments.

2.2 Sediment Management in Rivers

The following basic principles should be followed for sediment management of Indian rivers:-

1. Sediment management should become a part of integrated river basin management plan. Regular sediment budgeting for all basins should be done especially which are affected by heavy siltation problem.

2. Removal of sediments from river bed may help in channelization of river flow during the lean season and improve the navigability, but will not have any considerable effect on flood levels.

3. There is natural deposition of sediments upstream of any barrage, but this attains equilibrium after few years. Desiltation in upstream of a barrage may be taken for channelization of stream flow. However proper operation of Gates should be ensured for reducing sediment deposition in the upstream of the Barrages/Wier.

4. Urbanization and infrastructure development works like buildings, roads, embankments etc. require large amount of sediment. The quantity of sediment removed in such cases from the river shall be limited to the extent to which it does not harm the ecology of river or gainfully utilized in developmental works, whichever amount is less. Exploitable quantity should be determined "a-priori" and the reach should be monitored for excessive exploitative practices.

5. There is a need to pursue the de-siltation/dredging schemes with utmost care backed by scientific study, including simulations through mathematical and/or physical model study at appropriate scales and employing consistent formulations applicable to the given site. Mathematical and/or physical model study is exempted for dredging/de-siltation carried out for navigation purpose by Inland Waterways Authority of India.

6. If necessary, permanent observation stations may be opened for collecting data such as cross-section, hydrological observation etc. This should be coupled with periodic monitoring of various morphological changes with space technology such as formation of shoals, meandering tendency of the river, effect of construction of hydraulic structures, damages to the bank, effect of afforestation/ deforestation and tectonic occurrences. Data sharing mechanism is to be established in case of an inter-state river.

7. Different approaches of sediment management may be resorted to in rivers depending upon the stages of the river. The details of the same, along with some other management strategies are given in **Annexure-II**.

8. Sediment management action must follow best practices to minimize damage to the environment and river morphology. Restriction details for de-siltation/dredging are placed at **Annexure-III**.

9. In case, if it is not possible to utilise sediment removed by dredging/de-silting of rivers; a proper utilisation/disposal plan needs to be prepared, with the consideration that it does not create any environmental, ecological and social issues.

2.2.1 Effect of De-siltation in Reducing Floods

In general, de-silting of rivers does significantly affect flood levels. In this regard, it is mentioned that the Mittal Committee was constituted by the erstwhile Ministry of Water Resources in the year 2001, under the Chairmanship of Dr. B.K. Mittal, Former Chairman, Central Water Commission. The main objectives of the Committee were to identify the cause and extent of siltation in rivers, to suggest measures to minimize siltation, to examine as to whether de-silting is a technically feasible means to minimize magnitude of floods in rivers, to suggest appropriate technology/ methods of de-silting of rivers, to propose a realistic operational programme in a time-bound manner and other related aspects. The findings/recommendations of the Committee were as follows:

(i) De-silting of rivers for flood control is not an economically viable solution;
(ii) Dredging in general has been found to be inadequate and should not be resorted to, particularly in major rivers;
(iii) There are, of course, some locations such as tidal rivers, confluence points with narrow constrictions and the like which can be tackled by de-silting after thorough examination and techno-economic justification;
(iv) Selective dredging is suggested depending upon local conditions; and
(v) De-silting of rivers can marginally minimize the magnitude of floods and be effective only for a short period.

However, selective need-based dredging of certain reaches of rivers coupled with structural and non-structural measures may be considered in order to protect habitation, agriculture land, airports, industrial and institutional installations etc.

2.2.2 Extraction for Navigational Purpose

Inland Waterways Authority of India (IWAI) is required to carry out dredging to clear shoals/shallow patches on fairways in National Waterways as a mandatory functional requirement in terms of provisions of Section 14 (Chapter IV) of IWAI Act, 2016 (82 of 85).

The above dredging shall be necessitated to be carried out at frequent intervals as and when shoals are surfaced and identified based on continuous fortnightly/monthly bathymetric surveys being carried out by IWAI. This maintenance dredging is also required to be taken up at short notice and complete the dredging in a time bound manner to facilitate navigation. The above maintenance activities of dredging including its disposal are also exempted from obtaining clearance from MoEF&CC.

2.2.3 Extraction for Economic Uses

Sediment deposit in both rivers and reservoirs at some places contains considerable quantity of sand. In places where sediment deposits are having good sand content (of the order of 30% - 40%), it is possible to extract sand from sediment to meet the ever-increasing demand of sand. Sediment component such as silt and clay bears comparatively lesser economic value but still can be used in many works such as for brick making, as filling material, construction of embankments, roads,

constructing raised platforms for flood proofing etc. Its different uses are given at **Annexure-IV**. There is possibility of revenue generation in such cases.

2.2.4 Indispensable Removal

Many a time, excess deposition of sediment at undesirable places causes bank erosion, shifting of river course and navigational issues. Sediment deposition on the mouth of a river may cause large scale flooding due to drainage congestion. At many places, sediment needs to be removed from a river to channelize it to bring it to its original course especially during pre-monsoon and post monsoon. In such cases, it is imperative to remove the sediment by practically suitable means. Similarly, in some old reservoirs, especially those which are supplying drinking water, sediment removal becomes necessary to regain their capacity. In hydro-power projects, excess deposition of sediment just below the intake level of turbines hamper their operation and has to be removed with suitable means.

2.3 Sediment Management in Reservoirs

The importance of reservoir sedimentation management is evident when one considers that the cost of replacing storage lost annually due to sediment deposition throughout the world is significant. If sedimentation can be managed successfully, the loss in reservoir storage space due to this phenomenon can be lowered and life of reservoir can be prolonged significantly. The benefit of effective reservoir sedimentation management is enormous.

It is possible to successfully manage reservoir sedimentation by using comprehensive sediment management strategy coupled with measures to reduce sediment yield from watershed, route sediments around or through storage, and recover the lost capacity of reservoir through de-silting. Integrated management of reservoir sedimentation is easy to manage for new reservoirs which can be integrated at planning stage itself. In the existing reservoirs, one or combination of more than one technique can be explored in a holistic way. None of single technique/measure can be 100% effective for long term sustainability of sediment management in reservoirs. Due consideration shall be given to address environmental and social safeguards during the planning stage. In addition to this, robust institutional and sound financing mechanism forms the integral part of comprehensive planning and implementation strategy for sediment management.

The brief detail of framework for addressing sediment problems in reservoirs are given in the following paras.

2.3.1 Measures to Minimise Sediment Deposition in Reservoirs

The main source of incoming sediment to any reservoir is catchment erosion. Therefore, the first step to address the root cause of incoming sediment is watershed management through various engineering and bio-engineering techniques to arrest sediment erosion effectively. The next step is to manage the sediment deposited in the river by routing the sediment around or through the storage by various kinds of sediment by-pass and sediment pass-through interventions. There are structural and non-structural techniques for sediment routing. Sediment Bypass, include Flood Bypass Channel or Tunnel and off-stream reservoirs for bypassing sediment inflows away from reservoirs. Sediment pass-through strategies including draw-down flushing(complete and partial), pressure flushing, sluicing and venting turbid density currents are non-structural interventions comprising operational techniques for evacuating sediment from the reservoirs.

There are several techniques for sediment routing that take advantage of temporal variation in sediment discharge, managing flows during periods of highest sediment yield to minimize sediment trapping in the reservoir. The basic strategy is to impound the clear water and release the sediment-laden flood flows. Sediment routing techniques require a part of the river inflow and storage volume for transporting sediment around or through the reservoir. Consequently, this may not be feasible in reservoirs, where all the inflow is being captured and stored. However, as reservoir capacity is diminished by sedimentation, sediment routing may become more feasible.

The sediment not arrested through the above referred two stages, partially gets deposited in the reservoir and part of it is discharged downstream of the reservoir (suspended and colloidal). The deposited sediment in the reservoir is to be dredged to restore the lost capacity to the possible extent keeping in view techno-economic and environmental feasibility.

2.3.2 De-silting of Reservoirs

Sediment deposit in reservoirs may have adverse impact on storage, as well as safety of dams. The safety of reservoirs is directly having huge consequences to the downstream habitations as well as other vital installations along with the planned benefits. Dam safety requirement shall be complied with, when it comes to enforcing constructive or operational sediment management measures; at no time should such measures lead to an unacceptable state of dam safety.

Sediment management measures to reclaim live storage, to improve operations or for environmental reasons shall be in compliance with applicable environmental requirement, unless they are necessary to preserve immediate dam safety, and prevent an uncontrolled release of reservoir water that could lead to even larger environmental damages or cause loss of life, injuries or large damages to properties in the downstream area.

At the same time, for existing reservoirs; in case of high sediment inflow, long term integrated watershed management shall be explored effectively. In some of existing large reservoir(s), watershed management has resulted substantial reduction in erosion in turn reduced the sediment inflow viz. in Maithon Reservoir, initial average annual loss of capacity of 7.38 MCM reduced currently to 1.37 MCM over a period of time.

Annual loss of overall storage of Panchet Reservoir was reduced from 14.98 MCM/year (years 1959-66) to 4.06 MCM/year (years 1996- 2019) considering the maximum flood management pool of 132.62m (435 ft.) mainly on the ground of construction of Tenughat Dam upstream of Panchet Dam."

MAITHON DAM
WATERSHED MANAGEMENT

- Maithon dam (Damodar Valley Corporation - DVC) is a 56.08 m high composite dam constructed across river Barakar, Dhanbad District (Jharkhand). **The initial gross storage capacity of Maithon dam is 1196 MCM with live storage of 607 MCM considering the Maximum flood management pool of 150.91 m (495 ft.) and minimum drawdown level of 132.62 m (435 ft.)**
- It is a multipurpose dam with main function of flood control, supplying water for irrigation, Municipal & Industrial use, hydro power generation, and tourism. The construction commenced in December' 1951 and completed in September' 1957.
- Damodar Valley Corporation is working **since 1949-50** to tackle the soil erosional problems in upper Damodar-Barakar catchment area through **soil and water conservation/integrated watershed management programs** with multidisciplinary approach by its **Soil Conservation Department** located at Hazaribagh.



Drainage line treatment



Rainwater harvesting structures

Key Soil Conservation Measures

- ✓ Afforestation, Pastoral Development, Contour Trenching
- ✓ Field hedge, pasture and horticultural development, drainage line treatments, silt detention dams, ponds' renovation, reclamation of land, demonstrations on moisture conservation
- ✓ Construction of water harvesting structures

- Measures have played a significant role in arresting sediment deposition by more than 60% which has resulted, among other benefits, in **reducing loss rates in storage capacity from 7.38 MCM/year (years 1955-65) to 1.37 MCM/Year (years 2002-19).**

The structural invention(s) which includes renovation of low-level permanent river outlet with appropriate replacement provision for original valve with a new gate to allow sluicing during high flow event, renovation of power plant penstocks by replacing few penstock with a sluicing pipe and modifying the other penstock for electricity generation, retrofitting of dams by providing de-silting tunnel(s), silt-bypass weir/tunnel(s))/ tank/ chamber(s),de-silting etc. can be explored on case to case basis keeping in view engineering and techno-economic and environmental feasibility in providing such modifications. Such typical strategies have been experimented in Shihmen reservoir, Taiwan.

SHIHMEN DAM (TAIWAN)
SEDIMENT MANAGEMENT

- The reservoir management in Taiwan faces lots of challenge. The main source of rainfall is the northeast monsoon. Mean annual precipitation is about 2500 mm/year. On an average 3 to 4 typhoon strike the country every year. **Soil erosion is very high, almost having a rate of 3 to 6 mm/year.** Shihmen dam is located very near to Taoyuan city of Taiwan. It was commissioned in year 1964
- The gross storage capacity is 309 MCM. **This dam is a classic example of post construction retrofitting for integrated sediment management**. The journey of sediment management started by construction of 121 check dams which majority of these got filled by year 2007. **It is estimated that annual inflow of sediment in reservoir is 3.42 MCM.**

Sustainable Sediment Management Strategies at Shihmen Dam

Sediment yield reduction (Check Dams) | *Mechanical &Hydraulic Dredging* | *Sluicing* | *Routing-venting turbidity currents*

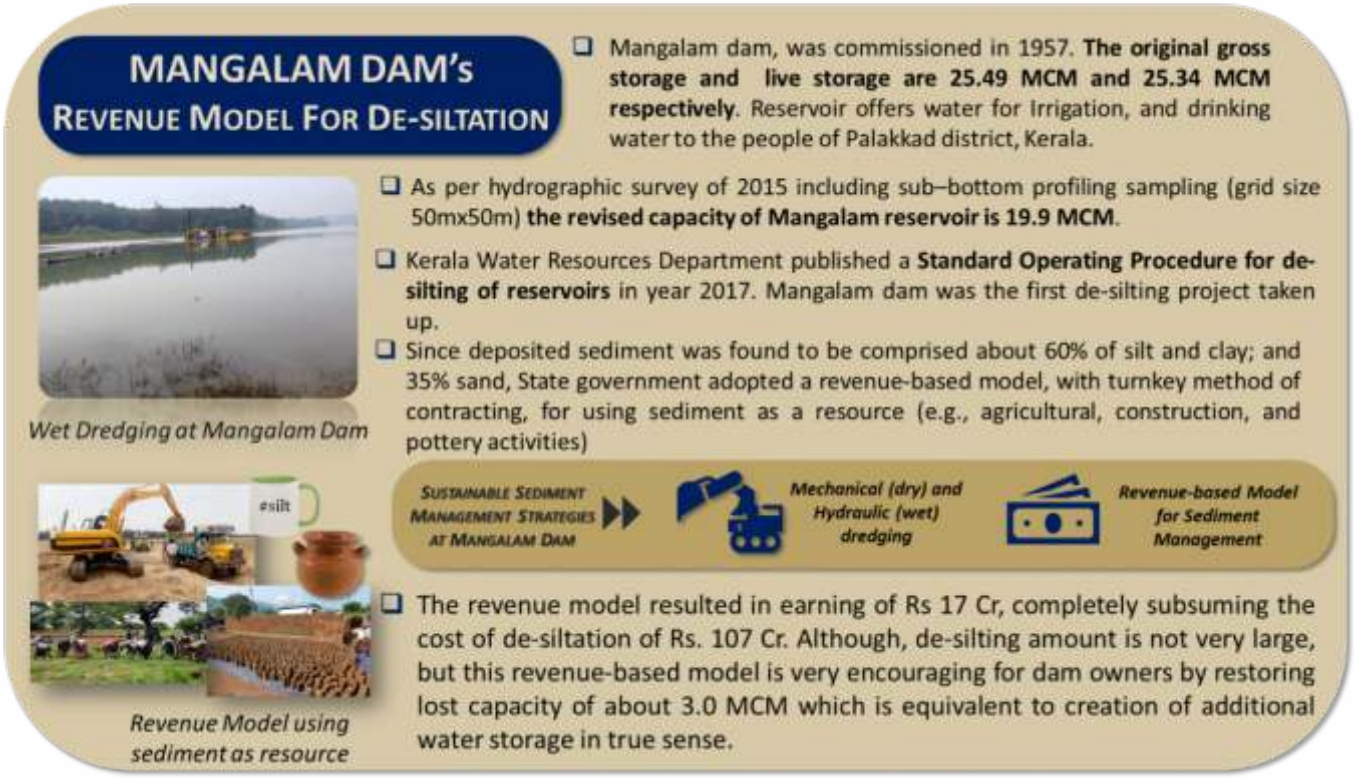


Simultaneous operation of spillway and penstock sluice venting turbid density current

- Then structural inventions included modification of permanent river outlet gates (4%) by replacing the original Howell-Bunger valve with a jet flow gate to allow sluicing during high flow events , renovated the power plant penstocks, replacing one penstock with a sluicing pipe and modifying the other penstock for electricity generation (55%), introduction of two nos of sediment-bye pass tunnels i.e. Dawanping (21%, under construction) and amuping (19%, commissioned) silt sluice tunnels. Also, some part is managed by dredging near dam(15%) and dredging upstream of dam(12%). **This arrangement is almost balancing the inflow sediment with outgoing sediment volume**

A majority of Indian reservoirs have been built through conventional design life approach rather than life cycle management approach. The latter approach considers storage as renewable as compared to exhaustible by first one. Furthermore, abandoning dam sites may not be affordable in any respect, as available sites for new reservoirs are very limited. Hence, there exist ample scope and cost-effectiveness in prolonging their lifetime.

De-silting plan for a given reservoir should be comprehensive. It shall be prepared based on latest bathymetry survey inputs along with representative sub profiling data of a given reservoir. The basic information shall include various methods of dredging along with their utilities and performances in accordance with different specific site conditions, proposed method with justification, estimated cost and proposed dredging volume, revenue and non-revenue models, cost benefit analysis vis-a-vis restored capacity, disposal plan of dredged material with detail of sediment stacking and processing yard, method of contract which include EPC/turnkey or work contract method with fixed time schedule, environment and social safeguards and monitoring mechanism etc. The de-silting of Manglam Dam in Kerala is a classic example of revenue model under implementation.



The following basic principles should be followed in De-silting of reservoirs:

i. Regular monitoring of sediment deposition in reservoir should be carried out. Integrated Bathymetry survey with sub-profiling sampling needs to be done to determine the actual quantity of sedimentation in reservoirs and estimation of the rate of sedimentation.

ii. For reservoirs selected for potential intervention, it is necessary to perform a diagnosis of the sedimentation problem, formulate and select the most viable management alternative, prior to implementing the selected measures.

iii. In case, if it is not possible to utilise sediment removed by dredging/de-silting / flushing from reservoirs; a proper utilisation/disposal plan needs to be prepared, with the consideration that it does not create any environmental, ecological and social issues.

iv. De-siltation for restoring the lost capacity of the reservoirs may be carried out by comparative analysis of revenue and non-revenue models. For reservoirs, which are constructed for providing drinking water supply as well as other strategic services, de-silting may be done on need basis including non-revenue model. Also for safety of dam, it requires the de-silting; this may be preceded to other concern keeping in view associated disaster consequences.

v. De-siltation/Dredging/Flushing in the cascade of reservoirs depends on the natural sediment load and may be shared between reservoirs. Appropriate monitoring mechanism along with institutional strengthening provision shall be inbuilt items in any programme of sedimentation management of reservoirs especially once the reservoir located in a lower riparian State is affected, when carried out in the reservoir, due care should be taken so that it does not affect downstream reservoirs. Proper consultation, with the reservoir authorities of downstream projects should be done. In case of hydro-power plants, each project or cascade projects should have coordinated Standard Operating Procedure (SOP), so that to the extent possible, sediment concentration may follow normal river regime during flushing.

vi. De-siltation/dredging work shall not affect any existing structures/ facilities. De-siltation, especially in reservoirs shall be done in such a manner that it does not induce any landslides and slip circle failure in case of quick drawdown conditions. Restriction details for de-siltation/dredging are placed at **Annexure-III**.

vii. In financing for new facilities, sediment management measures are considered to be an integral part of the facility cost. A life-cycle management approach shall always be recommended. For de-silting existing reservoirs, recurrent measures are financed through O&M budget. Reclamation of live storage is to be considered as like creating a new facility. Also, de-silting for reinstating safe operation is financed like other rehabilitation works (e.g. DRIP).

viii. Financing de-silting in cascades of reservoirs depends on the natural sediment load and may be shared between the reservoirs. Appropriate monitoring mechanism along with institutional strengthening provision shall be inbuilt items in any program of sedimentation management. Also, in case de-silted material is discharged or dumped in the downstream of dam, impacting immediate downstream reservoir located in lower riparian State, proposed Plan may also be shared with lower riparian State. In case of a reservoir having interstate implications, the downstream states should have a member in the State/Central TAC.

ix. The dredged material is a resource and the beneficial reuse in convergence with various concern organisation/agencies will not only bring direct economic values, but also social and environmental merits. Hence its end use should be part of comprehensive action plan. The possible major use of dredged material includes land reclamation, improvement & filling, construction & protection materials (for highways, railways, flood protection embankment etc.), top soil enhancement and agricultural use, habitat creation and restoration, beach nourishment and shore protection, river management (e.g. sand plug for channel closure) etc.

x. A Feasibility Report should be prepared considering various techniques of removal of sediment. The economic analysis of long term benefits owing to consideration of removed sediment as a resource should be an important part of the feasibility report. Restored capacity of reservoir should be considered equivalent to creation of new live storage and apart from the intended benefits in terms of various uses of reservoir water

(irrigation, drinking water, industrial water, hydro power, fisheries, tourism etc.), the benefits from selling of sand for construction purpose, silt and clay for pottery and tiling industries in the open market by the contractor should also be considered for cost-benefit analysis. The use of revenue model shall be invariably explored. However, in case of strategic restoration of lost capacity (like drinking water, trans-boundary rivers etc.), even the non-revenue model may be considered. In order to ensure credible and bankable competitive bidding, the bid document shall be supported in terms of proposed volume and composition of dredged sediment through a latest close interval sub-bed profiling data of reservoir.

The details about the measures that can be adopted for sediment management of reservoir are listed in **Annexure-V.**

2.3.3 Data Base & Survey:

i. Dam owners / Project Authority must carry out integrated bathymetry survey with sub-profiling sediment sampling of all large reservoirs of the country, keeping in view proper intervention for reclaiming of storage to improve water security. The survey is to be carried out at prescribed as per Compendium on sedimentation of reservoirs in India (2020).

ii. For preparation of strategic action plan for handling the challenge of reservoir sedimentation in future, integrated Bathymetry Survey and Sub-bottom Profiling should be conducted compulsorily. The sub bottom profiling would give the thickness of underwater sediment, its composition (type), density etc.

iii. Remote sensing Technique can be used for regular sediment assessment.

iv. GIS-based model for predicting sediment quantity and quality based on basin characteristics and river flow can be developed.

v. Video documentation of entire exercise of de-siltation, dredging, and other interventions executed for sediment management can be made so that cross learning can be promoted.

2.3.4 Retrofitting of Existing Dams

Retrofitting of existing dams: keeping in view availability of very limited sites for construction of new storage reservoir(s) along with various other challenges including R&R and environment impacts, dam owner(s)/Project Authority/(ies) may explore for retrofitting of few dams at a marginal cost. This retrofitting can be in many forms i.e. increasing the height of dam to the safe extent possible to create additional storageto meet extra demand, harnessing the available much easy hydroelectric potential at appropriate location(s), pumped storage option(s) etc. to make these reservoirs part of climate resilient strategies.

2.3.5 Institutions and Financing:

Certain guiding principles determine the arrangement of institutional setup and financing: Firstly, sediment management measures must never compromise dam safety and result in unacceptable state of dam safety. Secondly, sediment management measures must comply with prevailing environmental requirements, unless dam safety requires otherwise. Thirdly, reservoir sediment management is to be considered as an integral part of planning, design and operation of any new facility. Finally, sediment

management decisions follow similar considerations, needs, rules, processes as those for other environmental projects.

For de-silting of existing reservoirs, recurrent measures are financed through O&M budget. In order to handle the challenge of reservoir sedimentation on long term basis, all owners of reservoirs shall initiate policy interventions for earmarking certain percentage of dam revenues for carrying out de-siltation activities for sustainable dam operation and maintenance. Reclamation of live storage is to be considered akin to creating a new facility.

Financing de-silting in cascades of reservoirs depends on the natural sediment load and may be shared between reservoirs. Appropriate monitoring mechanism along with institutional strengthening provision shall be inbuilt items in any programme of sedimentation management.

2.4 Sediment Management for Lakes/Water Bodies

Lakes and water bodies constitute important habitats and food resources for a diverse array of fish, aquatic life, and wildlife. These are of great importance to mankind. They regulate the flow of river. During the rainy season, they prevent flooding and they help to maintain the flow of water during the dry season. Therefore, sediment management for Lakes and Water bodies are equally important for their sustenance. The scheme, namely, "Repair, Renovation & Restoration (RRR) of Water Bodies" is under implementation by Ministry of Jal Shakti, GoI with the objective of comprehensive improvement and restoration of water bodies in the country presently covered under the "Guidelines for the scheme on Repair, Renovation and Restoration (RRR) of Water Bodies under PMKSY (HKKP) – 2022".

3.0 CLIMATE CHANGE PERSPECTIVE

Climate change is now an unequivocally accepted phenomenon, which in turn will result in increased hydrologic variability. This is an emerging challenge for development and sustainability of water resources management. The water storage infrastructure more generally, are appropriate focal points for both sustainable development and climate resilience. In turn, sediment management is a necessary element of sustainable and climate-resilient plan that includes reservoir storage and hydro-power generation.

Climate change, such as more frequent and intense rain events, can increase erosion and result in greater amounts of sediment washing from watershed, reaching into rivers and reservoirs. To mitigate adverse impact of climate change in reliability of water supply, construct reservoir storage spaces as large as possible. In reservoir sediment management context, developing and retaining enough reservoir storage space to satisfy water supply needs over the very long term requires inclusion of reservoir sediment management facilities in dam and reservoir designs right from the start, at project conception. It requires abandoning the conventional design life approach to dam design and adopting a life-cycle management approach.

In run-of-river projects, sediment management aims to improve operational efficiency. If sediment is not removed from run-of-river facilities before it enters the canal heads/the turbines, it may cause heavy siltation in canals and clogging of the cooling water intakes of the electro-mechanical equipment and also abrasion of the blades of the turbine, which decrease the efficiency as well as increase operation and maintenance costs and diminish the amount of power that can be generated. The objective of sediment management in storage

projects is to ensure project longevity for storing large amounts of water for planned benefits and use during droughts. Such storage also provides the opportunity to attenuate floods up to some extent.

The life cycle of dams and reservoirs consists of operation and maintenance, continued and regular implementation of reservoir sediment management approaches, and regular refurbishment of the dam and its appurtenant structures. Reservoir sediment management and refurbishment of the dam and its appurtenant structures allow for continued use of the dam and its reservoir, ideally in perpetuity. In principle, the approach does not include the element of disposal. A major difference between the life-cycle management approach and the design life approach is the focus on preventing storage loss caused by reservoir sedimentation. It eliminates the threat of losing the reservoir's ability to store water over the very long term and promotes continued use of the dam and reservoir, providing utility to both current and future generations.

4.0 ENVIRONMENT AND SOCIAL SAFEGUARDS

Dredging and de-silting of dams, reservoirs, weirs, barrages, rivers and canals for purpose of their maintenance, upkeep and disaster management is exempted from environment clearance as per S.O.141(E) of MoEF&CC dated 15th January, 2016. However, reservoir sediment management methods such as by-passing, flushing or de-silting of existing reservoirs are associated with environment & social risks and impacts, which are to be identified based on interventions proposed and locational sensitivity, if any, such as dam/reservoir located in protected area, reservoirs notified as wetlands/bird sanctuaries, etc. and some of the above interventions would involve creation of new infrastructures. In such cases all statutory clearances will be required. Wild life clearance would be applicable if reservoir is in a notified protected area. For structural intervention for sediment by-passing in existing dams or any other activity, if the land required is forest land, diversion of forest land would attract forest clearance process as per Forest Conservation Act, 1980.

For the de-siltation activity, a proper Feasibility Report along with Environment Management Plan to dispose the silt is required to be prepared as per the guidelines provided in the "Handbook for Assessing and Managing Reservoir Sedimentation", CWC,2019. "Operational Procedures for Assessing and Managing Environmental Impacts in Existing Dam Projects", Central Water Commission, November 2020 with competent level approval of MoEF&CC, can be referred for the environmental and social safeguard issues related to de-silting in the existing dams in context of various statutory and regulatory norms.

5.0 DISPOSAL OF DREDGED / DESILTED MATERIALS

a) The proposal for de-siltation/ dredging activities shall be prepared as per applicable guidelines and prior approval may be taken from concerned agencies to ensure hassle free implementation. River gravels/sands/silts are valuable resource and could be used gainfully in construction works, including housing, roads, embankment and land reclamation activities.

b) Appropriate sediment disposal plan shall be a part of Feasibility Report along with applicable Environment and Social safeguards. Dredged material shall be disposed as per the approved Environmental Management Plan. It should not contaminate any water body, adverse impact to the flora and fauna existing adjacent to the disposal site(s) etc.

c) Desilted material should not be used for filling up of wetlands and water bodies including oxbow lakes, as these are important for recharging ground water and providing base flow in rivers during lean season.

d) In the case of de-silting of reservoirs, regarding applicability and procedures for Environment Clearance, Forest Clearance and Wildlife Clearance, activity listed at Sl. No.18, Table 2.2, can be referred in the "Operational Procedures for Assessing and Managing Environmental Impacts in Existing Dam Projects" CWC, November, 2020. This referred guideline has the competent level approval of MoEF&CC.

e) NOC from State Pollution Control Board (SPCB)/Union Territory Pollution Control Committee (UTPCC) as well as concerned local authorities is required in advance for disposal site for disposal of dredged materials. Requirement of NOC from State/Union Territory Pollution Control Board and from local authorities for disposal of dredged material is exempted for dredging carried out for navigation purpose by Inland Waterways Authority of India.

6.0 EVALUATION OF SEDIMENT MANAGEMENT PROJECTS

Dredging/de-silting projects including all components and their techno-economic performances need to be evaluated. An ongoing monitoring program is essential for optimizing sediment management. Short and long-term monitoring plans should be developed as an integral aspect of the Sustainable Management Plan.

7.0 APPRAISAL OF THE PROPOSAL

7.1 Regarding Environmental Clearance of project other than de-silting of reservoirs, "Procedure for Environmental Clearance for Mining of Minor Mineral including Cluster", as enumerated in appendix XI of MOEF&CC Gazette notification no. S.O. 141 (E) dated 15.01.2016 (as amended from time to time) may be followed; including the exemptions. The exemption given in Appendix XI of MOEF&CC Gazette notification regarding dredging and de-silting of dams, reservoirs, weirs, barrages, river and canals will be applicable for purpose of annual/routine maintenance/upkeep and disaster management only.

7.2 There are instances of sediment removal from dams/rivers for different purposes and activities like for commercial purposes, restoration of storage capacity of reservoirs, channelization of rivers, etc. Such activities generally do not fall under regular maintenance/ upkeep or disaster management and will be governed by this national framework for sediment management.

7.3 The detailed procedure for appraisal, environmental & other clearances and monitoring of the proposals of sand and gravel mining has been described in the "Sustainable Sand Mining Management Guidelines, 2016" of MoEF&CC".

Further, the detailed Guidelines for de-silting of reservoirs, its applicability and procedures for Environment Clearance, Forest Clearance, and Wildlife Clearance, activity listed at Sl. No.18, Table 2.2, in the "Operational Procedures for Assessing and Managing Environmental Impacts in Existing Dam Projects" CWC, November, 2020 may also be referred.

7.4 For de-silting/ dredging of sediment from rivers/ reservoirs; comprehensive DPR may be prepared by the State Authority/ Project authority/ PSU/private company etc. A Technical Advisory Committee (TAC) may be constituted by concerned State for appraisal and

approval of the DPR for the techno-economic viability. Concerned regional Chief Engineer of CWC or his representative should be included as one of members of the State TAC. Suggested composition of State TAC is enclosed at **Annexure-VI.**

2019



ANNEXURE-I

ANNEXURE-I

SEDIMENTATION PROCESS IN RIVERS AND RESERVOIRS

All rivers and streams flowing in alluvial plains tend towards a stable flow condition maintaining a balance between the silt load carried, silt load deposited, and the resulting volume and velocities achieved. This is generally called a stable sediment regime for the river. When underlying parameters of volume and velocities are disturbed, either due to lower gradient (entering into plain reaches) or encroachment in flood plain, widening of the channel (braiding of river streams), suspended silt particles in the river water settle down, this is called siltation. This phenomenon is normally called sedimentation when it occurs in a reservoir.

Main factors responsible for the siltation / sedimentation are:

(i) Physical and hydrological characters of the catchment, such as slope, geology and structures, land use, land cover, urbanisation, agricultural practices, deforestation and forest degradation etc.,

(ii) Intensity of erosion in the catchment (sheet, rill, gully and stream channel erosion) including over-exploitation of minerals,

(iii) Occurrence of landslides/landslips especially in hilly areas with heavy rainfall

(iv) Construction of Roads, Houses etc. in the flood plain.

(v) Quality, quantity and concentration of the sediment brought down by the river,

(vi) Size, shape and length of the reservoir and operation strategies impacting trap efficiency of the reservoir,

(vii) Some additional sources of silt generation are as follows:

a) In rural areas, the erosion source is typically soil degradation due to intensive or inadequate agricultural practice thereby resulting in an increased amount of silt and clay in the water bodies that drain the area.

b) In urban areas, the additional siltation sources are construction activities and seepage & sewage sludge discharged from household/business establishments with no septic tanks/wastewater treatment facilities.

c) In water, the main pollution source is sediment from dredging, and the deposited dredged material near water shore.

The detailed phenomena of sedimentation in rivers and reservoirs are explained as under:-

SEDIMENTATION IN RIVERS

Rivers are natural channels to drain water from highlands to lowlands/seas. Erosion and aggradations are the most important geological processes which have brought down large amounts of sediments from the higher elevations to the plains and have formed large fertile plains, which were adopted by the hominoid races for their development and sustenance. Big towns were located on the banks of rivers to

meet needs of water and navigation. These sediments are responsible for formation of delta of a river and providing sand to sea beaches. Further, flora and fauna (e.g. Mangrove forest) depend on water and sediment supply from rivers. Fishes and other aquatic organisms choose specific sediment types of river environments for feeding, breeding and spawning. Over time, the high lands of an area get worn down. The material thus eroded is utilized further downstream to build banks and flood plains.

Sediment carrying capacity of a river is directly proportional to the kinetic energy of water. With more kinetic energy water is capable of carrying larger amount of sediment and of bigger size. However, due to human interventions on rivers (e.g. Dams, bund, barrages etc.) natural regime of river is disturbed. Traditional flood plains remain no longer available for offloading the excess sediments and river is forced to deposit sediment in its channel or nearby. Further, as the river flows from high gradient to low gradient, momentum of the flow is reduced progressively by consumption of the kinetic energy in overcoming the flow resistance and consequently reducing its capacity to carry the sediments by tractive forces along the bed and suspension of coarser particles through turbulence, inducing thereby silt deposition en route. In the Indian context, which is essentially having monsoon type climate, there is huge variation of flows in different seasons.

Further, during floods also the rate of increase and decrease of flow is very high. As sediment carrying capacity of river is directly proportional to the quantity and velocity of water, during high flows considerable sediment is carried in the river which is deposited as the flow reduces. This rapid change of flows causes erosion and deposition at different places. This is also the main cause of change of cross-sections in alluvial rivers.

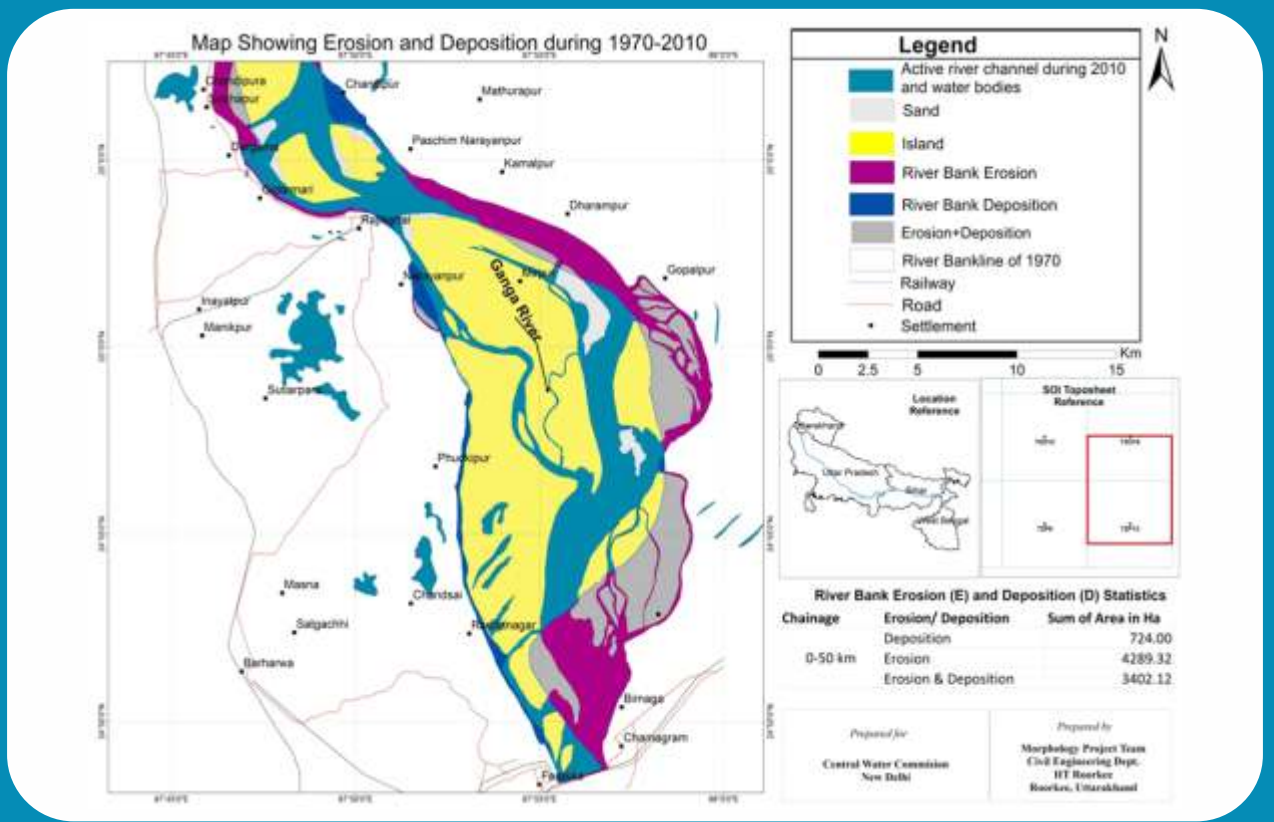


Fig 1 Sedimentation in River Ganga (near Farakka)
Source: Report of Morphological Study of River Ganga

SEDIMENTATION IN RESERVOIRS

Reservoirs are generally a part of the river system and quantity of sediment entering in the reservoir is dependent on the catchment area, type of soil, vegetation cover and gradient of river upstream of the reservoir. The river water entering the reservoir carries sediments which settle at various reaches in the reservoir. River systems erode material from the ground they flow over; these sediments are then transported downstream. When a river is dammed, the velocity of the water is slowed down and thus its ability to transport these sediments is reduced. When the velocity is too low the sediments in the river water will begin to settle down. The largest particle will settle first, near the upstream end of the reservoir, and often cause what is known as backwater delta. The finer suspended colloidal material (silts and clays) will settle down close to the dam where velocities are even lower. Some of the finer particles will remain in suspension and will flow through/over the outlet structures. The backwater delta will move forward towards the dam wall as time progresses. Depending on the shape, density, viscosity, size of the particle and flow, sediment settles in a reservoir in different patterns. The layer of water containing fine particles travel further down towards the dam as density current and may deposit there or near the rim of the reservoir. A major secondary effect is the downstream degradation of the river channel caused by the releases of clearer water. Siltation in rivers may or may not be accumulative; whereas sedimentation in reservoirs is generally accumulative.

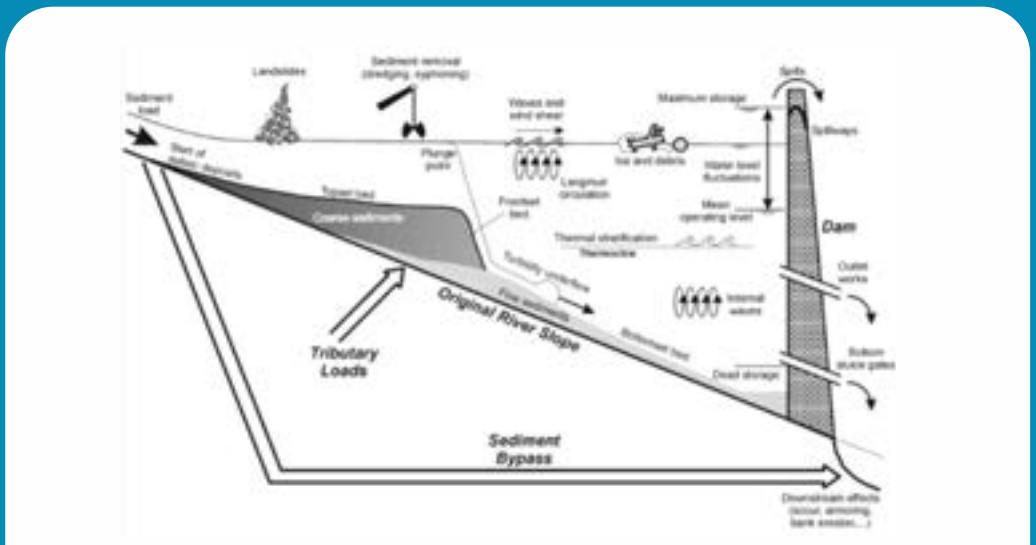


Fig 2 Sedimentation Pattern in Reservoir (USBR, 2006)

Sedimentation processes in a reservoir are quite complex because of the wide variation of the many influencing factors, the most important being, (1) hydrological fluctuations in water and sediment inflow, (2) sediment particle size variation, (3) reservoir operation fluctuations, and (4) physical controls or size and shape of the reservoir. Other factors that for some reservoirs may be quite important are: vegetative growth in upper reaches, turbulence and/or density currents, erosion of deposited sediments and/or shoreline deposits, and operation for sluicing of sediment through the dam.

2023



ANNEXURE-II

ANNEXURE-II

APPROACH FOR SEDIMENT MANAGEMENT OF RIVERS

To reduce sediment production in the watershed sustainably, the main actions include (i) study watershed characteristics, (ii) assess the vulnerability of watershed in terms of soil erosion & sediment production using modelling and to identify & prioritise the degraded micro-watershed for treatment, (iii) treatment of the prioritised micro watersheds with biological and engineering erosion control measures, (iv) stream bank erosion control using river training works like spurs etc., and (v) trapping sediment upstream of reservoir (in river) .

Identification of hotspots may be carried out for prioritizing the action plans for Sediment Management thereby helping in targeted, cost-effective interventions. It is recommended to quantify the sediment load in order to identify effectiveness and type of interventions required.

A. **Upper course-** In this stage, the rivers have steep slopes and high sediment transport capacity. The following sediments management practices may be adopted-

a. **Catchment Area Treatment-** Catchment Area Treatment and Watershed Development works along with good agricultural practices and river bank protection/anti-erosion works are necessary to reduce silt inflow into the river system and must be undertaken in a comprehensive way. Catchment area treatment on watershed approach plays an important role in minimizing sedimentation. Watershed management programme needs to be integrated with river basin management programme appropriately. An effective and permanent method of sediment control is soil conservation in the catchment.

The method to be adopted in catchment may include-

i. Afforestation and forest management

ii. Regrading and grassland management

iii. Cultivation practices, such as crop rotation, increasing organic matter, mulching, seasonal cover crops, contour cultivation, strip cropping and terracing.

iv. Gully control and check dams- contour bunding and trenching.

v. Appropriate land use controls for protecting areas of importance.

vi. The various on-farm practices to control the soil detachment to reduce silt load may include the following practices:

- To maintain grass cover on soil
- To control sediment generation through film trap

vii. Adoption of practice of bio-filter strips, field borders, sediment retention terraces and ponds

b. **Regrading & Check dams-** Regrading of river bed slope and construction of check dams may be suitably adopted for management of degradation of river beds as per techno-economic feasibility.

c. Controlled construction activities of roads and houses also reduce the silt intake in hilly areas.

d. Occurrence of landslides / landslips especially in hilly areas with heavy rainfall need to be controlled by proper slope stability measures.

e. **Storage Reservoirs-** The reservoirs are built to store water. Incidentally, these act as settling tanks for sediment and trap the sediment carried by the river. Therefore, the sediment concentration of the water released from the reservoir gets effectively reduced depending upon the size of the reservoir.

f. River training works such as bank protection, spurs etc. should also be made for the vulnerable reaches to check the river bank erosion.

g. **Boulder/Gravel/ Sand Mining-** In the upper course, boulder, gravels and sand (course & fine) are deposited in the river. If these are mined at this stage and used for construction purpose, then Boulder/ Gravel/sand mining can be done strictly as per following guidelines-

I. "Sustainable Sand Mining Management Guidelines – 2016" of MoEF&CC

ii. "Sand Mining Framework" released by Ministry of Mines in March, 2018

iii. GSI Guidelines for riverbed gravel/ sand mining.

B. **Middle course-** In this stage, the river exits the hills, enters the plains, gets meandered mostly on bed of fine sand, has a wide river bed and flood plain. Most importantly, the river gets modified through human interventions in terms of huge quantities of water diversion/abstraction and subjected to high degree of pollutant loads from domestic, industrial and agricultural activities. In this stage, following sediments management practices may be adopted:-

a. **River training works such as bank protection, spurs etc** – River training works are used to control the erosion of river banks. Erosion control of riverbank reduces the sediments intake in river

b. **Submerged Vanes & Bandalling-** These methods may be adopted for management of localized aggradations within the river course as per techno-economic feasibility.

c. **Sand Mining -** In this stage, sand is deposited in the river. If these are mined at this stage and used for construction or other purposes, then a major portion of sediment can be reduced. Sand mining can be done as per the guidelines mentioned above.

d. **De-siltation/Dredging-** De-silting using sluicing and flushing near water resources infrastructure is very effective in increasing their serviceability. However, there exist some

locations such as congestion at the mouth of tidal rivers, confluence points and the likes which can be tackled by de-silting after thorough examination. For navigation purpose the river reaches in the waterway path can be dredged, to have minimum required draft for plying vessels. De-silting improves the hydraulic efficiency if done near outlets and intakes.

When the meander loop extends substantially in the lateral direction, the friction loss over the meander length generates a head loss thereby resulting in a rise in the flood levels. Over the course of time, when the water path around a meander lengthens, arising to a critical level, a natural cut-off takes place. Construction of artificial cut-offs (cunnette) can be utilized as a method for flood control.

It is necessary to appreciate that de-silting does not always lead to reduction of flood levels as the levels in the river are essentially controlled by the hydraulic conditions persisting at the cross sections forming upstream and downstream boundaries of the reach. The lowering of the bed level within the reach may not have influence on them consequently leading back to drainage problems within the season or within a few years. On the other hand, unsystematic dredging may have the effect on bank destabilisation.

C. **Lower course-** In this stage, the river experiences considerable changes in the sediment transport and deposition, causes wide spread flooding, undergoes frequent changes in the channel path/ delta formation.

The following sediments management practices may be adopted:-

(a) **Desiltation/ Dredging-** In this stage, generally delta formation occurs due to heavy siltation, which leads to drainage congestion and the mouth of river gets choked. In these areas, dredging/ de-silting works may be undertaken to maintain flow continuity and ensure sediments transportation to sea.

(b) **River training works wherever possible may be taken up for sediment management.**

General Guidelines for carrying out de-siltation/dredging work

(i) A study of the river reach may be selected for de-siltation/ dredging by appropriate mathematical and/ or physical model studies by employing consistent practices. Based on the outcome, the DPR may be prepared.

(ii) Dredging for de-silting of Indian rivers may be adopted only in exceptional circumstances or when no other sustainable alternative is available. However, dredging for maintaining the necessary draft for maintaining the navigation may be done as and where required. However, it shall be ensured that such dredging does not cause any considerable pollution to river water and not harm flora and fauna.

(iii) The de-silting of any river reach needs to be justified bringing out clearly the flooding caused due to siltation along with technical comparisons of the alternative flood mitigation measures with "do nothing" or "proposed de-silting/ dredging" being other options. It should invariably be associated with sediment flux studies and morphological studies to confirm no significant adverse effect on downstream or upstream reach of the river including the safety and effectiveness of river crossings, water intakes, existing river

bank / flood protection measures, etc. Post dredging, sediment flux studies should also be carried out to quantify the amount of silt likely to be deposited in future i.e. Sediment modelling studies for the river may be done before taking up any such project.

(iv) Negative impact on ecology and environment due to de-silting may also be studied along with other studies and should be invariably made a part of DPR.

(v) The quantity of sediments needed to be removed from rivers is usually very high. Since it may not be easy to find lands for silt disposal, therefore it should be ensured that all silt removed from river should be utilized in some works in association with concerned state government.

(vi) The proposal for de-siltation/ dredging work should also contain environmentally acceptable, practically possible silt disposal/ utilisation plan. River gravels/sands/silts are valuable resource and could be used gainfully in construction works, including housing, roads, embankment and reclamation works. Since it is very difficult to find lands for silt disposal therefore it should be ensured that all silt removed from river is utilized in some works in association with concerned state governments. However, in the critical cases where it becomes necessary to remove the silt for free flow of water or protection of any installation, action may be taken up with the prior approval of the committee.

(vii) Under no circumstances, disposal should create any contamination of water bodies, harmful to the flora and fauna existing adjacent to the disposal sites or disposed material should come back into the river again.

(viii) Desilted material should not be used for filling up of wetlands and water bodies including oxbow lakes, as these are important for recharging the ground water and providing base flow in rivers during lean season.

(ix) The modus operandi for sediment disposal should be finalized before carrying out dredging. No project should be executed before formulating a suitable and sustainable action plan for sediment disposal and be preceded by EIA Study, as per MoEF& CC notification dated 15.01.2016 to avoid damage to ecology. The methodology to be adopted (say use of dredgers etc.) should be clearly laid down in the proposal so that its co-relation with the environmental hazards can be made.

(x) Normally, funds required for dredging projects are enormous. Before embarking on a major de-silting operation in any of the rivers, the financial implications may be discussed in detail.

(xi) The dredging/de-siltation/mining activities thereby disturbing the river regime may result into some adverse impacts, i.e., (a) River bed degradation; (b) Bank erosion; (c) Channel widening; (d) Lowering of water surface elevations in the river channel; (e) Lowering of water table elevations adjacent to the river; (f) Reduction in the structural integrity of bridges, pipelines, jetties, barrages, weirs, foundations supporting high tension lines, existing bank protection works and other man-made structures; and (g) Loss of environmental values resulting from (a) through (e). Restrictions as presented in **Annexure III** need to be enforced

before planning and executing any dredging/ de-silting / mining activities. These restrictions may be modified only after proper study and monitoring the effects of dredging / de-silting / mining.

OTHER STRATEGIES

1. Silt management upstream of bridges, barrages & weirs

Shoal formation upstream of barrages/bridges in the pond area is a natural phenomenon. Reduced velocities of water in upstream of barrage leads to deposit of silt, but sometime after construction, this attains equilibrium and the incoming silt is washed away through the under sluices and during the flood season when all gates of the barrage are open.

I. Upstream reaches of construction works, like barrages/bridges, etc., tend to get silted leading to wandering of river. As the waterway provided for design flood condition is much larger than actual waterway required in normal condition, there is a tendency for shoal formation upstream of barrages. Possibly, proper operation of gates verified on the basis of physical or mathematical modelling, river training, cut-off developments and provision of extra water way near the constrictions could be tried after proper assessment without impacting the morphology of river elsewhere. The area freed from the development in the form of oxbow lakes should be used for flood moderation rather than reclaiming it for other purposes.

II. Sediment sluicing may be incorporated to maintain sediment continuity from upstream to downstream reaches after carrying out necessary studies.

2. Lateral Connectivity for Sediment Management- Construction of embankment has resulted in breaking the lateral connectivity of river with its flood plain. Therefore, the silt carried by the river is being deposited in river bed only leaving the flood plains devoid of sediments. This has resulted in rising of river bed and causing bank erosion at high flood levels. In order to provide lateral connectivity to the river with its flood plains, sluice gates may be provided at appropriate places in the embankment to allow controlled flooding in flood plains. This will allow silt carried by the river to be deposited in its flood plains in thin layers distributed over vast areas and will ultimately result in reduction of silt loads in rivers and will make the agriculture fields in flood plains fertile. This will benefit in multiple ways-

(a) Reduced high flood levels in downstream.
(b) Increased fertility of flood plains. Thus reducing the dependency of farmers on chemical fertilizers.
(c) Recharge of ground water.
(d) Rejuvenation of the water bodies etc.

Here, it may be mentioned that the sluice gates which allow incoming of flood waters in country side will be used for discharging extra water in river again when flood levels in rivers go down. Such sluice gates will also reduce drainage congestion on country side, if any.

3. Floodplain Management

River tends to achieve equilibrium on its own given the hydrology, sediment and natural bed and bank disposition. It is necessary to provide the river sufficient flood plain areas and lakes along the river to

moderate the flood level. Any encroachment of flood plain, reclamation of lakes or disconnection of lakes from river should be avoided. Rather, adjoining lakes/depressions may be de-silted to increase their storage capacities. The de-silting of lakes, etc., should be in such a manner that the sediment continuity is maintained and should not lead to head cut that creates safety issues for the river crossings, water intakes or river training works locally or upstream.

To maintain the hydrological and ecological balance, regulation of different activities in the river bed and different zones of flood plain is essential. The River Regulation Zoning for demarcating necessary zones should be implemented as early as possible. Central Water Commission in 1975 has already prepared a draft Flood Plain Zoning Bill in this regard.

4. Solid Waste Management

Solid waste from community including garbage, rubbish, agricultural waste, toxic Industrial discharge, construction debris, landfills in the catchment area etc. all contributes to pollution in rivers which damages highly sensitive and fragile river ecosystem. Such anthropogenic activities cause aggradations and morphological changes in the river. The disposal of solid waste needs to be controlled by the community, local municipal bodies and government bodies.

Special care should be taken for solid waste generated out of industrial processes. Many times, the same contains toxic materials and intermixing with other silt may render the same unusable for food chain use. Such waste should not be allowed to be dumped in the river.

5. River rejuvenation / Environmental flow

There is need to construct storages with sufficient flood cushion. The stored water needs to be released during the non-monsoon period in such a way that environmental flow and silt carrying capacity of river is by and large maintained. This will also improve the ecology of river. In this regard, DoWR, RD & GR, Ministry of Jal Shakti, GoI has issued guidelines on e-flow for river Ganga in 2018 vide notification dated 09.10.18

6. Bed-load management

Bed-load relocation (dredging) and artificial bed load supply, etc. Flood Control Programs-Detention basins (holding ponds), energy dissipaters in channels (culvert outlet controls, forced hydraulic jumps, drop structures, stilling wells, etc. Land use controls: these are used to reduce storm runoff), Embankments/dyke/levee construction, Periodic flushing of rivers, etc may be used to control the sediments.

7. Land Management and Soil Conservation Techniques

Check dams, settling basins, vegetation covers, agricultural practices, etc. may be adopted to control sedimentation.

8. Artificial Nourishment (with sediments) in the River

Due consideration has to be given for artificial nourishment (with sediment) in River stretches/ Reaches that contain inadequate quantity of bed sediments. This is very important to protect psammophilc/ lithophilic organism that are inhibiting in river stretches devoid of adequate supply of sediments.

Further, artificial sediment nourishment is required, in certain cases, to contain the adversities of hungry water effect in river environment. This will also minimise the ill-effect on coastal and near shore environment as well.

9. Application of Multi-Temporal High-resolution Satellite Imagery

Multi-temporal high-resolution satellite imagery may be used for identification of hotspots (heavily sediment-laden stretches). However, there are some limitations for monitoring suspended sediment concentration using remote sensing such as availability of satellite data for the study period as sediment yield is time-dependent and simultaneous satellite imagery might not be available. Therefore, more research is necessary to harness the advancements in satellite remote sensing for studying the suspended sediment dynamics and sediment management in river stretches.

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ANNEXURE-III



ANNEXURE-III

DREDGING/DE-SILTING/ MINING RESTRICTIONS

The dredging/ de-silting/ mining restrictions are intended to limit the adverse impacts associated with it. They are intended to limit those impacts to a level which will have limited and manageable minor effect on the morphology and ecology of the river. These are guiding principles and de-silting works should be done only and after detailed studies are undertaken. If the State Government/local bodies have any regulatory law in this regard, conservative restriction shall be followed. However, dredging by Government agencies like IWAI, PSUs etc. for maintaining the necessary draft for maintaining the navigation may be done as and where required.

1.0 Restriction on River Bed Degradation

The magnitude of dredging-induced river bed degradation is a key factor influencing the degree of instability of the river channel. This may result in secondary impacts such as bank erosion, channel widening, lowering of water surface elevations adjacent to the river, alteration of aquatic and terrestrial habitat, and a reduction in the structural integrity of man-made structures. Since secondary impacts increase as riverbed degradation increases, the degree of dredging/ de-silting/ mining induced river channel instability can be limited by identifying and selecting appropriate reaches for suitably controlling the amount of dredging related degradation. The dredging /de-silting / mining of the river reach shall be altered or terminated if the average river bed degradation over a10 km reach length is more than 1 meter. A reach of river which has been dredged / de-silted /mined out and closed for further dredging will not be reopened until sufficient materials have accumulated to support renewed dredging activities for a reasonable period of time.

2.0 Restrictions Concerning Man-made Structures

2.1 Barrage or weirs or jetties

The barrages or weirs act as a river bed control structures across river and have huge influence on the river bed. If they fail, it could induce unintended severe riverbed degradation, bank erosion and channel widening due to design and other related issues. The unregulated dredging/ de-silting can result in Structural/functional failure of the structure in addition to the ill effects on river regime. To safeguard the structural integrity of the barrage or a weir, following restrictions shall apply:-

a) Dredging/ de-silting/ mining activity upstream of structure will be allowed only beyond 200 m or L/5 whichever is more (Where L is the length of barrage/weir).

b) Dredging/de-silting/ mining activities downstream of the structures will be allowed only beyond a distance of 800 m or L whichever is less (Where L is the length of barrage/weir).

c) The region of extraction shall be decided in upstream so as to have a positive effect on hydraulics of the pond and channel.

d) Maximum volume of extraction on downstream shall be decided by proper monitoring so that it will not have any effect on the integrity of the structure.

2.2 Water Intake Structures

No dredging below the natural bed level will be allowed within 150 m distance from the intake structures for safeguarding structural integrity. However, dredging can be carried out, if the water flow to the intake structures has been obstructed by excessive sedimentation. The dredging activity shall be restricted so that the water level reduction will not lead to functional difficulties in diverting water in to the intakes.

2.3 Bridges

No dredging will be allowed below the level of top of raft/bottom of pier within 150 m of any bridge crossing to safeguard the structural integrity of the bridge. This shall not be applied where water way has been obstructed by excessive sediment deposit and is causing flooding of upstream reaches.

2.4 Pipelines

2.4.1 Pipelines buried in the riverbed have a high potential to be adversely impacted by dredging activities. If degradation of the riverbed exposes pipelines, damage could occur through sagging, buoyancy or displacement of the line downstream due to an accumulation of debris. The following restrictions will limit the potential for dredging/ de-silting/ mining induced localized degradation to expose buried pipelines:

a) No dredging will be allowed within 60 m of any pipelines that is buried 3 m or below the river bed.

b) No dredging will be allowed within 150 m from any pipeline that is buried less than3 m below the river bed. Additional restrictions may be required for any pipeline located on or above the river bed. Such restrictions could be developed on a case by case basis.

2.4.2 Laying of pipelines/telecommunication lines/internet cables etc. below the bed of any river should be done only after the approval of the concerned competent authority.

2.5 Bank Stabilization Structures

No dredging will be allowed within 60 m of the most upstream and downstream point of the bank stabilization structure. Dredging/ de-silting/ mining restrictions as shown in Figure 1 & 2 and the limit given in Guidelines/Notification 2020 of MoEF&CC shall apply for the bank stabilization structures. The same restrictions shall apply to levees or embankments also.

2.6 Other structures

The support structure for high tension lines passing over the river shall also be treated as bridge piers and relevant restrictions as provided in clause.2.3 for bridges shall apply. Restrictions regarding other man-made structures not identified in this section may be determined on a case to case basis.

3.0 Restrictions Concerning Natural Formations

3.1 Natural Rock or Hard Deposits in River Channel

Natural rock or hard deposits located on or in the riverbed may act as riverbed controls and/or may increase aquatic habitat diversity. The importance of rock or hard deposit is dependent upon extent of its area, its thickness and other relevant factors. Based on these hard deposits, river is restrained to flow along a predefined alignment. Dredging/ de-silting/ mining shall not dislodge such hard deposits or dredging of collected silt upstream or downstream of such hard stratum shall not in turn displace it, whereby the river loses its control. Therefore, restrictions concerning natural rock deposits will have to be dealt case by case basis. River Ganga flows along important ghats of Varanasi and other such places, where people gather in large numbers. It is held to flow along these ghats due to peculiar alignment formed by rock or hard strata and silt deposits together. Hence, dredging / de-silting / mining shall be avoided at these places entirely along the width and at least 5 km upstream and downstream of such congregational areas. However, for navigational purpose, limited dredging will be allowed in such shallow reaches as recommended in DPR.

3.2 River Banks

Dredging/ de-silting/ mining close to riverbanks have a high potential to adversely impact the stability of those banks, especially when dredging/ de-silting/ mining occurs near the outside of sharp river bends. Bank erosion induced by such dredging can result in the loss of land, damages to man-made structures, and adverse impact to environmental resources. Therefore, to limit the potential bed/bank degradation, restrictions as per notifications and guidelines being notified under Environment (Protection) Act, 1986 (latest Guidelines/Notification 2020 of MoEF&CC) shall apply on Dredging/ de-silting/ mining. The restrictions as shown in Figures 1 and 2 may be used as a guide as documented for river Ganga in the report of the Committee constituted for preparation of guidelines for works on de-siltation from Bhimgauda (Uttarakhand) to Farakka (West Bengal) prepared in 2017. Such restrictions for other rivers need to be derived by studies.

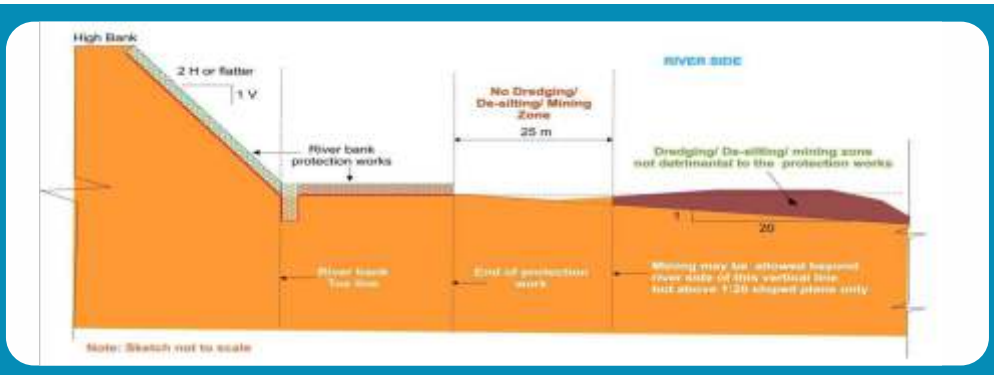


Figure 1: Typical Dredging / De-silting / Mining Restrictions for protecting river bank with bank protection works

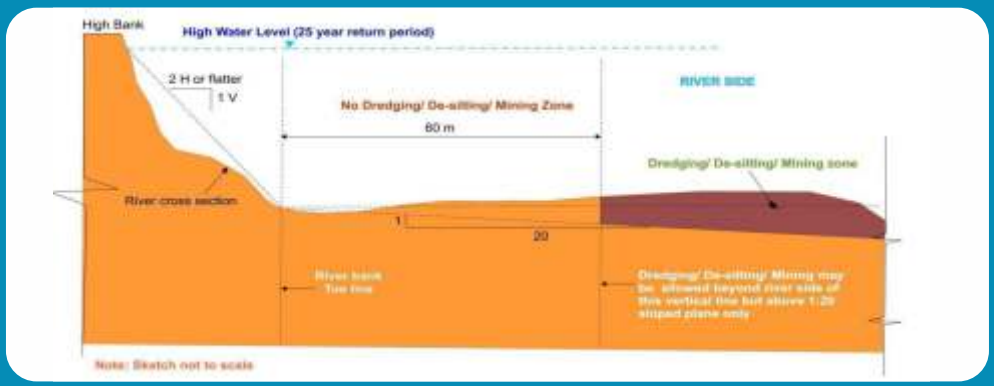


Figure 2: Typical Dredging / De-silting / Mining Restrictions for protecting natural river banks

ANNEXURE-IV

ANNEXURE-IV

SEDIMENT-A RESOURCE

NATURAL FUNCTIONS OF SEDIMENT

The presence of the sediment in rivers is very important and equally beneficial. It is important because it often enriches the soil with nutrients. This deposited sediment on the banks and flood plains of a river which is highly mineral-rich makes excellent and the most fertile farmlands. This even reduces the need of fertilisers and pesticides to be used for cropping.

Areas rich in sediments are often also rich in biodiversity. They also provide the spawning bed for fishes. Further, deltas are the wetlands that form as rivers empty their water and sediment into oceans/seas. These deltas are important wetland habitats. Plants such as lilies and hibiscus grow in deltas, as well as herbs such as wort, which are used in traditional medicines. Many animals (Hilsa fish, crustaceans such as oysters, etc) are indigenous to the shallow, shifting waters of a delta. River sediment is an important source of beach nourishment. Sediment starvation may result in receding riparian zones and wetland.

BENEFICIAL USES OF SEDIMENT

Most dredged/removed/extracted material can be a valuable resource and should be considered for beneficial uses. Potential beneficial uses of dredged material should be thoroughly examined as part of pre-project planning studies. Preliminary surveys should be made during the reconnaissance phase of new studies and detailed aerial and ground surveillance should be conducted for feasibility studies. Modern tools such as remote sensing, visual data management systems and automatic data processing may be employed to help determine the most appropriate locations and best uses for dredged material.

Depending upon the geological formation a river passes through, the dredged material will vary in its composition. Therefore, the suitability of the dredged material has to be investigated/ assessed for its optimal application. Physical, engineering and chemical characteristics of dredged material proposed for beneficial use must be determined during the initial stages of planning. A number of standard soil properties are used to determine the physical and engineering characteristics of dredged material. Soil tests mainly would include grain-size analysis, Atterberg's Limits, bulk density, specific gravity and compaction characteristics. Engineering tests may mainly include shear strength, compressibility and permeability parameters. The chemical characteristics determination may include chemical constituents, cation exchange capacity, Nitrogen, Sulphur, Heavy metals, water quality considerations, concentration, organic content and contamination depending on the potential use.

The most common beneficial use of the dredged material is as a substrate for habitat development which refers to the establishment and management of relatively stable and biologically productive plant and animal habitats. This can range from wetland, upland, aquatic to island habitats. The river dredged material, if suitable can be used for construction, raising and strengthening of embankments, dykes, levees for bank protection works, raised platforms for flood proofing etc. This would serve the dual purpose of increasing the water flow area in the river as well as a resource material for use in river bank protection works.

Shore erosion is a major issue along the country's coastline and one of the most desirable, cost-effective shore protection alternatives is beach nourishment, which is usually accomplished by transporting sand/ sandy dredged material from inshore or offshore locations by truck, hopper dredge or hydraulic pipeline to an eroding beach.

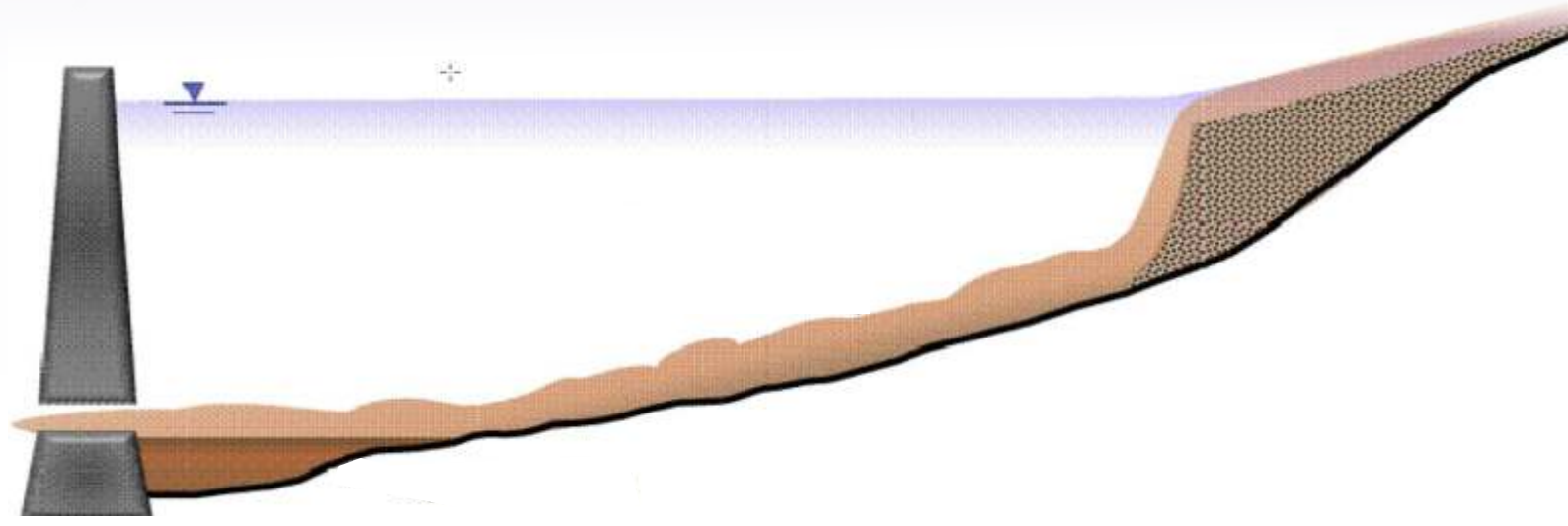
Other uses for dredged material include agriculture, forestry, horticulture, aquaculture industries, reclamation of abandoned strip mine sites, capping of solid waste landfills, protect landfills, manufacture bricks and hardened material that could be moderately contaminated and still be acceptable.

The dredged material is generally a good fill material for a variety of construction projects and serves as foundation material for road projects. Industrial/commercial development near waterways can be aided by the availability of hydraulic fill material from nearby dredging activities. The use of dredged material to expand or enhance river bank or port-related facilities has the potential benefits to the local economy.

In spite of the sometimes poor foundation qualities, dredged material containment areas have become useful sites of high and low rise residential and business complexes. However, it is mandatory to ascertain the competency and suitability of the dredged material when it is proposed to be used in the foundation or as a construction material. Success has been attained where the properties of the dredged material have been properly accounted for in the residential design. A number of coastal areas have been built on dredged material foundations in areas where insufficient land was available for a commercial airport and use of dredged material was easily justified both economically and socially.

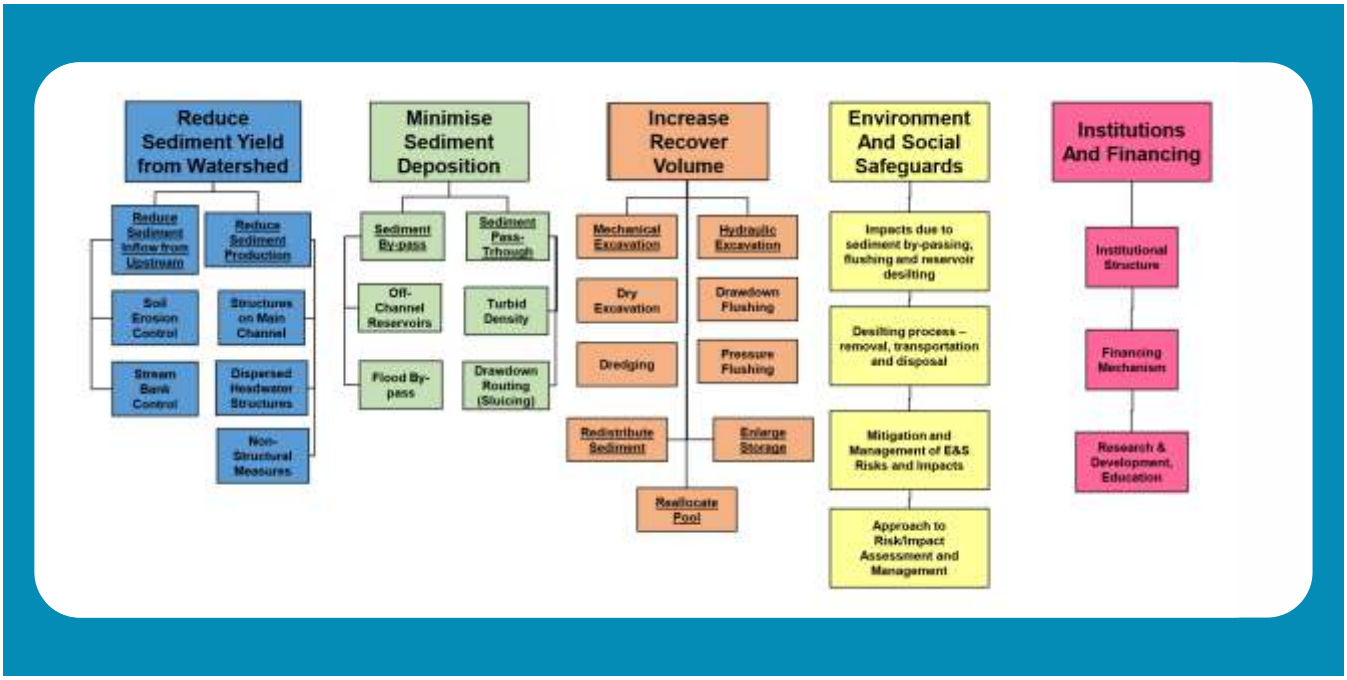
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ANNEXURE-V



ANNEXURE-V

MEASURES FOR SEDIMENT MANAGEMENT IN RESERVOIR



Measures to reduce sediment yield from watershed are common for rivers as well as reservoirs. The approach given under **Annexure-II** may be referred for further details.

The other strategies for sediment management in reservoirs are described hereunder:

A. Minimize Sediment Deposition

1.0 Sediment Bypass

It is a technique for reducing sediment inflow/deposition into reservoirs. This can be further sub divided into two categories:

1.1 Flood Bypass Channel or Tunnel

The purpose of a bypass is to divert sediment laden flood flows around a reservoir to downstream of the dam. By-passing a reservoir by making use of conveyance structures (tunnel or channel) is often only feasible when favorable hydrological, topographical and morphological conditions exist. The ideal geometry for sediment bypass is one where the river makes a sharp turn between the point of sediment collection and the point of sediment reintroduction to minimize the length of the conveyance device and take advantage of the relatively steeper gradient for gravity flow. Where that ideal condition does not exist, the technique is most practical where the reservoir is relatively short, as there must be sufficient gradient to drive the transport of sediment through the diversion tunnel or diversion channel.This measure has considerable financial implication in construction of diversion infrastructures, hence may not be preferable options for many reservoirs.

1.2 Off-stream reservoir

Off-channel/Off-stream storage reservoirs are built adjacent to the main river channel (e.g., a small tributary or on the flood plain). Water from the main river is diverted into the reservoir during times of low sediment concentrations. It is an alternate approach to sediment bypass tunnel, such that the diversions from the weir are clear-water diversions, while sediment-laden water is left in the river to pass downstream. Similar to sediment bypass, there needs to be sufficient gradient to drive flow through diversion channels or tunnels to the off-channel storage feature. One advantage of this approach is that all bed load entering into reservoirs can be excluded.

2.0 Sediment Pass-through

It is the technique for evacuation of sediments from reservoir. There are various methods for pass-through described here under:

2.1 Reservoir drawdown/sluicing

Sluicing is an operational technique by which a substantial portion of the incoming sediment load is passed through the reservoir and dam before the sediment particles can settle, thereby reducing the trap efficiency of the reservoir. This is accomplished in most cases by operating the reservoir at a lower level during the flood season in order to maintain sufficient sediment transport capacity (turbulent and colloidal) through the reservoir. Higher flow velocities and higher sediment transport capacities in the water flowing through the reservoir result from operating the reservoir at these lower levels. The increased sediment transport capacity of the water flowing through the reservoir reduces the volume of sediment that is deposited. After the flood season, the pool level in the reservoir is raised to store relatively clear water. Effectiveness of sluicing operations depends mainly on the availability of excess runoff, on the grain size of the sediments and on reservoir morphology. One advantage of this approach is that deposition in the reservoir is minimized and the sediment continues to be transported downstream during the flood season when sediment is naturally discharged by the river. Finer sediments are more effectively transported through the reservoir than coarse sediments. A drawdown and sluicing strategy may be employed at reservoirs of all sizes, but the duration of sluicing depends on the watershed size and the time scale of flood events.

2.2 Vent turbid density currents

In some instances sediments can flow into a reservoir as a density current. This phenomenon can occur when the sediment concentration in the inflow is much higher than the water in the impoundment and/or there is a significant temperature difference between the incoming flow and the impounded water. Under such circumstances the density current may flow under the impounded water in the reservoir toward the dam. If the density current is not allowed to flow through the dam by means of low-level gates, a technique known as density current venting, it will curl up at the dam and its return-flow will mix with the clearer water in the reservoir. The sediment thus mixed into the clearer water will deposit with time. Most dams have been designed with a dead storage capacity below which there are no outlets and therefore the water in this zone cannot be used. Many designers incorrectly assumed that sediments would naturally deposit in this dead storage.

B. Increase/Recover Volume

1.0. Mechanical Excavation

1.1. Dry Excavation

By dry excavation, sediment which is temporarily above water is removed from the reservoir bed. At the upper delta area of the reservoir with coarse sediment deposits from flood events, the reservoir bed can be dried out and excavated by lowering the reservoir level, for instance on a seasonal basis if water level variations over the seasons are predictable. Earth-moving equipment such as bulldozers, scrapers, excavators and trucks are used. Dry excavation in the delta may be done in combination with installing a sediment check dam at the upstream end of the reservoir and mechanically removing sediment captured in the check dam.

By completely emptying the reservoir of water, access is allowed to dry excavation of the finer sediment in the lower part of the reservoir. Dry excavation in this part will in general be more challenging due to the finer material which tends to have higher water content if unconsolidated, and considerable time may be required for the sediment to dewater and consolidate. Furthermore, the access road by truck along the reservoir bed to transport the excavated sediment away may be difficult to establish. Costs of emptying the reservoir should also consider the lost benefits of power production, flood control, water supply for irrigation etc.

Coarse sediment at the upper delta consisting of sand and gravel, usually represent a higher commercial value than fine silty or clayish material from the lower part of the estuary. Such added benefits of reusable sediment which could be transported directly to the buyer of such sediment, should be considered.

The feasibility of mechanical excavation as compared to alternatives also depends on the volume of material involved to be transported from the reservoir by truck and the difficulty of obtaining suitable sites for placement of the excavated material within an economic distance with least environmental and social impact.

As dry excavation with complete emptied reservoir is performed by shutting down the dam for one year or more, it will be a larger investment in terms of lost benefits, and the interval in between such operations should be a specified number of years to be determined by careful sedimentation analyses. In case of cascade of reservoirs, the lost benefits may be alleviated by de-silting reservoirs in rotation.

1.2. Dredging

By dredging, sediment is removed from the reservoir bed from beneath the water. Mechanical excavators mounted on barges represent one option whereas hydraulic dredging with use of slurry pipelines by which a mix of sediment and water is pumped onshore is another option. Mechanical excavators are most efficient with coarse and/or well consolidated sediment in shallow areas. While excavating and lifting sediment from the bottom to the water surface, spill may occur, and the softer/finer material, the more spill.

Hydraulic dredging is a common solution to sediment removal in the deeper part of the reservoir. Transport and disposal of sediment are key factors to consider. One option is to

discharge the dredged material downstream of the dam in a way, so that the downstream river has capacity for this extra sediment load. In such case, hydrosuction dredging or siphon dredging utilising the gravity of force can be considered to reduce pump energy requirements. Another option is to pump the slurry to nearby containment areas, from where the water can be drained, and the dredged material can settle and consolidate for either permanent disposal or transport by other means (trucks) to other disposal sites.

Important considerations for accessing the feasibility are the cost and efficiency of the dredging equipment itself, power supply, the dredging operation including synchronisation with the river flow, natural as well as released flow downstream, the transport and disposal of the slurry and/or excavated sediment, the sediment spilling including adverse effects this may have on the environmental conditions within the reservoir. Transport of heavy dredging equipment, spare parts, fuel etc. to and from the reservoir site is another consideration.

Pump energy, abrasion of equipment, and availability of nearby containment areas (including the river downstream) are main factors which determine the feasibility of dredging. Considering that sedimentation is of increasing concern in many countries, substantial product development goes on and many new technologies such as submersible dredge pumps emerge. Thus, awareness of the newest solutions within dredging is important to identify the best technical solutions.

Every dam site has its own constraints and opportunities when it comes to de-silting and solutions may be very different for e.g. small irrigation dams and for large hydro-power reservoirs

2.0. Hydraulic Excavation

2.1. Draw-down Flushing

Flushing is a technique whereby the flow velocities in a reservoir are increased to such an extent that deposited sediments are re-mobilized and transported through low-level outlets in the dam. For flushing to be successful, in general the ratio of reservoir storage to mean annual flow should not exceed 4%, because with larger storage the reservoir cannot be easily drawn down. Also flushing flows need to pass through the low-level outlet without appreciable backwater; it may not be feasible to use large floods which exceed low-level gate capacity as flushing event.

Two approaches to flushing exist: complete draw-down flushing and partial draw-down flushing. Complete draw-down flushing reservoir is emptied during the flood season), resulting in the creation of river-like flow conditions in the reservoir. Partial draw-down flushing occurs when the reservoir level is drawn down only partially. In this case the sediment transport capacity in the reservoir increases, but usually only enough to allow sediment within the reservoir to be re-located, i.e., sediment is moved from upstream locations in the reservoir basin to locations further downstream and closer to the dam.

2.2. Flushing Sediment for Dams in Series

In flushing sediment through a series of dams, simultaneous flushing can be accomplished by releasing the flushing pulse first from the upstream reservoir. Just before that pulse reaches the next downstream reservoir, its lower level gates are also opened to pass the sediment. After finishing the

sediment flush, the reservoirs are refilled and clear water released from upper level gates to flush the downstream channel of deposited sediment. The basic sequence of operations is to draw down the reservoir water level, maintaining a free-flow state over several hours (the duration being determined by the amount of sediment to be flushed), and then allowing the reservoir water level to recover.

2.3. Pressure flushing

This technique is a variant of draw-down flushing, rather than drawing the reservoir down so that it is acting like a river in carrying its sediment load, pressure flushing works only to remove sediment directly upstream of the dam to keep intakes operational. The reservoir level is not lowered, but outlets are opened to remove sediments a short distance upstream of the outlet, creating a cone-shaped area of scour just upstream of the outlet, the scour hole being created in a fraction of the time it would take to refill. However, the scale of sediment removal by this technique is much smaller than with draw-down flushing. Rather, pressure flushing serves to reduce sediment concentrations to the intake and thereby reduce abrasion of hydraulic structures by sediment. To maintain or restore reservoir capacity, pressure flushing is not an effective technique.

3.0. Adaptive Strategies

As an alternative to actively handling sediment, the lifetime of reservoirs may be prolonged through other approaches. This must be considered in the feasibility studies of de-silting. A non-exhaustive list of options is described below.

3.1. Reconfigure Reservoir Layout

Other than from siltation over the last decades of an ageing reservoir, the hydrological design basis may have altered (e.g. different hydrograph inflow due to climate change, upstream watershed characteristics etc.), and the water resource demands downstream may also have changed considerably.

With new design criteria, consideration of new benefits and new costs (including environmental and social safeguarding costs), definition of minimum requirements, a redesign of the existing reservoir may therefore be considered. With relevant modifications, a conversion of the current layout of the reservoir into a different reservoir (although located at the same place) may be investigated.

Reconfiguration could be by dividing the existing pool into two or more interlinked pools, some possibly off-channel. Pools could serve different purposes (flood control, water supply for irrigation and other, hydro-power, fishery, tourism etc). Each pool will have better steering of sediment processes such as siltation of fine sediment in some pools and coarse sediment in other (upstream) pools. Efficient sediment handling strategies will be devised for each. The overall storage capacity will most likely be less (as existing siltation is still there), but the remaining capacity is better utilised.

A reconfiguration of the reservoir layout and utilisation will be an attempt to convert the design into a life cycle management mode instead of the original finite lifetime mode. Re-establishing a natural long-term balance of sediment considering the need for natural sediment transport processes in the downstream river should be part of this approach.

3.2. Modify Reservoir Structures

The lifetime of the reservoir may be extended by few passive modifications of the structures in the reservoir or addition of new structures.

Check dams upstream of the reservoir will arrest coarse sediment, which can subsequently be dry excavated. Other guiding structures could be built in parts of the reservoir (or sub-pools) to manipulate the flow pattern and thereby the sediment transport and siltation pattern. Submerged guiding walls could steer the near-bed sediment processes like fluid mud. The elevation of outlets could be increased. Sediment screens could protect inlets. Eddy formations in front of penstocks which cause high suspended sediment concentrations could be arrested by structural measures to reduce coarser abrasive sediment that reaches turbines. Protective coatings of gates, pipelines, and other equipment exposed to scour or abrasion by sediment.

The crest of the dam may be elevated to increase the storage volume, and the elevation of the spillway can be increased and thereby modifying the overall rules of reservoir operation. This will, however, not address the overall siltation issue, but simply extent the lifetime of the reservoir.

3.3. Improve Operational Efficiency

The efficiency of the storage capacity allocated for different purposes must be considered as an alternative to increase the storage volume. The feasibility of such solutions may be many times more beneficial but may involve participation of other stakeholders also. Examples are provided in the following.

Flood control is usually based on decades-old operating rules. With modern technology and use of low-cost internet-of-things sensor technologies, real-time hydrological data can be collected, processed and used as the backbone of dynamic rule-curves.

The same real-time data technology is applicable for hydro-power production, which may also take other parameters into account in a dynamic multi-criteria optimisation using real-time data of grid demands, electricity spot pricing forecasts, as well as conjunctive use of stored water for multiple purposes (power production during flood prone season, or crop-growth season etc.).

The loss of water in irrigation canal systems (transmission losses), as well as the field efficiency in the command area (equal distribution between fields, use of drip and sprinkler irrigation etc.), and the crop efficiency of water use (crop-per-drop) can in most cases be substantially improved. Examples of water loss of 50-80% are not uncommon in irrigation systems and should be considered as options alongside with desilting reservoirs. Other water-intensive activities drawing water from the reservoir may also be optimised.

4.0. Mechanical Removal of Silt

During low season (low flow conditions) when the reservoir is dry or marginally filled, silt may be removed from the live storage area and transported to a desired safe location. Though Environmental impact during dry excavation is generally not very high, as dry earth is being removed, it should not contribute to sediment runoff during subsequent rainy/flood conditions. This dumping place should be selected in such a way that neither it becomes a cause of sedimentation of the same reservoir from which the sediment is removed nor cause of deposition in subsequent reservoirs. Further, the temporary approach roads laid for truck movements for silt

removal shall be cleared off on completion of the work as it may affect the flow path of water into the reservoir later.

5.0. Handling of Removed Sediment

Disposal or use of sediment which is removed from the reservoir is a major consideration which must be investigated thoroughly as part of the feasibility analysis. The characteristics of the sediment: Quantity as well as Quality, must be clarified as part of the long-term sediment monitoring programme as well as additional sediment analysis in connection with de-silting projects. The quality of sediment is related to its physical properties (grain size, density, load-bearing capacity, cohesiveness etc.) as well as chemical and biological properties (toxicity, nutrient contents, metal contents, organic contents, sediment oxygen demand etc.) and determines its environmental impact and potential utilisation. Different options for handling the sediment must be considered for planning de-siltation actions. The available strategies are Disposal of Sediment below Dam, Transport and Disposal Off-channel, filling up old abandoned mineral mines to reduce land subsidence, Redistribute sediment within reservoir, utilisation as resource, etc.

ANNEXURE-VI

ANNEXURE-VI

Suggestive composition of State Technical Advisory Committee (TAC) for Techno-economic Appraisal of Sediment Management Schemes

S No	Committee Composition	
1	Principal Secretary(Irrigation/Flood Control/ water Resources)	Chairman
2	Representative of State Finance Department	Member
3	Chief Engineer of CWC of concerned basin	Member
4	Representative from State Environment & Forest Department	Member
5	Member (Technical). Inland Waterways Authority of India and Development Advisor (Ports) MoPSW.	Member
6	Representative from Dept of Mining	Member
7	Representative from District Administration of concerned area	Member
8	Engineer- in-Chief (Flood control/ Water Resources/ Navigation/ Irrigation)	Member
9	Representative from Ministry of Earth Sciences	Member
10	Representative from Building Construction Dept/ Road Construction Dept	Member
11	Regional Officer, MoRTH/NHAI/NHIDCL	Member
12	Member from Downstream State (in case of Inter State implication)	Member
13	Chief Engineer/General Manager (Dam Owner/ Project Authority	Member Secretary

Terms of Reference (ToR) of the Committee:

1. The Committee shall examine the proposal in detail from Technical, Environmental and Financial and social aspects including BC ratio.
2. Committee shall examine details critically and ensure that the proposed works are not repetitive in nature.
3. Source of funding of scheme may be mentioned.
4. Committee shall check the DPR prepared as per guidelines and having all relevant information.
5. Committee may co-opt any member as Special Invitee.
6. Committee shall ensure that works are not broken in pieces to reduce the level of approval.

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सत्यमेव जयते

Government of India
Ministry of Jal Shakti
Department of Water Resources,
River Development
and Ganga Rejuvenation

National Framework for Sediment Management

RECORD OF DISCUSSIONS OF FIRST MEETING OF THE JOINT COMMITTEE ON 05/02/2024 IN COMPLIANCE OF HON'BLE NATIONAL GREEN TRIBUNAL ORDER IN OA NO. 481/2023 IN THE MATTER OF BALBIR SANDHU & ORS. VS. STATE OF UTTAR PRADESH & ANR.

1. Hon'ble NGT vide its order dated 04.08.2023 in the matter of O.A. No. 481/2023 Balbir Sandhu &Ors. Vs. State of U.P. & Anr., constituted a Joint Committee. In line with the aforesaid order passed by the Hon'ble Tribunal, the Ministry constituted a Joint Committee under the Chairmanship of Chairman, Central Pollution Control Board, comprising a representatives of Uttar Pradesh Pollution Control Board, Haryana State Pollution Control Board, Directorate of Geology & Mining Department, Uttar Pradesh, Mines and Geology Department, Haryana, Delhi Pollution Control Committee, Chief Secretory, Government of National Capital Territory of Delhi, National Mission for Clean Ganga, National Institute of Hydrology, Roorkee, Central Water Commission, Bhaskaracharya National Institute for Space Applications and Geo-informatics, Gandhinagar, National Institute of Technology, Kurukshetra, Indian Institute of Technology, Roorkee, Department of Space, Space Application Centre, Jodhpur Tekra, Ambawadi Vistar, Ahmedabad, Shri Ajit Vidyarthi, Scientist 'F'/ Nazimuddin, Scientist 'F', Central Pollution Control Board, Dr. S. R. Watte, Ex-Director, NEERI, Shri. Avijit Ghosh, Ex- CMD, Shri Pankaj Verma, MS, Jt.Committee, Ministry of Environment, Forest and Climate Change and Dr. J.C. Kuniyal, Scientist-G, G.B. Pant National Institute of Himalayan Environment. Wherein, G. B. Pant National Institute of Himalayan Environment to be nodal agency for co-ordination and compilation of the report.

   In the O.A. No. 481/2023 petitioner alleged the following grievances:

   Grievances regarding illegal mining in District Saharanpur, Uttar Pradesh:

   1. Causing of loss of revenue to the extent of Rs. 5000/- by the Administrative Officers in collusion with the mining mafia.
   2. Commercial mining by illegal stone crushers in the flood plain area of River Yamuna in the name of mining on agricultural land.
   3. Mining of about 1 crore 80 lakhs cubic metres sand, murum, boulder in three years without grant of CTE/CTO by PCB.
   4. Illegal mining in the area of Yamuna on the basis of MM-11 permits issued for mining in agricultural land.
   5. Misappropriation of amount of Rs. 350 crores in the name of reclaiming agricultural land for cultivation.
   6. Misappropriation of GST reverse charge on mining in agricultural land.
   7. Allowing illegal mining in area prohibited under the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016 and MoEF&CC circular dated 14.02.2022.
   8. Violation of Sustainable Sand Mining Guidelines, 2016 and Enforcement and Monitoring Guidelines for Sand Mining, 2020.
   9. Concealment of information regarding mining in agricultural land by non-inclusion thereof in DSR.

Grievances of illegal mining in District Yamuna Nagar, Haryana:

1. Illegal mining by showing sale of sand as sale of boulder by misuse of Mineral Dealer License.
2. Illegal mining in the area of River Yamuna under the garb of E-Ravana issued for other places.
3. Continuance of illegal mining despite prohibitive orders passed by this Tribunal and Hon'ble Punjab and Haryana High Courts.
4. Illegal recovery of *Gunda Tax* by unsocial elements on Government check-posts.
5. Investment of black money by money laundering in mining leases carried out in District Yamuna Nagar and Saharanpur.
6. Illegal mining under forged E-Ravanas procured from other States.
7. Illegal mining by showing longer distances in E-Ravana to enable the vehicles to make more round trips within the time mentioned.
8. Overloading of illegally mined material for transportation. The applicant has further submitted that use of satellite imaginary and google maps will substantiate high incidence of illegal mining.

Hon'ble NGT in its order dated 04.08.2023 observed that the Sediments in the river and along the banks of the river are brought by the flow of the river stream which originate in the upstream which could be a mountain or a ground water source. These sediments follow the course of the river and deposit at different locations based on flow velocity of the river and terrain of the river bed. These sediments consist of boulders, stones, pebbles, sand, gravel, clay, etc. The sediments play an important role in maintaining the hydro-geology of river stream and also the aquatic ecosystem. The sediments along the river bank prevent flooding and erosion of the banks. In the river bed, these sediments act as substrata for biological growth such as aquatic flora and fauna on which the fish and other animals depend upon. There has been rampant mining of these sediments consisting of sand, pebble and stone for construction and other development activities. The mining has been going on indiscriminately along the river at various stretches right from the place of origin till it meets the final destination at sea. On account of such mining, there has been reports of river bank erosions, flooding, destruction of aquatic habitat, depletion of ground water, etc. This adverse impact not only effects the river system but also the farming and marginal communities who depend on the river for irrigation and other farm related activities. Given the above grave situation along River Yamuna, it will be appropriate that a holistic and comprehensive study be carried out.

2. The Hon'ble NGT vide its order dated 04.08.2023 directed to carry out the study regarding the following aspects: -

i. The source of sediment brought in by River Yamuna from the upstream;
ii. The amount / quantity of sediments brought by River Yamuna annually;
iii. Deposition of the sediments at various locations and the quantity annually;
iv. Mining activities being undertaken along the River Yamuna and the quantity (legally and illegally) along with geo-coordinates of the mining area on annual basis;

v. Impact of such mining on the hydro-geology and environment of the river by undertaking holistic and cumulative impact of such mining on river ecosystem and river dynamics including the surrounding floodplain and the habitation.
vi. To suggest remedial measures and methods to identity suitable locations to permit mining of the minerals with minimum adverse impact;
vii. To suggest the mechanism to monitor the transportation of the minerals by utilizing information technology including drone to monitor the mining activities;
viii. To suggest erosion control mechanisms and flood control mechanisms in the river to protect people and property;
ix. To suggest suitable methods to appropriately utilize the flood plain by undertaking agro based activities, fish culture activates, etc. without harming the riverine eco-system, and.
x. To suggest mechanisms or guidelines for utilization of environment compensation recovered from such violators for restoration of mining area.

3. In this regard, a letter dated 07.11.2023 was sent to all the Institutes/Departments to nominate a representative to assist the Joint Committee for the study. Further, vide letter dated 08.01.2024 the Ministry sought comments from the Institutes/Departments/Individuals with regard to provide the information.

Accordingly, the Joint Committee undertook a site visit to Yamunanagar and Saharanpur on 5th February 2024.The list of the committee members who attended the site visit is annexed herewith (Annexure I). The members of the committee visited the Regional Office of Haryana Pollution Control Board located at Yamunangar District and had a preliminary discussion with the State officials from Mining Department, Local Administration and State Pollution Control Board prior to the site visit. During the preliminary discussion, the brief history of sand mining along with the existing regulatory frameworks and their implementation was discussed. The discussion stretched from identification of lease to production, from production to dispatch and from dispatch to end use by the users. Given below are the key regulatory provisions governing the sand mining and stone crushing that were highlighted during the preliminary discussion:

3.1 Sand / Bajri Mining

3.2 Mines and Minerals (Development and Regulation) (MMDR) Act, 1957

The representative of the Department of Mining and Geology Department from Yamunagar and Saharanpur stated that Sand mining is regulated in terms of the Mines and Minerals (Development and Regulation) Act, 1957 [MMDR Act] and the Mineral Concession Rule framed by the concerned State Governments. The Section 15 of the MMDR Act 1957, empowers the State Government to formulate rules for minor minerals. The State Government is empowered to formulate the rules for preventing illegal mining, transportation and storage of minerals (including sand) by exercising the powers conferred by section 23(C) of the Mines and Minerals (Development and Regulation) Act, 1957.Section 23C of the MMDR Act, also empowers the State Governments to make rules

for preventing illegal mining, transportation and storage of minerals and for the purposes connected therewith.

3.3 Applicability of Environment Impact Assessment (EIA) Notification 2006 and its Subsequent amendments with regard to Sand/*Bajri* Mining

The officials from the Ministry of Environment, Forest and Climate Change stated that prior environment clearance (EC) is mandatory for mining of sand/*bajri* in accordance with EIA Notification 2006 and its subsequent amendments. Further, vide amendment notification S.O. 1886 (E), dated 20.04.2022, Ministry has delegated the power to issue EC to State Level Environment Impact Assessment Authority (SEIAA) for all minor minerals including sand irrespective of mine lease area.

In addition to the Notification, Ministry of Environment, Forest and Climate Change (MoEF&CC) has also issued "Enforcement & Monitoring Guidelines for Sand Mining" (EMGSM), 2020 supplemental to the existing guidelines i.e. Sustainable Sand Management Guidelines (SSMG), 2016, which focuses on the effective monitoring of the sand mining, from the identification of sand mineral sources to its dispatch and end-use by consumers and the general public. These guidelines also highlight the essential infrastructural requirements necessary for effective monitoring for Sustainable Sand Mining and to control illegal sand mining through the use of IT, night surveillance through UAV/Drone, etc. Besides, the Sand Mining Framework released by the Ministry of Mines during March 2018 was also highlighted during the discussion. The framework emphasizes on better sustainability, availability, affordability and transparency in sand mining, and to improve the effectiveness of monitoring and transportation of mined material. It was also mentioned that the Ministry of Jal Shakti, DoWR, RD & GR has formulated a National Framework for Sediment Management, 2022 for managing sediments in a holistic manner. The framework has been prepared after extensive discussion and consultation with the State Governments/ Union Territories and stakeholding Ministries / Departments and mandates the environmental safeguards with regards to reservoirs, weirs, barrages, river and canals.

3.4 Regulations governing the Stone Crushers

State Pollution Control Board of Haryana and Uttar Pradesh stated that Stone crushing units should operate only after obtaining Consent to Establish (CTE) and Consent to Operate (CTO) from concerned State Pollution Control Boards (SPCBs) and Pollution Control Committee (PCCs) as per provisions of the Water (Prevention and Control of Pollution) Act, 1974 (hereinafter referred to as 'Water Act, 1974') and the Air (Prevention and Control of Pollution) Act, 1981 (hereinafter referred to as 'Air Act, 1981') and should meet the conditions of consents laid down in Consent to Establish (CTE) and Consent to Operate (CTO) issued by SPCBs/PCCs. CPCB officials also stated that CPCB has issued guidelines in the year 2023 for better operation of Stone Crushers and it has been circulated to all States/UTs for implementation.

4. After going through the existing rules and regulations governing the sand mining and stone crushing activity, the members of the Joint Committee provided the following comments and same is given as under:-

   a. Prof. N K Goel, IIT Roorkee, suggested that cross-sectional flow study of the entire stretch of River Yamuna stretching from the upstream point in Yamunanagar District to the downstream point in the Saharanpur District needs to be carried out for providing conclusive result. Besides, ecological studies throughout the terrain also need to be carried out for commenting on existing status of the riparian habitat.

   b. Dr. Anupama Sharma, Scientist G, NIH informed that National Institute of Hydrology has carried out the E-flow study of the entire stretch of Yamuna from its upstream till Delhi and if required NIH will provide the data that it created in the year 2020.

   c. Dr. Anu Chetal from NMCG apprised the committee that a similar committee under the then Joint Secretary of Ministry of Jal Shakti Shri Anand Mohan submitted a report to the Hon'ble NGT in OA No. 268/2021 in the matter of Jahangir V/s State of Haryana.

   d. Officials from CPCB stated that redline has not been defined in any of the mining sites neither the bank has been fixed wherever the mining is being undertaken by the Project Proponents. It was emphasised that without fixed redline (in msl) or defined bank limit, it would not be feasible to deduce the level of illegal mining being undertaken in these districts

   e. Officials from Central Water Commission informed that Kalanaur hydrological observation (HO) site of Central Water Commission is located across river Yamuna near railway bridge (Latitude-30° 04' 04.20"N Longitude-77° 21' 14.18"E) in Saharanpur district of Uttar Pradesh. This site is about 40 km distance from Hathnikund barrage on river Yamuna. At this site, Gauge, Discharge, Silt and Water Quality parameters are being observed. This site was established on 28/10/1975. The Highest Flood Level of 268.66 m was observed at this site on 09/09/2010. The CWC also informed that they have the data regarding river water level, discharge, sediment, river cross-section, water quality and rainfall. Data of river water level, discharge, sediment and river cross-section is classified and can only be shared after the recommendations of Classified Data Release Committee, headed by the Chairman, CWC, which includes members from different ministries. Data regarding water quality and rainfall is unclassified and the same can be released after the recommendation of Chief Engineer, Yamuna Basin Organization, CWC.

   f. Dr. Bimal Kumar Bhattacharya, Group Director, SAC, ISRO stated that the area identified in the NGT order covers the River Yamuna and its bank area falling in districts of Saharanpur in Uttar Pradesh and Yamunanagar in Haryana. The course of the River Yamuna in this region roughly parallels the Haryana-Uttar Pradesh state boundary. The length of the river along these two districts is approximately 110 km. In order to define the study area around River Yamuna, a buffer area of 3 km was created for carrying out investigation by them, and has been referred as "Study Area".

   g. The Regional Officer, Haryana Pollution Control Board informed the committee that all existing and operating sand mining leases both on river bed and agricultural area

having valid ECs, and Consent to Establish (CTE)/Consent to Operate (CTO). It was also informed that there are many legacy cases wherein mining has been done long back and a number of agricultural fields can be seen lying dugged out in past and left empty without any restoration in Belgarh region of the Yamunanagar District. It was also stated that all stone crushers and screening plants have been issued CTE/CTO.

h. The officials from Uttar Pradesh Pollution Control Board informed all the existing and operating sand mining leases both on river bed and agricultural are having valid ECs and CTE/CTO. It was also stated that all stone crushers are having valid CTE/CTO.

i. District Mining Officer (DMO), Yamunangar, informed that they have all the latitude-longitude data of the existing mining leases and stone crushers. They are ready to provide all mining and stone crushing data such as replenishment data, excavation data, dispatch data, capacity of each stone crushing units, compliance of regulatory provisions, instances of illegal mining observed and action taken, etc. It was also informed by the DMO, Yamunagar that beside river sand mining, agricultural field mining is also prevalent in Yamunagar wherein mining upto a depth of 9 metres is allowed.

j. District Mining Officer (DMO), Saharanpur, informed that they have all the latitude-longitude data of the existing mining leases and stone crushers. They are ready to provide all mining and stone crushing data such as replenishment data, excavation data, dispatch data, capacity of each stone crushing units, monitoring data, compliance of regulatory provisions, instances of illegal mining observed and action taken, etc. It was also informed by the DMO, Saharanpur that they have stopped issuing mining permits since June 2023 for agricultural fields. It was informed that these were short term mining permits for 3 months and maximum of 2 m depth was allowed for mining. It was also informed that for the short term mining leases, no EC is required.

5. After the preliminary discussion, the committee headed for site visit in the Belgarh region of the Yamunanagar District, Haryana along with the State Government officials of both the State. The Committee visited one riverbed mining site, on agricultural field and stone crushing sites. During the visit, the committee observed the following in the Belgarh mining and stone crushing site:-

a. The committee while visiting the river bed mining site observed numerous stone crushing units along side the approaching road.

b. These stone crushing units along with screening units were located on both sides of the road and adjacent to each other over the entire stretch. None of them were operating during the site visit. The concerned Regional Officer informed that more than 150 stone crushing units are located in the Belgarh stone crushing zone.

c. The river bed mining site was also not under operation. The District Mining Officer and State officials stated that the mining lease has been cancelled.

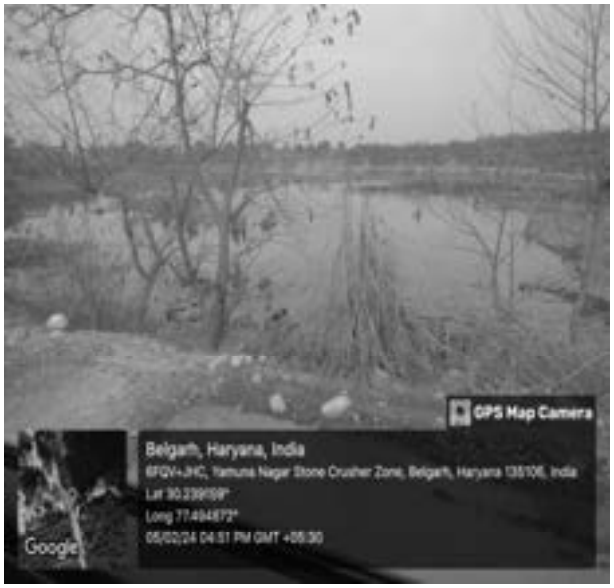
d. Even though it was an old river bed mining lease that was under operation in the past, no green belt was observed by the committee.

e. The river bed contained sand, *bajri*, and boulders. No demarcation was observed.

f. Many stone crushing sites were also located near the river bank which were not under operation during the visit
g. No plantations were observed in the stone crushing units.
h. Many agricultural fields were observed that were dugged out in the past. It was informed by the Regional Officer Haryana Pollution Control Board that these were legacy cases where mining took place long back. None of these pits were restored. The vegetation of the entire stretch was very poor.
i. Even none of the stone crushing units were under operation during the site visit, the committee observed many number of dumper vehicles.
j. The entire approach road was in poor condition with potholes having radius approximately more than 3 metres. It was filled with rain water at the time of the site visit.
k. Plantation was not observed in any of the stone crushing units, neither any wind barriers were observed.
l. As informed by the State officials, the Belgarh mining site and stone/screening units are located in the downstream of River Yamuna.
m. Afterward, the committee visited on existing sand,/,bajri mining lease on agricultural field. During the visit, the mining was not under operation. Dump of sand, *bajri* and small boulders were observed during the visit.

	
Stone Crusher in Yamunanagar Stone Crushing Zone, Near River Yamuna, Yamunagar, Haryana	Screening Plant in Yamunanagar Stone Crushing Zone, River Near Yamuna, Yamunagar, Haryana

	
Broken approach Roads	Riverbed mining site, Belgarh, Yamunagar, Haryana

	
Legacy mined out agricultural land filled with rain water	Mining on agricultural land in Yamunagar Haryana



Existing dump of sand / Bajri on agricultural mining lease

6. After undertaking the site visit to the mining and stone crushing sites in Yamunanagar, the committee visited the Hathinikund barrage and proceeded towards the mining and stone crushing sites in Saharanpur District of Uttar Pradesh. The committee visited one mining site in Saharanpur District. During the visit, the committee observed the following:-

a. The committee visited the Hathinikund barrage and observed the downstream and the upstream part of the River Yamuna from the barrage.
b. DMO, Saharanpur and local administration stated that most of the mining leases are located in downstream of the River Yamuna in Saharanpur District.
c. The Committee visited on sand mining lease being operated by M/s Star Mines located at Bartha Korasi, Behat Tehsil, Saharanpur. The Project Proponent (PP) informed that the annual permitted limit for excavation as per EC is 7.5 lakh cum.
d. The committee went inside the mine lease and observed the replenished sand. It was informed by the PP that annual depth of replenishment was about 1.8 m and they have been operating the mine lease since last 3 years.
e. The committee also observed deposition of stones and boulders within the lease area. As informed by DMO Saharanpur, the lease area was 36 ha.
f. The committee also observed that boundary pillars have been erected by the Project Proponent and location of one of the pillars were verified using a handheld GPS device on the spot of the District Mining Officials of Saharanpur.

g. The committee observed the plantation undertaken by the PP in the lease area. PP informed that due to heavy flood, last year most of the plantations undertaken by them were washed out and thus they have again undertaken the plantation initiative.
h. While visiting the mine site, the committee also observed number of stone crushing units which are operating after 6 p.m., i.e, end of day light.

	
Hathinikund Barrage	Boundary Pillar of M/s Star Mines

	
Plantation undertaken by M/s Star Mines	Committee members visiting the mine lease area of M/s Star Mines

7. Upon conclusion of the site visit, the committee had a post visit discussion at Behat Tehsil Office in Saharanpur District. The committee emphasised that Mining within or near riverbed has a direct impact on the stream's physical characteristics, such as, channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature, etc. Thus, utmost care should be taken to promote sustainable mining. Based on the discussion and site visit, committee recommended the following action points to ensure the compliance of order passed by the Hon'ble NGT:-

a) All members of the committee shall provide their written comments based on their observation stating the future course of action to ensure the compliance of Hon'ble NGT order.

Action: All Committee Members

b) The National Institute of Hydrology shall provide the data that it has created during the year 2020 with regard to hydrological parameters of Yamuna.

Action: National Institute of Hydrology

c) The Central Water Commission shall also provide the hydrological data as stated by them from their observation site which is located on River Yamuna. Ministry may write to them officially to obtain the data.

Action: CWC and MoEFCC

d) IIT Roorkee / NIT Kurukshetra shall provide technical knowhow to estimate the sediment deposition based on the available information from CWC/NIH/SAC-ISRO/NMCG/DMG

Action: IIT Roorkee / NIT Kurukshetra

e) Data on status of flood plain zoning in River Yamuna may also be provided by NMCG along with the report of e-flow assessment of River Yamuna sponsored by NMCG and carried out by NIH.

Action: NMCG

f) The SAC-ISRO shall provide the GIS data regarding the stretch of River Yamuna in both the districts from upstream to downstream. It will provide detailed land use-land cover map in the surrounding area and possibly encroachment to agriculture area. SAC will also map the data on KML based upon the information provided by State Department of Mines and Geology and other local bodies of state government for both Sand/ *Bajri* mining and stone crushing units.

Action: SAC-ISRO / DMG (Haryana and Uttar Pradesh)

g) The State Department of Mining and Geology of both the States shall provide the following data with regard to mining from the year 2018 onward.

I. Sand/*Bajri* Mining on riverbed

1. The number of identified patches from upstream to downstream along with their geocoordinates (include all corners/pillars), KML/KMZ file and amount of deposition patch wise since 2018 onward.

2. Total number of leases as per the records, their geocoordinates (include all corners/pillars), lease wise annual deposition based on replenishment.
3. Number of leases that has been granted to project proponents (their names), the depth of mining allowed in each lease, whether a minimum depth of 1m has been left out from the level of water flow alongside the lease / width of the river/ distance of mining zone from the bank of the river (whether 1/4th distance from bank has been maintained or not).
4. Lease wise annual production limit, actual production, actual dispatch, actual stock within mine site or anywhere else/ Rawana receipts/royalty paid since 2018 for the leases that have granted/allotted to Project Proponent. Transportation routes of each of those leases is to be provide in KML/KMZ file mentioning the number of nakas/checkposts, etc. that it passes through before end use.
5. Lease wise details of illegal mining for leases that have been granted to project proponent if any either production wise, depth wise, etc. in allotted mining leases.
6. Lease wise details of illegal mining from those leases which has not been allotted/granted to any body.
7. Details of illegal mining from identified patches which has not yet been demarcated as a mining lease by the State Govt.
8. Table indicating lease wise production and royalty received by State Govt. highlighting discrepancies, if any.
9. Lease wise monitoring data for leases that have been allotted / granted in compliance of SSMG 2016 and EMGSM 2020.
10. Lease wise EC data for leases that have been granted to project proponent.
11. Total number of cases / penalties imposed for illegal mining lease wise.
12. Independent cases wherein penalties have been imposed for illegal mining, transport or sale of sand / *Bajri*, FIRs registered to be provided in a table with detailed summary.
13. District Survey Report.
14. Material balance of mining, crushing and despatch by both the districts.
15. Details of weigh bridges may be provided with the name of the staff from mining offices of both districts.

II. **Mining on Agricultural Land within flood zone or near flood zone in Haryana**

1. The number leases along with their geocoordinates (include all corners / pillars), KML/KMZ file and amount of deposition available for mining (from upstream to downstream).
2. Number of leases that has been granted to project proponents (their names), the depth of mining allowed in each lease.
3. Lease wise annual production limit, actual production, actual dispatch, actual stock within mine site or anywhere else/ Rawana receipts/royalty paid since 2018 for the leases that have granted / allotted to Project Proponent.

Transportation routes of each of those leases is to be provided in KML/KMZ file mentioning the number of nakas/checkposts, etc. that it passes through before end use.

4. Lease wise details of illegal mining for leases that have been granted to project proponent if any either production wise, depth wise, etc. in allotted mining leases.
5. Lease wise details of illegal mining from those leases which has not been allotted/granted to any body.
6. Details of illegal mining from identified patches of agricultural land which has not yet been demarcated as a mining lease by the State Govt.
7. Table indicating lease wise production and royalty received by State Govt highlighting discrepancies, if any, for leases that been granted to Project Proponent.
8. Lease wise monitoring data for leases that have been granted compliance of SSMG 2016 and EMGSM 2020.
9. Lease wise EC data for leases that have been granted to project proponent.

III. Mining on Agricultural Land within flood zone or near flood zone in Uttar Pradesh

1. The total number of mining permits issued to farmers / geocoordinates of those lands (KML/KMZ file) total estimated mineable reserve and depth of mining permitted since 2018.
2. Details of production, stock and dispatch during the permit period.
3. Permit wise royalties and production details highlighting discrepancies, if any, for leases that been granted to Project Proponent.
4. Details of transport route, if any, followed by the PPs on KML File.
5. Details of illegal mining by permit holders.
6. Details of illegal mining wherein permit has not been issued.

IV. Stone crushing units

1. The total number of Stone Mining units / Screening units along with their geocoordinates (KML/KMZ file) operating since 2018.
2. Details of annual production, stock and dispatch.
3. Details of transport route if any followed by the PPs on KML File.
4. Details of illegal crushing activities within the permitted units
5. Details of illegal crushing units that are operating with statutory permissions.
6. Compliance and monitoring of each stone crushing units.

Action: Department of Mines and Geology, Haryana and Uttar Pradesh

h) The state pollution control board shall provide the details of CTE/CTO of each of the lease that has been granted to the PPs for sand mining and stone crushing/screening. SPCBs shall also provide the compliance report of each sand mining and stone crushing / screening plant.

Action: State Pollution Control Board Haryana and Uttar Pradesh

i) The members of the committee upon receiving aforesaid information shall suggest remedial measures and methods to identify suitable locations to permit the mining of the minerals with minimum adverse impact along with transportation mechanism for monitoring purposed. The experts will give their recommendation for overall development of flood zones, development of agrobased activities, fish culture, prevention of soil erosion, restoration of environment, mechanism for utilization of funds recovered from the violators for restoration, etc. without harming the riverine ecosystem.

Action: All committee members / Shri Avijit Ghosh / Dr.S.R.Wate

j) The entire information obtained from the members of the committee, State Departments and Expert members shall be compiled by GBPNIHE and to be presented before the Chairman of this committee for onward submission to Hon'ble NGT.

Action: Dr J C Kuniyal, GBP-NIHE

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RECORD OF DISCUSSIONS OF SECOND MEETING OF THE JOINT COMMITTEE ON 19/02/2024 IN COMPLIANCE OF HON'BLE NATIONAL GREEN TRIBUNAL ORDER IN OA NO. 481/2023 IN THE MATTER OF BALBIR SANDHU & ORS. VS. STATE OF UTTAR PRADESH & ANR.

In continuation to the first meeting, the record of discussion with actionable points was circulated among the joint committee members for necessary action. In line with that, a second meeting was organized through video conference on 19.02.2024 at 3 pm to review the progress made with regard to the recommendations made in the first meeting. The list of participants is annexed.

During the meeting following emerged: -

1. All committee members are requested to send the information with regard to the actionable points circulated via record of discussion of first meeting held on 05.02.2024

   Action: All Joint Committee Members

2. Accordingly, State Department of Mines and Geology along with State Pollution Control Board were again requested to furnish the requisite information at the earliest and before 23.02.2024

   Action: DMG and SPCB, Haryana and Uttar Pradesh

3. NMCG/NIH/SAC-ISRO; all these institutes requested to expedite their submissions within 23.02.2024.

   Action: NMCG/NIH/SAC-ISRO/CWC

4. Based on the submission of the aforesaid data, IIT Roorkee, NIT Kurukshetra and NIH shall provide the following information for Yamunanagar and Saharanpur District alongside River Yamuna.
   a. The source of sediment brought in by River Yamuna from the upstream

b. The amount/quantity of sediments brought by River Yamuna annually

c. Deposition of the sediments at various locations and the quantity annually;

Action: IIT Roorkee/NIH/NIT Kurukshetra

5. In addition to above, the joint committee members shall also submit their observations based on the site visit conducted on 05.02.2024 within 23.02.2024.

Action: All Joint Committee Members

6. All members were requested to submit the requisite information in doc format for ease of compilation.

Action: All Joint Committee Members

Annexure

Date: 19.02.2024 [Monday]

Video Conferencing

S.No.	Name	Address	Present
1.	Dr. S.R. Wate, Ex-Director, NEERI, Nagpur	148/149, Nagar Vikas Society, Narendra Nagar, Nagpur-440 015, Maharashtra.	Yes
2.	Shri Avijit Gosh, CMD, Retd.	A-604 Shahadeo Tower, P.P. Compound, Ranchi	Yes
3.	Shri Nazimuddin, Scientist F, CPCB	Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi	Yes
4.	Representative of UPPCB	Uttar Pradesh Pollution Control Board, Building No. TC-12V Vibhuti Khand, Gomti Nagar Lucknow.	No
5.	Representative of HSPCB Shri Virender Singh	Haryana State Pollution Control Board, C- 11, Sector-6. Panchkula, Haryana	Yes
6.	Representative from Mines and Geology Department, Haryana Mr. Rohit Rana (Mining Inspector)	Mines and Geology Department, Haryana Second Floor, DHL Square, Plot No. 9, Sector-22 IT Park, Panchkula, Haryana	Yes
7.	Representative from Directorate of Geology & Mining Department, Uttar Pradesh Shri Ranbir Kumar Singh, MO	Directorate of Geology & Mining Geology & Department, Khanij Bhawan 27/8, Raja Ram Mohan Rai Marg, Lucknow, Uttar Pradesh	Yes
8.	Dr. Anu Chetal, Scientist B, NMCG	National Mission for Clean Ganga, 1st Floor, Major Dhyan Chand, National Stadium, India Gate, Delhi	No

9.	Dr. Anupama Sharma, Scientist G, NIH	National Institute of Hydrology, Roorkee, Uttarakhand	No
10.	Representative of CWC Shri H S Sengar, Suptt.Engg	Central Water Commission, Sewa Bhawan, R.K. Puram, Sector-1, New Delhi	Yes
11.	Dr. J.C. Kuniyal Scientist-G, G.B. Pant National Institute	G.B. Pant National Institute of Himalayan Environment, Kosi Katarmal, Almora, Uttarakhand	Yes
12.	Dr. K.K. Singh, Professor, NIT-Kuruksshetra	National Institute of Technology, Kurukshetra	Yes
13.	Shri Manohar Arora, IIT, Roorkee	Indian Institute of Technology, Roorkee- Haridwar Highway	Yes
14.	Dr. Bimal Kumar Bhattacharya, Group Director, SAC-ISRO	Department of Space, Space Application Centre, Jodhpur Tekra, AmbawadiVistar, Ahmedabad.	Yes
15.	Shri Khalid Mehmood, Project Director	Bhaskracharya National Institute for Space Applications and Geoinformatics, Near CH 'O' Circle Indulal Yagnik Marg, Gandhi Nagar Ahmedabad.	Yes
16.	Shri Pankaj Verma, MS, Jt.Committee, MoEF&CC	Ministry of Environment, Forest & Climate Change, Jor Bagh, Delhi	Yes

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RECORD OF DISCUSSIONS OF THIRD MEETING OF THE JOINT COMMITTEE ON 13/03/2024 IN COMPLIANCE OF HON'BLE NATIONAL GREEN TRIBUNAL ORDER IN OA NO. 481/2023 IN THE MATTER OF BALBIR SANDHU & ORS. VS. STATE OF UTTAR PRADESH & ANR.

In continuation to the second meeting, the record of discussion with actionable points was circulated among the joint committee members for necessary action. Based on the information received from the committee members, a draft report was prepared. The aforesaid draft report was placed for comments/discussions during the joint committee meeting held on 13.03.2024 at Central Pollution Control Board, New Delhi. The list of participants is annexed.

During the meeting following emerged:-

1. State Department of Mines and Geology shall furnish the following data in the Microsoft excel format so that same may be included in the draft report.
    a. The amount/quantity of sediment brought by river Yamuna annually in the format given below:

Information as per District Survey Report 2017

S.No.	Name of Mine	Lesse name	Lease Area (in ha)	Geocordinates	Geological Reserve (in cum)	Mineable Reserve (in cum)
1						
2						
3						
4						
5						
6						

Information as per latest District Survey Report

S.No.	Name of Mine	Lesse name	Lease Area (in ha)	Geocordinates	Geological Reserve (in cum)	Mineable Reserve (in cum)
1						
2						
3						
4						
5						
6						

b. Deposition of the sediments at various locations and the quantity annually in the format given below;

Year Wise Deposition after replenishment in cu.m

Annual Data	Lease Name 1			Lease Name 2			Lease Name 3		
Year	Existing Reserve	Annual Replenish Ment	Mineable Reserve	Existing Reserve	Annual Replenish Ment	Mineable Reserve	Annual Replenish Ment	Mineable Reserve	
2017									
2018									
2019									
2020									
2021									
2022									
2023									
2024									

Action: DMG, Haryana and Uttar Pradesh

2. State Pollution Control Board based on the earlier monitoring report shall provide in writing on the impacts of mining on ambient air quality, water quality, noise etc due to the ongoing mining activities in Yamunanagar and Saharanpur District.

Action: SPCB, Haryana and Uttar Pradesh

3. Mining activities being undertaken along the River Yamuna and the quantity (legally and illegally) along with geo-coordinates of the mining area on annual basis;

Action: DMG, Haryana

4. Revised draft report shall be updated and discussed in the fourth meeting scheduled on 15.03.2024 at 3 PM through Video Conference.

Action: All Committee Members

Ministry of Environment, Forest & Climate Change
Attendance Sheet

3rd Joint Committee meeting for compliance of Hon'ble National Green Tribunal order dated 04.08.2023 and order dated 26.09.2023 in OA No. 481/2023 in the matter of Balbir Sandhu & Ors. Vs. State of U.P. & Anr.

Date: 13.03.2024 [Wednesday]
Mode: Physical
Venue: Central Pollution Control Board (CPCB), New Delhi

S. No.	Name	Present
1.	**Dr. S. R. Wate, Ex-Director, CSIR-NEERI, Nagpur** NEERI, 148/149, Nagar Vikas Society, Narendra Nagar, Nagpur-440 015, Maharashtra.	Yes
2.	**Shri Avijit Gosh, CMD-Retd.** Marg, A-604 Shahadeo Tower, P.P. Compound, Ranchi- 834 001	No
3.	**Shri Nazimuddin and Shri Ashish Vidyarthi, Scientist-F** Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110 032	Yes
4.	**Representative of UPPCB** Uttar Pradesh Pollution Control Board, Building No. TC-12V Vibhuti Khand, Gomti Nagar Lucknow-226 010 Dr.Yogender Singh, RO Shri Mahender Singh, JE	Yes
5.	**Representative of HSPCB** Haryana State Pollution Control Board, C- 11, Sector-6. Panchkula-134 109, Haryana (Details mentioned at S.No. 17) **Shri Abhijeet Singh Tanwar,** A.E.E. Yamuna	Yes

S. No.	Name	Present
	Nagar Region	
6.	**Representative from Mines and Geology Department, Haryana** Mines and Geology Department, Haryana Second Floor, DHL Square, Plot No. 9, Sector-22 IT Park, Panchkula, Haryana Shri Om Dutt Sharma, DMO	Yes
7.	**Representative from Directorate of Geology & Mining Department, Uttar Pradesh** Directorate of Geology & Mining Geology & Department, Khanij Bhawan 27/8, Raja Ram Mohan Rai Marg, Lucknow, Uttar Pradesh- 226 001 Shri Subhash Singh, DMO	Yes
8.	**Dr. Anu Chetal, Scientist B, NMCG** National Mission for Clean Ganga, 1st Floor, Major Dhyan Chand, National Stadium, India Gate, Delhi-110 002	Yes
9.	**Dr. Sumant Kumar, Scientist-E, NIH Roorkee** National Institute of Hydrology, Roorkee - 247 667 Uttarakhand	Yes
10.	**Representative of CWC** Central Water Commission, Sewa Bhawan, R.K. Puram, Sector-1, New Delhi-110 066 Shri H S Sengar, Suptt. Engineer	Yes
11.	**Dr. J. C. Kuniyal, Scientist-G, G.B. Pant National Institute** G.B. Pant National Institute of Himalayan Environment, Kosi Katarmal, Almora-263 643, Uttarakhand	Yes
12.	**Dr. K. K. Singh, NIT-Kurukshetra** National Institute of Technology, Kurukshetra - 136 119	Yes
13.	**Prof. N.K. Goel, IIT-Roorkee** Indian Institute of Technology, Roorkee-Haridwar Highway-247 667	Yes
14.	**Dr.Bimal Kumar Bhattacharya, Group Director, SAC-ISRO** Space Application Centre, Jodhpur Tekra, Ambawadi Vistar, Ahmedabad - 380 015	Yes
15.	**Representative of Bhaskracharya National Institute for Space Applications and Geoinformatics,** Bhaskracharya National Institute for Space	no

S. No.	Name	Present
	Applications and Geoinformatics, Near CH 'O' Circle Indulal Yagnik Marg, Gandhi Nagar Ahmedabad.	
16.	Representative of Member Secretary, Delhi Pollution Control Committee, Delhi	no
17.	**Shri Pankaj Verma, MS, Jt. Committee** Ministry of Environment, Forest & Climate Change, Jor Bagh, Delhi	Yes

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RECORD OF DISCUSSIONS OF FOURTH MEETING OF THE JOINT COMMITTEE ON 15/03/2024 IN COMPLIANCE OF HON'BLE NATIONAL GREEN TRIBUNAL ORDER IN OA NO. 481/2023 IN THE MATTER OF BALBIR SANDHU & ORS. VS. STATE OF UTTAR PRADESH & ANR.

In continuation to the third meeting, the record of discussion with actionable points was circulated among the joint committee members for necessary action. In line with that, a fourth meeting was organized through video conference on 15.03.2024 at 3 pm to review the progress made with regard to the emerged points made in the third meeting. The list of participants is annexed.

During the meeting following emerged: -

1. The revised draft was circulated among all committee members to offer their comments for finalization of the report and presentation before the chairman of the committee on 18.03.2024.

   Action: All Joint Committee Members

2. State Department of Mines and Geology Haryana and Uttar Pradesh were requested to furnish the requisite information at earliest.

   Action: DMG and SPCB, Haryana and Uttar Pradesh

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Ministry of Environment, Forest & Climate Change

Attendance Sheet

4th Joint Committee meeting for compliance of Hon'ble National Green Tribunal order dated 04.08.2023 and order dated 26.09.2023 in OA No. 481/2023 in the matter of Balbir Sandhu & Ors. Vs. State of U.P. & Anr.

Date: 15.03.2024 [Friday]
Mode: VC

S. No.	Name	Present
1.	**Dr. S. R. Wate, Ex-Director, CSIR-NEERI, Nagpur** NEERI, 148/149, Nagar Vikas Society, Narendra Nagar, Nagpur-440 015, Maharashtra.	Yes
2.	**Shri Avijit Gosh, CMD-Retd.** Marg, A-604 Shahadeo Tower, P.P. Compound, Ranchi- 834 001	Yes
3.	**Shri Nazimuddin, Scientist-F** Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110 032	Yes
4.	**Representative of UPPCB** Uttar Pradesh Pollution Control Board, Building No. TC-12V Vibhuti Khand, Gomti Nagar Lucknow-226 010 Dr.Yogender Singh, RO Shri Mahender Singh, JE	Yes
5.	**Representative of HSPCB** Haryana State Pollution Control Board, C- 11, Sector-6. Panchkula-134 109, Haryana (Details mentioned at S.No. 17) **Shri Abhijeet Singh Tanwar,** A.E.E. Yamuna Nagar Region	Yes
6.	**Representative from Mines and Geology Department, Haryana** Mines and Geology Department, Haryana Second Floor, DHL Square, Plot No. 9, Sector-22 IT Park, Panchkula, Haryana Shri Om Dutt Sharma, DMO	Yes
7.	**Representative from Directorate of Geology & Mining Department, Uttar Pradesh** Directorate of Geology & Mining Geology & Department, Khanij Bhawan 27/8, Raja Ram Mohan Rai Marg, Lucknow, Uttar Pradesh- 226 001 Shri Subhash Singh, DMO	Yes
8.	**Dr. Anu Chetal, Scientist B, NMCG**	Yes

S. No.	Name	Present
	National Mission for Clean Ganga, 1st Floor, Major Dhyan Chand, National Stadium, India Gate, Delhi-110 002	
9.	**Dr. Sumant Kumar, Scientist-E, NIH Roorkee** National Institute of Hydrology, Roorkee - 247 667 Uttarakhand	Yes
10.	**Representative of CWC** Central Water Commission, Sewa Bhawan, R.K. Puram, Sector-1, New Delhi-110 066 Shri H S Sengar, Suptt. Engineer	Yes
11.	**Dr. J. C. Kuniyal, Scientist-G, G.B. Pant National Institute** G.B. Pant National Institute of Himalayan Environment, Kosi Katarmal, Almora-263 643, Uttarakhand	Yes
12.	**Dr. K. K. Singh, NIT-Kurukshetra** National Institute of Technology, Kurukshetra - 136 119	Yes
13.	**Prof. N.K. Goel, IIT-Roorkee** Indian Institute of Technology, Roorkee-Haridwar Highway-247 667	Yes
14.	**Dr.Bimal Kumar Bhattacharya, Group Director, SAC-ISRO** Space Application Centre, Jodhpur Tekra, Ambawadi Vistar, Ahmedabad - 380 015	Yes
15.	**Representative of Bhaskracharya National Institute for Space Applications and Geoinformatics,** Bhaskracharya National Institute for Space Applications and Geoinformatics, Near CH 'O' Circle Indulal Yagnik Marg, Gandhi Nagar Ahmedabad.	no
16.	Representative of Member Secretary, Delhi Pollution Control Committee, Delhi	no
17.	**Shri Pankaj Verma, MS, Jt. Committee** Ministry of Environment, Forest & Climate Change, Jor Bagh, Delhi	Yes

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Report on

ECOLOGICAL DAMAGE ASSESSMENT AND ECORESTORATION PLAN

for illegal mining sites in Yamuna river and tributaries of Saharanpur district, Uttar Pradesh



Prepared by

Forest Research Institute
Indian Council of Forestry Research and Education
(An autonomous body of Ministry of Environment, Forest and Climate Change)
PO : New Forest, Dehradun - 248 006
http://fri.icfre.gov.in/

(January 2017)

Care has been taken to make the report factually and scientifically correct on the basis of the data and information made available, subject to the limitations mentioned in the document. However the report is strictly meant for the information and use by the MoEF & CC. The Institute may not be held liable in case any loss or damage is caused to anybody by using the information or observations made in this report.

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ECOLOGICAL DAMAGE ASSESSMENT AND ECORESTORATION PLAN

for illegal mining sites in Yamuna river and tributaries of Saharanpur district, Uttar Pradesh

(January, 2017)

Submitted to

Ministry of Environment Forest and Climate Change

Submitted by

Forest Research Institute

(Indian Council of Forestry Research and Education)

PO: New Forest, Dehradun – 248006

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EXECUTIVE SUMMARY

The mining of minor minerals, particularly, that of the riverbed material or RBM is widely perceived as a development activity along with its economic dimensions. Its impacts on the river geomorphology and hydrology draw public attention only during floods and droughts. With the increased awareness about pollution and respiratory problems in the mine workers, the environmental impacts of mining have also started drawing public attention. However, the ecological impacts of mining still remain within the domain of the scientists. The massive riverbed material mining in the Yamuna river and nearby tributaries in Saharanpur district in recent years, allegedly carried out in contravention of the provisions of the Environmental Protection Act of 1986, has caused colossal damage to the region's ecology and environment.

The alarming levels of the damage caused by riverbed mining to the geomorphology -the land aspects, hydrology - the water aspects, environment - the air aspects, and ecology - the life aspects, awakened the public as well as institutions to take immediate cognizance of the matter. Hon'ble Supreme Court of India passed an order on 25th November 2011 in IA nos. 12-13, 14-15, 16-17 and 18-19 in SLP (C) No. 19628-19629/2009 wherein the Central Empowered Committee (CEC) was directed to inspect the alleged illegal mining going on in the States of UP and Rajasthan, and submit report. The report submitted by the CEC on 4th January 2012 indicated of the scale and extent of the illegal mining. The CEC observed a number of heavy machines like JCB's and excavators operating for excavation of boulders, sand and bajri from the river bed and loading the same into tractor-trolleys, trucks and dumpers moving around, also a number of screening plants and stone crushers and large quantities of processed/unprocessed minerals lying in the screening plants. CEC's checking revealed illegalities in all operations including mining, transportation and processing in the illegally set up screening plants/crushers going on a massive scale. Taking cognizance of the CEC Report, Hon'ble Supreme Court ordered on 16th January 2012 to take immediate steps to close down all illegally operating screening plants/crushers etc. on both sides of the river Yamuna forthwith, and to seize the illegally mined sand, bajri and boulders as well as the vehicles, and also to dismantle the screening plants/ crushers installed within the prohibited zone or operating in violation of guidelines issued by the U.P Pollution Control Board.

Accordingly, the district collector of Saharanpur, vide letter dated 26th January 2012, imposed a complete ban on transport of the illegally mined material and ordered for dismantling of 133 screening plants and 14 stone crushers, and closure of 114 stone crushers. As much as 95.62

lakh MT of illegally mined sand, bajri, and boulders stocked at stone crushers/screening plants was seized and auctioned on 2nd July 2012 for Rs. 95.62 crore.

The issue of illegal mining in river Yamuna again came to the fore in O.A. No. 184 of 2013 titled Gurpreet Singh Bagga V/s MoEF & ors which was filed before the Hon'ble National Green Tribunal. Hon'ble Tribunal disposed off the case vide orders dated 18.02.2016 and, *inter alia*, directed the State Government to submit a 'comprehensive mining plan' and a 'comprehensive report' stating the extent of illegal extraction of minor minerals, their impact on the environment, ecology and recommendations for restoration.

Given the above, the MoEF&CC vide letter dated 12th August 2016 and further letter dt. 18.8.2016 asked FRI Dehradun to undertake the study on **Assessment of ecological damage and preparation of restoration plan for the illegal mining sites of minor minerals in Yamuna river bed in Saharanpur district, of Uttar Pradesh.**

FRI Dehradun has carried out the required study on the basis of the facts and figures provided by the district officials of revenue and mining departments and by undertaking extensive touring of the reportedly illegal mining sites with these officials in the given 44 villages.

It was observed that the leases were granted only for 380.4 ha. area in 21 out of the 44 villages reported for illegal mining. The mining carried out in 631.2 ha. area in other 23 villages is totally illegal. In the villages with duly granted mining lease also, the mining was found to be illegally carried out in additional 599.3 ha. area. Hence the total extent of illegal mining in the 44 villages is about 1230.5 ha.

The mining has caused colossal damage to the ecosystem structure by extensive physical removal of the soil substrate, and impoverishment of the biological richness by elimination of plant propagules, regeneration, growth, and dispersal of individual species, formation of associations and the community. The rapid assessment field surveys carried out by FRI and WII scientists/researchers reveal that a large number of indigenous species such as *Dalbergia sissoo*, *Azadirachta indica, Ehretia laevis, Acacia catechu, Trewia nudiflora*, *Ziziphus mauritiana* etc, are either absent or found in negligible quantity. Not even a single species out of 13 native tree species as reported in CMP were found in the study areas. Even though the wildlife is not immobile like plants, its sighting is equally worse. In comparison to the list of 30 wildlife species given in the CMP, only 5 mammal species could be observed during the recent survey. Only two winter migratory birds out of the earlier 25 birds were sighted in

Hathnikund barrage. In comparison to Asan barrage the number is a meager 3 against 31. The present state of affairs calls for immediate ecological restoration measures.

The five decade old Minor Mineral (Concession) Rules of 1963 duly recognize and foresee the impact of sand mining in the river geomorphology, ecology and riverine habitat at a time when the present massive scale of the mining activity was not there. These mining rules laid down several requirements including the necessity to (i) keep vigil for not polluting the environment, (ii) maintain ecological balance, (iii) to demarcate the mining area and erect and maintain boundary pillars, (iv) carry out sand and gravel mining in slices of 1m thickness (v) raise plantation on the bank side, (vi) leave a 100m barrier between two mining sites. All these rules need to be followed in letter and spirit.

The mining sites are vulnerable to the erosive force of the floods. Therefore these need to be physically protected by construction of engineering structures before attempting re-vegetation by propagation of local species. FRI has, therefore, formulated an eco-restoration strategy taking into account both - (i) engineering and (ii) biological measures. The suggested engineering measures include 13229m long retaining wall and 322 number of spurs in 25 villages which will cost Rs. 12.72 crores. The biological measures include plantation along the riverbanks in 216 ha area and catchment area treatment in 1900 ha in catchment of the Hathnikund barrage. These will cost Rs. 35.68 crore. Hence total cost of ecological restoration interventions is estimated as Rs. 48.40 crores. Though these measures will largely improve the habitat for wildlife, some wildlife specific interventions like reduction in Hathnikund wetland siltation and removing of obstruction in wildlife corridors etc. are also important and call for a separate detailed report. Therefore these costs are not accounted for at present.

Valuation of ecological damage of a natural resource like the Yamuna riverine ecosystem will perhaps be never exhaustive. At present, estimated values of three most apparent components, viz., material component, eco-restoration cost and net present value of the ecosystem services foregone have been considered. The land and water comprise the milieu in which the ecology or the life forms thrive. The illegal mining has physically removed the land which formed the medium and substrate of the micro and macro fauna and flora. Therefore the value of the 39.62 lakh MT illegally mined material taken equal to the sum of the auction amount (Rs. 95.62 crores) and the fines realized for mining related illegal activities (Rs. 1.48 crore) is taken as cost of material component of ecological damage. It may be pertinent to mention here that the above auction amount cover the value of the illegally mined material seizure only in one year

(2012). The ecological damage caused by the illegal removals in earlier years, if any, does not figure in this value.

The cost of the proposed eco-restoration measures (Rs. 48.40 crores) comprise the second component of valuation because this amount is needed to restore the lost ecosystem goods and services which would have been emanating from the landscape, had it not been damaged.

The eco-restoration interventions in the ecologically damaged mining sites are analogous to the compensatory afforestation required to be undertaken in the cases of diversion of forest area for non-forest purposes under the Forest (Conservation) Act of 1980. The benefits from the eco-restoration interventions will increase gradually over a period of time. The rationale for accounting the Net Present Value (NPV) is to balance the uncompensated benefits till the eco-restoration areas start providing the ecological goods and services comparable to their natural state. Therefore, the NPV has been calculated for the total estimated illegal mining area of 1230 ha. @ Rs. 7.4 lakh/ha. which works out to be Rs. 90.93 crore. This is the net rate computed by the IIFM Bhopal and FSI Dehradun for this type of forest lands. In this manner, the total value of the ecological damage is suggested as equal to the sum of the above three components, i.e. Rs. 236.43 crores.

It is suggested to review the scale and extent of the riverbed material mining in view of the extent of damage caused to the geomorphology, hydrology and ecology of various mining sites. The adherence to the rules and regulations of mining need to be duly enforced and strictly monitored. The mined out areas need to be reclaimed and rehabilitated according to a well planned ecological restoration strategy in a time bound manner.

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ABBREVIATIONS

A	Ahtmal
CMP	Comprehensive Mining Plan
Cum/m^3	Cubic Meter
CS	Cross section
DPR	Detail Project Report
FRI	Forest Research Institute
GIS	Geographical Information System
GPS	Global Positioning System
Ha/ha	Hectare
Kg	Kilogram
Km	Kilometer
LHW	Length Height and Width
m	Meter
M	Mustakam
mj	Min-jumla
MoEF & CC	Ministry of Environment, Forest & Climate Change
MT	Metric Ton
NGT	National Green Tribunal
RBM	River Bed Material
Rs	Rupees
RS	Remote Sensing
sp	Species
Sqm	Square meter
WII	Wildlife Institute of India

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PART - I

1. INTRODUCTION

The riverbed material (RBM) mining is widely perceived as a developmental activity with its associated economic dimensions. The geo-morphological and hydrological aspects usually draw public attention only during the floods and droughts. With the increased awareness about pollution, environmental aspects of mining have also started drawing public attention. However, the ecological impacts of mining still remain within the domain of scientists. The massive riverbed material mining in the Yamuna river, allegedly carried out in contravention of the provisions of the Environmental Protection Act of 1986, attracted attention of some private litigants in this decade, who agitated the issue in the court of law. This study was necessitated to examine the ecological damage done by mining scientifically and to suggest methods and scope for restoration of the ecology. The relevant extracts of various orders, directions, and actions taken in this decade are briefly described below for a comprehensive understanding of the whole illegal mining issue.

1.1 Context of the Study

The recent history of the illegal mining in river Yamuna in Saharanpur district spans over a period of about six years. The important milestones are briefly described in the following sub-sections.

1.1.1 Hon'ble Supreme Court Order dated 25th November 2011 and the CEC Inspection Report dated 4th January 2012

1) The genesis of this study can be traced back to the order of the Hon'ble Supreme Court of India passed on 25th November 2011 in IA nos. 12-13, 14-15, 16-17 and 18-19 in SLP (C) No. 19628-19629/2009 wherein the Central Empowered Committee (CEC) was directed to submit its report after carrying out site inspection regarding the alleged illegal mining going on in the States of UP and Rajasthan. On 9th December 2011, the CEC along with the Learned Amicus Curiae Mr. K. Parmeshwar undertook an unannounced site visit of the mining areas of district Saharanpur, UP adjoining district Yamuna Nagar, Haryana. The CEC noticed a serious violation of the provisions of the EIA Notification dated 14th September 2006. Large scale illegal mining was going on in the Yamuna bed and in areas far outside the sanctioned leased areas even though it had been stated by the State of U.P. that about 30 mining leases stand closed w.e.f. 30th June 2011 and that no mining operations in the leased areas had after that been permitted.

2) The CEC found a large number of heavy machineries like JCB's and excavators operating feverishly for excavation of boulders, sand and bajri from the river bed and loading the same in the vast numbers of tractor-trolleys trucks and dumpers moving around. A huge number of screening plants and at least two stone crushers were seen fully operational on both sides of the bed of River Yamuna. Ramps/roads have been constructed for to and fro movement of the vehicles from/ to such screening plants/crushers and bed of River Yamuna. A very large number of vehicles were seen unloading illegally excavated mixture of sand, boulders, and bajri in such screening plants and returning to the river beds. The screening plants were found to be operating at a high efficiency or processing the illegally mined mineral and to separate them into heaps of boulders, sand, and bajri. Large quantities of unprocessed minerals, as well as processed minerals, were seen lying in the screening plants. The tractor-trolleys and trucks were seen carrying stone, bajri, and boulders from the screening plants. The crushers located at Doiwala, Yamuna Nagar, Haryana were found to be fully operational, and massive quantities of boulders as well as bajri and dust (obtained after processing the boulders) were seen lying all around the stone-crushers. While returning in the evening, a vast number of empty trucks were seen moving towards the screening plants/crushers apparently for loading of the processed material. The CEC, based on the observations made during the unannounced site visit, was of the view, which was corroborated by the details of the transit permits and other documents, that illegal mining, illegal transportation and illegal processing in the illegally set up screening plants/crushers was going on a massive scale involving probably thousands of truck loads of mineral every day.

3) The same areas were visited again by the CEC on 12th December 2011 after the program of the site visit was formally intimated. This time the officers of the State of U.P and Haryana were present. During this formal site visit no mining activity was found to be going on in the area wherein massive illegal mining was seen during the unannounced visit, and all the screening plants/crushers were found to be closed, the owner/staff of none of the screening plants/crushers were present and no movement of vehicles was noted. The screening plants and stone crushers were illegally established and were operating in contravention of the UP Pollution Control Board Guidelines of January 2010. Evidently, the closure of the screening plants remained only on paper, that too only in respect of the 35 units located in village Nuniyari and Jodhe Bans.

The so-called sealed screening plants and many other plants continued to operate illegally with the connivance of the concerned officers.

4) During the unannounced site visit carried out on 9th December 2011, large scale mining was found to be taking place adjoining the Hathinikund Barrage whereas mining is specially prohibited within a distance of 2.1 km from the barrage.

5) After the unannounced site visit of the CEC on 9th December 2011, the Additional Collector, Saharanpur (Mining Division) issued notices dated 16th December 2011 to a number of persons for the recovery of the penalty for illegal mining allegedly done by them. He also requested the Deputy Commissioner, Yamuna Nagar, Haryana to recover the penalty amount from the concerned persons (residents of Haryana) and deposit the same in District Saharanpur. This belated action by the District authorities duly established that illegal mining had been going on in the area.

6) The CEC expressed the view that the illegal mining had continued not because of lack of adequate Rules and procedure but in spite of them and that this had been mainly possible because of the active connivance of the officers. The CEC submitted a detailed report in the Supreme Court of India expressing following views:

   a) The mining of sand, bajri and boulders in District Saharanpur U.P and its transportation including from the screening plants set up on both sides of the Yamuna River should be prohibited with immediate effect.

   b) The crusher/screening plants located within 500 meters from the Yamuna flood should be directed to be physically dismantled.

   c) The quantity of illegally mined construction material during the last 3 years should be directed to be assessed, and in addition to its normative market price, exemplary penalty/compensation should be imposed on the persons responsible for the illegal mining.

   d) The responsibility for allowing illegal mining should be fixed on the concerned officers and others in a time bound manner; and

   e) The state of Haryana should be directed to take effective steps to ensure that no boulders, bajri, and sand from District Saharanpur, U.P is transported and/or used in the State of Haryana.

1.1.2 Hon'ble Supreme Court Order dated 16th January 2012

Taking cognizance of the CEC Report, Hon'ble Supreme Court ordered on 16th January 2012 as under:

1) The District Collector, District Superintendent of Police, and the Additional Director (Mining Division) of Saharanpur would see that no illegal mining be carried on in the District.

2) They are directed to take immediate steps to close down all illegally operating screening plants/crushers etc. on both sides of the River Yamuna forthwith, and the illegally mined sand, bajri and boulders and the vehicles be seized forthwith;

3) Screening plants/crushers located on either side of the River Yamuna, within the prohibited zone and operating in violation of guidelines issued by the U.P Pollution Control Board and/or within the prohibited zone, shall be immediately dismantled;

1.1.3 Compliance of Hon'ble Supreme Court Orders by the District Collector Saharanpur in 2012

1) The district collector, vide letter dated 26th January 2012, ordered a complete ban on transport of the illegally mined material in Saharanpur district. 133 screening plants and 14 stone crushers installed in the prohibited area were dismantled. 114 stone crushers not having 'no objection certificate' from the UP Pollution Control Board were closed.

2) The illegally mined sand, bajri, and boulders stocked at stone crushers/screening plants was seized and auctioned on 2nd July 2012 for Rs. 95.62 crore. District Collector, Saharanpur letter 911/Khanij dt. 2nd July 2012 is enclosed in **Appendix-I**.

3) Since 2012, no mining lease has been granted in the State of Uttar Pradesh due to various court orders and/or lack of environmental clearance.

1.1.4 Hon’ble National Green Tribunal, New Delhi Order dated 18th February 2016

The O.A. No. 184 of 2013 titled Gurpreet Singh Bagga V/s MoEF & ors was filed before the Hon’ble National Green Tribunal, New Delhi alleging illegal mining in river Yamuna area of district Saharanpur. The applicants alleged that illegal mining was even reported by the CEC in its report dated 04.01.2012 filed before Hon’ble Supreme Court in compliance with orders dated 25th November 2011 in IA Nos. 12-13, 14-15, 16-17 and 18-19 IN SLP (C) No.19628-19629/2009.

The Hon'ble Tribunal disposed off above cases vide orders dated 18.02.2016 and directed that Mining and Crushing activities in the districts of Saharanpur in UP and Yamunanagar in Haryana shall be stopped for 45 days and both the States to prepare a Comprehensive Mining Plan and submit the same to the High Powered Committee constituted under the Chairmanship of Secretary, Ministry of Environment, Forest & Climate Change, Government of India.

The Hon'ble Tribunal also passed following directions:

1) There shall be complete prohibition on carrying on of any mining of minor minerals (Bajri, Sand and Boulders) in the flood plain of river Yamuna in the district Yamunanagar (Haryana) and Saharanpur (Uttar Pradesh) and all other villages situated on the bank of river Yamuna and rivers Kaluwala Rao, Solani and Badshahibagh Rao for a period of 45 days from the pronouncement of this Judgment.

2) For the same period, no screening plant/stone crusher would be permitted to operate in the entire district of Saharanpur in Uttar Pradesh and Yamunanagar in Haryana.

3) We constitute the following High Powered Committee to submit a report to the Tribunal in accordance with these directions:

   (i) Secretary, Ministry of Environment, Forests and Climate Change will be the Chairperson.

   (ii) Secretary, Department of Environment and Minor Minerals of the State of Uttar Pradesh and similarly Secretary, Department of Environment and Minor Minerals of the State of Haryana.

   (iii) Member Secretary, Central Pollution Control Board.

   (iv) Member Secretaries of Haryana State Pollution Control Board and Uttar Pradesh Pollution Control Board.

   (v) Director of Mining, State of Uttar Pradesh and the State of Haryana.

   (vi) Deputy Commissioner and Superintendent of Police of District Yamuna Nagar (Haryana) and Saharanpur (Uttar Pradesh).

   Both the States of Haryana and Uttar Pradesh would submit complete and comprehensive mining plan (CMP) in consonance with the Act of 1957, Rules of 1960, the provisions of the Rules of 1963, Rules of 2012 and Notification of 2006 to this High Powered Committee within 2 weeks from the date of the judgment. This plan shall provide *inter-alia*, but specifically:

a) The methodology, which could be followed for permitting mining on the river bed and conditions which should be imposed.

b) It should also provide a complete mechanism for establishing check posts to ensure that there is no illegal transportation of mined minerals in these areas.

c) No overloading should be permitted.

d) Mining activity (if at all permitted) should be carried out in a semi-mechanized and scientific manner or entirely non-mechanized manner.

e) All other facets of extraction of minor minerals, mining, transportation and utilization of these minerals should be strictly in an environment-friendly manner.

4) In the event both the State Governments, State Boards, MoEF and other concerned parties are able to bring in force a complete regulatory regime and mechanism for ensuring on one hand, regulated and controlled mining in accordance with law, while on the other hand ensuring that there is no illegal and unauthorized mining or transportation of these minor minerals, the mining would be permitted after 45 days, subject to such orders of the Tribunal. During these 45 days, if any person is found to be violating these directions and carrying on mining of these minor minerals, mechanically or otherwise, their transportation and utilization thereof, such person responsible would be liable to pay Rs. 5 lakhs as environmental compensation for each such event. The vehicles, machines/plants used for this purpose, in violation to order of the Tribunal, would be liable to be seized.

5) The report should also specifically deal with as to how both the States would create an interstate mechanism to stop illegal extraction and transportation of minor minerals completely.

6) The Committee shall also define the closed season for carrying on of mining activity and the stretches of the river which should be preserved, delineated and excluded from mining, being turtle nesting zones.

7) The comprehensive mining plan and a comprehensive report stating the extent of illegal extraction of minor minerals, their impact on the environment, ecology and particularly, on river Yamuna and recommendations for restoration thereof shall be submitted by each of the State to the Committee within the afore-stated period.

The High Powered Committee would examine the same in accordance with Rules and laws in force and submit the final report to the Tribunal within 3 weeks after that.

8) The report will also examine the recommendations of the States regarding the above and express its opinion. Restrictions, limitations and financial liability that should be fastened upon these private parties for the violations and defaults in the past as well as the cost of restoration and the steps required to be taken for restoration of the ecology and biodiversity, particularly, concerning the flood plains of river Yamuna should be stated.

9) Upon receipt of the report, the same shall be placed before the Tribunal for final directions.

10) The operators of mines and stone crushers who have been operating without the consent of the State Boards, violating the laws, operating without EC, operating in violation of the conditions of the EC and operating without consent of the CGWA or any other Competent Authority as well as causing air and water pollution and have degraded and damaged the environment, ecology and biodiversity particularly, with reference to river Yamuna and its bed, and affected the lives of the residents of various villages, falling under these Districts on the bank of river Yamuna. Given the indisputable fact that nearly 2, 40,704 cubic meters of mined minerals were illegally extracted and transported, the private respondents and notices are liable to pay Environmental Compensation.

1.1.5 NGT order para 7: Study of impact of mining on environment and ecology of the Yamuna and recommendation for restoration

The para 7 of the NGT order dated 18th February 2016 specifically requires preparation of comprehensive mining plan and a comprehensive report stating the extent of illegal extraction of minor minerals, their impact on the environment, ecology and particularly on river Yamuna and recommendation for restoration thereof to be submitted by each of the states to the committee. The High Powered Committee would examine the same in accordance with rules and Laws and submit the final report to the Tribunal within three weeks after that.

Given the above, the Ministry of Environment, Forest, and Climate Change vide letter F. No. L-140/2013-IA-II(M) dated 12th August 2016 and further letter No. 11011/140/2013-IA-II(M) dt. 18.8.2016 requested Forest Research Institute Dehradun for undertaking the study

on **Assessment of ecological damage and preparation of restoration plan for the illegal mining sites of minor minerals in Saharanpur district, of Uttar Pradesh.**

Accordingly, FRI Dehradun has carried out this study with WII input on faunal aspects of the ecological damage and its restoration.

1.2 A River: More than a watercourse

A River is much more than just the water flowing inside it. Water is just one component among several interdependent components and links in the river ecosystem. The water, rocks, sediment, and living organisms inside the river are intrinsically connected. Rivers are the fundamental components of landscape and lifescape. These complex systems of flowing waters drain through specific land areas and have evolved through multiple and complex interactions of geological, geo-morphological, climatic and hydrological processes.

1.2.1 River as an ecosystem

Rivers provide habitat for many biotic communities all along their courses. The longitudinal changes in community structure within a river system reflect differences in the capacity of various species to tolerate the changing physical and chemical conditions along with differences in food resources, predators, and competitors in the system. River flow determines many of the land-life systems' key features and transports particulate and dissolved materials in the form of sediments from land to ocean.

A river ecosystem consists of interrelated living and a non living environment. Flow or hydrology is the central driving force of river ecology. These are heterotrophic; a substantial proportion of the biotic energy that drives stream communities is organic matter derived from allochthonous sources (originating somewhere else). The studies have shown that the lotic ecosystems are longitudinally interdependent and that energy processing depends on the retention and cycling of nutrients by biological communities in upstream areas.

From a biological point of view, flowing water has a number of advantages over still water. It is constantly mixed up by turbulence providing nutrients, exchange of respiratory gasses, and removal of wastes. Lotic water is fundamental for the downstream and lateral movement of plants and animals. However, the character of flow changes from the headwater to the river mouth and this leads to a characteristic zonation in the biota of rivers. In Floodplain Rivers, the recession of the annual flood delivers high levels of dissolved organic carbon and detritus (wood, leaves, seeds, etc.) to the main channel. This lateral connectivity is so important for sustaining the integrity of large floodplain rivers.

1.2.2 Influence of channel morphology in river ecology

The morphology of a river channel results from the movement of water and sediment in relation to the material locally available in the bed and the banks. Hydraulic and morphological variability through space and time determine the different habitats found both within a given river channel and also in the adjacent riparian and floodplain zones. Channels change in a variety of ways through the processes of erosion and deposition. Surface runoff and sediment load may be expected to change in response to land use alterations such as deforestation, agriculture, grazing, urbanization and other influences. However, a change in the discharge and sediment load rarely produces an immediate response but instead initiates a change, or sequence of changes, which may extend over a long period. Pools, riffles, and bars are composed of different bed-load materials which provide environments for a variety of benthic organisms.

1.2.3 Human interventions on river environment and threats

Today, the dynamics of river systems are affected significantly by human interventions either within the catchment or directly within the river corridor. Disturbances like erosion and abrasion, siltation and burial, desiccation and extremes of water quality play a critical role in organizing communities and ecosystems. Ecologically and geo-morphologically, running waters are ever-changing systems. It is often implicitly assumed in fluvial geomorphology that, given sufficient time between disturbances or environmental changes, a fluvial system will reach a state of adjustment with a characteristic form, and that a dynamic steady-state will be maintained. In many cases, streams do maintain dynamic steady-state equilibrium, but many do not, either because they are too frequently disturbed, or they are inherently unstable. There is no evidence that stable, steady static equilibrium stream channels or fluvial systems are notably more widespread or more "normal" than non-equilibrium states.

River regulation by dams, diversions, channelization and other physical controls, resource extraction including sand and gravel, etc., has significantly altered majority of the Rivers. The physical, chemical and biological characteristics of rivers suffer from these effects. In addition to directly altering river flow, anthropogenic activities transform the landscape through which the river flows. Erosion delivers more sediment to the river channel, with detrimental effects on the in-stream habitat. Removal of riparian vegetation leads rise in temperature of overlying waters, shift from heterotrophy to autotrophy, reduced bank stability, and loss of the natural capacity to prevent sediments and nutrients from reaching

river channels. Anthropogenic activities also enhance the quantity of chemical wastes entering rivers, both from agricultural and urban sources.

Human impacts on river ecosystems may vary in character, and the way in which they are mitigated or resolved depends on whether they are 'planned' or 'unplanned'. 'Planned impacts' are usually direct, quickly felt effects, such as land use change or in channel changes by construction and / or mining activities. Clear-felling of forest cover on slopes close to channel margins may increase the quantity and speed of overland flow. Construction of bridges and check dams modifies local flow behaviour in channels, causing scour of adjacent bed and bank sediments. Construction of large impoundments as well as large-scale river bed mining is the most radical forms of human impacts. Although this form of intervention can exert long-term effects, most of them are, in principle, reversible, or at least amenable to mitigation. Channel works can be removed or redesigned; land use change can be reversed. 'Unplanned effects' are usually delayed in their onset, are often more difficult to identify, and may be cumulative. Protection and restoration of rivers from anthropogenic disturbances are the need of the hour. Rivers have considerable ability to recover from 'pulse events', such as chemical inputs from an accidental spill or a point source. Unfortunately, the most serious threats like sand and gravel mining, channelization and other forms of regulation are essentially continuous, or 'press events'. These require much more effort to address, and one hopes that the principles of ecology and geomorphology will have to be considered / viewed seriously while designing conservation and management strategies to these life-sustaining systems.

1.2.4 Components of river corridor

The fundamental component of river corridor is the riverbed, flood plain and transition upland fringe as the riparian zone. Riverbed is naturally lowered landform usually used as a passageway for flowing water. The next component is the floodplain – this is the neighboring part of the riverbed, flooded by high water at different intervals varying from very often to seldom. The floodplain may be situated on either one or both river banks, depending on relief. The transition upland fringe comprises the riparian zone. It begins above the floodplain and forms the frontier between the river corridor and the adjacent landscape.

1.2.4.1 Riverbed

The shape and size of the riverbed are defined by the equilibrium of the energy of the water stream (slope and water velocity) and the resistance of substratum (particle size of the sediment and its runoff). If we illustrate this on a scale where we have the sediments on one side, and the water energy on the other, every decrease in the water energy will result in smaller sediment particles and in the widening of the riverbed. Riverbed material chiefly determines the morphology of the river. It represents the sediment eroded from upstream, their transportation and deposition on river floor at downstream. It can be composed of boulders, coarse and/or fine materials.

1.2.4.2 Floodplain

The floodplain is theoretically divided into two parts: hydrologic floodplain and topographic floodplain. The hydrologic floodplain is an area inundated about two out of every three years. The topographic floodplain includes the hydrologic floodplain up to the altitude reached by a flood peak of given frequency every 100 to 500 years). The topographic floodplain is used in spatial planning and development, and all the activities therein must consider the risk of flooding. For instance, no human settlements or important infrastructure facilities should be developed in the floodplains. The floodplains, especially those downstream, are dynamic systems with many various components that undergo a continuous process of formation or disappearance

1.2.4.3 Riparian zone

This is a very important component of the river corridor, and its ecosystem significance is even higher. Riparian vegetation plays an important role in riverbank consolidation and prevention of coastal erosion. Various riparian species protect against erosion. The roots of riparian vegetation also serve as a filter that "swallows" most of the nutrients dissolved in groundwater before reaching the river. Vegetation in catchment basins considerably slows down rainwater runoff to the river, thus decreasing the risk of a high tide. The abundant vegetation controls evaporation from earth surface and keeps groundwater near the surface. Thus riparian zone plays a significant role in the restoration of river banks, its conservation and checking soil erosion.

Riparian zones form the interface between aquatic and terrestrial systems along inland watercourses. They have a disproportionate ecological role in the landscape considering their narrow extent, which makes them a good example of small natural features. The best

practices for conservation of riparian zones have mostly focused on manipulating biotic and physical components like re-naturalizing flow regimes, improving channel mobility, and controlling invasions of exotic ecosystem engineer species. However, these strategies face important technical, socio-economic, and legal constraints that require a more integrative approach to effective conservation.

In recent year, Yamuna's riparian zone has been threatened as never before due to changed land using practices causing deterioration of zone

Aquatic and riparian vegetation are vital for a healthy and sustainable river ecosystem. Riparian vegetation plays an inevitable role in checking soil erosion and maintains river water quality. The importance of aquatic plants to organisms especially fishes are water purification, nutrient recycling, the physical link between water and air for many invertebrates, refugia for zooplankton which graze phytoplankton, cover for the huge range of invertebrates, food source, affects flow patterns, the creation of discrete habitat structure, etc. The riparian vegetation along the river banks is a unique habitat, existing in a mutual balance with the channel. Characteristically, riparian zones increase species richness in the landscape and provide key services to society, such as soil fertility, water purification, and recreation. Despite the recognized importance of riparian zones for ecological, economic and social reasons, and the vast amount of scientific literature exploring measures for their conservation, current management is still failing at enabling a proper ecological functioning of these areas.

1.3 River-bed material mining

River sand and gravel are generally mined from alluvial deposits — both from active channels river bed and flood plains/overbank areas. Mining of sand and gravel from active channels is referred to as in-stream mining and mining from overbank areas in the lowlands as floodplain mining. The term terrace mining (or land sand mining) is often used synonymously with floodplain mining. Mining of sand is also reported from abandoned river channels (palaeo-channels) of the rivers as well.

1.3.1 Instream mining

Instream sand deposits are easily accessible, well-sorted, and generally free from fine particulates such as silt and clay. Hence, it is extensively used in construction industry for concrete preparation and plastering. Different methods are adopted to extract sand from the active channels of river systems. The commonly adopted practices are (i) pit excavation and

(ii) bar skimming (also known as bar scalping). Pit excavation can be classified further into the dry pit and wet pit mining. Dry pit mining refers to mining of sand from dry ephemeral stream beds by manual or mechanical methods using conventional bulldozers, scrapers, and loaders. Wet pit mining requires the use of a dragline or hydraulic excavator to extract sand and gravel below the water table level or within a perennial stream itself. If the water is shallow, mining is carried out manually. In some cases, high power jet pumps are used for the extraction of sand from wet pits and river channel. Bar skimming involves scraping off the top layer (of variable thickness) from a gravel bar without excavating below the summer water level. Bars are temporary storage features in which sand and gravel pass through. Controlled bar skimming is a recommended sand extraction method in most of the developing countries as a means of achieving stream resource conservation while sustaining the mining industry. Bar skimming is somewhat a controlled type of sand extraction. Usually, bar skimming is done above the water table and within a minimum width buffer that separates the excavation site from the low flow channel and the adjacent active channel bank.

1.3.2 Floodplain mining

Floodplains and terraces (older floodplains) are the sites of sediment storage in river systems and can contain large quantities of sand and gravel. Floodplain mining pits often extend below the water table, which can provide a convenient water source for separating desired particle sizes from the excavated materials. The deep pits left after floodplain mining often coalesce due to the collapse of the separating boundary walls of the pits. Under high flow regimes of monsoon, some of the pits can even be captured by the river ultimately leading to valley widening and disfiguration of the natural channels. All these processes not only change the aesthetics of floodplain areas of the river but also impose tremendous pressure in the geo-environmental and socio-economic settings of the region.

1.4 Impact of river-bed mining: Scientific insights

1.4.1 Impact on geomorphology and hydrology

Sand mining disturbs the equilibrium of a river channel because it intercepts material load moving within a dynamic system and triggers an initial morphological response to regain the balance between supply and transport. Habitat alteration is also inevitable when morphological adjustments take place. The extent of these effects depends on the type and scale of sand extraction, the channel's resistance to erosion, and watershed differences in hydrology and sediment transport. The various effects of sand mining on the river bed geomorphology and hydrology are discussed below:

1.4.1.1 Changes in bed forms

River channels transport sediments and water from headwaters to its mouth. They are built up and maintained by erosion and deposition of sediments during river flows. Water current velocity varies from one part of a given cross section to another. Most rivers experience a wide range of flows along its river course. In relatively undisturbed river systems a condition known as dynamic equilibrium exists where gradual erosion of outside bends of river meanders and deposition of eroded material on inside bends occurs. A dynamic equilibrium is formed within the alluvial channels (i) the quantity of sediment, (ii) particle diameter or size of the sediment, (iii) water discharge and (iv) slope of the stream. If any one of these four variables is altered, the river loses its equilibrium, ultimately leading to channel instability. Channel stability in a given river reach occurs from a delicate balance among river flow, channel form, the influx of sediment from the watershed and loss of sediment to downstream reaches.

Instream mining can result in channel instability through the direct disruption of pre-existing channel geometry or through the effects of incision and related undercutting of banks. Mining aggravates widespread instability because the discontinuity in the sediment supply-transport balance tends to migrate upstream as the river bed is eroded to make up for the supply deficiency. Thus sand mining from a relatively confined area triggers erosion of bed and banks, which in turn, increases sediment delivery to the site of original sediment removal. Bed degradation is caused by pit excavation and bar skimming, the two general types of sand mining. Bed degradation occurs through two primary means: head-cutting and “hungry” water effects.

In the first, excavation of a mining pit in the active channel lowers the stream bed, creating a nick point that locally steepens channel slope and increases flow energy. During high flows, a nick point becomes a location of bed erosion that gradually moves upstream through head-cutting. Head-cutting mobilizes substantial quantities of stream bed sediments that are then transported downstream to deposit in the excavated area and locations further downstream. Headcuts often move long distances upstream and into the tributaries. Of the two forms of bed degradation, head cutting is more recognizable in the field and represents a greater risk to aquatic resources.

1.4.1.2 Toe cutting and bank erosion

Indiscriminate sand extraction from the river beds often aggravates bank erosion incidence. Mining reduces the strength of river banks and resistance to erosion by enlarging channel cross sections and by damages to bank integrity and riparian vegetation at access points.

1.4.1.3 Turbidity and water quality

Wash-water discharge, storm runoff, and dredging activities from improper sand and gravel operations cause re-suspension of sediments and increase the turbidity of streams. Turbidity is greatest at dredging sites or wash water discharge points. Turbidity decreases with distance downstream and can be controlled by containing runoff and by filtering or containing wash water. Water temperature and dissolved oxygen of streams can be changed if in-stream mining reduces water velocity or spreads out the flow over shallow areas. Changes in some situations are local in nature and subtle.

Also, the water quality is greatly impacted due to stockpiling and dumping of excess mining materials and organic particulate matter, and oil spills or leakage from excavation machinery and transportation vehicles. Increased riverbed and bank erosion increases suspended solids in the water at the excavation site and downstream. Suspended solids may adversely affect water users and aquatic ecosystems. The impact is particularly significant if water users downstream of the site are abstracting water for domestic use. Suspended solids can significantly increase water treatment costs.

1.4.1.4 Groundwater depletion and contamination

Apart from threatening the geo-morphology and engineering structures like bridges, sand mining transforms the riverbeds into large and deep pits. As a result, the groundwater table drops leaving the drinking water wells on the embankments of these rivers dry. Bed degradation from instream mining lowers the elevation of stream flow and the floodplain water table which in turn can lower flow depth, and a bar skimming operation increases flow width. Both conditions produce slower stream-flow velocities and lower flow energies, causing sediments arriving from upstream to deposit at the mining site. As stream-flow moves beyond the site and flow energies increase in response to the "normal" channel form downstream, the amount of transported sediment leaving the site is now less than the sediment carrying capacity of the flow. This sediment-deficient flow or "hungry" water picks up more sediment from the stream reach below the mining site, furthering the bed degradation process. This causes shallowing of the streambed, producing braided flow or

subsurface inter-gravel flow in riffle areas, hindering movement of fishes between pools. Channel reaches become more uniformly shallow as deep pools fill with gravel and other sediments, reducing habitat complexity, riffle-pool structure, and numbers of large predatory fishes. The deep mining causes the water infiltration into ground water table without filtering the impurities by the overlying earth hence increasing the probability of groundwater contamination.

1.4.2 Impact on ecology

1.4.2.1 Riparian habitat, flora, and fauna

The impact of instream mining goes much beyond the immediate mine sites. Many hectares of fertile land, valuable timber resources and wildlife habitats in the riparian areas are lost. Degraded stream habitats result in loss of fisheries productivity, biodiversity, and recreational potential. Severely degraded channels lower the land and aesthetic values. All species require specific habitat conditions to ensure long-term survival. Factors that increase or decrease sediment supply often destabilize bed and banks and result in dramatic channel readjustments affecting the life forms living there and the habitat developing process. Furthermore, movement of unstable substrates results in downstream sedimentation of habitats. The affected distance depends on the intensity of mining, particles sizes, stream flows, and channel morphology. The complete removal of vegetation and destruction of the soil profile destroys habitat both above and below the ground as well as within the aquatic ecosystem, resulting in the reduction in faunal population. Channel widening condition continues until the equilibrium between input and output of sediments at the site is re-established.

1.4.2.2 Biological environment

The environmental impact due to dredging stem from the suspension of sediment themselves and the release of pollutants from the disturbed sediment. Thus, dredging induced suspensions can perturb water quality and affect local biota. The operational design, scale, and duration of activity are significant factors since each material handling phase - extraction, transport, and emplacement can generate undesirable effects. While the direct environmental impacts associated with offshore dredging are due to the massive displacement of the substrate and the subsequent destruction of non-motile benthic communities, the resulting indirect impacts are more subtle and can escape recognition by an untrained person. They include:

a) Restriction of feeding and respiratory efficiencies and induced mortalities in bottom- dwelling biota as a result of the smothering effect of sedimentation;

b) Reduction of the primary productivity (photosynthesis) due to turbidity in the water column;

c) Introduction of abnormal volumes of organic material and nutrients, thus increasing the biological oxygen demand (BOD), which in turn reduces oxygen levels and productivity;

d) Reintroduction of toxic substances uncovered by mining activities;

e) Inadvertent destruction of the adjacent habitat critical to the life cycles of certain organisms.

f) Disruption of migratory routes of motile organisms.

1.4.2.3 Destruction of riparian vegetation

Caused by heavy equipment, processing plants and gravel stockpiles at or near the extraction site. Heavy equipment also causes soil compaction, thereby increasing erosion by reducing soil infiltration and causing overland flow. Disturbing the natural hydraulics of the riparian zone during infrequent elevated flow levels (1 in 3 or 5 year events). Caused by temporary bridges and mounds of soil overburden and sand. In such cases water, with important nutrient and silt loads, may be prevented from being deposited on riparian terraces downstream of the disturbance. This can significantly impact on the recruitment of certain species which are reliant on these events for their long-term persistence on these terraces. In other words, a generation of recruitment may be lost causing a gap in the population structure which can be exploited by other species, commonly exotics.

1.5 Effect of Sand and Gravel Mining: MoEFCC Guidelines

The MoEF Guidelines of September 2015 have duly summed up the impacts of sand and gravel mining on the stream's physical characteristics, such as channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature, etc. Alteration or modification of the above attributes may cause a hazardous impact on the ecological equilibrium of the riverine regime as well as the adverse impact on in-stream biota and riparian habitats besides the changes in channel configuration and flow-paths.

The effects of sand and gravel mining are as follows

1) Extraction of bed material more than replenishment from upstream causes the bed to lower (degrade) upstream and downstream of the site of removal.
2) Bed degradation is responsible for channel shifting, causing loss of properties and degradation of the landscape, it can also undermine bridge supports, pipelines or other structures.
3) Excessive pumping of groundwater in the process of mining in abandoned channels depletes ground water causing scarcity of irrigation and drinking water. In extreme cases, it may create ground fissures and subsidence in adjacent areas.
4) Flooding is reduced as bed elevations, and flood heights decrease, reducing hazard for human occupancy of floodplains and the possibility of damage to engineering works.
5) The supply of overbank sediments to floodplains is reduced as flood heights decrease.
6) Rapid bed degradation may induce bank collapse and erosion by increasing the heights of banks.
7) Polluting ground water by reducing the thickness of the filter material especially if mining is taking place at the top of recharge fissures.
8) Choking of filter materials for ingress of ground water from river by dumping of finer material, compaction of filter zone due to movement of heavy vehicles. It also reduces the permeability and porosity of the filter material.

9) Removal of gravel from bars may cause downstream bars to erode if they subsequently receive less bed material than is carried downstream from them by fluvial transport.

10) In-stream habitat is impacted by increase in river gradient, suspended load, sediment transport, sediment deposition. Excessive sediment deposition for replenishment increases turbidity which prevents penetration of light required for photosynthesis and reduces food availability of aquatic fauna.

11) Riparian habitat including the vegetative cover on and adjacent to the river banks controls erosion, provide nutrient inputs into the stream and prevents intrusion of pollutants in the stream through runoff. Bank erosion and change of morphology of the river can destroy the riparian vegetative cover.

12) Degradation may change the morphology of the river bed, which constitutes one aspect of the aquatic habitat.

13) Degradation can deplete the entire depth of gravelly bed material, exposing other substrates that may underlie the gravel, which could, in turn, affect the quality of aquatic habitat. Lowering of groundwater table in the floodplain because of lowering of riverbed level as well as river water level takes place because of extraction and draining out of excessive groundwater from the adjacent areas. So, if a floodplain aquifer drains to the stream, groundwater levels can be lowered as a result of bed degradation.

14) Lowering of the water table can destroy riparian vegetation.

15) Ecological effects on bird nesting, fish migration, angling, etc.

16) Direct destruction from heavy equipment operation; discharges from equipment and refueling.

17) Bio-security and pest risks.

18) Impacts on coastal processes.

The other deleterious impacts of indiscrete mining include

1) Loss of riparian habitat resulting from the direct removal of vegetation along the stream bank to facilitate the use of a dragline or through the process of lowering the water table, bank undercutting, and channel incision.

2) The physical composition and stability of substrates are altered as a result of in-stream mining, and most of these physical effects may exacerbate sediment entrainment in the channel. Furthermore, the process of in-stream mining and gravel washing produces fine sediments under all flow conditions, resulting in a deposition of fine sediment in riffles as well as other habitats at low discharge.

3) Excess sediment is considered the greatest pollutant in waters and constitutes one of the major environmental factors in the degradation of stream fisheries.

4) In-stream mining may contribute additional sediment to downstream reaches due to the disruption of substrate stability. Once sediment enters the stream, it is best to let natural geo-morphological and hydrological processes reach a dynamic equilibrium, rather than further exacerbating the situation by additional disturbance.

1.6 The Yamuna Riverscape

From the origin of a river in the hilly regions up to the river mouth, a continuous change can be observed in the floral and faunal composition with the changing environmental parameters like altitude, humidity, soil, water flow and temperature. Rivers have a complex mosaic of habitat with meandering curves and riparian island which make the unique landscape in the river, known as Riverscape. The concept is used to describe the broad scale physical, biological and aesthetic nature of rivers. Riverine landscape indicates a holistic perspective of patterns and processes linking the river and its banks and its riparian zones within a fluvial system.

The river Yamuna, as shown in **Figure 1**, originates from the Yamunotri glacier situated at an elevation of 6387m above mean sea level near Banderpoonchh peaks (38° 59' N 78° 27' E) in the uppermost region of the lower Himalayas in Uttarkashi district of Uttarakhand. It is the westernmost and largest tributary of the river Ganges. In its first stretch of 170 km, it is joined by the Himalayan tributaries Rishi Ganga, Kunta, Hanuman Ganga, Tons, and Giri. In the plains, it is joined by the Hindan, the Rind, the Sengar, the Varuna, etc. on its left bank and the Chambal, the Sind, the Betwa and the Ken on its right bank which themselves originate from the Peninsular plateau. It joins the Ganga at Prayag (Allahabad) in Uttar Pradesh. In this journey through the States of Uttarakhand, Himachal Pradesh, Haryana, Delhi and Uttar Pradesh, it travels 1370 km. Much of its water feeds the western and eastern Yamuna canals and the Agra canals for irrigation purposes.

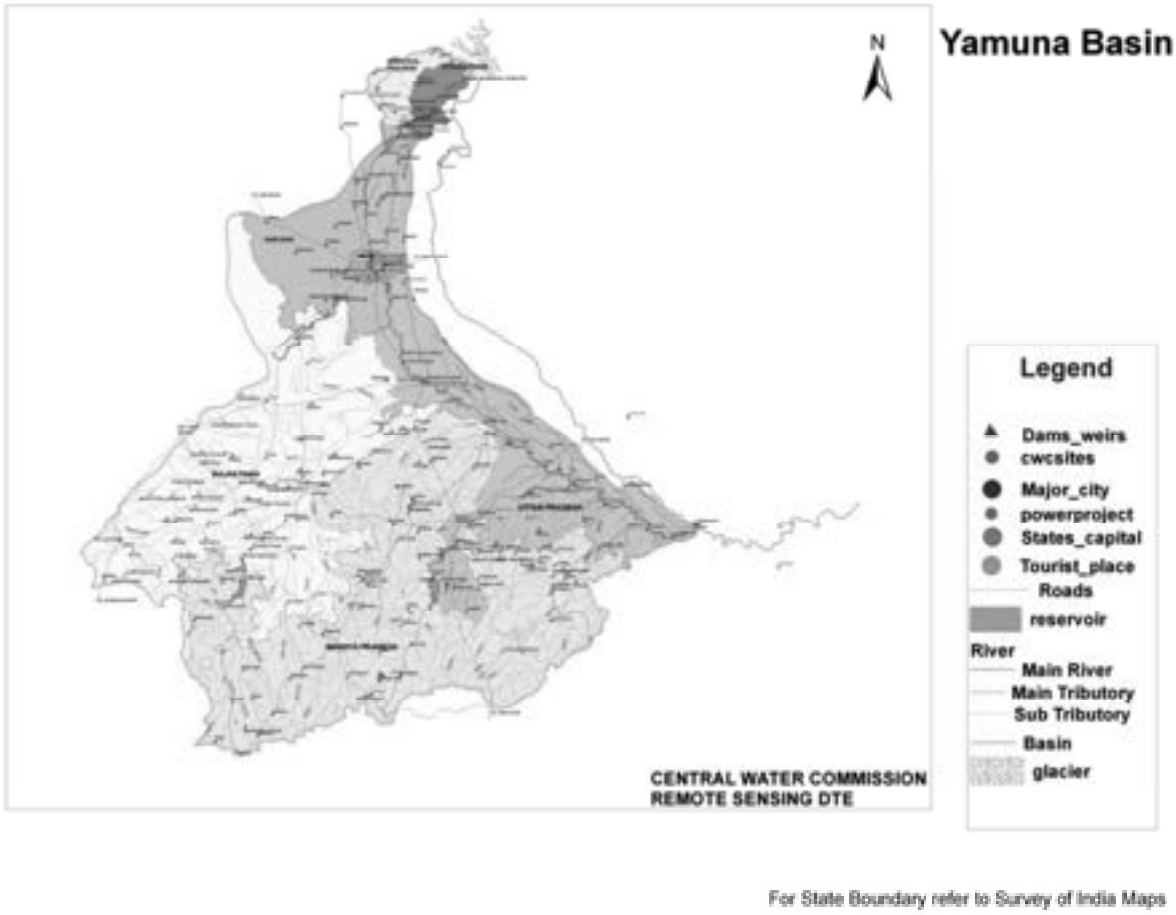


Figure 1: Yamuna basin

Emerging from the source, it flows through a series of valleys in lower Himalayas for about 200 Kms before entering the Indo-Gangetic plain at Dak Pathar. In the upper reaches, the main Yamuna valley is overlooked by numerous hanging valleys, carved by glaciers during the ice ages. In this part, the gradient of the river is steep and entire geomorphology of the valley has been influenced by the passage of the river. In this stretch, it draws water from several major streams. The combined stream flows through the Shivalik range of hills of Himachal Pradesh and Uttarakhand. The river descends onto the plain of Doon valley at Dak Pathar. Here, through the Dak Pathar barrage, the water is diverted into a canal for power generation. Little further down where the Yamuna is met by the Asan River, lies the Asan barrage which hosts bird sanctuary as well. After passing through the famous Sikh religious place at Poanta Sahib, it reaches Hathinikund/Tajewala at about 370m above MSL in Yamuna Nagar district of Haryana state, where the river water is again diverted into Western Yamuna Canal and Eastern Yamuna Canal for irrigation. During the dry season, the only environmental flow of 160 cusec is allowed to flow in the river downstream. The river

remains dry in some stretches between Tajewala and Delhi. The river regains water because of ground water accrual, contributions of feeding canal through Somnadi (seasonal stream) upstream of Kalanaur and through drain no.8 upstream of Palla. After traversing a route of about 224 km, it enters Delhi near Palla village at about 275m above MSL. The Yamuna forms part of the border between the states of Himachal Pradesh and Uttarakhand in its upper water course and between the states of Haryana and Uttar Pradesh in the plain. The Yamuna is popularly called as Jamuna in Uttar Pradesh state and northern India. It is a source of irrigation for Uttar Pradesh and Haryana states.

Another notable fact about the Yamuna is that it is the western frontier of the Indian elephant. There is no elephant in 900 Km of the western Himalaya or its foothills in the west of Yamuna. Sal, Khair, Sissoo trees and Shivalik Chir-pine forests comprise principal forests of the lower Yamuna and offer ideal corridors for elephant movement.

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2. RIVERBED MINING IN SAHARANPUR DISTRICT

2.1 Geographical Location

The district Saharanpur in the state of Uttar Pradesh, as shown in **Figure 2**, occupies the most north-westerly position in the Doab region which spans between the holy rivers of the Yamuna in the west adjoining Yamunanagar district of Haryana and the Ganga in the east in Haridwar district of Uttarakhand.

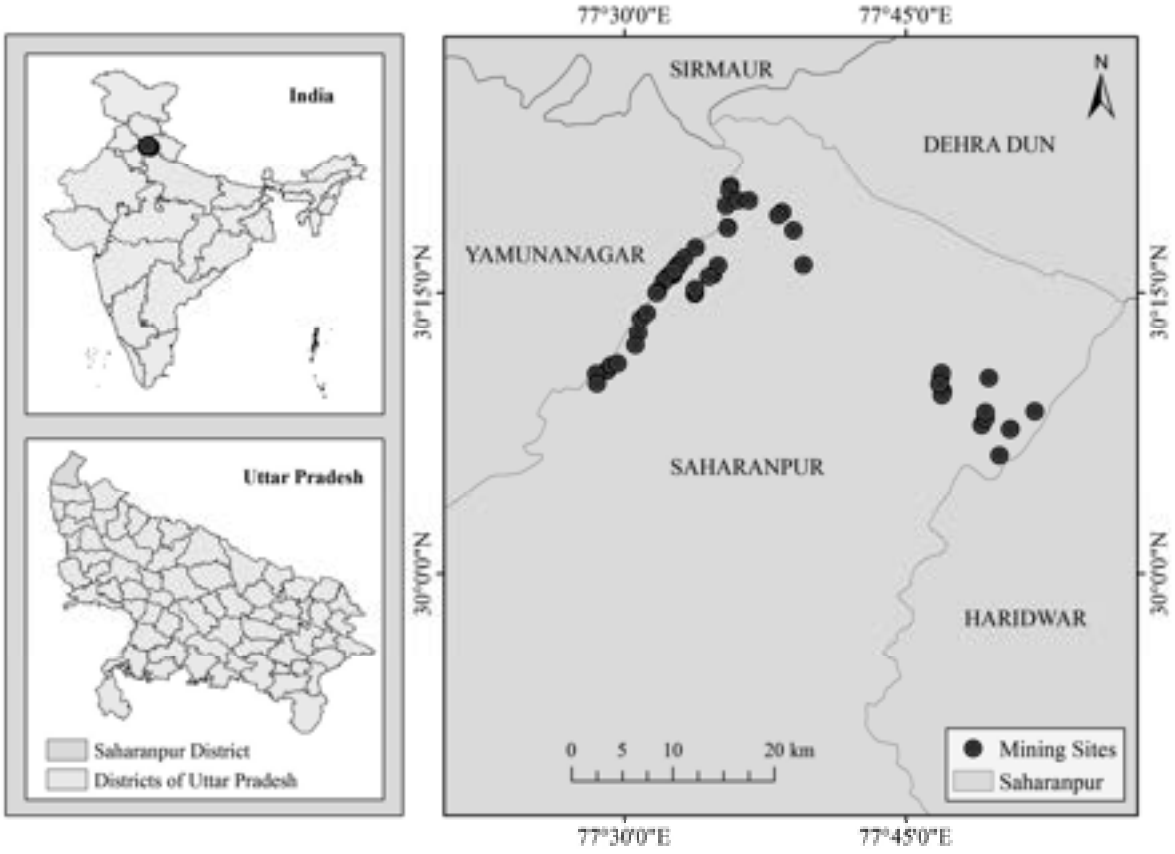


Figure 2: Location of the mining area in Saharanpur district

The portion of the Doab in which Saharanpur is situated was probably one of the first regions of upper India occupied by the Aryans Colonizers as they spread eastward from the Punjab. Geographically District Saharanpur lies between latitude 29°34′ - 30°24′ N and longitude 77°7′ - 78°12′ E encompassing a geographical area of 3860 sq. km. The district is bounded by the state of Uttarakhand in the North and East, state of Haryana in the West, and by Muzaffarnagar and Bijnor districts in the South. A large part of the district is situated in the Shivalik foothills. The district has Shivalik hills and Foothill rolling plain in the North and North-East, and floodplain along the Yamuna River in the West and South-West. The important rivers/streams of the district are Yamuna, Solani, Hindon, Sukha Rao, Kothari Rao, Kaluwala Rao, Badshahibagh Rao etc. By and large river the Yamuna acts as a natural

boundary between the State of Uttar Pradesh and Haryana. The district Saharanpur is primarily an agricultural district roughly 70% of the land is under agriculture use. Therefore agriculture plays a major role in the economy of the district.

All rivers/drainage systems in the district Saharanpur other than river Yamuna are seasonal rivers. At Hathnikund barrage, the water of river Yamuna is also diverted partly towards Uttar Pradesh and Haryana through different Canal Systems for irrigation purposes, after which very low flow remains in the river downstream of the barrage, particularly during the lean season. During the rainy season, water is fully released in the main river from *Hathnikund* barrage which at times causes floods downstream.

2.2 Geology and Mining

The region does not have much potential in mineral resources except river bed minerals. Boulders of Limestone and Sandstone found in the river bed are the only main minerals. Limestone is found in the Shivalik hills. Stones are hard enough to be used for building purposes and are found in Shivaliks while stone for road metal is found in the beds of Solani, Hindon and Sukha Rao streams. The saline effervescence which is known by the name of Rah is found in the low-lying tracts and the canal irrigated areas.

River Sand, Bajri, and Boulders found in the river bed is an alluvium deposit formed as a result of transportation of the same from the upstream side as far as back from where the river originates and carried along the eroded bed and side materials along its course. So, these sediments are river-borne and got deposited along the course of the river bed and its flood plains with bigger sized fraction at the floor with graded and lighter/ smaller fraction as upper layers.

The sequences of formation observed with varying thickness are as follows:

g) Silt (inseparable from the main body of sand)

h) Sand (1 mm to 3 mm size)

i) Bajri (3 mm to 6 mm size)

j) Boulders (Large size)

The depth extension of deposit is more than 5m as judged from a trial pit. The southern part of the district is flood plain area and mainly comprises of alluvial soil.

Mining of riverbed material (RBM) or minor minerals in the river bed of Yamuna in district Saharanpur has been in the news for last few years. Mining of Sand, Bajri and Boulders is being done since a long time. River-borne sediments are deposited all along the river-bed and are very well exposed on the surface.

River Bed Material (RBM) is obtained through the deep excavation of materials from the river bed. There are numerous methods to extract River bed Material from river bed/stream including extraction with conventional earth moving types of equipment and channel dredging etc. The method chosen commonly depends on the nature of the deposit. In the part of Saharanpur district, River Bed Material is commonly excavated by conventional earth moving types of equipment mainly using JCB machine.

The mining of river bed materials has a direct bearing on river bed instability as gravel acts like armor for the river bed. Mining activities lead to changes in the form of river flow, physical habitats, and food webs. Riverbed mining has also been shown to have a variety of other effects such as changes in local water table and a decrease in sinuosity through meander cut off. It can also result in the alteration in fluvial characteristics of the river channel. Over-extraction of RBM can destabilize channel and banks, and/or affect the ecological functioning of river particularly if undertaken at the wrong time or in wrong place or in a way that damages the river bed or margins.

The material deposits are found in villages of the districts located along the river or in the flood plains and abandoned water courses or drains. The deposits are also found in the foothills of the hilly terrains.

2.3 Geo-technical Aspects

Nature of river bed and alluvial sand

The lease areas which are allotted for mining in the regular course of the 11 tributaries get flooded in the rainy season. All the deposit comprises sand at upper most level. The sand is surrounded by boulders discoid in shape having a smooth surface. The thickness of deposit varies up to 5m from ground level.

During monsoon, the river beds are replenished to a large extent due to erosion by heavy flow in higher reaches, and as soon as the stream reaches in channel downward, they shed their loads in river banks due to the decrease in velocity and carrying capacity.

The area is dominated by medium to fine sand. Geologically the area comprising of Terrace alluvium deposited in depositional terraces of old rivers & the Alluvium may be differentiated into Older Alluvium consisting of oxidized (brown, yellow and Khaki colour) sediments and Newer Alluvium is comprising of un-oxidized (gray and khaki colour) sediments. The grains are sub-angular, and the angularity of the grains of this category of sand decreases with depth.

2.4 Policy and Plans

2.4.1 State mining policy

Section 15 of MMDR Act 1957 empowers the respective State Government to make rules for regulating the grant of quarry leases, mining leases or other mineral concessions in respect of minor minerals. In exercise of the powers conferred by subsection (1) of section 15 of the Mines and Minerals (Regulation & Development) Act, 1957, the Government of Uttar Pradesh has made the Uttar Pradesh Minor Mineral Concession Rules 1963 in respect of minor minerals. The rules provide three ways of mineral concession for river bed minor minerals such as Sand, Bajri, Boulder namely (i) Mining lease (ii) Auction Lease and (iii) Short term mining permits**.**

2.4.2 Recent policy environment

In the year 2002 vide G.O. 1560/77-5-2002-461/2000 dated 02.11.2002 State of U.P. decided for auction lease policy. In the year 2004 vide G.O. 5667/77-05-2004-08 (204)/95TC dated 16.10.2004, State of U.P. adopted mining lease policy**.** Further in the year 2012 vide G.O. 1277/86-2012-278/2011 dated 31.05.2012 State of U.P. brought auction lease policy again by e-tender method, but due to several orders of the Hon'ble High Court, no lease could be finalized by e-tender. Then vide G.O. 3210/86-2014-278/2011 dated 22.10.2014 mining lease policy was adopted by the State of U.P under a new rule 9A which has been inserted by 37th amendment dated 22.10.2014 in U.P Minor Mineral Concessions Rules 1963. In rule 9A selection of the applicant for lease is made on the basis of highest one-time premium amount offered by the applicant and in addition to this premium amount, dead rent/lease amount or royalty is paid for the quantity of mineral excavated and removed. In writ petition No. 1498/2015 Gulab Chand Mishra V/s State of U.P., Hon'ble High Court vide its order dated 03.04.2015 said that Rule 9A to be bad in law. Further State of U.P. has filed a Special Leave Petition 14578/2015 State of U.P. V/s Gulab Chand Mishra and Others before the Supreme Court, which is yet to be decided.

Thus since 2012, no lease could be granted in the State of U.P. for the reasons stated above.

2.4.3 Comprehensive Mining Plan: Safeguards for potential mining impacts

The State of UP has prepared a 'Comprehensive Mining Plan' (CMP) in compliance with the Hon'ble NGT order dated 18th February 2016. In clauses 6.6, the CMP duly highlights the potential impact of sand mining on geo-morphology, hydrology, and ecology. In clause 6.7 it describes the necessity of proper identification of mining areas by detailed survey and notification of available areas for granting a lease as reproduced below:

"6.6 Sand is naturally occurring granular material composed of finely divided rock and mineral particles between 0.06 mm to 2 mm in diameter. Sand is formed due to weathering of rocks due to mechanical forces. In the process, the weathered rocks form gravel and then to sand. Mining within or near riverbed has a direct impact on the stream's physical characteristics, such as channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature, etc. Alteration or modification of the above attributes may cause a hazardous impact on the ecological equilibrium of riverine regime. This may also cause an adverse impact on in-stream biota and riparian habitats. This disturbance may also cause changes in channel configuration and flow-paths.

6.7 The Uttar Pradesh Minor Minerals (Concession) Rules, 1963 has elaborately described the steps to be follow for permitting the mining on the river bed. To allot any mining lease on the river bed primarily it is taken care by detailed survey to ensure the identification of areas of accreditation/deposition where mining can be allowed; and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited. After pointing out the potential and available mining lease areas which can be granted the respective district administration publish notification of available mining areas which can be allotted only to the Indian citizen and No mining lease shall be granted to any person who is not an Indian National."

2.4.4 Conditions to be imposed

The 1963 Rules as quoted in condition b), e), g) and k) of the CMP as reproduced below, provide safeguards for the ecology of the area.

"(b) As per the provision of Rule 41 (g) of UP Minor Mineral (Concession) Rules, 1963, the lessee is bound to keep vigilance for not polluting the environment of the leasehold area and the nearby area in connection with mining operation and also maintain the ecological balance of the area. If at any time it is found that the mining operation is leading to environment pollution or imbalance of ecology, then after giving an opportunity of being heard the lease may be prematurely terminated.

e) As per the provisions of Rule 34(4) of UP Minor Mineral (Concession) Rules, 1963, mining operation shall in respect of sand or murram or bajri or Boulder or any of these in mixed state exclusively found in river bed be undertaken in accordance with the mining plan, detailing yearly development schemes, aspect of reclamation and rehabilitation of mined out area including progressive mine closure scheme duly approved by the Director. Provided that the lessee shall start the mining operation after obtaining environmental clearance if required under the provisions of the Environment Impact Assessment Notification, dated September 14, 2006, issued by the Ministry of Environment & Forests, Government of India as amended from time to time. As per the Provisions of Rule 34(6), financial assurance has to be deposited by the lessee at the time of the execution of the lease at the rate of Rs. 25000 per acre that to minimum Rs. 2.00 lakh to ensure the undertaking for reclamation and rehabilitation of the area.

g) As per the provisions of Rule 17(1) of UP Minor Mineral (Concession) Rules, 1963 when a mining lease is granted, arrangement shall be made by the Director for survey and demarcation of the area granted under the lease and then as per Rule 35 the lessee shall after the survey and demarcation of the area granted under the lease and before executing the lease deed, at his own expense, erect and at all times maintain and keeping good repair boundary marks and pillars necessary to indicate the demarcation shown in the lease deed.

k) Mining will be restricted minimum 7.5 m away (inward) from river bank but up to 10% of the width of river whichever is higher as a safety barrier to minimize the effect of river bank erosion and to avoid consequent channel migration. Plantation will be done on the side of bank along the side of lot area to prevent soil erosion and to get as a noise/dust arresters."

2.4.5 Reclamation and Rehabilitation

As per the provisions of Rule 34(4) of UP Minor Mineral (Concession) Rules, 1963, mining operation in river bed are supposed to be undertaken in accordance with the mining plan, detailing yearly development schemes, aspect of reclamation and rehabilitation of mined out area including progressive mine closure scheme duly approved by the Director. Thus, every mining lease has its own individual mining plan including reclamation and rehabilitation plan, and Lessee is bound to reclaim and rehabilitate the area after mining. As per the Provisions of Rule 34(6), financial assurance has to be deposited by the lessee at the time of the execution of the lease at the rate of Rs. 25000 per acre that to minimum Rs. 2.00 lakh to ensure the undertaking for reclamation and rehabilitation of the area. However, a general view of the reclamation and rehabilitation of the area is detailed here. As mentioned in para **8.2** of the CMP, Sand mining disturbs the equilibrium of a river channel because it intercepts

material load moving within a dynamic system and triggers an initial morphological response to regain the balance between supply and transport. Habitat alteration is also inevitable when morphological adjustments take place. The river channels are naturally modified into different bed forms depending on the changes in flow energy and sediment discharge. River channels transport sediments and water from headwaters to its mouth. They are built up and maintained by erosion and deposition of sediments during river flows. River sand mining is essential for the channelization and better flow of the river, and this will only be possible by adopting the scientific approach of mining which not only harmonies the river but also take care of the ecology of the river.

From forcing the river to change its course to affecting the groundwater tables and impacting the habitat of micro-organisms, the ramifications of sand mining are many. Sand is important for groundwater recharge, on a riverbed, it acts as a link between the flowing river and the water table and is part of the aquifer. Sand holds a lot of water, and when it is mindlessly mined and laden on to trucks, large quantities of water is lost in transit.

The impact of sand mining far outweighs the economic benefits. There is a perception that sand and boulders are useless and rivers have a lot of sand. This is incorrect because they are crucial for the sustained existence of the river and perform many functions. When sand and boulders are removed in an unimpeded way using heavy machines, the erosion capacity of the river increases. Sand and boulders prevent the river from changing the course and act as a buffer for the riverbed. Unplanned and rampant removal of sand from riverbeds also amounts to destroying the habitat of biodiversity. There are a lot of micro-organisms that are not visible and widely known but are critical to soil structure and fertility. When we dredge sand, we literally take away their habitat. Excessive in-stream sand mining causes degradation of rivers. Therefore, there has to be a periodic assessment of how much sand can be sustainably mined, as the quantity can vary from river to river and within a river from stretch to stretch.

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3. ASSESSMENT OF ECOLOGICAL DAMAGE

In pursuance of the Hon'ble NGT order and the directions of the MoEF&CC, teams of scientists of FRI Dehradun and WII Dehradun were constituted by the respective Directors for undertaking the required study for assessment of ecological damage and put forth ecological restoration measures. The FRI team examined the available reports, maps and other documents before undertaking field study for ecological damage estimation and devising eco-restoration strategy. In this regard following two letters of the District Collector, Saharanpur - (i) letter no. 334/Khanij/2016-17 dated 25-4-2016 and (ii) letter no. 911/Khanij dated 2-7-2012 formed the starting point. The letter dated 25-4-2016 provided an authentic list of 44 villages, as shown in **Table 1**, wherein illegal mining was carried out. A copy of the letter is placed in **Appendix 1**. The letter dated 2-7-2012 provided the details of 39.62 lakh cum illegal minor minerals seized during 2012, out of which 37.4 lakh cum were auctioned for Rs. 95.29 crore in that year. Besides these references, the district authorities provided a list of 35 mining leases issued by the Mining Officer, Saharanpur with village-wise details of the leased Khasra no. and areas, and revenue officials of the SDM Office Behat provided revenue maps and areas of the Khasra nos. involved in illegal mining.

3.1 Location and extent of mining

The teams of the scientists and other supporting research staff visited all the 44 villages during November-December 2016 and January 2017. The visits were facilitated by the district administration Saharanpur, district officials of the statutory and regulatory bodies such as Regional Geology and Mine Department as well as revenue and mining officials of SDM Office Behat. They visited all mining sites in these villages shown and explained by the accompanying local officials and collected information. **(Plate 1 and 2)**. The geographical locations of the visited sites were duly recorded with handheld GPS. The village serial numbers given in the District Collector letter dated 25-4-2016, as reproduced in **Table 1**, have been treated as village IDs in the whole study for the sake of unambiguous reference. A copy of the letter is enclosed as **Appendix-II**.

The geographical locations of all above-mentioned villages are shown in map in **Figure 3**. The villages seen in the west or left side of the map are situated near the river Yamuna and its tributaries whereas those in the east or right side of the map are situated near the Ganga tributaries like Solani nadi.



Plate 1: Approximation of the extent of mining on the basis of revenue record

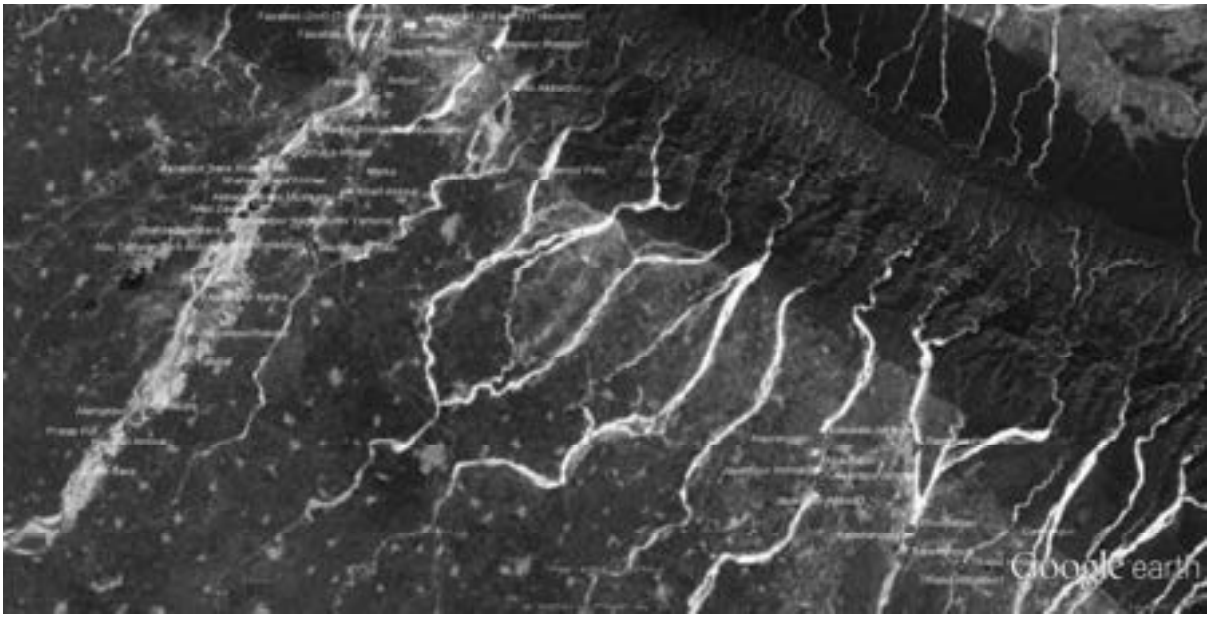


Figure 3: Location of villages of illegal mining in Saharanpur district

Table 1: List of villages of illegal mining in Saharanpur district

S. No	Tehsil	Village	Proposed Zone in Comprehensive mining plan
1	Behat	Sherpur Pelo	-
2	Behat	Rehna	-
3	Behat	Jayantipur Ahtmal	C3
4	Behat	Ganeshpur	C3
5	Behat	Naurangpur	C1
6	Behat	Akbarpur Bans Ahtmal	A
7	Behat	Chhajja Ahtmal	A
8	Behat	Allauddinpur Bans A	A
9	Behat	Mayapur Rooppur	-
10	Behat	Badshahpur	C3
11	Behat	Rasoolpur / Rasooli	A
12	Behat	Nuniyari Ahtmal	A
13	Behat	Aslampur Bartha	A
14	Behat	Faizabad	-
15	Behat	Thapul Ismailpur	C3
16	Behat	Fatehpur Pelo	-
17	Behat	Madhti Ahtmal and Mustakam	A
18	Behat	Kaluwala Jahanpur	C2
19	Behat	Tatohal	A
20	Behat	Abdullapur	C2
21	Behat	Khushalipur	C3
22	Behat	Ali Akbarpur	C1
23	Behat	Shahpur Bans	A
24	Behat	Mahmoodpur Nagli	A
25	Behat	Arazi Zewari	A
26	Behat	Masoodpur Garh	A
27	Behat	Nityanandpur	A
28	Behat	Syed Mohammadpur Garh	A
29	Behat	Shahzadpur Bans	C2
30	Behat	Abu Talibpur Garh	A
31	Behat	Bartha Korsi	A
32	Behat	Alamgirpur	A
33	Behat	Pratap Pur	A
34	Behat	Dhaulra	A
35	Behat	Jodhe Bans	A
36	Behat	Arifpur	A
37	Behat	Fatehpur	-
38	Behat	Kheri Ahatmal	A
39	Behat	Matka	A
40	Behat	Akbarpur Bans Mustakam	A
41	Behat	Syed Mohammadpur Mustakam	A
42	Behat	MurtazaPur	A
43	Behat	Allauddinpur Mustakam	A
44	Behat	Mahmoodpur Nagli Mustakam	A

3.1.1 Basic information

During the field visits, the FRI team collected information on several aspects like the extent of illegal mining, signs of mining, damage to agriculture and forest lands, river bank cutting, destruction of flood plain and riparian areas in the river Yamuna and tributaries etc. The observations were made for the purpose of assessment of the extent of illegal mining, the ecological damage caused by the mining and the scope of ecological restoration of the mined out areas. Similarly, the WII scientists and scholars visited the areas under study and collected data about the status of wildlife, including avifauna.



Plate 2: Recording detailed information about the mining site

The village-wise description of all mining sites in the 44 villages is given in Part II of the report. A summary of the basic information of all mining sites regarding the lease no., lease area, extent of illegal mining, ownership of the mined land and conspicuous signs of mining is given in **Table 2**.

Table 2: Summary of basic information

SN	Vill ID	Name of Village	Nearby Lease no.	Lease Area (ha)	Illegal Mine Area (ha)	Land Ownership	Signs of Mining
1	1	Sherpur Pelo	1	7.7	8.5	Gram Samaj	Pits of mining and heaps of RBM
2	2.1	Rehna (1/2)	4	10.3	22.9	Gram Samaj	Mining pits
3	2.2	Rehna (2/2)	5	10.3	1.3	Gram Samaj	Mining pits
4	3.1	Jayantipur Ahtmal (1/3)	22	4.0	1.6	GS and Private Land	No sign of mining
5	3.2	Jayantipur Ahtmal (2/3)	23	4.0	0.5	GS and Private Land	Recent mining pits in riverbed
6	3.3	Jayantipur Ahtmal (3/3)	24	7.7	23.2	Gram Samaj	Recent mining pits in riverbed
7	4	Ganeshpur	12	6.9	5.1	Gram Samaj	No sign of mining at present
8	5	Naurangpur	13	12.5	6.7	Gram Samaj	Pits and heaps of 1-2 feet depth
9	6	Akbarpur Bans Ahtmal	17	22.7	23.3	Gram Samaj	Pits and heaps of RBM
10	7	Chhajja Ahtmal	18	10.5	49.6	Gram Samaj	Pits and heaps of RBM
11	8	Allauddinpur Bans Ahtmal	21	19.9	0.1	Gram Samaj	Mining pits and heaps
12	9.1	Mayapur Rooppur (1/2)	26	9.3	14.1	GS and Private Land	No sign of mining at present
13	9.2	Mayapur Rooppur (2/2)	27	14.9	19.5	GS and Private Land	No sign of mining at present
14	10.1	Badshahpur (1/2)	28	8.9	2.4	Gram Samaj	Pits and heaps of RBM
15	10.2	Badshahpur (2/2)	29	13.4	6.6	Gram Samaj	Pits and heaps of RBM
16	11	Rasoolpur/Rasooli	36	34.8	45.6	Gram Samaj	Heaps of boulders
17	12	Nuniyari Ahtmal	37	24.3	62.4	Gram Samaj	Sand mining and RBM in riverbed
18	13	Aslampur Bartha	40	36.7	133.8	Gram Samaj	Deposits of RBM in flood plain
19	14.1	Faizabad (1/2) (Yamuna)	6	12.4	3.4	Gram Samaj	Mining pits in riverbed
20	14.2	Faizabad (2/2) (Tributaries)	7	2.4	6.0	Gram Samaj	Mining pits
21	14.3	Faizabad (3/3) (Tributaries)	8	6.9	13.0	Gram Samaj	Mining pits

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SN	Vill ID	Name of Village	Nearby Lease no.	Lease Area (ha)	Illegal Mine Area (ha)	Land Ownership	Signs of Mining
22	15.1	Thapul Ismailpur (1/3)	9	6.9	16.4	Gram Samaj	No sign of mining
23	15.2	Thapul Ismailpur (2/3)	10	12.1	1.6	Gram Samaj	No sign of mining
24	15.3	Thapul Ismailpur (3/3)	11	7.0	0.0	Gram Samaj	No sign of mining
25	16	Fatehpur Pelo	15,16	11.3	12.4	Gram Samaj	Pits and heaps of RBM in Kaluwala Jahanpur
26	17	Madhti Ahtmal and Mustakam	20	12.4	102.6	Gram Samaj	Pits and heaps
27	18	Kaluwala Jahanpur	33	6.5	0.2	Gram Samaj	1.5m deep recent mining pits in riverbed
28	19	Tatohal	39	9.3	0.5	Gram Samaj	Heaps of boulder in flood plain
29	20	Abdullapur	25	5.6	9.8	Gram Samaj	Deep mining pits and heaps
30	21	Khushalipur	30,31	29.1	6.5	Gram Samaj	No sign of illegal mining
31	22	Ali Akbarpur	No	No	44.2	Gram Samaj	No sign of illegal mining
32	23	Shahpur Bans Ahtmal	No	No	16.3	Gram Samaj	Mining pits and heaps of RBM
33	24	Mahmoodpur Nagli (Yamuna)	No	No	28.3	Gram Samaj	Pits and heaps of RBM throughout river bed and bank
34	25	Arazi Zevari	No	No	17.3	Gram Samaj	About 2m deep pits in river bed and 4-5m deep pits in flood plain
35	26	Masoodpur Garh Ahtmal	No	No	4.6	Gram Samaj	About 3m deep pits in river bed and 5-6m deep pits in flood plain
36	27	Nityanandpur Ahtmal	No	No	7.8	Gram Samaj	Mining pits about 3m deep in river bed and 5-6m deep in flood plain
37	28	Syed Mohammadpur Garh Ahtmal	No	No	24.6	Gram Samaj	Dumps of RBM in River Bed and at River-bank
38	29	Shahzadpur Bans	No	No	31.3	Gram Samaj	Deep pits and heaps of RBM
39	30	Abu Talibpur Garh Ahtmal	No	No	73.1	Gram Samaj	Dumping of RBM at River-bank

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SN	Vill ID	Name of Village	Nearby Lease no.	Lease Area (ha)	Illegal Mine Area (ha)	Land Ownership	Signs of Mining
40	31	Bartha Korsi	No	No	137.6	Gram Samaj	Mining pits, RBM heaps in flood plain areas
41	32	Alamgirpur	No	No	64.6	Gram Samaj	3-4 m deep mining pits and heaps of RBM
42	33	Pratap Pur	No	No	15.4	Gram Samaj	No sign of mining
43	34	Dhaulra	No	No	5.4	Gram Samaj	Mining pits and heaps of RBM
44	35	Jodhe Bans	No	No	102.4	Gram Samaj	Mining pits and heaps of RBM in river bed
45	36	Arifpur	No	No	1.6	Private Land	Deep mining pits and heap of excavated
46	37	Fatehpur	No	No	17.2	Gram Samaj	Deep mining pits and numerous heaps of boulders forming undulating landscape
47	38	Kheri Ahtmal	No	No	10.3	Gram Samaj	Piled up stacks of boulders on right bank near the mining site but source of excavation not
48	39	Matka	No	No	3.4	Gram Samaj	Mining pits were noticed adjoining Matka. The ownership of the mined land not known
49	40	Akbarpur Bans Mustkam	No	No	6.4	Gram Samaj	Excavation of mining material noticed
50	41	Syed Mohmmadpur	No	No	0.4	Gram Samaj	No sign of mining at present
51	42	Murtazapur Saur	No	No	16.9	Gram Samaj	Mining pits noticed
52	43	Allauddinpur	No	No	0.5	Gram Samaj	Recently mined material used for bund
53	44	Mahmoodpur Nagli (Budhi Yamuna)	No	No	1.7	Gram Samaj	Deep mining pits noticed
		Total Area (Ha)		**380.4**	**1230.5**		

Note: As per the list provided by the district authorities, the illegal mining sites are situated in 44 villages. During the field visits, multiple numbers of mining sites were found in some villages. The IDs of such mining sites are suffixed by #.1, #.2, #.3 etc. in their village IDs. Hence, the total sites visited during the field tours are 53, i.e. 9 more than the 44 number of villages. The village IDs are the serial nos. given in the list of illegal mining villages provided by the district authorities.

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Some important observations are made hereunder:

1) The leases were granted only in 21 villages out of the 44 villages listed for illegal mining. The mining of minor minerals in other 23 villages is totally illegal.
2) The duly leased mining area of 21 villages is 380.4 ha. However the mining was spread out in additional 599.3 ha. area. The mining carried out in this excess areas is obviously un-authorized and illegal. A lot-wise detailed list of the leased areas issued by the Mining Officer, Saharanpur is enclosed in **Appendix-III**. In other 23 villages wherein illegal mining has been reported, there is altogether no mining lease Therefore the mining carried out in 631.2 ha area of these 23 villages is totally illegal. Hence the total extent of illegal mining in the 44 villages is about 1230.5 ha.
3) The mining is supposedly stopped in the State since 2012, partly owing to the order passed by the Hon'ble Supreme Court on 16-1-2012 and partly due to the procedural issues as mentioned in the CMP. However, the signs of recent RBM mining can be easily seen. The specially designed high capacity tractor trolleys with extra tyres, big body and powerful tractors for extraction of the riverbed mining material is a common sight.
4) Ownership of the mining site largely vests in the Gram Samaj. However, mining sites in one villages (Arifpur) is owned solely by private people whereas in Badshahpur, Jayantipur and Fatehpur villages, some private lands which submerged into river due to flood, are now being mined for RBM along with the GS land in the riverbed.

3.1.2 Zonation of mining sites

For the purpose of describing the mining damage of different major types, the mining sites were categorized into following 5 clusters on the basis of their location in relation to the river and the tributaries as shown in **Figure 4**.

Cluster 1: Mining in riverbed and floodplain
Cluster 2: Mining in riverbed, floodplain and riverbank
Cluster 3: Mining in the tributaries of river Yamuna
Cluster 4:Mining in the tributaries of river Ganga and
Cluster 5: Mining in the area away from the river and tributaries.

For the purpose of wildlife survey, Cluster 1&2 have been placed in Yamuna river Zone, Cluster 3 has been placed in Badshahibagh Zone and Cluster 4 has been placed in Biharigarh Zone.

The type and extent of the damage in various clusters is described in the respective sub-sections.

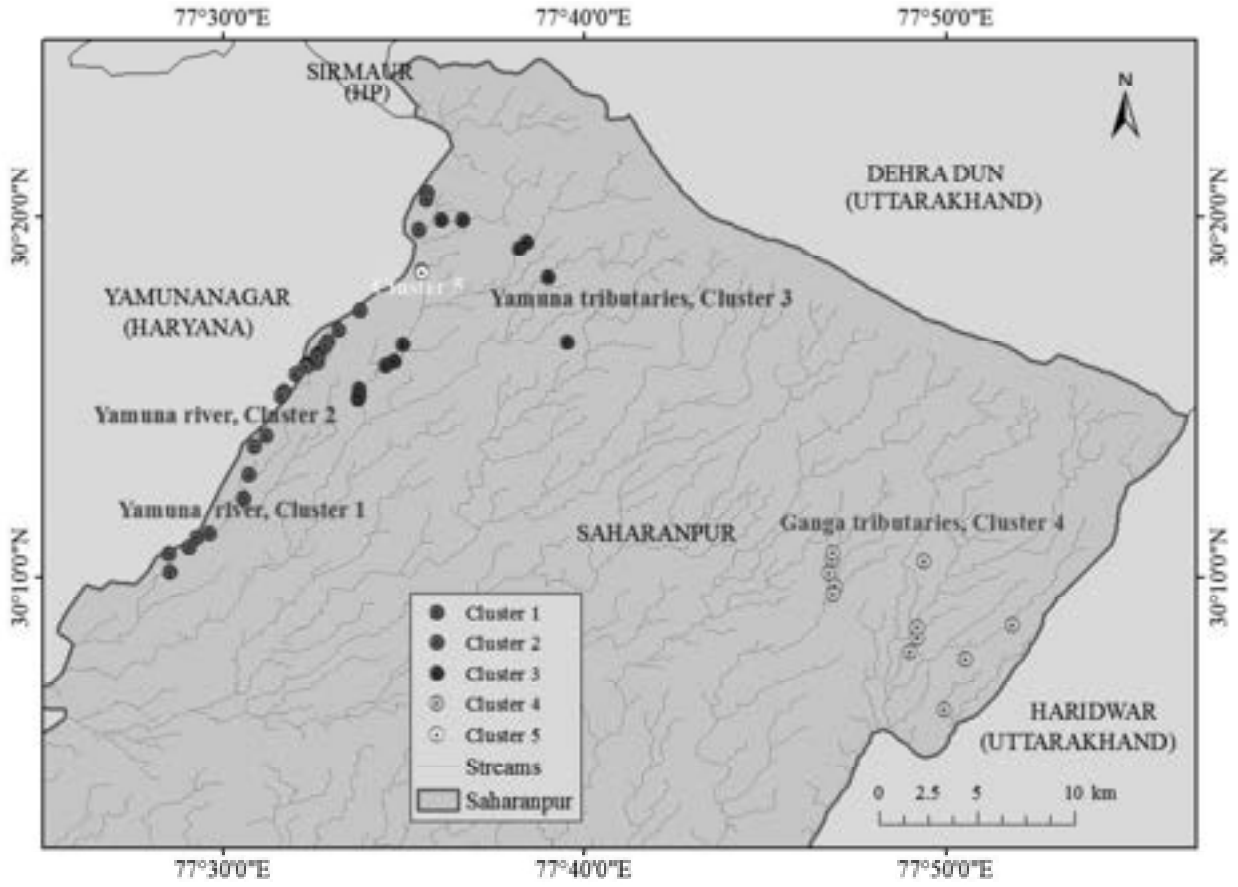


Figure 4: Distribution of mining clusters

3.1.2.1 Cluster 1: Mining in riverbed and floodplains

There are 24 mining sites in the Yamuna river. Out of these 24, operations of 15 mines are within the river bed and flood plain comprising 'Cluster 1' whereas operations of other 9 sites extend to the river bank as well, in addition to the river bed and flood plain. These 9 sites comprise 'Cluster 2' as described in next sub-section. These two clusters collectively comprise the 'Yamuna River Zone' used for the purpose of surveying the wildlife.

The location of the mining sites in this cluster is shown in **Figure 5.** As given in **Table 3**, the mining leases were granted for only 10 sites out of the total 15 sites. The other 5 villages were not granted any mining lease and hence the mining was totally illegal. The mining in the leased area was supposed to be carried out in the Khasra no. and upto the extent mentioned in the sanction letter. upto the extent given in the lease letter. The mining in excess of the permitted area is obviously illegal. As per the record provided the local officials and explained by them, the extent of illegal mining in this cluster is estimated to be 516 ha.

The mining in this cluster has primarily damaged the flood plain and river bank **(Plate 3)**. In some cases, it has also caused damage to the adjacent agricultural land. It was noticed that mining in this zone has restricted the colonization and establishment of a number of native species in the river bank areas The flood plain areas which were undisturbed by mining for last 4-5 years have been heavily colonized by the grass, *Saccharum spontaneum* and *S. munja*. Some other riverine species have also been noticed colonizing in such kind of habitats.



Figure 5: Location of mining sites in Yamuna riverbed



Plate 3: Riverbed mining and heaps of RBM in Akbarpur Bans

Table 3: List of mining sites in cluster 1 in Yamuna riverbed

SN	Vill ID	Name of Village	Latitude	Longitude	Nearby Lease no.	Lease Area (Ha)	Illegal mine Area (Ha)	Significant Damage
1	2a	Rehna (1/2)	20°20'40.4"	77°35'39.5"	4	10.3	22.9	Damage to floodplain and riparian ecosystem
2	2b	Rehna (2/2)	30°20'28.5"	77°35'37.4"	5	10.3	1.3	Damage to floodplain and riparian ecosystem
3	6	Akbarpur Bans Ahtmal	30°16'32.6"	77°32'54.6"	17	22.7	23.3	Damage to floodplain, riparian ecosystem, and loss of agriculture land due to bank cutting
4	7	Chhajja Ahtmal	30°16'53.3"	77°33'13.6"	18	10.5	49.6	Damage to floodplain and riparian ecosystem
5	8	Allauddinpur Bans Ahtmal	30°16'07.0"	77°32'34.9"	21	19.9	0.1	Loss of agriculture land due to bank cutting
6	11	Rasoolpur/Rasooli	30°12'50.6"	77°30'44"	36	34.8	45.6	Damage to floodplain and riparian ecosystem
7	12	Nuniyari Ahtmal	30°10'50.7"	77°29'5.0"	37	24.3	62.4	Damage to floodplain and riparian ecosystem
8	14a	Faizabad (1/2) (Yamuna)	30°19'38.8"	77°35'25.5"	6	12.4	3.4	Damage to floodplain and riparian ecosystem
9	17	Madhti Ahtmal and Mustakam	30°17'24.2"	77°33'48.8"	20	12.4	102.6	Damage to floodplain and riparian ecosystem
10	19	Tatohal	30°12'12.7"	77°30'35.5'	39	9.3	0.5	Damage to floodplain and agriculture land
11	23	Shahpur Bans Ahtmal	30°16'23.6"	77°32'48.8"	No	No	16.3	Damage to floodplain and riparian ecosystem
12	32	Alamgirpur	30°11'07.0"	77°29'17.3"	No	No	64.6	Damage to floodplain and riparian ecosystem
13	33	Pratap Pur	30°10'40.0"	77°28'30.7"	No	No	15.4	Damage to floodplain and riparian ecosystem
14	34	Dhaulra	30°11'13.4"	77°29'38.1"	No	No	5.4	Damage to floodplain and riparian ecosystem
15	35	Jodhe Bans	30°10'10.1"	77°28'33"	No	No	102.4	Damage to floodplain and agriculture land
		Total Area of Cluster 1 (Ha)				**167**	**516**	

3.1.2.2 Cluster 2: Mining in riverbed, floodplain and riverbank

As mentioned in the previous section, the mining sites of cluster are located in river bed, flood plain and the river bank **(Figure 6).** There are 9 villages out of which the mining lease were granted only in one village **(Table 4)**. The extraction of minerals in other 8 villages was totally illegal. The extraction of minerals in site no. 1 was permitted only upto the extent of 36.7 ha. The total extent of the illegally mined area is estimated to be 458 ha.

The mining in this cluster has caused major habitat damage in the riverbed, flood plain and the riparian ecosystem **(Plate 4)**.

The most of the mined out areas in this cluster are being colonized by the grasses, especially by *Saccharum spontaneum* and *S. munja.*



Figure 6: Location of mining sites in Yamuna riverbed and riverbank



Plate 4: The riparian zone damaged by mining in cluster 2

Table 4: List of mining sites in cluster 2 in Yamuna riverbed and riverbank

SN	Vill ID	Name of Village	Latitude	Longitude	Nearby Lease no.	Lease Area (Ha)	Illegal mine Area (Ha)	Significant Damage
1	13	Aslampur Bartha	30°13'38.0"	77°30'53"	40	36.7	133.8	Damage to floodplain and riparian ecosystem
2	24	Mahmoodpur Nagli (Yamuna)	30°15'58.3"	77°32'36.6"	No	No	28.3	Damage to floodplain and riparian ecosystem
3	25	Arazi Zevari	30°15'53.6"	77°32'20.4"	No	No	17.3	Damage to floodplain and riparian ecosystem
4	26	Masoodpur Garh Ahtmal	30°15'51.3"	77°32'18.8"	No	No	4.6	Damage to floodplain and riparian ecosystem
5	27	Nityanandpur Ahtmal	30°15'50.1"	77°32'17.6"	No	No	7.8	Damage to floodplain and riparian ecosystem
6	28	Syed Mohammadpur Garh Ahtmal	30°15'38.5"	77°32'02.5"	No	No	24.6	Damage to floodplain and riparian ecosystem
7	29	Shahzadpur Bans	30°15'09.0"	77°31'42.8"	No	No	31.3	Damage to floodplain and riparian ecosystem
8	30	Abu Talibpur Garh Ahtmal	30°15'02.9"	77°31'37.6"	No	No	73.1	Damage to floodplain and riparian ecosystem
9	31	Bartha Korsi	30°13' 55.7"	77° 31' 11.2"	No	No	137.6	Damage to floodplain and riparian ecosystem
		Total Area of Cluster 2 (Ha)				**37**	**458**	

3.1.2.3 Cluster 3: Mining in the tributaries of river Yamuna

The 13 mining sites in 11villages as given in **Table 5** are located in the Yamuna tributaries, namely Badshahibagh Rao, Budhi Yamuna, Khairowali Nadi and Hindon. These are placed in 'Cluster 3' **(Figure 7).** The mining lease were granted only for 5 sites whereas other 8 sites are without any lease. The permissible area for mining is only 41 ha. whereas the mining in excess of this extent is illegal. The total extent of the illegally mined area is estimated to be 145 ha.

The mining sites are mostly surrounded by agriculture. Hence the major loss due to mining in this cluster has been done to the agriculture land, largely by bank cutting. The surrounding habitats comprising scrub land has been impacted by mining in some of the cases. Prominent bank cutting was observed in different places in these tributaries **(Plate 5)**.

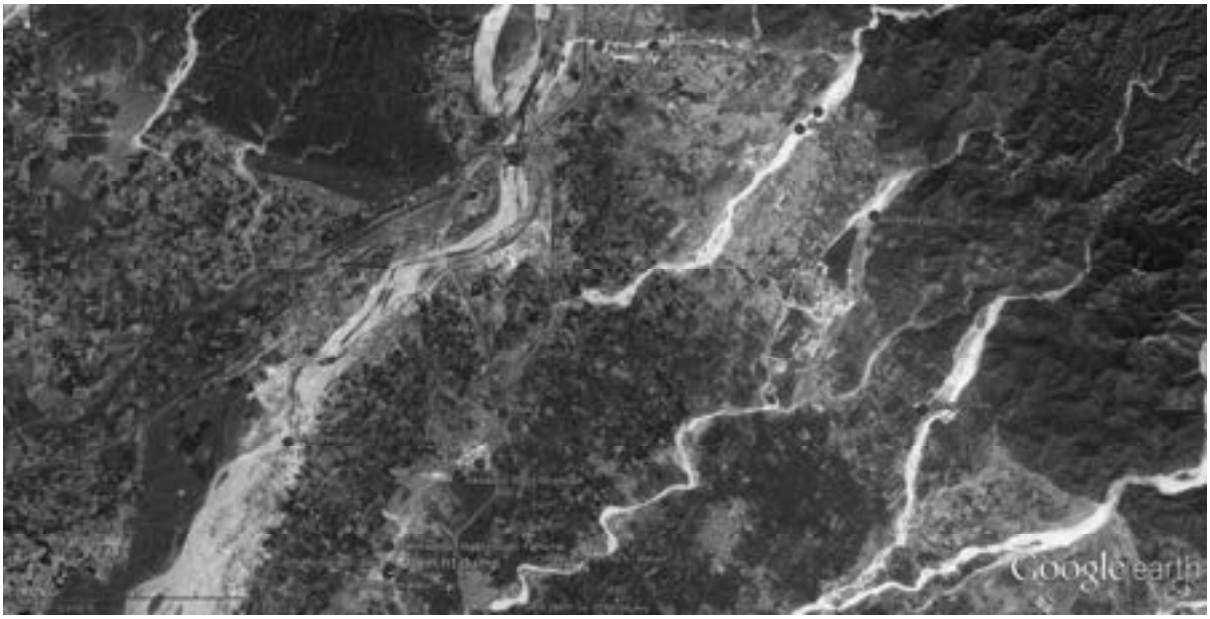


Figure 7: Location of mining sites in cluster 3 in the tributaries of river Yamuna

Table 5: List of mining sites in cluster 3 in the tributaries of river Yamuna

SN	Vill ID	Name of Village	Latitude	Longitude	Nearby Lease no.	Lease Area (Ha)	Illegal mine Area (Ha)	Significant Damage
1	1	Sherpur Pelo	30^{0}16'30.4"	77^{0}39'32.9"	1	7.7	8.5	Damage to floodplain and riparian ecosystem
2	9.1	Mayapur Rooppur (1/2)	30^{0}19'17.7"	77^{0}38"24.8"	26	9.3	14.1	Loss of agriculture land due to bank cutting
3	9.2	Mayapur Rooppur (2/2)	30^{0}19'08.0"	77^{0}38"13.0"	27	14.9	19.5	Loss of agriculture land due to bank cutting
4	14.2	Faizabad (2/2) (Tributaries)	30°19'54.6"	77°36'2.2"	7	2.4	6.0	Loss of agriculture land due to bank cutting
5	14.3	Faizabad (3/3) (Tributaries)	30°19'54.7"	77°36'37.9"	8	6.9	13.0	Loss of agriculture land due to bank cutting
6	22	Ali Akbarpur	30^{0}18'19.2"	77^{0}39'01.2"	No	No	44.2	Damage to surrounding habitat
7	38	Kheri Ahtmal	30°15'59.7"	77°34'44.4"	No	No	10.3	Damage to surrounding habitat and agriculture
8	39	Matka	30°16'28.2"	77°34'59.9"	No	No	3.4	Damage to surrounding habitat
9	40	Akbarpur Bans Mustkam	30°15'52.6"	77°34'30.5"	No	No	6.4	Damage to surrounding habitat
10	41	Syed Mohmmadpur	30°14'57.6"	77°33'44.8"	No	No	0.4	Damage to surrounding habitat
11	42	Murtazapur Saur	30°15'01.6"	77°33'45.7"	No	No	16.9	Damage to surrounding habitat
12	43	Allauddinpur	30°16'12.1"	77°32'39.8"	No	No	0.5	Damage to surrounding habitat
13	44	Mahmoodpur Nagli (Budhi Yamuna)	30°15'12.8"	77°33'45.7"	No	No	1.7	Damage to surrounding habitat
		Total Area of Cluster 3				**41**	**145**	



Plate 5: Bank cutting along Budhi Yamuna in Mahmoodpur Nagli

3.1.2.4 Cluster 4: Mining in the tributaries of river Ganga

The 14 mining sites in 9 villages as given in **Table 6**, are located in the Solani nadi, a tributary of river Ganga. These sites comprise 'Cluster 4' **(Figure 8)**. The mining lease were granted for 136 ha. whereas actual mining was in excess of this extent. The total extent of the illegally mined area is estimated to be 93 ha.

The mining sites are mostly surrounded by agriculture. Hence the major loss due to mining in this cluster also has been done to the agriculture land, largely by bank cutting. The surrounding habitats comprising scrub land has been impacted by mining in some of the cases. Prominent bank cutting was observed at different places along the Solani nadi **(Plate 6)**.

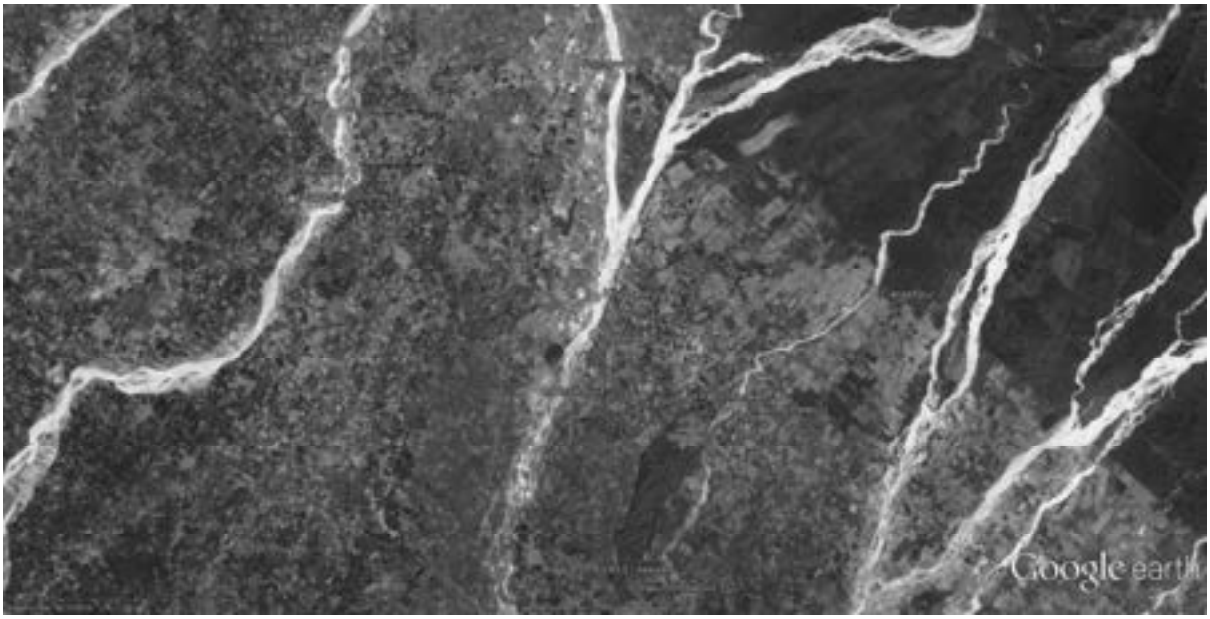


Figure 8: Location of mining sites in cluster 4 in tributaries of river Ganga



Plate 6: Severe bank cutting and river bed lowering in Ganeshpur

Table 6: List of mining sites in cluster 4 in tributaries of river Ganga

SN	Vill ID	Name of Village	Latitude	Longitude	Nearby Lease no.	Lease Area (Ha)	Illegal mine Area (Ha)	Significant Damage
1	3.1	Jayantipur Ahtmal (1/3)	30°09'40.0"	77°46'57"	22	4.0	1.6	Loss of agriculture land due to bank cutting
2	3.2	Jayantipur Ahtmal (2/3)	30°09'47.0"	77°46'57"	23	4.0	0.5	Loss of agriculture land due to bank cutting
3	3.3	Jayantipur Ahtmal (3/3)	30°09'32.0"	77°46'55"	24	7.7	23.2	Loss of agriculture land due to bank cutting
4	4	Ganeshpur	30°08'40.8"	77°51'52.3"	12	6.9	5.1	Loss of agriculture land due to bank cutting
5	5	Naurangpur	30°10'30.6"	77°46'51.8"	13	12.5	6.7	Damage to floodplain and riparian ecosystem
6	10.1	Badshahpur (1/2)	30°07'57.1"	77°49'2.4"	28	8.9	2.4	Loss of agriculture land due to bank cutting
7	10.2	Badshahpur (2/2)	30°08'19.4"	77°49'13.9"	29	13.4	6.6	Loss of agriculture land due to bank cutting
8	15.1	Thapul Ismailpur (1/3)	30°07'44.9"	77°50'34.4"	9	6.9	16.4	Loss of agriculture land due to bank cutting
9	15.2	Thapul Ismailpur (2/3)	30°06'20.4"	77°49'59.3"	10	12.1	1.6	Loss of agriculture land due to bank cutting
10	15.3	Thapul Ismailpur (3/3)	30°07'43.7"	77°50'33.7"	11	7.0	0.0	Loss of agriculture land due to bank cutting
11	16	Fatehpur Pelo	30°10'26.7"	77°49'25.7"	15,16	11.3	12.4	Loss of agriculture land due to bank cutting
12	18	Kaluwala Jahanpur	30°10'42.2"	77°46'54.0"	33	6.5	0.2	Damage to surrounding habitat
13	20	Abdullapur	30°10'08.0"	77°46'48"	25	5.6	9.8	Loss of agriculture land due to bank cutting
14	21	Khushalipur	30°08'37.3"	77°49'14.9"	30,31	29.1	6.5	Damage to floodplain and riparian ecosystem
		Total Area of Cluster 4				**136**	**93**	

3.1.2.5 Cluster 5: Mining in areas away from the river and tributaries

Out of the 53 mining sites in 44 villages, two mines were located away from river Yamuna and the tributaries **(Figure 9)**. These two mining sites comprise 'Cluster 5'. There was no mining lease for either of these sites **(Table 7)**. Therefore the mining in the whole area of 19 ha. was altogether illegal.

The mining in one of the sites was carried out solely in private land whereas the other mining site was both in Gram Samaj and private land. The major affect of mining in this site is the loss of agriculture land **(Plate 7)**. At both these locations, very deep mining sites were noticed.



Figure 9: Location of mining sites in cluster 5 in areas away from river and tributaries

Table 7: List of mining sites in cluster 5 in areas away from river and tributaries

SN	Vill ID	Name of Village	Latitude	Longitude	Nearby Lease no.	Lease Area (Ha)	Illegal mine Area (Ha)	Significant Damage
1	36	Arifpur	38°18'29.4"	77°35'31"	No	No	1.6	Loss of agriculture land
2	37	Fatehpur	30°18'26.7"	77°35'30.8"	No	No	17.2	Loss of agriculture land
		Total Area of Cluster 5				**0**	**19**	



Plate 7: Loss of agriculture land due to deep mining pits

3.2 Vegetation

The active and recently mined out areas are altogether barren and bereft of vegetation. The abandoned mining sites are showing signs of vegetation revival to some extent. The FRI team planned a study for assessment of the present status of vegetation and plant succession in the mining sites on following ecological parameters.

3.2.1 Ecological parameters

3.2.1.1 Species richness

Species richness is simply total number of different species present in the unit of study. Well developed ecosystems are expected to have high species richness.

3.2.1.2 Species density

Density refers to the quantity (no., volume, weight etc.) occurring in unit area. The density in the presence study has been calculated by no. of individuals per unit area as there is no worthwhile growth to measure size and work out volume . The shrub density is calculated in terms of no./ha, whereas herb/grass density in terms of the no./m^2.

3.2.1.3 Species diversity

The plant diversity has been computed by the widely used Shannon-Weiner Diversity Index (H). This index is negative sum of products of the particular species probability and its natural log.

$$H= - \sum [(p_i)*\ln(p_i)]$$

where $p_i=n_i/N$ taking n_i=number of plants of a particular species and N=Total number of plants in all sample plots.

3.2.1.4 Biomass estimation

This has been determined by weight in terms of tons/ha.

3.2.1.5 Frequency

This refers to the proportion of sampling units where a species is represented in relation to the total number of sampling units.

3.2.2 Study methodology

The assessment was planned to be carried out on the basis of sample data collected from different stages of revival of the mining sites in the Yamuna river bed and banks as under:

1) Un-mined area along the river bank under moderate biotic pressure in **Rehna**
2) Abandoned 4-5years old mined out area in the river bank of **Mahmoodpur Nagli**
3) Area undisturbed by mining for the last 5-6 years in flood plain in **Jodhe Bans**

Since there was *no vegetation in the recently mined out areas*, no plot was laid out in such sites.

The vegetation survey in different habitats as mentioned above was carried out using quadrat sampling method. The size of the quadrat was (i) 10m x 10m for trees, (ii) 3m x 3m for shrubs and (iii) 1m x1m for herbs and grasses. However since there was no tree to be seen, only 3x3 and 1x1 size plots were laid out randomly for collection of data of shrub, herb and grass species. Five sets of widely spaced sample plots were laid out on each of three selected habitats.



Plate 8: Sample collection from a 3m x 3m plot for biomass estimation

3.2.3 Sample data inventory

A complete inventory of the herbs, shrubs and grasses found in all the sample plots in the mined out riverine areas is given in **Table 8** below.

Table 8: Occurrence of different plant forms in mined out riverine areas

Type of Vegetation	SN	Species	Mahmoodpur Nagli	Jodhe Bans	Rehna	Total
Herb	1	*Euphorbia hirta*	1	1	1	3
	2	*Vernonia cinerea*			1	1
	3	*Acacia catechu*			1	1
	4	*Aerva sanguinolenta*		1		1
	5	*Ageratum conyzoides*	1		1	2
	6	*Alternanthera sessilis*		1		1
	7	*Andrographis paniculata*	1			1
	8	*Artemisia sp.*	1			1
	9	*Atylosia scarabaeoides*		1	1	2
	10	*Crotalaria sericea*			1	1
	11	*Desmodium gangeticum*			1	1
	12	*Desmodium triflorum*	1			1
	13	*Euphorbia hirta*	1			1
	14	*Evolvus nummularius*			1	1
	15	*Hyptis suaveolens*	1		1	2
	16	*Ichnocarpus* frutescens			1	1
	17	*Indigofera linifolia*			1	1
	18	*Lantana camara*			1	1
	19	*Launaea nudicaulis*	1	1		2
	20	*Mimosa himalayana*			1	1
	21	*Oxalis corniculata*	1	1	1	3
	22	*Rungia pectinata*	1		1	2
	23	*Sida cordifolia*		1	1	2
	24	*Tephrosia purpurea*		1		1
	25	*Trema politoria*		1		1
	26	*Tridex procumbens*			1	1
	27	*Triumfetta rhomboidea*	1		1	2
		Total	**11**	**9**	**18**	**38**
Shrub	1	*Calotropis procera*			1	1
	2	*Holarrhina antidysentrica*	1			1
	3	*Ipomoea carnea*			1	1
	4	*Lantana camara*			1	1
	5	*Randia spinosa*	1			1
	6	*Trema politoria*	1			1
	7	*Wendlandia exserta*			1	1
	8	*Ziziphus nummularia*	1		1	2
		Total	**4**	**0**	**5**	**9**
Grass	1	*Cynodon dactylon*	1	1	1	3
	2	*Dactyloctenium aegyptium*	1	1		2
	3	*Dichanthium annulatum*			1	1
	4	*Digitaria ciliaris*		1		1
	5	*Eragrostis tenella*		1		1
	6	*Imperata cylindrica*			1	1
	7	*Saccharum bengalense*	1			1
	8	*Saccharum spontaneum*	1	1	1	3
	9	*Setaria glauca*		1	1	2
	10	*Sporobolus diander*	1		1	2
		Total	**5**	**6**	**6**	**17**

3.2.4 Data analysis and results

The sample vegetation data collected from the four habitats was analysed for various ecological parameters as described in sub-section 3.2.1. The results are shown in **Table 9**

Table 9: **Analysis of ecological parameters**

Sample study of ecological parameters under different habitat conditions along the flood plain and river bank of Yamuna									
SN	Habitat/ Parameter	Mined out areas		Unmined area along the river bank under moderate biotic pressure (Rehna)		Abandoned mined out area in the river bank (Mahmoodpur)		Undisturbed floodplains for last 5-6 years in flood plain (Jodhe Bans)	
		Shrubs	Herbs	Shrubs	Herbs	Shrubs	Herbs	Shrubs	Herbs
1	Species Richness	Nil	Nil	6	24	4	16	-	15
2	Diversity Index	Nil	Nil	1.29	2.57	1.33	1.69	-	1.81
3	Total Density Shrubs (No/ha), Herbs (No/m^2)	Nil	Nil	2777.5	52	2222	56.43	-	66.4
4	Ground Biomass (Ton/ha)	Nil	Nil	_	3.52	_	2.4	-	5.88

It is observed that

1) Not even a single native species in form of tree was recorded in the vicinity of mining site. The seedling and sapling of only two and three tree species respectively were found in the sample plots.
2) The mined out flood plains of Jodhe Bans have shown the regeneration of one tree species.
3) The total number of herbaceous species (species richness) in unmined, abandoned and undisturbed flood plain areas were recorded in order of 24,16 and 15 respectively.
4) The total number of shrubs and saplings (species richness) in unmined and abandoned mined out areas were recorded in order of 6 and 4 whereas, no shrub species was recorded in undisturbed 5-6 year old flood plain areas.
5) The density of shrubs (number per hectare) was recorded in order of 2777.5 and 2222 respectively in unmined and abandoned mined areas undisturbed for 4-5 years.

6) The density (number/m^2) of herbaceous species was recorded higher in undisturbed flood plain area (66.4) than abandoned mined out area (56.43) and unmined area (52).

7) The diversity of herbaceous plant was higher (2.57) in abandoned mined out site than the undisturbed flood plain (1.81) and unmined area (1.29).

8) The occurrence of various species in general is between the range of 10-20% except *Saccharum* spp. which ranges from 80-100%.

3.2.5 Comparison with reference data

A comparison of the sample data was made with the species commonly found in this riparian belt as listed in the Comprehensive Mining Plan (CMP) prepared by the Directorate of Geology and Mining, Government of Uttar Pradesh is shown in **Table 10**. It was observed that none of the native tree species out of common native species as reported in CMP are found in the abandoned mined or adjacent areas. Only one pioneer grass species, *Saccharum spontaneum*; two shrubs, namely *Calotropis gigantea, Ipomoea carnea* and one invasive species *Parthenium hysterophorus* were found.



Plate 9: A vegetated area in Kheri Ahtmal in the mining region

Table 10: Comparison of the observed species with CMP reference table

S No	Scientific name	Family	Common name	Observed	Origin
1	*Acacia nilotica*	Fabaceae	Babul		Native
2	*Alstonia scholaris*	Apocynaceae	Indian Devil Tree		
3	*Argemone mexicana*	Papaveraceae	Mexican Poppy		
4	*Azadirachta indica*	Meliaceae	Neem Tree		Native
5	*Bombax ceiba*	Malvaceae	Cotton Tree		Native
6	*Callistemon lanceolatus*	Myrtaceae	Bottle Brush		
7	*Calotropis gigantea*	Apocynaceae	Crown Flower	P	
8	*Cannabis sativa*	Cannabaceae	Hemp		
9	*Ceiba pentandra*	Malvaceae	Kapok		
10	*Cordia dichotoma*	Boraginaceae	Bird Lime Tree		Native
11	*Dalbergia sissoo*	Fabaceae	Indian Rose Wood		Native
12	*Eucalyptus camaldulensis*	Myrtaceae	Gum Tree		
13	*Grevillea robusta*	Proteaceae	Silky Oak		
14	*Ipomoea carnea*	Convolvulaceae	Pink Morning Glory	P	
15	*Lagerstroemia parviflora*	Lythraceae	Crape Myrtle		Native
16	*Mallotus philippinensis*	Euphorbiaceae	Monkey Face Tree		Native
17	*Mangifera indica*	Anacardiaceae	Mango		Native
18	*Melia azedarach*	Meliaceae	China Berry		Native
19	*Milletia pinnata*	Fabaceae	Indian Beech Tree		
20	*Parthenium hysterophorus*	Asteraceae	Congress Weed	P	
21	*Phoenix sylvestris*	Arecaceae	Silver Date Palm		
22	*Populus ciliata*	Salicaceae	Himalayan Poplar		
23	*Ricinus communis*	Euphorbiaceae	Castor Plant		
24	*Saccharum spontaneum*	Poaceae	Kans Grass	P	
25	*Solanum indicum*	Solanaceae	Indian Night shade		
26	*Syzygium cumini*	Myrtaceae	Jambolan Plum		Native
27	*Terminalia arjuna*	Combretaceae	Arjun		Native
28	*Trewia nudiflora*	Euphorbiaceae	--		Native
29	*Zea mays*	Poaceae	Corn		
30	*Ziziphus muritiana*	Rhamnaceae	Indian Plum		Native

3.2.6 Status of Damage

As observed during the field visits, the mined land ecosystems are in a state of severe physical damage and biological impoverishment. The mining, whether in river bed, floodplain or in river bank has caused complete destruction or elimination of plants propagules. Destruction of aquatic and terrestrial vegetation in the river corridor have severe implications in ecological services and functions and moreover on the livelihood of the dependent population.

The river bank along the river Yamuna and tributaries in Saharanpur district are under continuous stress due to sand, bajri and boulders mining. The mined out areas re-colonized by herbs, grasses and shrubs are being restrained from conversion into well stocked vegetation cover including tree cover. While conducting survey in different mined out habitat in river bank, it was observed that large number of indigenous species such as *Dalbergia sissoo*, *Azadirachta indica, Ehretia laevis, Acacia catechu, Trewia nudiflora*, *Ziziphus mauritiana* etc, are either absent or found in negligible quantity which shows that the system is inhospitable for regeneration and growth of native tree species. Though some tree species such as *Acacia catechu, Trema politoria* and *Wendlandia exserta* have shown their presence in different habitats, they were found only in the form of seedlings and saplings, none of the species were in the form of trees. The inhospitable condition for development of tree cover could be primarily due to continuous threat from river bed mining and its associated activities.

On comparison of the native tree species recorded during the survey with the common native species, not even a single species out of 13 native tree species as reported in comprehensive mining plan (**Table 10**) were found in study areas. However, in general, a few out of the 13 native tree species reported in CMP were noticed around the mining site. Two pioneer grass species *Saccharum spontaneum, S. munja* and two shrubs *Calotropis gigantea* and *Ipomoea carnea* were also noticed in the area surveyed.

From the above observations it can be inferred that if the sand mining is checked and regulated in river Yamuna and its tributaries, the mined out areas lying abandoned could be converted into thick vegetation cover. This was observed during the survey carried out by the visiting teams in flood plain of Jodhe Bans and abandoned mined areas of Mahmoodpur Nagli undisturbed for the last 4-5 years. It can be predicted that if these areas are protected from biotic disturbance including mining, these could be transformed into thick vegetation cover.

3.3 Wildlife

The status of wildlife was assessed by the scientists of the Wildlife Institute of India (WII) Dehradun by carrying out a study as described below.

3.3.1 Study objectives

The study was carried out to fulfill the following objectives:

1) To identify whether any significant wildlife species occur in the mining sites or not.
2) To identify whether the mining sites fall within a corridor or protected area boundary.
3) Whether the impact of sand mining is irreversible or not.

3.3.2 Division into zones-cum-clusters

Based on the proximity and distance from the Yamuna river, the miming areas were divided into three clusters namely, (i) Yamuna River, (ii) Badshahibagh (iii) Biharigarh.

(i) The Yamuna river mining cluster stretched from Rehna to Jodhe Bans village. This includes 24 mining sites.

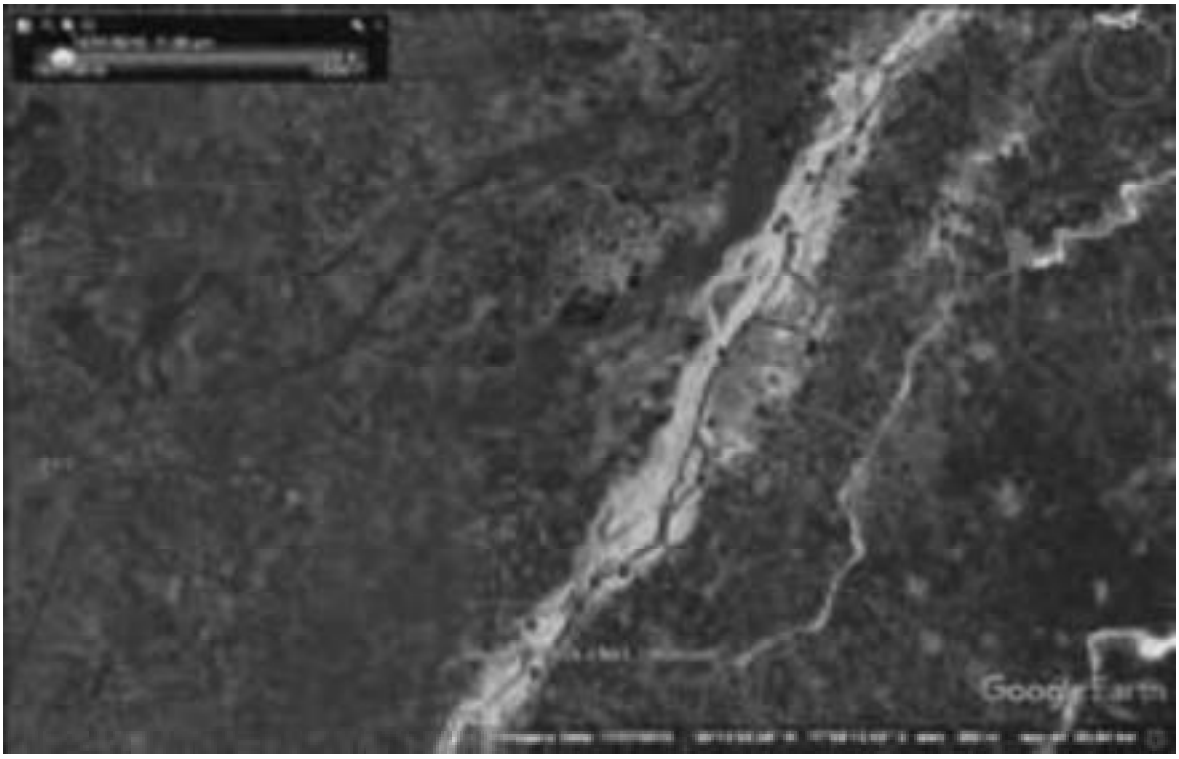


Figure 10: Line transact in Yamuna river zone

(ii) Badshahibagh cluster stretched from Badshahibagh to Sherpur Pelo and includes 13 sites.

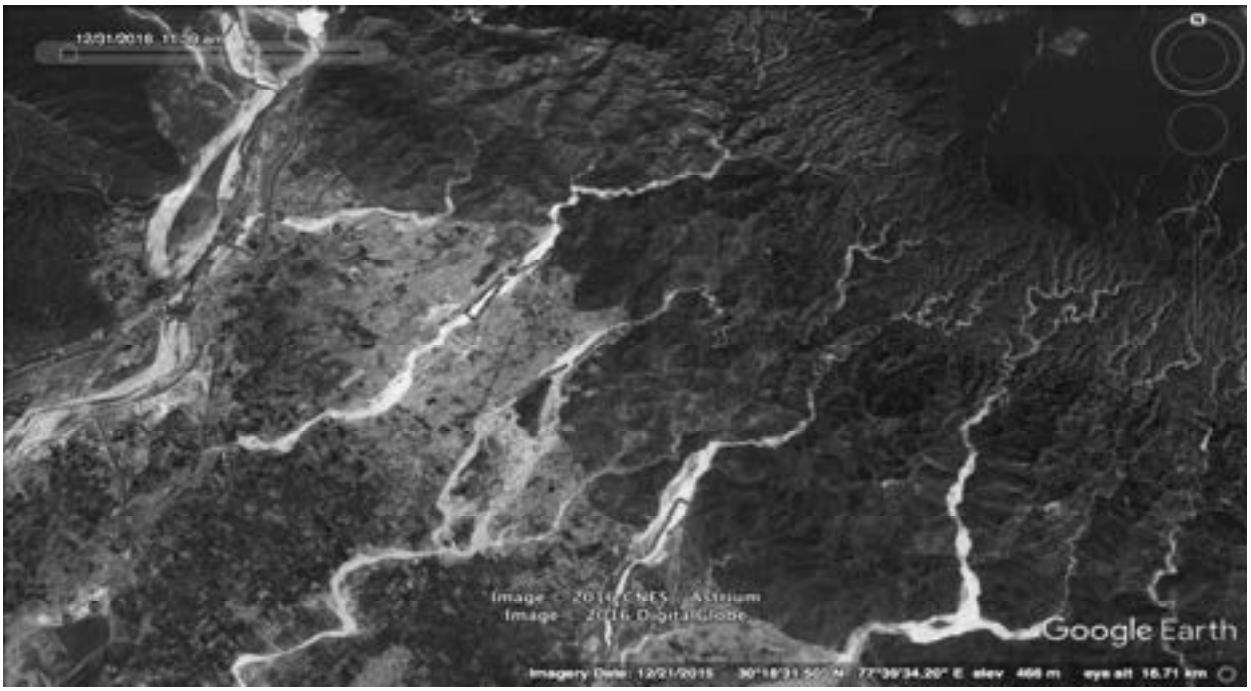


Figure 11: Line transact in Badshahibagh zone

(iii) Biharigarh cluster stretched from Naurangpur to Ganeshpur and includes 14 mining sites.



Figure 12: Line transact in Biharigarh zone

These zones/clusters correspond to the previously described cluster 1-2 (Yamuna river), cluster 3 (tributaries of the Yamuna) and cluster 4 (tributaries of the Ganga) respectively, which were constituted for assessment of physical damage of the mining activity.

3.3.3 Methodology

To study the ecological impacts of sand mining in Yamuna River and its tributaries, a rapid assessment was carried out by doing trail walks radiating in two different directions from the mining sites. In view of this, the sampling was carried out for a period of 5 days. During the study period 27 transects were laid with the length of transects varying from 1 km to 3 km according to the topography of the mining sites. Total sampling efforts spent in the field was 276 km and 140.5 man-hours.

The anthropogenic pressure decreases with increase in distance of village from the river bed (or mining activities) in the study area. It is significantly higher at sites near human habitation because they collect sand and boulders from the river bed and have converted some area into agricultural land. There was also presence of livestock which basically come from nearby villages for grazing. Presence of seven species of herbivores and carnivore viz. Blue-bull, Indian hare, Porcupine, Golden jackal, Sambar and Striped hyena were observed in the Yamuna River and its tributaries. Direct sighting of two carnivore species viz. Golden jackal and Stripped hyena were observed. Scats of Jackal were found in the area near human habitation and riverbed. No other Carnivore signs were encountered in the study area during the study period. The occurrence of Indian hare pellet is higher than that of blue-bull, sambar and porcupine. Sambar pellets were found only in one site in Ganeshpur (Biharigarh). This site is very close to the Mohand range.

3.3.4 Zone-wise description

3.3.4.1 Yamuna river zone

In this stretch Hathnikund barrage is present. On the upper side of barrage, mining activity is less and water level is high. Due to less anthropogenic activity, presence of water birds is high. In this area the sighting of Ruddy shelduck, Little cormorant, Eurasian coot etc, were common. On lower side of the Yamuna river, sand mining and anthropogenic activity is higher because of which sighting of birds is very less. In this zone sighting (direct/ indirect) of mammals is also very less. Many migratory birds use Yamuna river (Hathnikund barrage) as a stopover. Due

to sand mining and anthropogenic pressure, sighting of migratory birds has decreased. Presence of many threatened birds species like Pallid harrier, River lapwing, Wooly necked stork, Egyptian vulture enhance conservation value of Yamuna river.



Plate 10: Declining diversity of the birds in Yamuna river

3.3.4.2 Badshahibagh zone

Agriculture field and human habitation are situated near the river bed. In Khushalipur Khurd village people made their agriculture field in the middle of Sonali river. Indirect evidence of mammals such as Indian hare was found and other mammals like Nilgai, Golden jackal were occasionally seen. In that particular area the military camp are presence they are created more disturbance like firing in that particular area some time Asian Elephant and Spotted Deer occasionally seen by the villager and that area near the reserve forest.

3.3.4.3 Biharigarh zone

In this zone riverbed were dry. No water birds were sighting occur but sighting of mammals (direct/ indirect) were high. Direct sighting of Striped hyena in Hindon Nadi. Indian hare and Nilgai pellets were common. Indirect sighting of other mammals like sambar, porcupine, golden jackal were also recorded. Indirect evidence of porcupine and sambar were found in Fatehpur Pelo Nadi and Lalo Nadi respectively. Presence of striped hyena and sambar in that particular area is a significance of conservation.

Table 11: Birds observed during the survey

S.No.	Species	Scientific Name	No. of Individuals	IUCN Status
1	Ruddy Shelduck	*Tadorna ferruginea*	447	Least concern
2	Little Cormorant	*Phalacrocorax niger*	84	Least concern
3	Paddy field pipit	*Antheus rufulus*	16	Least concern
4	Black kite	*Milvus migrans*	6	Least concern
5	Cattle egret	*Bubulcus ibis*	15	Least concern
6	Eurasian Coot	*Fulica atra*	36	Least concern
7	River lapwing	*Vanellus duvaucelii*	50	Near threatened
8	White wagtail	*Motacilla alba*	11	Least concern
9	White throated kingfisher	*Halcyon smyrnensis*	5	Least concern
10	Curlew sandpiper	*Calidris ferruginea*	5	Near threatened
11	Pallid harrier	*Circus cyaneus*	2	Near threatened
12	Rufous treepie	*Dendrocitta vagabunda*	3	Least concern
13	Brown rockchat	*Cercomela fusca*	2	Least concern
14	House crow	*Corvus splendens*	4	Least concern
15	Egyptian vulture	*Neophron percnopterus*	1	Endangered
16	Jungle crow	*Corvus culminatus*	1	Least concern
17	Indian grey hornbill	*Ocyceros birostris*	1	Least concern
18	Black drongo	*Dicrurus macrorcercus*	1	Least concern
19	Little egret	*Egretta garzetta*	9	Least concern
20	Oriental magpie robbin	*Copsychus saularis*	2	Least concern
21	Eurasian white stork	*Ciconia ciconia*	1	Least concern
22	Intermediate egret	*Mesophoyx intermedia*	3	Least concern
23	Little ring plover	*Charadrius dubius*	7	Least concern
24	Red watted lapwing	*Vanellus indicus*	6	Least concern
25	Little stint	*Calidris minuta*	3	Least concern
26	White browed wagtail	*Motacilla maderaspatensis*	6	Least concern
27	Ashy prinia	*Prinia socialis*	6	Least concern
28	Great egret	*Casmerodius albus*	1	Least concern
29	Red crested pochard	*Netta rufina*	8	Least concern
30	Pied kingfisher	*Ceryle rudis*	3	Least concern
31	Wooly necked stork	*Ciconia episcopus*	2	Vulnerable
32	Red vented bulbul	*Pycnonotus cafer*	7	Least concern
33	Scaly breasted munia	*Lonchura punctulata*	1	Least concern
34	Great cormorant	*Phalacrocorax carbo*	5	Least concern
35	Bay backed shrike	*Lanius vittatus*	1	Least concern
36	Asian short toed lark	*Calandrella cheleensis*	3	Not evaluated
37	Black stork	*Ciconia nigra*	8	Least concern
38	Black winged stilt	*Himantopus himantopus*	1	Least concern
39	Common pigeon	*Columba livia*	4	Least concern
40	Rose ringed parakeet	*Psittacula krameri*	3	Least concern
41	Wallcreeper	*Tichodroma muraria*	1	Least concern
42	Lesser coucal	*Centropus bengalensis*	1	Least concern
43	Long tailed shrike	*Lanius schach*	1	Least concern

Table 12: Birds of conservation concern found during assessment

S.N.	Species	Scientific names	IUCN Status
1	River lapwing	*Vanellus duvaucelii*	Near threatened
2	Curlew sandpiper	*Calidris ferruginea*	Near threatened
3	Pallid harrier	*Circus cyaneus*	Near threatened
4	Egyptian vulture	*Neophron percnopterus*	Endangered
5	Wooly necked stork	*Ciconia episcopus*	Vulnerable

Table 13: Mammals observed during the survey

Direct Sighting				
S.No.	Species	Scientific Name	No. of Individuals	IUCN Status
1	Striped hyena	*Hyaena hyanea*	2	Near threatened
2	Golden jackal	*Canis aureus*	2	Least concern
3	Rufous tailed hare	*Lepus nigricollis*	2	Least concern
4	Blue bull	*Boselaphus tragocamelus*	2	Least concern
5	Common mongoose	*Herpestes edwardsii*	1	Least concern
Indirect Evidence				
S.No.	Species	Scientific Name		IUCN Status
1	Rufous tailed hare	*Lepus nigricollis*		Least concern
2	Blue bull	*Boselaphus tragocamelus*		Least concern
3	Golden jackal	*Canis aureus*		Least concern
4	Sambar	*Rusa unicolor*		Vulnerable
5	Indian porcupine	*Hystrix indica*		Least concern

Table 14. Mammals of conservation concern found during assessment

S.N.	Species	Scientific names	IUCN Status
1	Striped hyena	*Hyaena hyanea*	Near threatened
2	Sambar	*Rusa unicolor*	Vulnerable

3.3.5 Comparison with reference data

The 'Comprehensive Mining Plan' (CMP) has listed 19 such wild animal species which were commonly observed in this area. The Hathnikund barrage situated in the study area forms a wetland attracting a large number of migratory as well as local/resident birds. This barrage is quite near the Asan barrage situated about 20 km upstream. Hence flora and fauna of the two barrages, particularly avian fauna are comparable. The zoologists of Kurukshetra University studied the avian biodiversity of the Hathnikund barrage during 2005-08 and further made a

comparative study of the Hathnikund and Asan barrages in 2011. A comparative account of the present status of wild mammals and avian fauna and the reference studies is briefly given below.

1) In comparison to the list of 30 wildlife species given in the CMP, only 5 mammal species have been observed during the recent survey.
2) In comparison to the previous (2005-08) status of the avian biodiversity in Hathnikund barrage wherein 47 species were recorded, now only 12 bird species have been observed. These comprise only 8 resident species, 5 local migratory and only 2 winter migratory species out of the erstwhile 13, 9, 25 species respectively.
3) A comparison of present status of Hathnikund barrage with the recent study of Asan barrage shows that in comparison to the 60 species of Asan barrage, only 13 species were found in this area. These comprised are only 8 resident species, 2 local migratory and 3 winter migratory species out of the 20, 9 and 31species respectively at the Asan barrage.

3.3.6 Status of Damage

The severe depletion of animal and bird species like sighting only 5 out of the CMP list of 30; only 12 out of the previously recorded 47 at Hathnikund barrage and only 13 in comparison to the Asan barrage described in foregoing section depicts the state of habitat loss more than words. The rejection of the Hathnikund wetland by winter migratory birds, visiting only 2 species out of earlier 25 species and only 3 species in comparison to Asan barrage indicates the degree of habitat degradation. A very high level of anthropogenic disturbance has been recorded in all the study sites which were mainly due to rampant mining activities and dependence of villagers of the nearby settlements. Most of the sites are in a highly degraded state and weed dominated. Even though presence of mammals like Indian hare, Nilgai, Golden Jackal and Stripped Hyena were recorded, the elephant and tiger were absent primarily due to habitat degradation and high anthropogenic pressures.

A few bird species of conservation concern like River Lapwing and Egyptian Vulture were also recorded. This indicates the high conservation value of this wetland which needs to be duly protected by restricting/regulating the activities like riverbed mining, and developed by taking appropriate eco-restoration interventions.

4. ECOLOGICAL RESTORATION

4.1 Rationale

The value of ecological equilibrium and healthy environment for human well-being is generally masked by the development needs and economic benefits emanating from the mining activity. This perception about the mining, particularly the river bed mining, needs to be duly corrected on the basis of scientific investigation. Necessary corrective measures need to be taken to stop further damage and to restore the ecosystem to a healthy and self-sustaining state. Besides pollution of the environment, the geo-morphological and ecological damage caused by riverbed mining in the Yamuna river and in the tributaries in Saharanpur district has been duly described in the previous section. It has manifested itself in the form of severe depletion of the native plant species and rejection of the area by the birds and wild animals. The damage encompasses all dimensions including soil erosion, land degradation and loss in productivity, affect on water infiltration and recharge of aquifers, pollution of air, water and soil including the ground water etc. The type and scale of the damage should perhaps be enough to awaken the concerned authorities to take immediate regulatory, reclamation and eco-restoration measures for reversing the process of habitat degradation and destruction.

4.2 Adherence to Rules: Effective Monitoring

The cause of the devastation is not so much the lack of rules and regulations but gross violation of the same. In fact the rules and regulations are the first casualty and non-adherence to the rules is the norm rather than exception.

The five decade old mining rules of 1963 duly recognize and foresee the impact of sand mining in the river geomorphology, ecology and riverine habitat at a time when the present massive scale of the mining activity was hard to visualize.

The 1963 mining rules lay down several requirements including the necessity to (i) keep vigil for not polluting the environment, (ii) maintain ecological balance, (iii) to demarcate the mining area and erect and maintain boundary pillars, (iv) carry out sand and gravel mining in slices of 1m thickness (v) raise plantation on the bank side, (vi) leave a 100m barrier between two mining sites. None of these requirements seems to have been met.

Therefore ensuring adherence to the relevant rules, regulations and prescriptions is the first and foremost requirement. The monitoring mechanism needs to be appropriately strengthened at all levels, right from sub-division level to MoEF&CC.

The monitoring bodies should have adequate representation of the civil society.

4.3 Intervention Strategy

Perennial vegetation in the form of forests is the most natural and wholesome way of keeping the land resource in a state of optimum productivity and safe from erosive forces of air and water. However, due to the geo-morphological damage done by mining, the riverbed, floodplain and the riverbanks in the study area are vulnerable to the erosive force of the floods. Therefore, these sites need to be physically protected from the erosive force of water by appropriately designed engineering structures before attempting any vegetation model. Hence the suggested strategy takes into account both - (i) engineering and (ii) biological eco-restoration measures. The biological measures primarily include re-vegetating the devastated landscape/riverscape with appropriate native species which would largely restore the habitat for wildlife. However, keeping in view the specific needs of the wild-animals and the geophysical damage caused by the riverbed mining in respect of wetland siltation and obstruction in wildlife corridors, certain wildlife specific interventions are also necessary.

4.4 Engineering Measures

The riverbank erosion is driven by two primary components, (i) the characteristics of the river bank and (ii) the gravitational/hydraulic forces. The riverbank erosion can occur in three forms- vertical, head-wards, and lateral. Vertical erosion makes a river deeper, lateral erosion makes it wider and head-ward erosion makes it longer. Further the erosion has four processes: attrition, corrosion, abrasion and hydraulic action. The abrasive erosion occurs when river sediments collide with the channel’s floors to form craters. Hydraulic action erosion occurs when the pressure of water chips away at rock particles in the bed and banks. The force of the water slams into the banks and pushes water into cracks. This force compresses air and increases pressure to damage or collapse the bank. Banks erode from attrition when eroded rocks collide together and break-off into smaller fragments. Corrosion occurs when carbon dioxide dissolves to form a weak acid. The acid then eats away at the rock bed and ultimately collapses the bank.

In riverbank erosion, the soil is removed either by runoff flowing the side of the stream bank or by scouring and under cutting below the water surface. Scouring is influenced by velocity and direction of flow, depth and width of stream, soil texture and alignment of stream.

The above described forces and processes need to be appropriately tamed by properly designed physical structures for protection of riverbanks from damage. For this purpose, normally three types of engineering structures are constructed. Embankment or protection walls and Spurs are constructed for protection of the riverbank from bank erosion and Check dams are constructed for gully plugging.

4.4.1 Embankments

Embankments or protection wall helps in training the river flow and need to be constructed along the river bank(s) to contain the flow within the torrent and not allow it to overtop the bank(s) in order to save the adjoining land. The type of construction of the embankment is decided according to the availability of material and site situation. Gabion protection wall is a better choice when the sufficient stone is available near the site. Gabion structures are made of boulders packed closely in wire crates made of 10 gauge G.I. wires. Semi permeable gabion structures are being used extensively for stream bank protection because they are flexible and economical. The minimum bottom and top width for low-height walls are kept as 1 m. If height of wall is more than 1m, it should be constructed in steps. Normally, the bottom width of a gabion wall is taken as two-third of its height. For example, a wall of 3 m height would require a bottom width of 2 m (**Figure 13** and **14).** Source**:** ICAR-Indian Institute of Soil & Water Conservation.

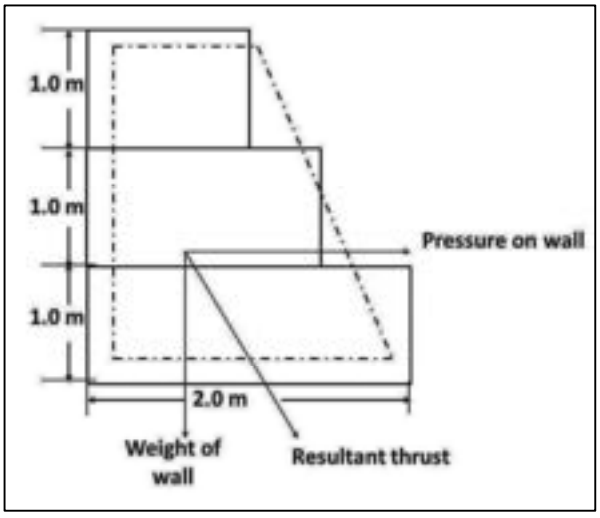


Figure 13: Force acting on a retaining wall

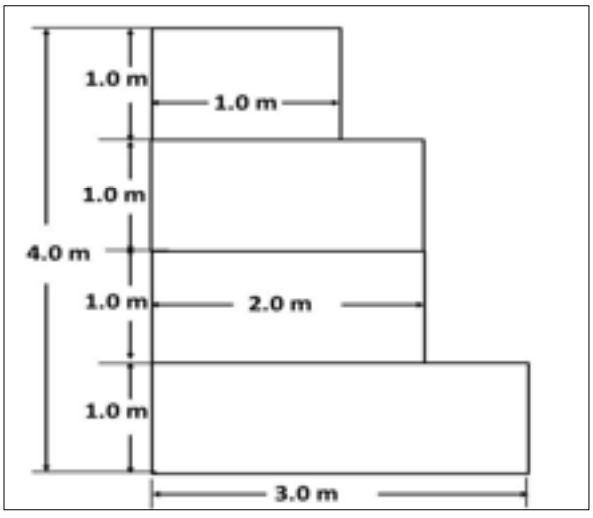


Figure 14: CS of a 4m high retaining wall

4.4.2 Spurs

Spurs are the structures constructed on the bank(s) and extending towards river flow at an angle. Spurs are usually constructed in a series along the bank to have a continuous protection. Purpose(s) of spurs may be as follows:

- Diversion of current in a desired direction.
- Protection of river banks including land, houses, road etc. adjoining the banks.
- Reclamation of land along torrent banks, other than that required for the flow discharge.

Construction type wise, commonly Gabion type spurs are constructed for torrent training.

4.4.2.1 Types of Spurs

The spurs are extended into the stream at appropriate angle for a length not exceeding 30 percent of the river width. The angle is decided according to the function served. Therefore the spurs form any of the following three types:

1) Attractive type: These are constructed in such a way that it points downstream (30º to 45º angle) to the direction of normal flow. Such spurs are commonly used for flow diversion purpose.
2) Deflecting type: These spurs are constructed at right angle (90º) to the bank. These are generally of short length and closely spaced for quick sedimentation of torrent banks.
3) Repelling type: These spurs are constructed in such a way that it points towards upstream at an angle of 5º to 10º to the line normal to the bank.

4.4.2.2 Design Criteria of Spurs

The design of spur construction is based on five parameters, namely (i) Length, (ii) Alignment, (iii) Spacing, (iv) Cross-section and (v) Apron.

(i) Length of spur

Length of a spur should be restricted such that it does not constrict the river section adversely and allows the river flow to occur unhindered. Blockage ratio is defined as projected length of a spur divided by the torrent width. The blockage ratio should not exceed 0.3 i.e. the projected length of the spur *should not exceed 1/3 of the width* of river.

(ii) Alignment of spur

Alignment of a spur (Θ) is defined as the angle the spur makes from torrent bank and is usually measured from the downstream. As the angle of the inclination of the spur along the flow direction increases, its sedimentation capacity increases but stability decreases due to greater scour.

(iii) Spacing of spurs

A spur provides protection to only a limited length of the bank. Hence, to give a continuous protection to a river reach, spurs are used in series. The spacing between the spurs on straight reach may be 4 to 6 times the projected length of spurs. In case of curved bank, a closer spacing of 2 to 2.5 times of spur length may be kept.

(iv) Cross-section of spur

The height, top and bottom widths of the spur determine the cross-section of a spur. The height of the spur near the bank depends upon the highest flood level (HFL). The top of spur is given grade towards the stream bed. Height of spur is usually kept about 0.3 m more than the highest flood level. Base width of a spur may vary from 1.5 m to 8 m depending upon the catchment area. The top width may normally be kept as 1.0 m. for spurs of low height, say upto 2.0 m. A trapezoidal cross section can be adopted with side slope of 1:3 to 1:4. If height of the spur is more, stepped shape should be adopted with width of each succeeding step reducing gradually. Spurs are normally constructed up to a maximum height of 3.0 m.

(v) Apron

Spur failure often occurs due to scouring action at the spur nose. Hence, suitable protection device in the form of an apron (below ground level) is essential.

4.4.3 Check dams

Check dam are constructed in gullies/river bed to reduce river bed gradient for bringing the flow velocity within permissible limit.

4.4.4 Construction of Gabion type structures

In the main streams receiving relatively large quantity of runoff and debris load, the Gabion structures are preferred for construction of the retaining walls, spurs and check dams. The gabion

structures are made with stone/boulders packed closely in wire mesh cage made with G.I. wire of 10 gauge. The boxes may be fabricated with a dimension of 3m x 1m x 1m or any other suitable dimensions with mesh opening size of 10-20 cm depending on the stone size.

The cross-sections of two typical spurs of height 2m and 1m are shown in **Fig.15 (1) and (2)**. The cross section of 1m high spur is a 1m x 1m square. In case of 2m high spur, the base width is 2m making a lower block of 2m x 1m cross section. The upper block of 1m x 1m is constructed in the centre of the lower block leaving steps on the lower block.

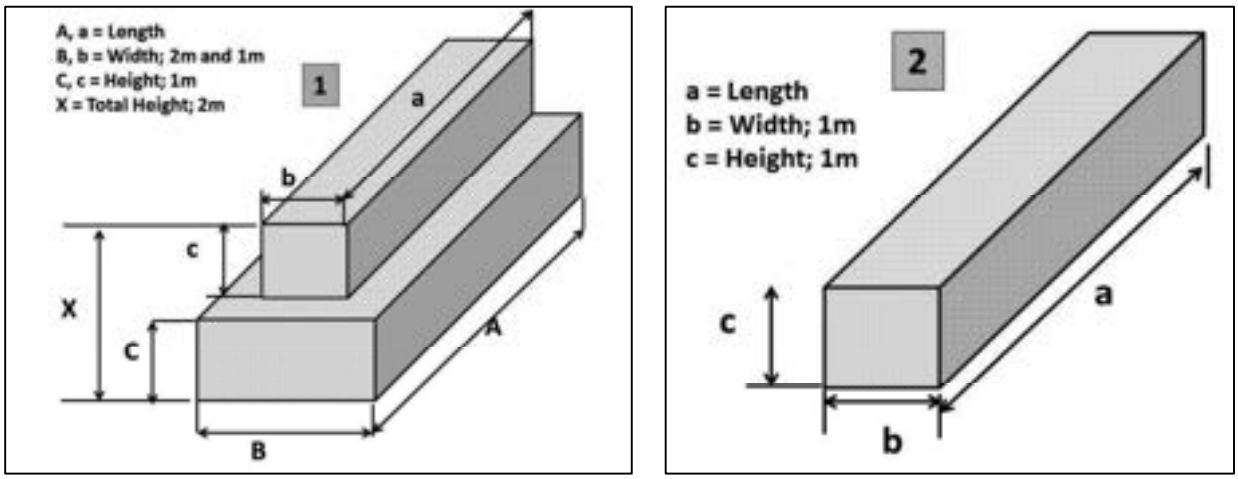


Figure 15: CS of typical spurs of (1) 2m and (2) 1m height

Some important points about gabion type structures are given below

- Spurs are normally made using gabion type structures (stones packed in wire mesh).
- The wire mesh (15 cm x 15 cm) for the spur is fabricated as per the design.
- The wire used is 10 gauge (3.15 mm dia) galvanized iron (GI) wire.
- Location of the spur is marked at the site as per its length, width and angle.
- Spur should be firmly anchored into the bank (0.5 – 1.0 m)

4.4.5 Cost norm for construction of gabion structure

(Provided by the Indian Institute of Soil and Water Conservation, ICAR)

The cost of construction of the gabion structure is worked out on the basis of the cost of a block of 3 cubic meter measuring 3m in length, 1m in width and 1m in height. This cost is divided by three to arrive at the unit cost in Rs/cum. An analysis of the cost estimation is given in **Table 15**.

Table 15: Analysis of cost norm for gabion structure

(Source**:** ICAR-Indian Institute of Soil & Water Conservation)

SN.	Particulars of Items	Quantity	Amount
1	Wire net 10 gauge or 3.15 mm dia (1.28 kg/sqm)		
2	Wire net with 10 cm x 10 cm opening of 3m x1m x 1m Size (sqm)	14 sqm	
3	Weight of wire for 3 m3 gabion structure (14*1.28 kg)	18 kg	
4	Rate of 10gauge wire (Rs. 60/kg)		
5	Cost of wire for 3 m3 gabion structure (Rs. 18*60 kg) **(A)**	18 kg	1080
6	Rate of knitting wire (Rs. 15/sqm)		
7	Cost of wire knitting for $3M^3$ gabion structure (Rs.15*14 sqm) **(B)**	14 sqm	210
8	Cost of Stone gathering, placing and dressing for $3M^3$ **(C)**	3 M^3	3300
9	Earth work excavation for foundation (Item No. 2.6.1 DSR) **(D)**		153.6
Total cost (A+B+C+D) for 3 cum		**Rs**	**4743.6**
Cost per cubic meter		**(or) Rs**	**1581.2** **1600.00**

Note: The cost of material is taken at site including carriage, local taxes etc. If the construction site is located in a remote place, then proportionately the analysis of the material may also be added. A provision of 10% cost as contractor's profit and 5% cost of the contingency may also be added to obtain the per unit of the item of work.

4.4.6 Scope and cost of engineering measures

For ecological restoration of the mined areas of Saharanpur district, physical support of the above described engineering structures viz., retaining wall, spurs and check dams for riverbank protection is essentially required for success of the biological measures. During the field visits with the local mining and revenue officials, the mining sites were particularly observed from the perspective of estimating the requirement of retaining walls and spurs at various sites. The village wise detail of the proposed Retaining wall and Spurs/Check dams along with their approximate dimensions, quantity and cost are given in **Table 16** (Retaining wall) and **Table 17** (Spurs and Check dams).

Table 16: Village-wise details of retaining wall

Village-wise Details of Quantity and Cost of gabion Retaining Walls										
SN	Vil. ID	Village	Length (m)	Total Ht (m)	Base Width (m)	Ht (m)	Width (m)	Vol. (m^3)	Total Volume (m^3)	Total Cost @1600.00/m3*
1	3	Jayantipur Ahatmal	900	4	3	1	3	2700		
						2	2	3600		
						1	1	900	**7200**	**11520000**
2	4	Ganeshpur	1000	4	3	1	3	3000		
						2	2	4000		
						1	1	1000	**8000**	**12800000**
3	5	Naurangpur	837	3	2	1	2	1674		
						1	1.5	1255.5		
						1	1	837	**3766.5**	**6026400**
4	6	Akaberpur Bans Ahatmal	452	3	2	1	2	904		
						1	1.5	678		
						1	1	452	**2034**	**3254400**
5	7	Chhajaa Ahatmal	450	3	2	1	2	900		
						1	1.5	675		
						1	1	450	**2025**	**3240000**
6	8	Aluddinpur Bans	200	2	1			400	**400**	**640000**
7	9	Maya Rooppur II	700	3	2	1	2	1400		
						1	1.5	1050		
						1	1	700	**3150**	**5040000**
8	10a	Badshahpur I	300	3	2	1	2	600		
						1	1.5	450		
						1	1	300	**1350**	**2160000**
9	10b	Badshahpur II	1000	2	1			2000	**2000**	**3200000**
10	15	Thappul Ismailpur III	1200	3	2	1	2	2400		
						1	1.5	1800		
						1	1	1200	**5400**	**8640000**
11	16	Fatehpur Pelo	800	3	2	1	2	1600		
						1	1.5	1200		
						1	1	800	**3600**	**5760000**
12	17	Madathi Ahtmal and Mustakam	450	3	2	1	2	900		
						1	1.5	675		
						1	1	450	**2025**	**3240000**
13	18	Kaluwala Jahanpur	500	3	2	1	2	1000		
						1	1.5	750		
						1	1	500	**2250**	**3600000**
14	20	Abdullapur	390	3	2	1	2	780		
						1	1.5	585		
						1	1	390	**1755**	**2808000**
15	21	Khushalipur	800	3	2	1	2	1600		
						1	1.5	1200		
						1	1	800	**3600**	**5760000**
16	22	Ali Akabarpur	300	2	1			600	**600**	**960000**
17	23	Shahpur Bans A	450	2	1			900	**900**	**1440000**
18	28	Sayd Mohammad Pur Garh Ahatmal	500	3	2	1	2	1000		
						1	1.5	750		
						1	1	500	**2250**	**3600000**
19	30	Abutalibpur Garh	950	3	2	1	2	1900		
			950			1	1.5	1425		
			950			1	1	950	**4275**	**6840000**
20	31	Bartha Korsi	750	3	2	1	2	1500		
			750			1	1.5	1125		
			750			1	1	750	**3375**	**5400000**
21	41	Sayed mohammad pur Mustakam	50	3	2	1	2	100		
						1	1.5	75		
						1	1	50	**225**	**360000**
22	43	Alauddin pur bans A	250	2	1			500	**500**	**800000**
Total								**60681**	**60681**	**97088800**
									Total Cost (Rs.)	**970,88,800**

* Note: The detailed calculation of unit cost is given in the section of Engineering Measures

Table 17: Village-wise details of Spurs and Check dams

Village-wise Details of Quantity and Cost of Gabion Spurs and Check Dams										
SN	Vill. ID	Name of Village site	Type of Spur	No.	Length (m)	Ht (m)	Width (m)	Vol. (m^3)	Total Volume (m^3)	Total Cost @ Rs1600/m^3*
1	3	Jayantipur Ahtmal	Repelling Type	2	10	1	2	40		
						1	1	20		
				3	15	1	2	90		
						1	1	45		
			Attracting Type	3	5	1	2	30		
						1	1	15		
				2	10	1	2	40		
						1	1	20		
			Deflecting Type	5	7	1	2	70		
						1	1	35		
			Check dam	4	50	1	2	400	**805**	**1288000**
2	4	Ganeshpur	Repelling Type	2	7	1	2	28		
						1	1	14		
				3	10	1	2	60		
						1	1	30		
			Attracting Type	3	5	1	2	30		
						1	1	15		
				2	10	1	2	40		
						1	1	20		
			Check dam	4	50	1	2	400	**637**	**1019200**
3	5	Naurangpur	Repelling Type	5	10	1	2	100		
						1	1	50		
				2	15	1	2	60		
						1	1	30		
			Attracting Type	2	10	1	2	40		
						1	1	20		
				1	15	1	2	30		
						1	1	15		
			Deflecting Type	4	10	1	2	80		
						1	1	40		
				1	15	1	2	30		
						1	1	15	**510**	**816000**
4	6	Akaberpur Bans Ahatmal	Repelling Type	2	7	1	2	28		
						1	1	14		
				1	10	1	2	20		
						1	1	10		
				2	15	1	2	60		
						1	1	30		
			Attracting Type	3	10	1	2	60		
						1	1	30		
			Deflecting Type	6	5	1	2	60		
						1	1	30	**342**	**547200**
5	7	Chhajaa Ahatmal	Repelling Type	3	7	1	2	42		
						1	1	21		
				2	10	1	2	40		
						1	1	20		
				2	15	1	2	60		
						1	1	30		
			Attracting Type	3	10	1	2	60		
						1	1	30		
			Deflecting Type	6	5	1	2	60		
						1	1	30	**393**	**628800**

* Note: The detailed calculation of unit cost is given in the section of Engineering Measures

SN	Vill. ID	Name of Village site	Type of Spur	No.	Length (m)	Ht (m)	Width (m)	Vol. (m^3)	Total Volume (m^3)	Total Cost @ Rs1600/m^3*
6	8	Aluddinpur Bans	Repelling Type	2	7	1	2	28		
						1	1	14		
				3	10	1	2	60		
						1	1	30		
			Attracting Type	3	7	1	2	42		
						1	1	21		
			Deflecting Type	4	5	1	2	40		
						1	1	20	**255**	**408000**
7	9a	Maya Rooppur I	Repelling Type	4	10	1	2	80		
						1	1	40		
			Deflecting Type	6	5	1	2	60		
						1	1	30	**210**	**336000**
8	9b	Maya Rooppur II	Attracting Type	3	10	1	2	60		
						1	1	30		
				2	15	1	2	60		
						1	1	30		
			Deflecting Type	5	5	1	2	50		
						1	1	25	**255**	**408000**
9	10	Badshahpur II	Repelling Type	5	10	1	2	100		
						1	1	50		
			Attracting Type	3	7	1	2	42		
						1	1	21		
			Deflecting Type	4	5	1	2	40		
						1	1	20	**273**	**436800**
10	15	Thappul Ismailpur III	Attracting Type	5	5	1	2	50		
						1	1	25		
			Deflecting Type	4	5	1	2	40		
						1	1	20	**135**	**216000**
11	16	Fatehpur Pelo	Repelling Type	2	7	1	2	28		
						1	1	14		
				3	10	1	2	60		
						1	1	30		
			Attracting Type	3	6	1	2	36		
						1	1	18		
			Deflecting Type	5	4	1	2	40		
						1	1	20	**246**	**393600**
12	17	Madathi Ahtmal and Mustakam	Repelling Type	5	12	1	2	120		
						1	1	60		
			Attracting Type	3	8	1	2	48		
						1	1	24		
			Deflecting Type	5	6	1	2	60		
						1	1	30	**342**	**547200**
13	18	Kaluwala Jahanpur	Repelling Type	2	8	1	2	32		
						1	1	16		
				3	10	1	2	60		
						1	1	30		
			Attracting Type	3	5	1	2	30		
						1	1	15		
				2	10	1	2	40		
						1	1	20		
			Deflecting Type	8	7	1	2	112		
						1	1	56	**411**	**657600**

* Note: The detailed calculation of unit cost is given in the section of Engineering Measures

SN	Vill. ID	Name of Village site	Type of Spur	No.	Length (m)	Ht (m)	Width (m)	Vol. (m^3)	Total Volume (m^3)	Total Cost @ Rs1600/m^3*
14	20	Abdullapur	Repelling Type	2	5	1	2	20		
						1	1	10		
				3	10	1	2	60		
						1	1	30		
			Attracting Type	2	5	1	2	20		
						1	1	10		
				1	10	1	2	20		
						1	1	10		
			Deflecting Type	3	10	1	2	60		
						1	1	30	**270**	**432000**
15	21	Khushalipur	Repelling Type	5	8	1	2	80		
						1	1	40		
			Attracting Type	4	7	1	2	56		
						1	1	28		
			Deflecting Type	4	5	1	2	40		
						1	1	20	**264**	**422400**
16	22	Ali Akabarpur	Repelling Type	4	5	1	2	40		
						1	1	20		
			Attracting Type	4	5	1	2	40		
						1	1	20		
			Deflecting Type	5	4	1	2	40		
						1	1	20	**180**	**288000**
17	23	Shahpur Bans A	Repelling Type	4	10	1	2	80		
						1	1	40		
			Attracting Type	4	5	1	2	40		
						1	1	20		
			Deflecting Type	6	4	1	2	48		
						1	1	24	**252**	**403200**
18	28	Sayd Mohammad Pur Garh Ahatmal	Repelling Type	4	12	1	2	96		
						1	1	48		
			Attracting Type	5	5	1	2	50		
						1	1	25		
			Deflecting Type	5	4	1	2	40		
						1	1	20	**279**	**446400**
19	30	Abutalibpur Garh	Repelling Type	5	10	1	2	100		
						1	1	50		
			Attracting Type	4	5	1	2	40		
						1	1	20		
			Deflecting Type	5	4	1	2	40		
						1	1	20	**270**	**432000**
20	31	Bartha Korsi	Repelling Type	5	15	1	2	150		
						1	1	75		
			Attracting Type	4	5	1	2	40		
						1	1	20		
			Deflecting Type	4	5	1	2	40		
						1	1	20	**345**	**552000**
21	33	Pratap pur	Repelling Type	3	15	1	2	90		
						1	1	45		
			Deflecting Type	6	5	1	2	60		
						1	1	30	**225**	**360000**

* Note: The detailed calculation of unit cost is given in the section of Engineering Measures

Village-wise Details of Quantity and Cost of Gabion Spurs and Check Dams										
SN	Vill. ID	Name of Village site	Type of Spur	No.	Length (m)	Ht (m)	Width (m)	Vol. (m^3)	Total Volume (m^3)	Total Cost @ Rs1600/m^3*
22	34	Dhaulra	Repelling Type	5	15	1	2	150		
						1	1	75		
			Deflecting Type	4	5	1	2	40		
						1	1	20	**285**	**456000**
23	35	Jodhe Bans	Repelling Type	2	10	1	2	40		
						1	1	20		
				1	15	1	2	30		
						1	1	15		
			Deflecting Type	6	15	1	2	180		
						1	1	90	**375**	**600000**
24	41	Sayed mohammad pur Mustakam	Repelling Type	5	5	1	2	50		
						1	1	25		
			Deflecting Type	4	5	1	2	40		
						1	1	20		
			Check dam	5	50	1	2	500	**635**	**1016000**
25	43	Alauddin pur bans A	Repelling Type	5	10	1	2	100		
						1	1	50		
			Attracting Type	4	5	1	2	40		
						1	1	20		
			Deflecting Type	5	4	1	2	40		
						1	1	20	**270**	**432000**
		Total							**8464**	**13542400**
									Rs	**135,42,400**

* Note: The detailed calculation of unit cost is given in the section of Engineering Measures

4.4.7 Total cost of engineering measures

As given in the village-wise detail in **Table 16**, the total length of gabion type retaining wall of different cross sections in the 21 villages would be 13229 m. The total quantity of the work will be 60681 M^3. Similarly the number of different types of spurs and check dams of different dimensions in the 25 mining sites would be 322 **(Table 17)**. Total quantity of work will be 8464 M^3. The cost estimate of this whole work, calculated @ Rs. 1600/cum, as worked out in sub-section 4.4.5 is given in **Table 18**.



Plate 11: A series of engineering structures on riverbank in village Dhaulra

Table 18: Cost estimate of engineering measures

Cost Estimate of Engineering Measures						
S.No.	**Item**	**No. of Villages**	**Quantity**	**Volume (m^3)**	**Rate/m^3 (Rs)**	**Amount (in Rs) (approx)**
1	Retaining/Protection Wall (Length in m)	21	13229	60681	1600	97089600
2	Check and Spurs (no)	25	322	8464	1600	13542400
	Sub-Total			69145		110632000
	Contractor's Profit (10%)					11063200
	Contingency (5%)					5531600
	Total					127226800
				Total	Rs.	**1272,26,800**



Plate 12: Gabion type retaining wall and spurs in village Dhaulra

4.5 Biological Measures

Riverine forest all along the river course play important role in preventing natural flood hazards. Vegetation intercepts the rain drops and dissipates their kinetic energy thus minimizing soil erosion. The riparian forests form a transitional zone between aquatic and terrestrial ecosystems. These act as a buffer to reduce the impact of anthropogenic disturbances on river and help in filtering pollutants. Preserving riparian corridors allows a stable watercourse as the downstream receiver of runoff. The underground parts particularly the roots increase the tensile and shear strength of the river bank and hence accord protection against erosive forces.

In view of the multi-dimensional role of vegetation in geo-morphological protection, stabilization of the soil and ecological development in the mining affected areas of Saharanpur districts, it is necessary to re-vegetate the area with appropriate native species and proactive interventions as early as possible. The various steps and considerations in this respect are described in following sub-sections.

4.5.1 General Principles

The following principles are applicable in the biological treatment of mined affected areas.

- Native species of tree, shrub and herbs will be planted. A combination of various will be used rather than pure plantation.
- Pits for planting works will be dug sufficiently before planting operation according to the standard practice in the plantation area, but period between pit digging and scheduled planting time will not be more than four months so that run-off of soil through wind and water will be low. Pits will be refilled after digging.
- Organic manures will be applied to boost plant growth in the plantations. Eco-friendly measures (e.g. physical or mechanical methods, use of natural products, etc.) of weed and pest control will be adopted without resorting to use of synthetic chemicals.
- Protection against all types of biotic and abiotic disturbances will be effectively provided to planted seedlings for five years through fence, watch and ward as well as public awareness.
- The native species recommended for the suggested model will be used for plantation. The propagation method and special attributes of various species are indicated in **Table 19 and 20**.

4.5.2 Season Considerations

The essence of restoration of a native ecosystem lies in establishing a self-sustaining system so that succession processes take their own course and lead to the desired vegetation complex. The seasonal distribution and reliability of rainfall determines the best time to establish vegetation. All the preparatory works must be completed before the time when seeds are most likely to experience the conditions that they need to germinate and survive, i.e. adequate rainfall and suitable temperatures.

4.5.3 Species selection

The species selected for establishment is based on the future land use of the area, soil conditions and climate. However, the objective is to restore the native vegetation and fauna to fulfill the functions of the original native vegetation. Species which have similar growth forms to the original vegetation, and thrive in areas with comparable soil types, drainage status, aspect and climate, are most appropriate. Suitable legumes should always be considered for the ability to improve soil fertility. Cover crops can be considered where a quick cover for erosion control is required.

4.5.3.1 Grasses for soil moisture conservation and slope stabilization

The grasses and herbaceous species available locally in abundance can be used for biological treatment. Slips can be collected from surrounding and nearby areas without destroying the grass cover of the adjacent areas. Many studies have documented the positive role of grasses as a nurse crop. Grasses may have both negative (preventing the natural regeneration of other species) and positive effects on restoration of mined out lands and slopes. They can offer superior tolerance to drought, establish fast in low soil nutrients and other climatic stresses, and due to fibrous roots that can reduce soil erosion and eventually produce a layer of organic soil that allow early succession species to colonize. The important grass species, namely, *Saccharum spontaneum*, *Saccharum bengalense, Imperata cylindrica, Phragmites karka, Arundo donax, Eulaliopsis binata, Pennisetum purpureum, Cynodon dactylon* etc., which are excellent soil binders have been suggested for planting in the form of slips and root stocks as given in **Table 19**. These can easily be multiplied in the nursery by vegetative means for large scale planting.

Table 19: Suitable bamboo, grass, herb and shrub species

SN	Botanical Name	Common Name	Habit	Propagation	Special attributes
1	*Bambusa bambos*	Giant thorny bamboo	Bamboo	Seedling, rhizome	Making bridges, furniture, ladders, thatching, etc
2	*Dendrocalamus strictus*	Lathi baans	Bamboo	Seedling, rhizome	Fodder, edible young shoots, agricultural implements, contruction
3	*Arundo donax*	Narkat	Grass	Rootstock, culm	Medicinal, good agroforestry uses, soil binding capacity
4	*Cynodon dactylon*	Doob	Grass	Seed broadcast	fodder,soil binder, medicinal
5	*Desmostachya bipinnata*	Kush	Grass	Root stock, seed broadcast	Fodder, medicinal
6	*Eriophorum comosum*	Cotton grass	Grass	Seed broadcast	Soil stabiliser
7	*Eulaliopsis binata*	Sabai grass, Babni	Grass	Root stock, seed broadcast	Soil stabiliser
8	*Imperata cylindrica*	Kunai	Grass	Seed broadcast	Soil stabiliser,Ornamental, medicinal
9	*Pennisetum purpureum*	Napier	Grass	Root stock, culm	Soil stabiliser, fodder
10	*Phragmites karka*	Tall reed, Khagra	Grass	Root stock	Soil stabilizer, culms for making baskets, mats, pipe, paper
11	*Saccharum munja*	Munj ghas	Grass	Root stock, seed broadcast	Soil tabilizer, fibre, stem for basket, screen, furniture, leaves for thatching
12	*Saccharum spontaneum*	Kans	Grass	Root stock, seed broadcast	Soil stabiliser
13	*Vetiveria zizanioides*	Khas khas	Grass	Root stock	Aromatic,soil stabilizer
14	*Atylosia scarabaeoides*	Wild kulthi	Herb	Seed broadcast	Nitrogen fixer
15	*Cassia occidentalis*	Kasoundi	Herb	Seed broadcast	Medicinal
16	*Cassia tora*	Tora	Herb	Seed broadcast	Medicinal, edible
17	*Crotalaria juncea*	San	Herb	Seed broadcast	Fibre, medicinal, nitogen fixer
18	*Desmodium gangeticum*	Dirghamuli	Herb	Seed broadcast	Nitrogen fixer
19	*Indigofera linifolia*	Torki	Herb	Seed broadcast	Nitrogen fixer
20	*Stylosanthes hamata*	Stylo grass	Herb	Seed broadcast	Fodder, soil binding and nitrogen fixer
21	*Tephrosia hamiltonii (Syn. T. purpurea)*	Sarphonka, ban-nil	Herb	Seed broadcast	Medicinal (asthama, cough), rutin, dye, green manure
22	*Buddleia asiatica*	Butterfly bush	Shrub	Seed broadcast	Ornamental, Butterflies feeds on its nectar
23	*Calotropis gigantea*	Aak	Shrub	Seed broadcast	Fungicidal and insecticidal, medicinal, fibre and floss
24	*Calotropis procera*	Aak	Shrub	Seed broadcast	Medicinal (leprosy, elephantiasis), improves soil water condition, soil binder
25	*Carrisa opaca*	Jangali karaunda	Shrub	Seedling	Fencing, beekeeping, browsed by sheep and goat
26	*Ipomoea carnea*	Beshram	Shrub	Cutting	Soil stabliser
27	*Mimosa himalayana*	Agla	Shrub	Seed broadcast	Nitrogen fixer
28	*Tamarix dioica*	Jhau	Shrub	Seedling	Medicinal, tannin, dye, wood for baskets, turnery, fuel
29	*Vitex negundo*	Nirgundi /Shimalu	Shrub	Branch cutting	Fencing and fuel,Medicinal
30	*Woodfordia fruticosa*	Dhaula	Shrub	Seedling	Fodder, fuel, soil conservation
31	*Ziziphus nummularia*	Jahr beri	Shrub	Seedling, seed broadcast	Fruit, fuel wood

Table 20: Suitable tree species

SN	Botanical Name	Common Name	Habit	Propagation	Special attributes
1	*Acacia catechu*	Khair	Tree	Seedling and seed broadcast	Nitrogen fixer, fuel, timber, tannin, lac insect host, medicinal (cough and sore throats)
2	*Acacia nilotica*	Babul, Kikar	Tree	Seedling	Nitrogen fixer, fuel, timber, tannin, gum
3	*Aegle marmelos*	Bel	Tree	Seedling	Fuel wood, medicinal (laxative, heart and brain tonic, diarrhea, dysentery etc.)
4	*Albizia lebbeck*	Siris, Siras	Tree	Seedling and seed broadcast	Medicine (anti-poisoning herb)
5	*Albizia procera*	Safed Siris	Tree	Seedling and seed broadcast	Timber, Insecticidal
6	*Azadirachta indica*	Neem	Tree	Seedling	Medicinal (skin diseases, leprosy, intestinal helminthiasis, respiratory disorders, etc,), timber, oil, oilcake as manure
7	*Bauhinia purpurea*	Purple Bauhinia orchid tree	Tree	Seedling and seed broadcast	Young flowers edible, bark used for rope making, fodder
8	*Bauhinia variegata*	Kachnar	Tree	Seedling and seed broadcast	Food, fodder, fuel, fibre, gum, tannin, medicinal (antioxidant, anti-inflammatory, anti-spasmodic, anthelmintic and antimicrobial etc.)
9	*Bombax ceiba*	Semal	Tree	Seedling	Wood, floss, medicinal (anti-oxidant, antimicrobial)
10	*Butea monosperma*	Dhak	Tree	Seedling	Nitrogen fixer, dye, fuel, fodder, medicinal (diarrhea, diabetes)
11	*Cassia fistula*	Amaltas	Tree	Seedling and seed broadcast	Shade/ornamental
12	*Cordia dichotoma*	Lasora	Tree	Seedling	Fodder, medicinal
13	*Dalbergia sissoo*	Shisham	Tree	Seedling and seed broadcast	Timber, nitrogen fixer
14	*Ehretia laevis*	Charmol	Tree	Seedling	Medicinal
15	*Emblica officinaliis*	Amla	Tree	Seedling	Fruit, medicinal
16	*Ficus benghalensis*	Bargad	Tree	Seedling	Religious significance, shade
17	*Ficus racemosa*	Gular	Tree	Seedling	Fodder, medicinal (astringent, dysentery, stomach-ache, piles)
18	*Ficus religiosa*	Peepal	Tree	Seedling	Religious significance, shade
19	*Ficus semicordata*	Jarhphali	Tree	Seedling	Fodder
20	*Haldina cordifolia (Syn. Adina cordifolia)*	Haldu	Tree	Seedling	Furniture, bobbin, timber, bark antiseptic
21	*Holarrhena pubescens*	Kutaja	Tree	Seedling	Medicinal
22	*Holoptelea integrifolia*	Kanju	Tree	Seedling	Timber, medicinal (antioxidant)
23	*Lagerstroemia parviflora*	Sidh, Dhaura	Tree	Seedling	Timber, fodder, agricultural implements, medicinal (antidiabetic, antiobesity)
24	*Mallotus nudiflorus (Syn. Trewia nudiflora)*	Gutal	Tree	Seedling	Used for making drums, cheap planking, agricultural implements, also planted for biodrainage
25	*Mallotus philippensis*	Raini	Tree	Seedling	Fodder
26	*Pithecelobium dulce*	Jangal jalebi	Tree	Seedling	Fodder, medicinal
27	*Pongamia pinnata*	Karanj	Tree	Seedling and seed broadcast	Nitrogen fixer, fodder, insecticidal, fish poison, medicinal (Anti-diarrhoeal, Anti-ulcerogenic, anti-inflammatory)
28	*Putranjeeeva roxburghii*	Jivaputrak	Tree	Seedling	Medicinal, timber
29	*Salix tetrasperma*	Laila	Tree	Seedling and seed broadcast	Erosion control, soil binding, stream bank stabilisation
30	*Syzygium cumini*	Jamun	Tree	Seedling	Ornamental, edible fruit, medicinal (treatment of various disease particularly diabetes)
31	*Terminalia arjuna*	Arjun	Tree	Seedling	Tassar cultivation, timber, fuel wood, medicinal (heart tonic)
32	*Terminalia bellirica*	Bahera	Tree	Seedling	Fodder, fuel, fruit (myrobalan), timber, fuel wood, medicinal (heart tonic), shade
33	*Trema politoria*		Tree	Seedling, seed broadcast	Fibre, soil stabilisation
34	*Wendlandia exserta*	Simtaara	Tree	Seedling	Medicinal, soli stabilisation
35	*Ziziphus mauritiana*	Ber	Tree	Seedling, seed broadcast	Medicinal (cough, appetizer, skin disease), fruit, fuel wood

4.5.3.2 Legumes and other nitrogen enrichment species

In addition to the grasses, the legume species, namely, *Atylosia scarabaeoides, Cassia occidentalis, C. tora, Crotalaria juncea Stylosanthes hamata, Tephrosia purpurea, Mimosa himalayana* etc., are the other important plant species, which can improve the soil nitrogen and nutrient status and can easily be collected from adjacent areas. The herbs and shrubs species recommended for mined out areas are given in **Table 19**.

4.5.3.3 Trees and bamboos

Native flora of this tract comprises the Northern Tropical Dry Mixed Deciduous Forest type. Accordingly, detailed lists of suggested bamboo and tree species are given in **Table 19 and 20**. The tables also indicate the method of propagation and any other special attribute.

4.5.3.4 Broadcast sowing species

Some herbs, shrubs and grass species are amenable to be successfully grown by seed broadcast or seed-mix soil ball. These species get established in disturbed areas and then nature itself takes care provided the disturbance is not caused again. Seeds or propagules established inside or from adjacent forest areas or through nursery can be used for afforestation. Such species include following herbs, shrubs and grasses.

(i) Herbs: *Cassia tora, Crotalaria juncea, Indigofera linifolia, Stylosanthes hamata and Tephrosia purpurea.*

(ii) Shrubs: *Calotropis gigantea, Calotropis procera.*

(iii) Grasses: *Arundo donax, Cynodon dactylon, Dendrocalamus strictus, Desmostachya bipinnata, Imperata cylindrica, Phragmites karka, Saccharum spontaneum and Vetiveria zizanioides.*

4.5.4 Plantation model

This zone, as described in previous sections, is located below the foothills of the Shivaliks along the course of the Yamuna river in Saharanpur district of Uttar Pradesh. The altitude varies from 267m-380m. A large variety of agriculture and miscellaneous trees species growing in this zone are being fast degraded by mining activities in river bank causing deterioration of the soil and inducing ecological damage. River bed mining and related activities are the main reasons behind

soil erosion in this zone. The soil is sandy and fragile which is not very much able to support vegetation and therefore needs to be restored.

The riverine and mixed deciduous forest model (**Fig. 16**) is particularly recommended for this zone. It is envisaged to establish grasses like *Saccharum spontaneum*, *S. munja, Vetiveria zizanioides, Arundo donax, Phragmites karka, Imperata cylindrica, Pennisetum purpureum,* etc. with strong soil binding ability along the riverside by seed sowing and planting of rootstock and slip. This will be supplemented by a layer of shrubs *Carissa opaca, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Woodfordia fruticosa* etc. As far as possible, uniform distribution manner will be adopted for plantation of shrubs as a supplement in the model. Besides grass and shrubs plantation, the area comprising river bank and available adjoining area will be planted with *Terminalia arjuna*, *Trewia nudiflora*, *Butea monosperma*, *Salix tetrasperma, Dalbergia sissoo, Acacia catechu* etc. and other mixed forest species (suggested in the box below) at 3m x 3 m spacing. Along with the layer of trees and shrubs, bamboo shall be incorporated in the model to increase diversity and economical value of the area. A total of 1100 trees per hectare including bamboo i.e. in the proportion of 60% and 40% respectively will be planted. Besides this, 200 no. of shrubs will be planted per hectare. Grasses will be planted as required according to the particular location. In order to improve the nitrogenous content of the soil, leguminous species will be added either by seed sowing or by planting along with other tree species.

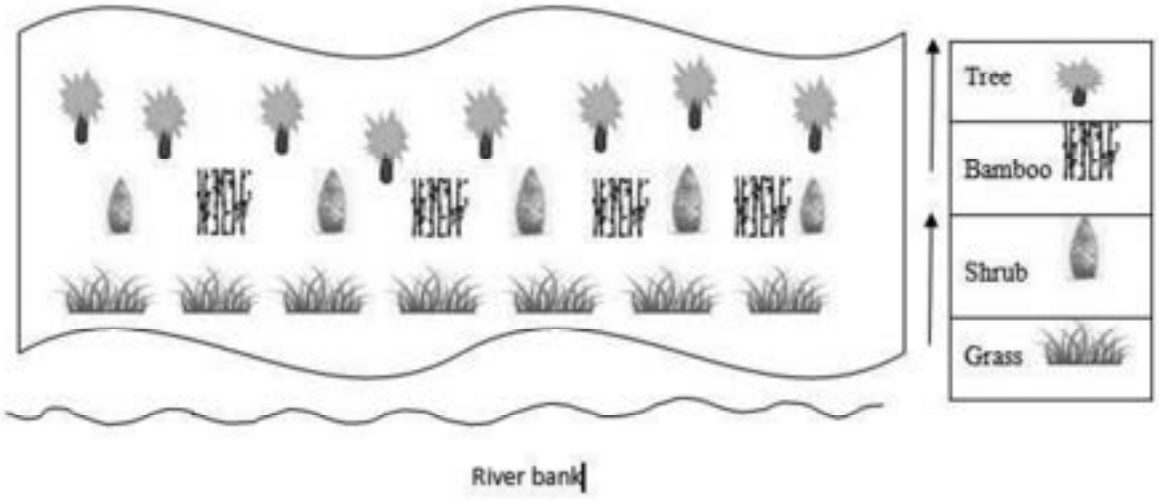


Figure 16: Schematic diagram of Tree-Bamboo-Shrub-Grass plantation model

Habit	Number of plants per ha
Trees	Total 1100 trees including Bamboo sp.
Bamboo	
Shrub	200
Grasses	Seed sowing, planting root stock; slip

List of illustrative species for plantation

Tree: *Dalbergia sissoo, Acacia catechu, Acacia nilotica, Syzygium cumini, Azadirachta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba*, *Pongamia pinnata, Salix tetrasperma, Butea monosperma, Bauhinia variegata, Ficus semicordata, Holarrhena pubescens, Trewia nudiflora, Emblica officinalis, Ehretia laevis, Trema politoria, Wendlandia exserta*

Bamboo: *Dendrocalamus strictus, Bambusa bambos*

Shrub: *Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Mimosa himalayana*

Grass: *Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Typha species, Arundo donax, Pennisetum purpureum.*



Plate 13: Model outcome of biological measures: An example of Jharia coalmines

4.5.4.1 Cost norm for plantation model

Table 21: Cost norm for plantation model

(Source: (i) Forest Department of Uttar Pradesh, (ii) DPR Ganga Project, FRI)

Unit Cost Estimation for Plantation Model			
S No	Particulars	Unit	Rate
1	Site clearance (two man-days/ha @ Rs 174.00)	Rs/ha	384
	A. Cost analysis for Tree Plantation		
2	Advance soil working	Rs/ha	19140
	Pit size (2' x2' x2')		
	Plant spacing 3m x 3m		
	No. of plants or pits =1100/ha		
3	Transplanting activities		
	Manuring	Rs/ha	9000
	Planting material (1100 plants @80.00 Rs)	Rs/ha	88000
	Planting Cost (20 plants transplant by one-mandays)	Rs/ha	9570
	55 man-days/ ha @ Rs. 174.00		
	Total (A)	Rs/ha	**126094**
	B. Cost analysis for Shrubs		
4	Advance soil working		
	Pit size (1' x 1' x 1')		
	No. of pits 200/ha		
	10 man-days @ Rs 174.00	Rs/ha	1740
5	Transplanting activities		
	Manuring	Rs/ha	5000
	Planting material (200 plants @50.00 Rs)	Rs/ha	10000
	Planting Cost (30plants transplant by one-manday)	Rs/ha	1218
	7man-days/ ha @ Rs. 174.00		
	Total (B)		**17958**
	C. Cost analysis for seed sowing of Grasses and Legumes		
	Seed cost (5kg/ha @Rs250/kg	Rs/ha	1250
	Soil and manure for premaration of seed ball	Rs/ha	2500
	Soil mix seed ball preparation (12 man-days @Rs174.00)	Rs/ha	2088
	Brodcasting of seed ball (5 man-days @Rs174.00)	Rs/ha	870
	Total (C)		**6708**
	Total (A+B+C)	Rs/ha	**150760**
	D. Contingency (5%)	Rs/ha	**7538**
	E. Maintinance cost		
	First year (20%)	Rs/ha	30152
	Second year (15%)	Rs/ha	22614
	Third year (10%)	Rs/ha	15076
	Fourth year (5%)	Rs/ha	7538
	Total (E)	Rs/ha	75380
	Fencing (F)	Rs/ha	**113119**
Grand Total (A+B+C+D+E+F)		**Rs/ha**	**3,46,797**
*Transport of materials charge will be applicable extra as per plantation site		**or Rs.**	**3,46,800**

4.5.5 Scope and cost of plantation

The mining sites were duly observed for assessing the scope of biological interventions for eco-restoration. Keeping in view the availability of suitable area, the village-wise extent of the proposed plantation and the respective cost are given in **Table 22**.

Table 22: Village-wise scope of plantation work and cost

Sl. No.	Vill ID	Village	Proposed Plantation Area (ha)	Total Cost @ Rs 346800/ Ha*
1	1	Sherpur Pelo	8.48	2940864
2	2a	Rehna I	22.80	7907040
3	2b	Rehna II	1.25	433847
4	4	Ganeshpur	3.00	1040400
5	5	Naurangpur	0.80	277440
6	6	Akbarpur Bans Ahtmal	9.50	3294600
7	7	Chhajja Ahtmal	4.00	1387200
8	8	Allauddinpur Bans Ahtmal	13.58	4709544
9	9	Maya Rooppur I	5.00	1734000
10	10	Badshahpur I	3.00	1040400
11	11	Rasoolpur Urf Rasooli	9.12	3162816
12	13	Aslampur Bartha	3.00	1040400
13	16	Fatehpur Pelo	12.39	4296852
14	17	Madathi Ahtmal and Mustakam	1.38	478584
15	18	Kaluwala Jahanpur	4.50	1560600
16	20	Abdullapur	3.00	1040400
17	23	Shahpur Bans A	4.58	1588344
18	24	Mahmoodpur Nagali Ahatmal	21.00	7282800
19	25	Arazi Jewari Ahatmal	12.00	4161600
20	26	Masoodpur Garah Ahatmal	2.50	867000
21	27	Nityanandpur Ahtmal	5.70	1976760
22	28	Syed Mohammad Pur Garh Ahatmal	17.00	5895600
23	29	Shahzadpur Bans	13.00	4508400
24	30	Abutalibpur Garh	4.21	1460028
25	31	Bartha Korsi	21.60	7490880
26	36	Arifpur	1.58	547944
27	37	Fatehpur	6.00	2080800
28	38	Kheri Ahatmal	2.17	752556
29	40	Akbarpur Bans Mustakam	0.23	79764
		Total	**216.37**	**750,37,463**

*Note: Detailed Unit Cost Estimate given in another related table.

4.5.5.1 Cost of watch and ward

It is necessary to keep proper watch and ward of the planted areas till the plantations establish and grow beyond the stage of trampling, grazing, browsing etc. Therefore, it is proposed to make provision for watch and ward for 5 years for all plantation sites as given in **Table 23.**

Table 23: Cost of watch and ward

Estimate of the Cost of Watch and Ward For 5 Years		
S No	Particulars	Cost (Rs)
1	No. of Plantation sites	20
2	Man-days/month	30
3	One man-day (Rs)	174
4	Cost for one month (Rs)	104400
5	Cost for one year (Rs)	1252800
Total cost for 5 years (Rs)		**62,64,000**

4.5.6 Wildlife Habitat Interventions

During the survey of wildlife in the mining area, it was observed that the mining activities have impacted the natural flow of the Yamuna River and other associated tributaries in the region. Additionally, mining activities away from the river bed and through deep excavations showed irreversible damage. These geo-morphological changes have badly affected the wildlife habitat in the region as described in the previous section. In order to counter the cumulative impacts of mining, it is necessary to take up the restoration interventions at the landscape scale going beyond the mining area under study and extending to the whole watershed.

For the purpose of the restoration strategy, the mining sites are categorized into two zones, namely (i) Yamuna Zone: those that are affecting the Yamuna and its tributaries and (ii) Biharigarh Zone: those located on the seasonal rivers (rau's) in and around Biharigarh adjoining the Rajaji National Park, which finally drain into the Ganga. The area of these two zones is further segregated into Priority Area 1, which require active restoration measures and Priority Area 2, which require passive restoration measures. The geographical position of these areas is indicated in **Figure 17**.

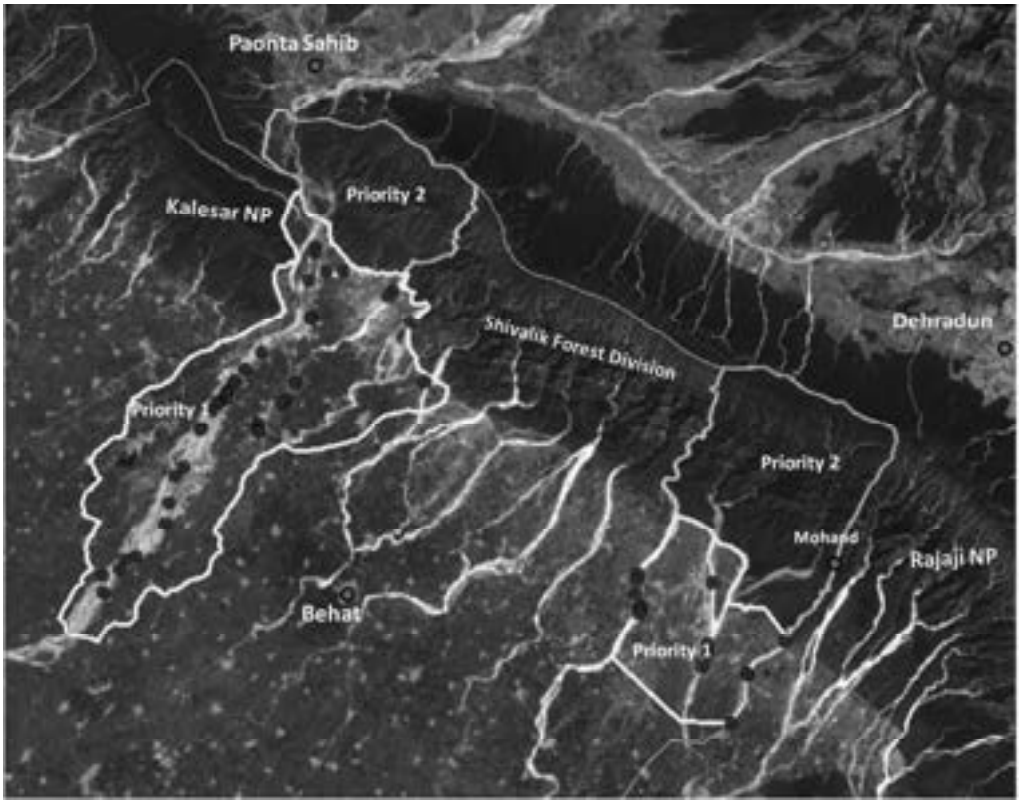


Figure 17: Wildlife habitat priority areas

The restoration measures for Priority 1 and 2 areas of both zones are described below.

4.5.6.1 Yamuna Zone-Priority Area 1

This zone includes the Yamuna River, its associated seasonal rivers (Budi Yamuna, Badoli Nadi, Chapdi, Kherowali), the Hathnikund barrage and the villages along the Yamuna. The restoration measures suggested in this area are as follows:

1. Improvement of Hathnikund Barrage

Due to the mining activities in and along the Yamuna River upstream of the barrage, there is extensive silt deposition in the barrage. As part of the restoration process desiltation and water bird habitat improvement measures is necessary. This will improve the water storage capacity of the barrage which is expected to attract a larger number of migratory birds. This barrage is located along the migratory routes of several water birds and is used as a staging ground. This area has the potential to be developed into an Important Bird Area similar to that the Asan Conservation Reserve located in the Uttarakhand State and about 20 km north of the Hathnikund barrage. A diversity of habitats such as deep water bodies, shallow areas, reed beds, and

grassland habitat will support a higher diversity of birds. Therefore it is suggested to undertake additional habitat improvement measures along with the desiltation of the barrage.

The excavated silt could be used as landfill of the deep excavations made by the mining pits. The silt could alternatively be auctioned and the revenue generated could be used in the long-term habitat improvement activities.

2. Livelihood development issues

A number of villages are located along the Yamuna and other seasonal rivers in this area. Though the local community is primarily agrarian, a large number of people have been involved in the mining related activities. Therefore alternate livelihood development measures should be considered as part of the restoration strategy.

3. Village forest development

Afforestation activities in suitable village lands are suggested, especially in the mining affected areas.

In addition to above, promotion of sustainable agricultural practices and plantation of horticultural crops are other measures which would contribute positively in the eco-restoration.

4. Yamuna Zone-Priority Area 2

This area includes the Yamuna river watershed areas in the Shivalik hills, and villages along the Yamuna. This forested tract forms an important corridor for wildlife movement between the Kalesar NP in Haryana and the Shivalik forest of both Uttarakhand and Uttar Pradesh. The area requires passive restoration measures. The measures suggested in this area include catchment treatment. The forests in the Shivalik hills are degraded due to the livestock grazing and lopping of trees for fodder by the resident Gujjar community. It is expected that catchment treatment measures will improve the habitat, reduce the erosion and subsequently lower the level of silt being drained into the Yamuna and its tributaries.

5. Biharigarh Zone-Priority Area 1

This area includes the seasonal rivers (Lalo Nadi, Sonali Nadi, Fatehpur Pelo, Hindon Nadi), and the numerous villages in the Biharigarh region. The restoration measures suggested in this area are primarily habitat improvement at the mining sites through tree plantation and raising grasslands, village forest development, livelihood development, promotion of sustainable agricultural practices and plantation of horticultural crops.

6. Biharigarh Zone-Priority Area 2

This area includes the Shivalik forests that comprise watershed of the seasonal rivers that flow through this area. This forested tract forms an important corridor for wildlife movement between Shivalik forests of the Rajaji NP in Uttarakhand to the Shivalik forests of both Uttarakhand and Uttar Pradesh. Like in the case of the Yamuna zone, this area requires catchment treatment as a passive restoration measure. The heavy dependence of the Gujjar community on the forests for livestock grazing and lopping of trees for fodder has resulted in severe forest degradation. It is therefore expected that catchment treatment measures will improve the habitat, reduce the erosion and hence lessen the silt drained into the seasonal river.

4.5.7 Priority 1 areas: A case for detailed project report

As described above, the scope of wildlife habitat improvement encompasses the whole landscape in and around the mining area. Though the plantation interventions will address the ecological issues in the mining area *per se*, the wildlife habitat development requires several other interventions pertaining to the local livelihood issues, village development in the region and the development of the Hathnikund barrage wetland. Therefore it is necessary to prepare a separate detailed project report for eco-restoration of the Priority 1 areas from wildlife perspective.



Plate 14: A waterbody near Faizabad: Scope of wetland development

4.5.8 Priority 2 areas: Catchment Treatment in Yamuna Zone

The ecological processes in the region are interrelated in the whole landscape, particularly in the watershed/catchment area upto the Shivalik ridge. This catchment is the source of the quality, quantity and velocity of water and the sediments flowing to various tributaries, to the Yamuna river and to the Hathnikund barrage wetland. The forest cover in the region is primarily open forest and moderately dense forest. The total area of the landscape located in western part of the slopes of the Shivaliks as shown in **Figure 17,** is about 5800 hectares.

Effective management of the drivers of degradation in this area, duly supported by appropriate catchment treatment activities is necessary for wholesome eco-restoration of the landscape and the river corridor.

It is, therefore, proposed to provide for treatment of the catchment area upto an extent of one third of the total area or about 1900 ha. in the south-western slopes of the Shivalik hill range. The necessary interventions will primarily include (i) effective protection of the catchment area by addressing local livelihood issues, (ii) low cost soil and moisture conservation measures, (iii) enrichment plantation in vegetation deficient sites and (iv) necessary wildlife habitat improvement activities. For the time being, it is proposed to adopt an indicative cost norm of Rs. 145000 per ha. for making provision for the 'Catchment Area Treatment' interventions The details of the cost norm may be worked out in due course.

4.5.9 Total cost of biological measures

Except the cost of wildlife habitat interventions in priority 1 areas, the total cost of the proposed biological measures is Rs. 35.68 crore as given in **Table 24**.

Table 24: Total Cost of Biological Measures

Total Cost of Biological Measures				
S No	Particulars	Quantity	Rate	Amount (Rs)
1	Plantation (Ha)	216.4	3,46,800	750,47,520
2	Watch and Ward (Years)	5	12,52,800	62,64,000
3	Catchment Area Treatment (Ha)*	1900	1,45,000	2755,00,000
4	Wildlife Habitat Interventions (Priority 1 Area)	Require separate detailed project reports		
Total Cost (excluding item 4)				3568,11,520

*The unit cost of Catchment Area Treatment mesures is indicative. The details can be worked out in due course.

4.5.10 Total Cost of Ecological Restoration

The total cost of the proposed engineering and biological measures for ecological restoration as described in respective sub-sections is summed up in **Table 26.**

Total Cost of Ecological Restoration		
S No	Particulars	Amount (Rs)
1	Engineering Measures	1272,26,800
2	Biological Measures (excluding Wildlife habitat improvement in Priority 1 areas)	3568,11,520
Total (Rs)		4840,38,320
		Rs. 48.40 crore

The amount of Rs. 48.40 crore covers the interventions other than the wildlife habitat improvement in priority 1 areas. The scope of the work at different mining sites was assessed during the field visits facilitated by the local mining and revenue officials, shown in their records and explained by them. Any deviation of the proposed quantity of works from the precise measurements during implementation will call for proportionate change in the cost estimate also. Further, the cost estimate is prepared on the basis of current market rates. Any deferment of the project implementation will also alter the cost estimate according to the then market conditions.

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5. VALUATION OF ECOLOGICAL DAMAGE

The life systems are, obviously, invaluable. Perhaps no monetary value can be assigned to the loss of ecological systems. However, an attempt can be made to measure or assess some of the ecosystem components and assign the monetary value to the same at least in part. Nowadays, the advances in scientific knowledge have accorded better understanding of the structure and functions of the life system whereas technological advances have made it possible to see and measure the erstwhile invisible and un-measureable. As described in previous sections, the colossal illegal mining in the Yamuna riverscape in Saharanpur district has caused enormous ecological damage which is manifested in serious depletion of plant and wildlife diversity and loss of interest in migratory birds to frequent the region. This is in addition to the probable loss of insects and butterfly diversity which are instrumental in pollination of the agriculture crops, horticulture and forest trees and all types of primary production.

There might be several components which could be considered for monetary valuation of the ecological damage. Three such components, viz., material component, eco-restoration cost and net present value of the ecosystem services foregone are described in the following sub-sections.

5.1 Cost of riverbed material

The geomorphology and hydrology, or simply stated, land and water comprise the milieu in which the ecology or the life forms thrive. The mining activity in Saharanpur district has physically removed the land component or the mined minerals which form the medium and substrate of the micro and macro fauna and flora. Besides the physical removal of the substrate, the mining has damaged the geo-morphological and hydrological systems making the ecosystem revival considerably less probable.

The CEC has castigated strong aspersions on the scale of the illegal mining in the district in gross violation of the rules and regulations, presuming connivance of the officers holding equally high positions and going to the extent of recommending action the defaulting officers.

As much as 39.62 lakh MT of illegally mined material equivalent to the monetary value of Rs. 101.45 crore was seized by the district authorities during 2012 at hundreds of stone crushers and other places. Due to court intervention, about 2.5 lakh MT material of some cases was held back whereas 37.3 MT was auctioned at the highest bid of Rs. 95.62 crore. In addition to this, vehicles

transporting illegally mined materials have been regularly checked since 2012-13 and fined/ prosecuted by the mobile parties. Details of the FIRs registered, criminal cases filed and fine/ penalty revenue realized, as summarized in **Table 25**, is placed in Appendix-II.

Table 25: Yearwise FIRs, criminal cases and penalties on illegal transportation

Yearwise detail of Action Taken for illegal mining and trasportation					
S No	**Year**	**No.of illegal mining, transportation vehicles**	**No. of Overloading vehicles**	**No. of FIRs for illegal mining, transportation**	**Received Revenue**
1	2012-13	147	116	6 FIR	38,38,542
2	2013-14	41	19	10 FIR; 20 Criminal case	1,65,274
3	2014-15	123	134	9 FIR; 15 Criminal case	66,13,724
4	2015-16	110	64	8 FIR; 10 Criminal case	26,14,820
5	2016-17	76	64	57 Criminal case	15,95,030
	Total	**497**	**397**	**33 FIR; 102 Criminal case**	**148,27,390**



Plate 15: Massive riverbed material extraction

The auction amount of the illegally mined material (Rs. 95.62 crore) and the fines and penalty (Rs. 1.48 crore) comprise the value of the land component of the ecological system and hence straightway makes a constituent of the ecological damage.

The sum of this amount is Rs. 97.10 crore.

5.2 Cost of ecological restoration

As described in the previous section, the engineering and biological measures which are necessary for the ecological restoration of the mining area will cost Rs. 48.40 crore over a period of five years. Assuming that the proposed interventions will restore the ecology to its normal, natural level, this cost of eco-restoration is equivalent to the deprivation from ecosystem services at this point of time due to ecological damage. Therefore this cost forms another constituent of the value of ecological damage.

5.3 Net present value of future ecosystem services

5.3.1 Analogy with FCA NPV

The eco-restoration interventions in the ecologically damaged mining sites are analogous to the compensatory afforestation required to be undertaken in the cases of diversion of forest area for non-forest purposes under the Forest (Conservation) Act of 1980. When the area was mined, the whole set of ecosystem goods and services emanating from there are lost. Now it cannot be immediately accounted for because it will be revived by the eco-restoration interventions only in due course. Accordingly, the benefits from the eco-restoration will increase gradually over a period of time. The rationale for accounting the Net Present Value (NPV) is to balance the uncompensated benefits till the eco-restoration areas start providing the ecological goods and services benefits comparable to their natural state. The time period required to restore the ecosystem to its natural state is another subject of scientific investigation.

The Indian Institute of Forest Management (IIFM) Bhopal and Forest Survey of India (FSI) Dehradun has adopted a well researched methodology for valuation of the ecosystem services which has been published in November 2014 under the title 'Revision of rates of NPV applicable for different class/category of forests'. Salient features of the methodology are given below.

- It has taken into account values of 12 ecosystem services and goods, namely (i) Bamboo, (ii) Fodder, (iii) Timber, (iv) NTFP, (v) Carbon sequestration, (vi) Fuelwood, (vii) Gene-

pool conservation, (viii) Pollination and seed dispersal, (ix) Water recharge, (x) Soil conservation, (xi) Water purification and (xii) Carbon storage.

- The item-wise values have been summed up in appropriate proportion to arrive at the total economic value (TEV) per ha.
- The Forest Type Groups of the Champion and Seth classification of forests forms the criteria for the first level of stratification.
- Each of the 14 forest type groups adopted in this process has been further stratified on the basis of four forest cover density classes, namely (i) very dense forest (VDF: density >70%), (ii) moderately dense forest (MDF: density 40-70%), open forest (OF: density 10-40%) and (iv) less than 10% forest (LTF: density <10%). Hence, theoretically, there are 14x4 or 56 strata in the whole country.
- A weighted average of the physical rotation of the dominant tree species of the area is taken as the period for calculating NPV. Two alternative rates of discount, 4%, and 6% have been suggested.
- It has been acknowledged that while plantations can never replace natural forests, these measures certainly compensate for a proportion of the ecosystem services lost as a result of non-forest use.
- Since the NPV asked from the user agency is in addition to the cost of the compensatory afforestation, the final NPV rates have been adjusted to account for the proportion of the value of ecosystem services restored due to compensatory afforestation. The adjustment factor has been termed as Standard Compensatory Afforestation Restoration Factor or SCARF.

5.3.2 Comparable Forest Type Group

The Saharanpur mining area is similar to the Tropical Dry Deciduous Forest of the Champion and Seth forest type classification system. The mining sites are located in gram samaj lands which are under high biotic pressure and hardly bear forest growth of very dense or moderately dense canopy. Taking worst case scenario, the normal forest density in the gram samaj land is taken as LTF or less than 10%. According to the NPV rate table prepared using 4% discount, the NPV rate of Tropical Dry Deciduous Forest of LTF density class is Rs. 7.73 lakh per hectare.

5.3.3 Computation of NPV

As calculated in earlier sections, the extent of illegal mining in Saharanpur district is 1230 ha. As mentioned in the previous section, the applicable NPV rate is Rs. 7.73 lakh/ha. Since the land available for eco-restoration is same as damaged by the mining, the applicable SCARF will be same i.e. 4.36% as given in the SCARF table using 4% discount. Therefore the SCARF adjustment will be Rs. 0.337 and SCARF adjusted NPV will be Rs. 7.393 lakh/ha. At this NPV rate, the total NPV for illegal mining over an area of 1230 ha will be Rs. 90.93 crore.

5.4 Total Value of Ecological Damage

The total value of ecological damage the basis of above three considerations will be the sum of the three components as under:

S/No	Component	Amount (Rs. in Crore)
1	Cost of Riverbed Material	97.10
2	Cost of Ecological Restoration	48.40
3	Net Present Value (NPV)	90.93
	Total Value	**236.43**

Therefore the amount of Rs. 236.43 crore is estimated as the total value of the ecological damage caused by the illegal mining in the Yamuna landscape in Saharanpur district.

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6. OBSERVATIONS, SUGGESTIONS, AND LIMITATIONS

6.1 Observations

1) The quantum of the illegal mining activity in Saharanpur district is simply huge. The CEC estimation of the mining material worked out to be 32.1 lakh MTs against the official production of boulders of 33002 MT i.e. or about 1% of the construction material actually used by the crushers during the year 2011-12 is independently confirmed by the seizure of the 39.2 lakh MT of illegal mining material in the subsequent year 2012-13, by district authorities. This was subsequently auctioned for an amount of Rs. 95.62 crore.

   Above 39.2 lakh MT is the illegally mined material seized by the authorities only during 2012-13. This does not include the illegally excavated/extracted/transported material, if any, in the earlier years prior to the intervention of the Hon'ble Supreme Court or NGT in such matters.

2) The mining is supposedly stopped in the State since 2012, partly owing to the order passed by the Hon'ble Supreme Court on 16-1-2012 and partly due to the procedural issues as mentioned in the Comprehensive Mining Plan. However, the signs of recent riverbed mining can be easily seen. The specially designed high-capacity tractor trolleys with extra tires, big body and powerful tractor for extraction of the riverbed mining material is a common sight.

3) The massive scale and devastatingly haphazard manner of mining in the river Yamuna and nearby tributaries have altered the river landscape beyond its natural resilience capacity and threatened the very existence of the riverine ecosystem. The plant and wildlife species are disappearing, and the birds are showing alarmingly low interest in visiting the Hathnikund barrage which is the only prominent wetland in this area.

4) The cause of the devastation is not so much the lack of rules and regulations but a gross violation of the same.

5) The five decade old 'UP Minor Mineral Concession Rules, 1963' duly recognize and foresee the impact of sand mining in the river geomorphology, ecology and riverine habitat at a time when the present massive scale of the mining activity was hard to visualize.

6) The quantum of the illegal mining activity in Saharanpur district is simply huge. The CEC estimation of the mining material worked out to be 32.1 lakh MTs against the official production of boulders of 33002 MT i.e. or about 1% of the construction material actually used by the crushers during the year 2011-12 is independently confirmed by the seizure of the 39.2 lakh MT of illegal mining material in the subsequent year 2012-13, by district authorities. This was subsequently auctioned for an amount of Rs. 95.62 crore.

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7) The mining is supposedly stopped in the State since 2012, partly owing to the order passed by the Hon'ble Supreme Court on 16-1-2012 and partly due to the procedural issues as mentioned in the Comprehensive Mining Plan. However, the signs of recent riverbed mining can be easily seen. The specially designed high-capacity tractor trolleys with extra tires, big body and powerful tractors for extraction of the riverbed mining material is a common sight.

8) The massive scale and devastatingly haphazard manner of mining in the river Yamuna and nearby tributaries have altered the river landscape beyond its natural resilience capacity and threatened the very existence of the riverine ecosystem. The plant and wildlife species are disappearing, and the birds are showing alarmingly low interest in visiting the Hathnikund barrage which is the only prominent wetland in this area.

9) The cause of the devastation is not so much the lack of rules and regulations but a gross violation of the same.

10) The five decade old 'UP Minor Mineral Concession Rules, 1963' duly recognize and foresee the impact of sand mining in the river geomorphology, ecology and riverine habitat at a time when the present massive scale of the mining activity was hard to visualize.

11) The 1963 rules lay down several requirements including the necessity to (i) keep vigil for not polluting the environment, (ii) maintain ecological balance, (iii) to demarcate the

mining area and erect and maintain boundary pillars, (iv) carry out sand and gravel mining in slices of 1m thickness (v) raise plantation on the bank side, (vi) leave a 100m barrier between two mining sites. None of these requirements seems to have been met.

12) The Comprehensive Mining Plan (CMP) duly echoes the spirit of the mining rules but out rightly states that the impact on ecology and environment cannot be assessed, perhaps without any input from the ecologists or environment specialists.

13) Notwithstanding the severe damage to the ecology and environment, the mining itself is unsustainable at the prevailing rate of material extraction. The CMP stipulates that since more or less same level is seen every year, the sediment load brought by water is near equal to what is lifted during mining. However, this does not seem to be validated by any systematic study.

14) The presumption that the tributary beds are replenished every year to a large extent in monsoon is a fallacy. For example, the tributary in Ganeshpur was earlier shallow which was deepened by the mining more than 2m. Since the cessation of mining 3-4 yrs ago, it has been replenished hardly by 2' or 60cm. As informed by the local farmers.

15) There is a requirement of prior survey and certificate of excess deposit or accumulation of river bed material before undertaking mining more than 1m deep. The mining pits much deeper than 1m is not difficult to find, but documents of such survey and certificates are rare to find out.

6.2 Suggestions

1) Adherence to the relevant rules, regulations, and prescriptions is the first and foremost requirement. Therefore monitoring mechanism needs to be appropriately strengthened at all levels, right from sub-division level to MoEF&CC. The monitoring bodies should have adequate representation of the civil society.

2) The periodical field visits of the monitoring bodies of all levels, their review meetings and reports should be time bound and mandatory.

3) The whole set of documents and information about all mining leases, viz., Environment Impact Assessment report, Environment Management Plan, Environmental Clearance, public consultation proceedings, periodical monitoring reports of all levels should be

available to all stakeholders on the website of the MoEF&CC. The authority issuing environment clearance should duly satisfy itself about adherence to the terms and conditions of the clearance and should mandatorily upload its report on the website periodically.

4) The capabilities of the modern remote sensing, GPS, and GIS technology should be duly harnessed in planning, implementation and monitoring the mining activity. The date stamped high-resolution satellite images have immense potential for monitoring.

5) The implementation of the eco-restoration strategy suggested in previous sections should be entrusted to the local Divisional Forest Officer or any other designated authority of the State Forest Department.

6) Since the ownership of the mining area is primarily vests in Gram Samaj, the restoration plan should be executed with the active involvement of Gram Samaj and other local institutions.

7) The river tract upstream of Hathnikund barrage is important for wild life and birds due to its wetland character and habitat contiguity with Kalesar National Park in Haryana and Shivalik hill forests in Uttarakhand/Uttar Pradesh. Therefore it is suggested to close it altogether from mining activities and develop it as a wildlife habitat.

8) Nature does not recognize the administrative boundaries or legality of the human interference. The wildlife of the region owns the whole landscape along and across the river. The southern aspect of the Shivalik hills forms the particularly important constituent of the wildlife habitat in the landscape as a source of food, water, shelter and also of the damaging factors like sediments and floods. The cumulative effect of the mining encompasses the whole landscape extending beyond the mining site. Therefore the whole landscape should be specially considered for catchment treatment and habitat enrichment interventions. It is suggested to commission a separate detailed project report (DPR) for the whole landscape and make provisions for the implementation of the project accordingly.

9) The river flow has left out certain islands like the one from Jodhe Bans to Dhaulra where plant succession has started afresh. Such islands need to be excluded from any

disturbance like mining as these islands are important corridors for wildlife movements in the landscape.

10) The mining is an as important requirement of the modern civilization as the ecology and environment for life. Therefore the solution does not lie in imposing a total ban on the mining but in carrying out mining in a judicious and well-planned manner and taking appropriate safeguards to minimize the adverse effects on the environment, ecology, hydrology and geology. At the same time, adequate measures should be taken for reclamation and rehabilitation of the mined sites.

11) Though the rural economy in the region is primarily agrarian, the mining activity has occupied a significant place in the livelihood of the local people in terms of occupations, employment, income, and market. Therefore it is necessary to provide alternate livelihood options while considering any significant reduction in this activity.

12) The terms and conditions laid down for mining should be practically feasible to meet and appropriate technical help should be available to the concession holders to implement the prescriptions during their mining operations, though at payment.

6.3 Limitations

1) The observations made in the report are solely based on the field visits facilitated by the district officials of the revenue and mining departments, and areas of the illegal mining sites shown and explained by them.

2) The facts and figures given in the report are solely based on the reports submitted by the district administration and the revenue records shown and explained by the district revenue officials.

3) The extent and dimensions of the engineering structures proposed in the eco-restoration plan were measured on the spot. These are based on the assessments made during the field visits. These may vary from the precise measurements up to 5 percent and the cost may also vary accordingly.

4) The rapid assessment of wildlife value of the area was carried out for five consecutive days covering winter season only. It is likely that a few species that might be using the area in other seasons may have gone unrecorded. Likewise the presence of freshwater

turtles at the survey site could not be documented, which may either be due to their low presence in the area or they being inactive due to winter. Therefore the list of species recorded from the area is only indicative and does not claim to be exhaustive. Similarly, the recording of lesser wildlife species, particularly migratory birds, may also be due to the limited time span spent in the field by the research personnel who carried out the rapid surveys for wildlife across the mining sites.

5) The observations about the aquatic and micro-fauna/soil biota are made on the basis of general scientific knowledge. No specific survey could be carried out in this respect in the limited time.

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PART - II

2201

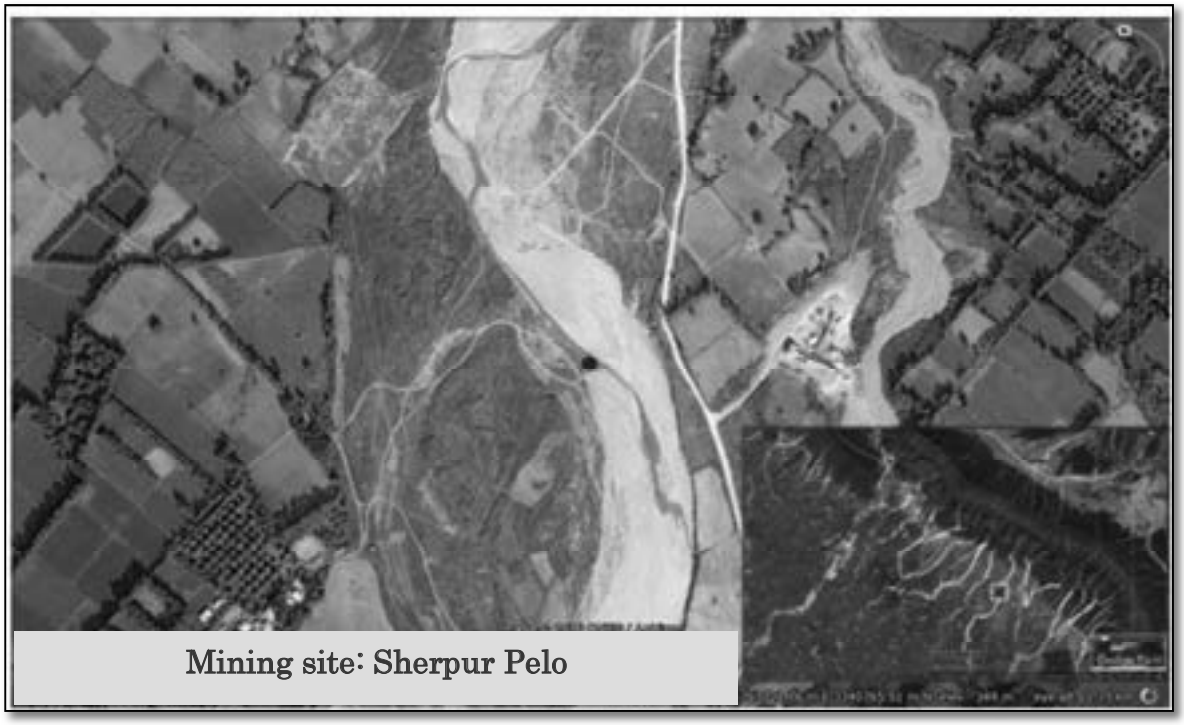
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2204
7.1 Sherpur Pelo (1)

1.	**Mining Cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Sherpur Pelo
3.	**Thana**	:	Mirzapur Pelo
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y): 30°16'30.4" Longitude (X): 77°39'32.9" Elevation (m): 352



Mining site: Sherpur Pelo

6.	**Lease no. near the illegal mining site(if any)**	:	1
7.	**Khasra nos. of the lease area**	:	403, 404/1, 405, 406/1, 428, 429, 430, 431, 434
8.	**Area under lease (ha)**	:	7.68
9.	**Khasra nos. of illegal mining**	:	226, 261, 262

Revenue Map



2205

10.	**Area under illegal mining(ha)**	:	8.48
11.	**Distance of mine site from the road**	:	2 km from Saharanpur - Chakrata road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of the river bed at present on the mine site (m)**	:	250
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	Pits of mining and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	Yes, Shiwalik forest towards north and scrub forest adjacent to mine
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp.
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo,Acacia catechu,Butea monosperma,Ziziphus nummularia*, *Pongamia pinnata*, *Dendrocalamus strictus*, *Albizia lebbeck*
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, on both side of river bed
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Groundnut etc.
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**		Floodplain in the form of a plateau covered with*Saccharum spontaneum* (Grass).
25.	**Bank erosion due to mining,(if any)**	:	No
26.	**Suggested engineering measures**	:	Not required
27.	**Area available for biological measures(ha)**	:	8.48

28. **Suggested species :**

Ficus religiosa, Ficus benghalensis, Acacia nilotica, Acacia catechu, Azadiracta indica, Ziziphus mauritiana, Dalbergia sissoo, Saccharum spontaneum, Oroxylum indicum, Ipomoea carnea etc. Syzygium cumini, Terminalia arjuna, Bombax ceiba, Pongamia pinnata, Butea monosperma, Bauhinia variegata, Embllica officinalis, Trema politoria,Wendlandia exserta, Dendrocalamus strictus,Carissa opaca, Vitex negundo, Ziziphus nummularia, Mimosa himalayana, Saccharum spontaneum, Saccharum munja, Eriophorum comosum, Arundo donax, Pennisetum purpureum.

2206
1. SherpurPelo



Plate1: River bed area of mining site



Plate2: Mined out area need to be restored



Plate 3: Flood plain area of mining site



Plate 4: River bank area

2208 7.2 Rehna (2.1)

1.	**Miningcluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Rehna
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y): 30°16'30.4" Longitude (X): 77°39'32.9" Elevation (m): 352



Mining site no.1: Rehna

6.	**Lease no. near the mining site (if any)**	:	4
7.	**Khasra nos. of the lease area**	:	1mj, 6mj, 7mj, 8mj
8.	**Area under lease (ha)**	:	10.30
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 1, 6, 7, 8

Revenue Map



10.	**Area under illegal mining(ha)**	:	22.87

2209

11.	**Distance of mine site from the road**	:	4 km from Saharanpur - Chakrata road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	280
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits
18.	**Occurrence of forest (if any) near the mining site**	:	Yes, Shiwalik forest towards N to E
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp. in river bank
20.	**Dominant local species around the mining site**	:	*Saccharum spontaenum*
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, towards NE
22.	**Main crops cultivated in the area**	:	Horticulture crops (Mango, Guava)
23	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining,(if any)**	:	Yes
26.	**Suggested engineering measures**	:	Not required
27.	**Area available for biological measures(ha)**	:	22.80

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Azadiracta indica, Ziziphus mauritiana, Bombax ceiba, Pongamia pinnata , Butea monosperma, Bauhinia variegata , Ficus semicordata, Embllica officinalis,Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja

7.3 Rehna (2.2)

1.	**Mining cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Rehna
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y): 30°20'28.5" Longitude (X): 77°35'37.4" Elevation (m): 336



Mining site no.2: Rehna

6.	**Lease no. near the mining site (if any)**	:	5
7.	**Khasra nos. of the lease area**	:	1mj,10mj
8.	**Area under lease (ha)**	:	10.30
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 1 and 10

Revenue Map



10.	**Area under illegal mining(ha)**	:	1.25

2211

11.	**Distance of mine site from the road**	:	4 km from Saharanpur-Chakrata road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of the river bed at present on the mine site (m)**	:	250
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits
18.	**Occurence of forest (if any) near the mining site**	:	Yes, Shiwalik forest towards N to E
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp. in river bank
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, towards NE
22.	**Main crops cultivated in the area**	:	Horticulture crops (Mango, Guava)
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	_
25.	**Bank erosion due to mining (if any)**	:	Yes
26.	**Suggested engineering measures**	:	Not required
27.	**Area available for biological measures(ha)**	:	1.25
28.	**Suggested species :**		

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Azadiracta indica, Ziziphus mauritiana, Bombax ceiba, Pongamia pinnata , Butea monosperma, Bauhinia variegata, Ficus semicordata, Embllica officinalis, Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja

2212

2. Rehna



Plate1: River bed area at the mining site



Plate2: Bank erosion at the site

2213

7.4 Jayantipur Ahtmal (3.1)

1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Jayantipur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS**	:	Latitude(Y):30°09'40.0"
		:	Longitude (X):77°46'57"
		:	Elevation(m): 331



Mining site no.1: Jayantipur Ahtmal

6.	**Lease no. near the illegal mining site (if any)**	22	**Revenue Map**
7.	**Khasra nos. of the lease area**	14, 15, 16, 18, 19, 20, 21, 22	
8.	**Area under lease (ha)**	3.99	
9.	**Khasra nos. of illegal mining**	Part of khasra 14, 15, 16, 18, 19, 20, 21, 22	



10. **Area under illegal mining(ha)** : 1.59

2214

11.	**Distance of mine site from the road**	:	12 km from Suderpur - Mirzapur road
12.	**Past land use of the mine site**	:	Agriculture
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of the river bed at present on the mine site (m)**	:	200
16.	**Land ownership**	:	GS and Private Land
17.	**Sign of mining**	:	No sign of mining
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp.
20.	**Dominant local species in and around the mined site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, right and left bank, about 4 m above riverbed
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus plantation on private land
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining (if any)**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	4(incl. 1/3,2/3,3/3)
	Spurs (no.)	:	15(incl. 1/3,2/3,3/3)
	Embankment/Protection wall (m)	:	900m(incl. 1/3,2/3,3/3)
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

2215

7.5 Jayantipur Ahtmal (3.2)

1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Jayantipur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS**	:	Latitude(Y):30°09'47.0"
		:	Longitude (X): 77°46'57"
		:	Elevation (m): 331



Mining site no.2: Jayantipur Ahtmal

6.	**Lease no. near the illegal mining site (if any)**	:	23
7.	**Khasra nos. of the lease area**	:	1, 2, 3, 4, 5mj
8.	**Area under lease (ha)**	:	3.99
9.	**Khasra nos. of illegal mining**	:	Part of khasra1,2,3,4,5 min

Revenue Map



2216

10.	**Area under illegal mining(ha)**	:	0.45
11.	**Distance of mine site from the road**	:	12 km from Suderpur - Mirzapur road
12.	**Past land use of the mine site**	:	Agriculture
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	200
16.	**Land ownership**	:	GS and Private Land
17.	**Sign of mining**	:	Recent mining pits in riverbed
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp.
20.	**Dominant local species in and around the mined site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, between two flanks of river, also adjacent to the bank
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus plantation on private land
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any other observations**	:	A small island formed between two flanks of river, agriculture is cultivated
25.	**Bank erosion due to mining (if any)**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	4(incl. 1/3,2/3,3/3)
	Spurs (no.)	:	15(incl. 1/3,2/3,3/3)
27.	**Area available for biological measure (ha)**	:	No scope
28.	**Suggested species:**	:	No possibility of plantation

2217

7.6 Jayantipur Ahtmal (3.3)

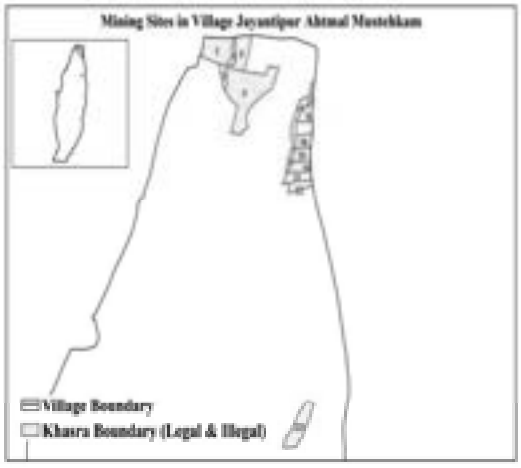
1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Jayantipur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS**	:	Latitude(Y):30°09'32.0"
		:	Longitude (X): 77°46'55"
		:	Elevation(m): 331



Mining site no.3: Jayantipur Ahtmal

6.	**Lease no. near the illegal mining site (if any)**	:	24
7.	**Khasra nos. of the lease area**	:	5mj, 221
8.	**Area under lease (ha)**	:	7.680
9.	**Khasra nos. of illegal mining**	:	Part of khasra 5, 221

Revenue Map



10.	**Area under illegal mining(ha)**	:	23.15

11.	**Distance of mine site from the road**	:	12 km from Suderpur- Mirzapur Road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	200
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Recent mining pits in riverbed
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp.
20.	**Dominant local species in and around the mined site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, right and left bank, about 4 m above riverbed
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus plantation on private land
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any other observation**	:	-
25.	**Bank erosion due to mining (if any)**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	4(incl. 1/3,2/3,3/3)
	Spurs (no.)	:	15(incl. 1/3,2/3,3/3)
	Embankment/Protection wall (m)	:	900m(incl. 1/3,2/3,3/3)
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

2219

3. JayantipurAhtmal



Plate1: Depression formed due to mining



Plate 2: River's bank erosion at the mining site

2220



Plate 3: Agriculture being practiced in the island at mining site



Plate 4: Area need to be restored

7.7 Ganeshpur (4)

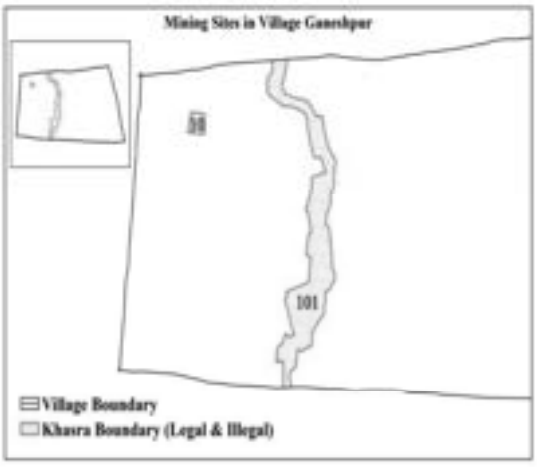
1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Ganeshpur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y): 30°08'40.8"
		:	Longitude (X): 77°51'52.3"
		:	Elevation(m): 359



Mining site: Ganeshpur

6.	**Lease no. near the illegal mining site (if any)**	:	12
7.	**Khasra nos. of the lease area**	:	101/1, 10/1/1
8.	**Area under lease (ha)**	:	6.85
9.	**Khasra nos. of illegal mining**		Part of khasra no. 101/1,10/1/1

Revenue Map



10.	**Area under illegal mining(ha)**	:	5.12
11.	**Distance of mine site from the road**	:	1 km from Dehradun - Saharanpur road

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12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	45
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	No sign of mining at present
18.	**Occurence of forest (if any) near the mining site**	:	Shiwalik forest towards North adjacent to boundary of Ganeshpur
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp.*Trema politoria*
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, on both side of river bank
22.	**Main crops cultivated in the area**	:	Wheat, Lentil, Maize, Barley, Groundnut etc.
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting

24. **Any other observation**:
    - Plantation of Teak and Eucalyptus in farmers land on both side of river bank.
    - Likely damage to permanent structure; Earlier riverbed was about 2 meter above the present level.
    - Clear demarcation in riverbed between mined and unmined site as riverbed depth was more in mined site than unmined site

25.	**Bank erosion due to mining (if any)**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	4
	Spurs (no.)	:	10
	Embankment/Protection wall (m)	:	1000m
27.	**Area available for biological measures(ha)**	:	3

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Azadiracta indica, Ziziphus mauritiana, Bombax ceiba, Pongamia pinnata , Butea monosperma, Bauhinia variegata , Ficus semicordata, Embllica officinalis,Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,Vitex negundo, Ziziphus nummularia, Calotropis procera,Mimosa himalayana, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Arundo donax, Pennisetum purpureum.

2223

4. Ganeshpur



Plate 1: Over view of mining site



Plate 2: Severe river bank erosion

2224



Plate 3: Lowering of river bed due to over extracting of the river bed material (Up-stream)

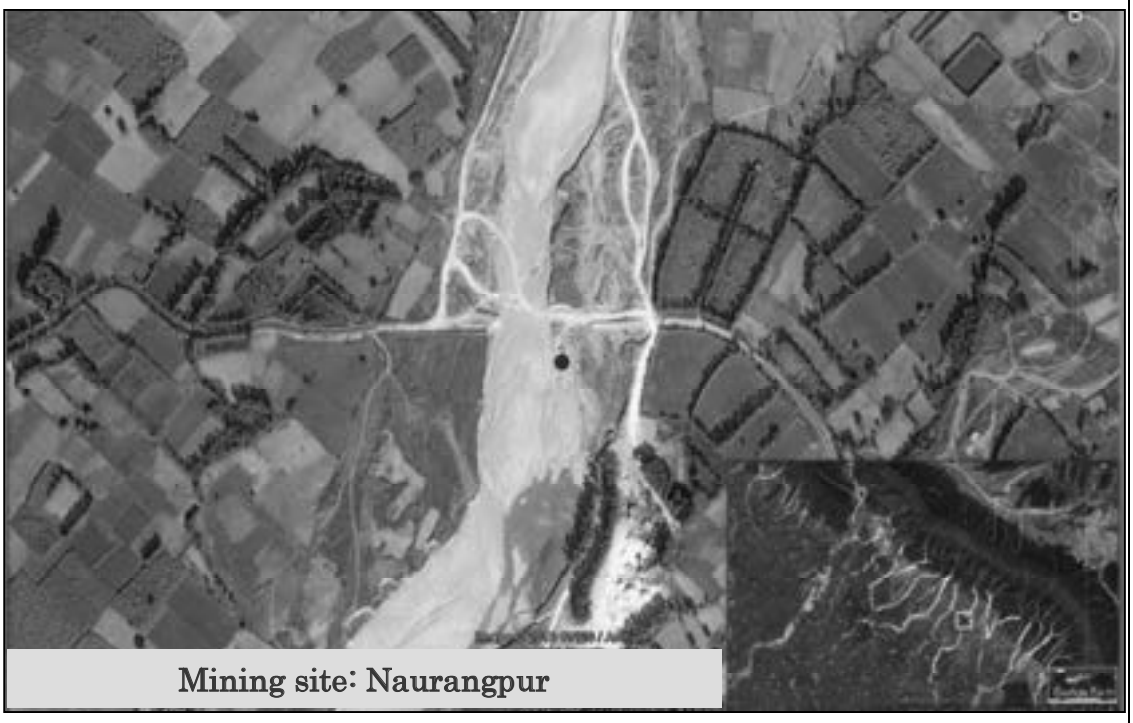


Plate 4: Lowering of river bed due to over extracting of the river bed material (down-stream)

2225

7.8 Naurangpur (5)

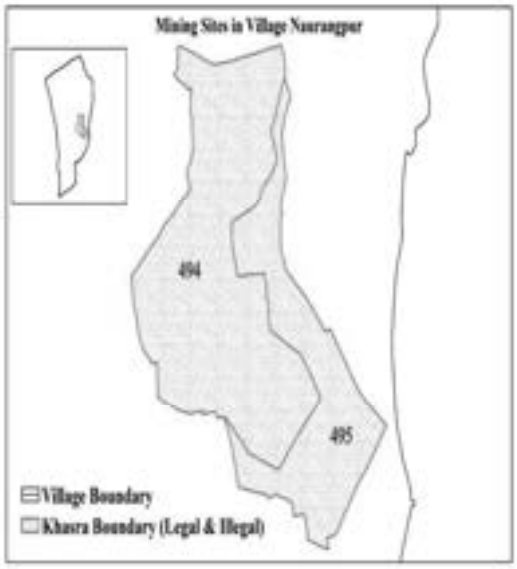
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Naurangpur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y): 30°10'30.6"
		:	Longitude (X): 77°46'51.8"
		:	Elevation(m): 337



Mining site: Naurangpur

6.	**Lease no. near the illegal mining site (if any)**	:	13
7.	**Khasra nos. of the lease area**	:	494/3, 495/1
8.	**Area under lease (ha)**	:	12.54
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 494/3, 495/1

Revenue Map



10.	**Area under illegal mining(ha)**	:	6.67

2226

11.	**Distance of mine site from the road**	:	10 km from Saharanpur-Dehradun road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	150
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Pits and heaps of 1-2 feet depth
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp., *Dalbergia sissoo*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land (if any) near mining site**	:	Yes, on both sides of river bank, adjacent to mining area
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Mustard etc.
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Agriculture loss, damage to road and concrete ramp/causeway (150X5 m)
25.	**Bank erosion due to mining (if any)**	:	Yes, both sides of river bank
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	NA
	Spurs (no.)	:	15
	Embankment/Protection wall (m)	:	837m
27.	**Area available for biological measures(ha)**	:	0.80

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Azadiracta indica, , Ziziphus mauritiana, Bombax ceiba, Pongamia pinnata , Butea monosperma, Bauhinia variegata , Ficus semicordata, Embllica officinalis, Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum.

2227

5. Naurangpur



Plate 1: Bank erosion at the mining site



Plate 2: Signs of RBM extraction at mining site

2228



Plate 3: Area need to be restored



Plate 4: Area need to be restored



Plate 5: Severe river bank cutting



Plate 6: River bank cutting at mining site

7.9 Akbarpur Bans Ahtmal (6) 2230

1.	**Mining cluster**	:	1: Yamuna River bed
2.	**Panchayat**	:	Akbarpur Bans
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y): 30°16'32.6"
		:	Longitude (X): 77°32'54.6"
		:	Elevation(m): 306



Mining site: Akbarpur Bans Ahtmal

6.	**Lease no. near the illegal mining site (if any)**	:	17
7.	**Khasra nos. of the lease area**	:	1
8.	**Area under lease (ha)**	:	22.68
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 1

Revenue Map



10.	**Area under illegal mining(ha)**	:	23.302

2231

11.	**Distance of mine site from the road**	:	15 km from Saharanpur - Chakrata road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	Riverbed and floodplain area
15.	**Approximate width of river bed at present on the mine site (m)**	:	800
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Pits and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp., *Dalbergia sissoo*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land (if any) near mining site**	:	Yes, On both side of riverbank left (UP) and right (Haryana)
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Poplar plantation
23.	**Significant damage, if any**	:	Damage to floodplain, riparian ecosystem, and agriculture land due to bank cutting
24.	**Any other observation**	:	Materials seized are dumped in right bank of river forming big heaps.
25.	**Bank erosion due to mining**	:	Yes, particularly on left bank
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	14
	Embankment/Protection wall (m)	:	452
27.	**Area available for biological measures(ha)**	:	9.51

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata, Salix tetrasperma, Trewia nudiflora , Embllica officinalis,Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Typha species, Arundo donax, Pennisetum purpureum

6. Akbarpur Bans Ahtmal



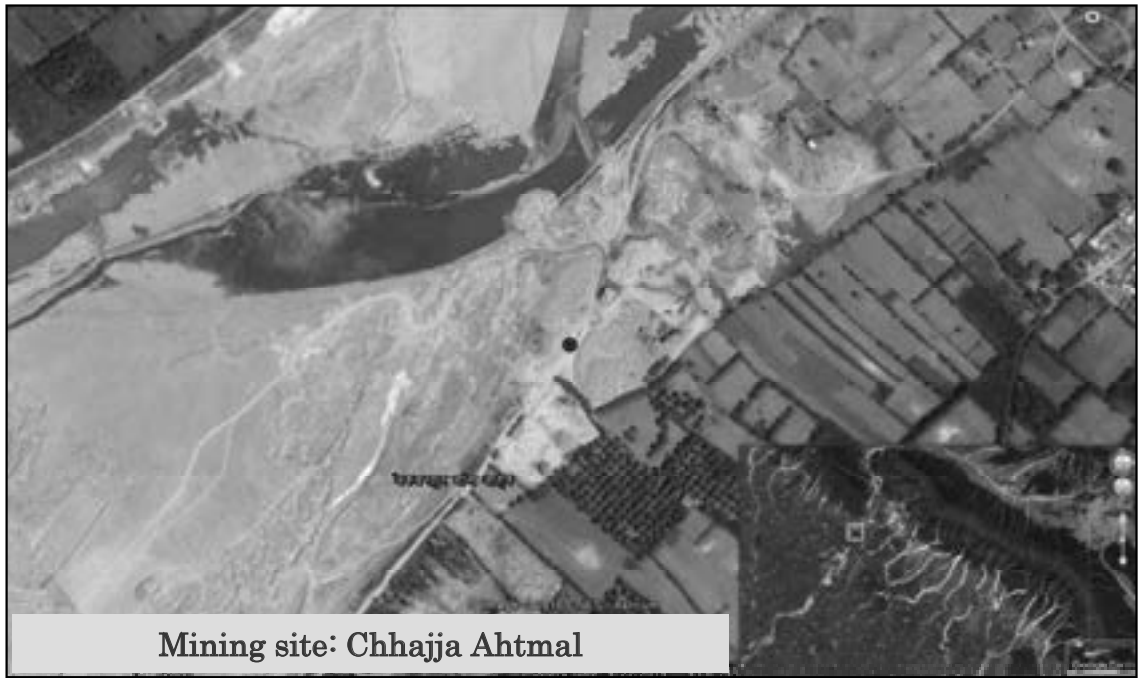
Plate 1: Unsystematic river bed mining



Plate2: Diversion of river flow path due to mining

7.10 2233 Chhajja Ahtmal (7)

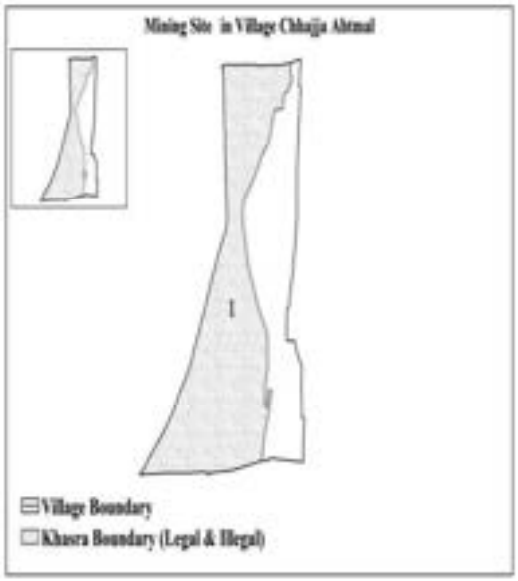
1.	**Mining cluster**	:	1: Yamuna River bed
2.	**Panchayat**	:	Kheri Mustakam
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y): 30°16'53.3"
		:	Longitude (X): 77°33'13.6"
		:	Elevation(m):306



Mining site: Chhajja Ahtmal

6.	**Lease no. near the illegal mining site (if any)**	:	18
7.	**Khasra nos. of the lease area**	:	1/1
8.	**Area under lease (ha)**	:	10.53
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 1

Revenue Map



10.	**Area under illegal mining(ha)**	:	49.64
11.	**Distance of mine site from the road**	:	15 km from Saharanpur - Chakrata road

2234

12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	400m
16.	**Land ownership**	:	Gram Samaj (GS)
17.	**Sign of mining**	:	Pits and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp., *Trema politoria, Dalbergia sissoo, Acacia nilotica*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo, Saccharum*spp.
21.	**Agriculture land (if any) near mining site**	:	Yes, on south and east direction
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus plantation on private land
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Small heaps of boulders on flat top on river bank area; Eucalyptus plantation on private land
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	16
	Embankment/Protection wall (m)	:	450
27.	**Area available for biological measures(ha)**	:	4

28. **Suggested species :**

Bombax ceiba, Trema politoria, Dalbergia sissoo, Acacia catechu, Acacia nilotica, Lannea coromandalica, Syzygium cuminii, Zizyphus mauritiana, Azadiracta indica,Terminalia arjuna, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens,Trewia nudiflora , Embllica officinalis, ,Ehretia laevis , Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Mimosa himalayana, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Arundo donax, Pennisetum purpureum.

2235

7. ChhajjaAhtmal



Plate 1: Piled-up RBM at the mining site

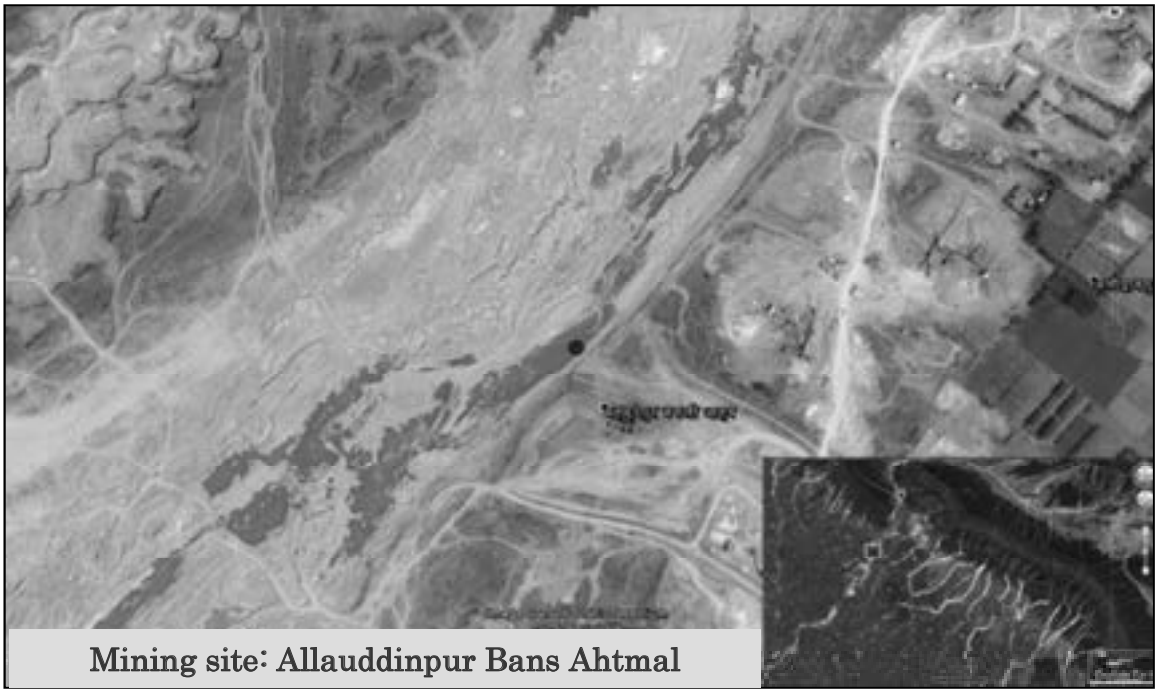


Plate 4: Changed river flowpath due mining

2236

7.11 Allauddinpur Bans Ahtmal (8)

1.	**Mining cluster**	:	1: Yamuna River bed
2.	**Panchayat**	:	Allaudinpur bans
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y): 30°16'07.0"
		:	Longitude (X): 77°32'34.9"
		:	Elevation(m):297



Mining site: Allauddinpur Bans Ahtmal

6.	**Lease no. near the illegal mining site (if any)**	:	21
7.	**Khasra nos. of the lease area**	:	1
8.	**Area under lease (ha)**	:	19.85
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 14/2, 16mj, 17mj, 18mj

Revenue Map



10.	**Area under illegal mining(ha)**	:	0.12
11.	**Distance of mine site from the road**	:	13 km from Saharanpur - Chakrata road

2237

12.	**Past land use of the mine site**	:	Part of area was agriculture land and submerged in the river bed and was part of Gram Samaj
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and flood plain
15.	**Approximate width of river bed at present on the mine site (m)**	:	25m
16.	**Landowner ship**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits and heaps
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp., *Dalbergia sissoo*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land (if any) near mining site**	:	Yes, on both left and right banks
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus plantation on private land
23.	**Significant damage,if any**	:	Loss of agriculture land due to bank cutting
24.	**Any other observation**	:	Part of farmer land converted into riverbed due to erosion and bank cutting
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	12
	Embankment/Protection wall (m)	:	200
27.	**Area available for biological measures(ha)**	:	13.58

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu, Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata, Salix tetrasperma, Ficus semicordata, Trewia nudiflora , Embllica officinalis, Ehretia laevis , Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Arundo donax, Pennisetum purpureum.

2238
Allauddinpur Bans Ahtmal



Plate1: River bed material excavation from river bed

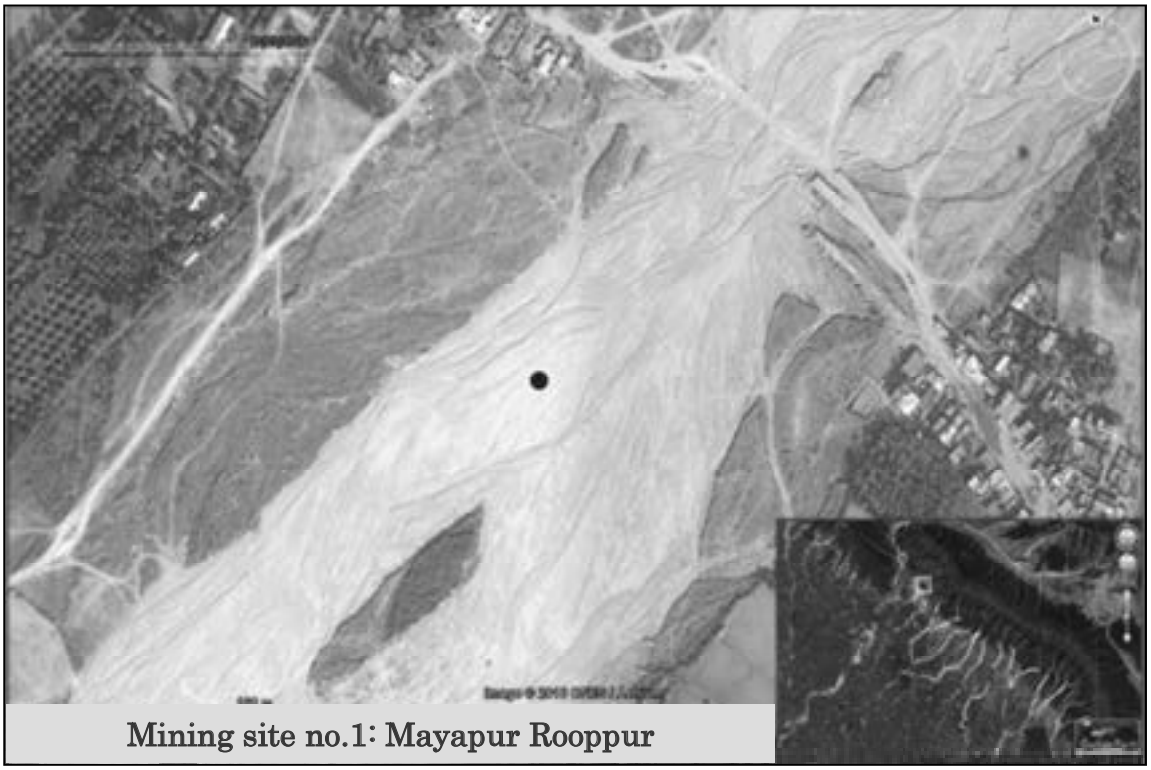


Plate2: View of river bank cutting at mining site

2239

7.12 Mayapur Rooppur (9.1)

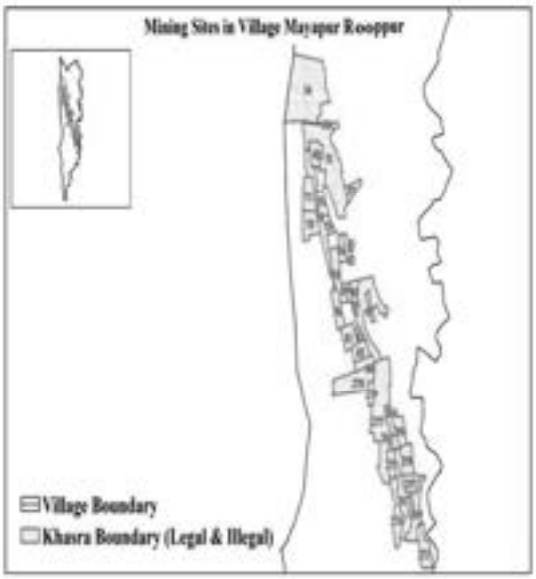
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Mayapur Ruppur
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y): 30°19'17.7"
		:	Longitude (X): 77°38"24.8"
		:	Elevation(m):380



Mining site no.1: Mayapur Rooppur

6.	**Lease no. near the illegal mining site (if any)**	:	26
7.	**Khasra nos. of the lease area**	:	14/1mj, 14/2mj, 14/3mj, 30mj, 31/1mj, 37/2/1m, 49mj, 50/2mj, 51mj, 53mj, 70mj, 71mj
8.	**Area under lease (ha)**	:	9.307
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 14/1mj, 14/2mj, 14/3mj, 30mj, 31/1mj, 37/2/1mj, 49mj, 50/2mj, 51mj, 53mj, 70mj,

Revenue Map



2240

71mj

10.	**Area under illegal mining(ha)**	:	14.11
11.	**Distance of mine site from the road**	:	2 km from Saharanpur - Chakrata road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	400
16.	**Landowner ship**	:	GS and Private Land
17.	**Sign of mining**	:	No sign of mining at present
18.	**Occurence of forest (if any) near the mining site**	:	Yes, Siwalik forest towards north
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp., *Dalbergia sissoo*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land (if any) near mining site**	:	Yes, on both side of river bank
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Sugarcane, Groundnut etc.
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any other observation**	:	Agricultural land submerged into riverbed
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	10
	Embankment/Protection wall (m)	:	-
27.	**Area available for biological measures(ha)**	:	5.0 ha (with farmer's consent)

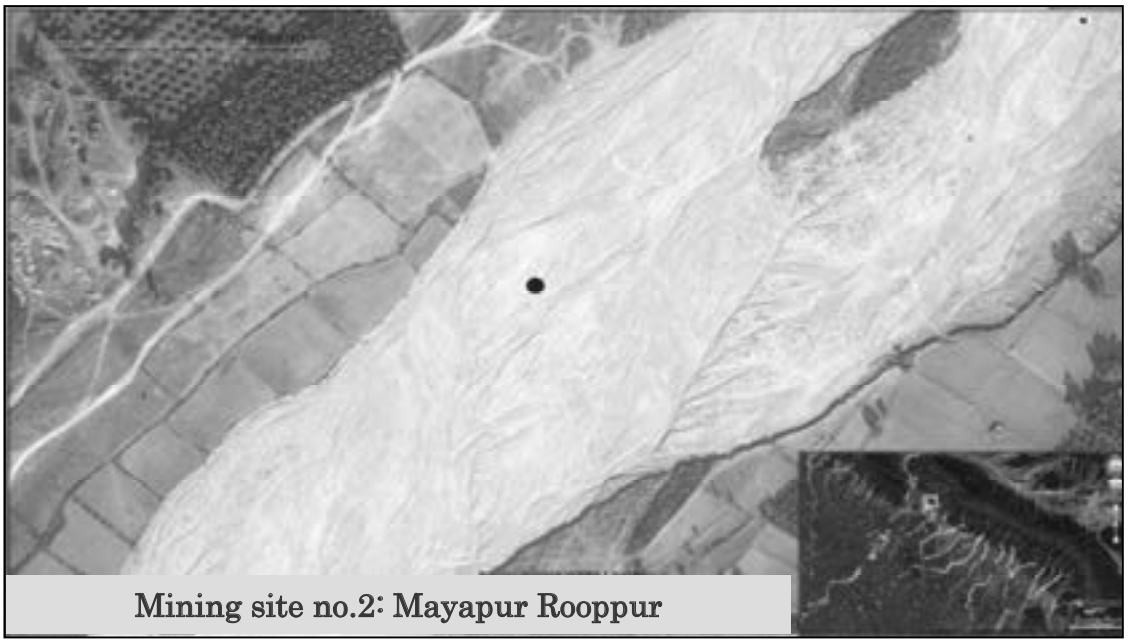
28. **Suggested species :**

Dalbergia sissoo , Acacia catechu, Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata, Salix tetrasperma, Ficus semicordata, Embllica officinalis, Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Arundo donax, Pennisetum purpureum.

2241

7.13 Mayapur Rooppur (9.2)

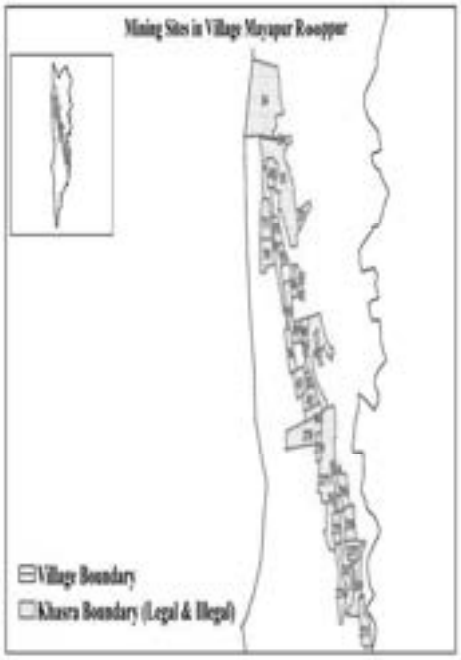
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Mayapur Ruppur
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y): 30°19'08.0"
		:	Longitude (X): 77°38"13.0"
		:	Elevation(m): 380



Mining site no.2: Mayapur Rooppur

6.	**Lease no. near the illegal mining site (if any)**	:	27
7.	**Khasra nos. of the lease area**	:	42mj, 43mj, 44mj, 55mj, 56mj, 81mj, 82, 83mj, 84mj, 85/1mj, 85/2mj, 87mj, 88mj, 89mj, 257mj, 258mj, 264, 265, 266mj, 267mj, 268mj, 269mj, 271mj, 274mj, 275mj, 276, 277/1mj, 278mj, 279mj
8.	**Area under lease (ha)**	:	14.86
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 42mj, 43mj, 44mj, 55mj, 56mj, 81mj, 82, 83mj, 84mj, 85/1mj, 85/2mj, 87mj, 88mj, 89mj, 257mj,258mj,264, 265, 266mj, 267mj, 268mj, 269mj, 271mj, 274mj, 275mj, 276, 277/1mj, 278mj, 279mj

Revenue Map



2242

10.	**Area under illegal mining(ha)**	:	19.516
11.	**Distance of mine site from the road**	:	2 km from Saharanpur - Chakrata road
12.	**Past land use of the mine site**	:	River bed and agricultural land (submerged in river bed)
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	500
16.	**Land ownership**	:	GS and Private land
17.	**Sign of mining**	:	No sign of mining at present
18.	**Occurence of forest (if any) near the mining site**	:	Siwalik forest towards north
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp., *Dalbergia sissoo*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land (if any) near mining site**	:	Yes, on both side of river bank
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Sugarcane, Groundnut etc.
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any other observation**	:	Agricultural land submerged into riverbed -
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	10
	Embankment/Protection wall (m)	:	700
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species :**	:	No possibility of plantation

2243

9. Mayapur Rooppur



Plate 1: View of river bed at mining site



Plate 2: River bank cutting at mining site

7.14 2244 Badshahpur (10.1)

1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Badshahpur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y) 30°07'57.1"
		:	Longitude (X) 77°49'2.4"
			Elevation (m)



Mining site no.1: Badshahpur

6.	**Lease no. near the illegal mining site (if any)**	:	28
7.	**Khasra nos. of the lease area**	:	96mj,123mj,128 mj,129mj ,132mj,133/3mj
8.	**Area under lease (ha)**	:	8.9
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 96mj,123mj,128 mj,129mj,132mj, 133/3mj

Revenue Map



10.	**Area under illegal mining(ha)**	:	2.379

2245

11.	**Distance of mine site from the road**	:	6 km from Saharanpur-Dehradun road
12.	**Past land use of the mine site**	:	Agriculture
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	300m
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Pits and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Calotropis procera, Dalbergia sissoo, Trema politoria*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land (if any) near mining site**	:	Yes, on both side of bank
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Groundnut, Sugarcane. Plantation of Poplar and Eucalyptus
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	-
	Embankment/Protection wall (m)	:	300
27.	**Area available for biological measures(ha)**	:	3
28.	**Suggested species**	:	No possibility of plantation

7.15 2246 Badshahpur (10.2)

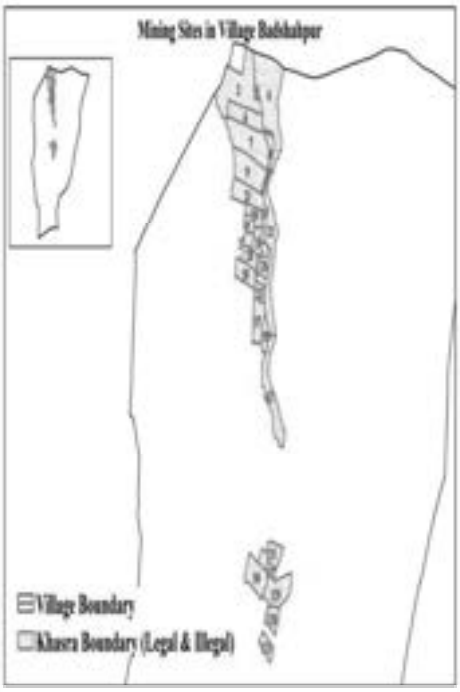
1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Badshahpur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y): 30º08'19.4"
		:	Longitude (X): 77º49'13.9"
		:	Elevation(m): 319



Mining site no.2: Badshahpur

6.	**Lease no. near the illegal mining site (if any)**	:	29
7.	**Khasra nos. of the lease area**	:	2/1mj, 2/2, 3, 4/4/1mj, 4/4/2, 6mj, 7mj, 8/1 mj, 9/2, 17, 18, 19 mj, 20 mj, 21 mj, 23 mj, 24, 25, 26, 27, 28 mj, 30 mj, 32 mj, 57 mj, 59 mj, 62/2, 62/3
8.	**Area under lease (ha)**	:	13.35
9.	**Khasra nos. of illegal mining**	:	Part of khasra no. 2/1mj, 2/2, 3, 4/4/1 mj, 4/4/2, 6 mj, 7 mj, 8/1 mj, 9/2, 17, 18, 19 mj, 20 mj, 21 mj, 23 mj, 24, 25, 26, 27, 28 mj, 30 mj, 32 mj,

Revenue Map



2247

57 mj, 59 mj, 62/2, 62/3

10.	**Area under illegal mining(ha)**	:	6.6
11.	**Distance of mine site from the road**	:	6 km from Saharanpur-Dehradun road
12.	**Past land use of the mine site**	:	Agriculture
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	150m
16.	**Landowner ship**	:	Gram Samaj
17.	**Sign of mining**	:	Pits and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Calotropis procera, Dalbergia sissoo, Trema politoria*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land (if any) near mining site**	:	Yes, on both side of bank
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Groundnut, Sugarcane. Plantation of Poplar and Eucalyptus
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	12
	Embankment/Protection wall (m)	:	1000
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

10. Badshahpur



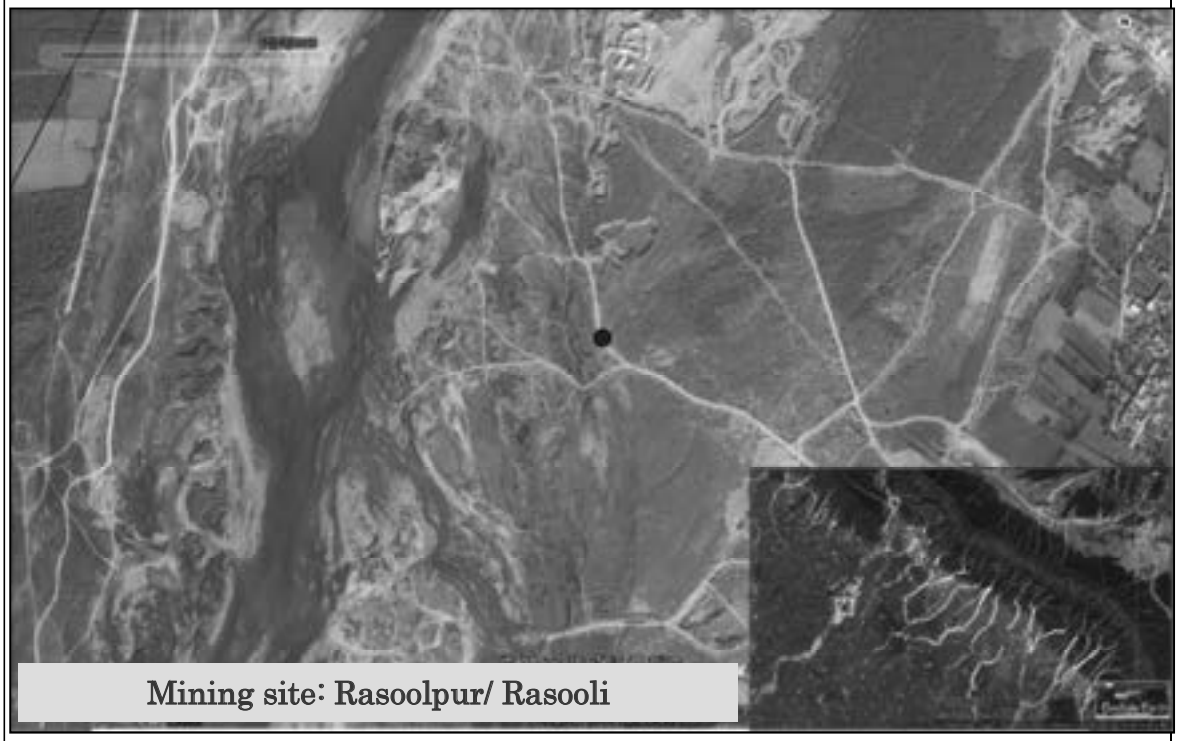
Plate 1: Area need to be restored



Plate2: Bank erosion likely damage to Eucalyptus plantation

7.16 2249 Rasoolpur/ Rasooli (11)

1.	**Mining cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Aslampur
3.	**Thana**	:	Behat
4.	**Tehsil**	:	Behat
5.	**GPS coordinates**	:	Latitude (Y) 30°12'50.6"
		:	Longitude (X) 77°30'44"
		:	Elevation(m) 278



Mining site: Rasoolpur/ Rasooli

6.	**Lease no. near the illegal mining site (if any)**	:	36
7.	**Khasra nos. of the lease area**	:	1mj
8.	**Area under lease (ha)**	:	34.8
9.	**Khasra nos. of illegal mining**	:	Part of khasra no. 1

Revenue Map



10.	**Area under illegal mining(ha)**	:	45.64

2250

11.	**Distance of mine site from the road**	:	8 km from Chilkana Gandevad Road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	Floodplain
14.	**The location of mining site**	:	Floodplain
15.	**Approximate width of river bed at present on the mine site (m)**	:	Nil , As the lease in flood plain area
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Heaps of boulders
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Calotropis procera*, *Wendlandia exserta*, *Ipomoea carnea*, whole floodplains covered by *Saccharum* spp.
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, near Tatohal village
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Heaps of boulders excavated from riverbed and floodplain
25.	**Bank erosion due to mining**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	_
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	9.12
28.	**Suggested species :**		

Dalbergia sissoo, Acacia catechu, Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens,Trewia nudiflora ,Embllica officinalis, Ehretia laevis , Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Arundo donax, Pennisetum purpureum.

~~2251~~

11. Rasoolpur/Rasooli



Plate1: View of mining at Rasoolpur/Rsooli



Plate2: Heaps of RBM at mining site

2252



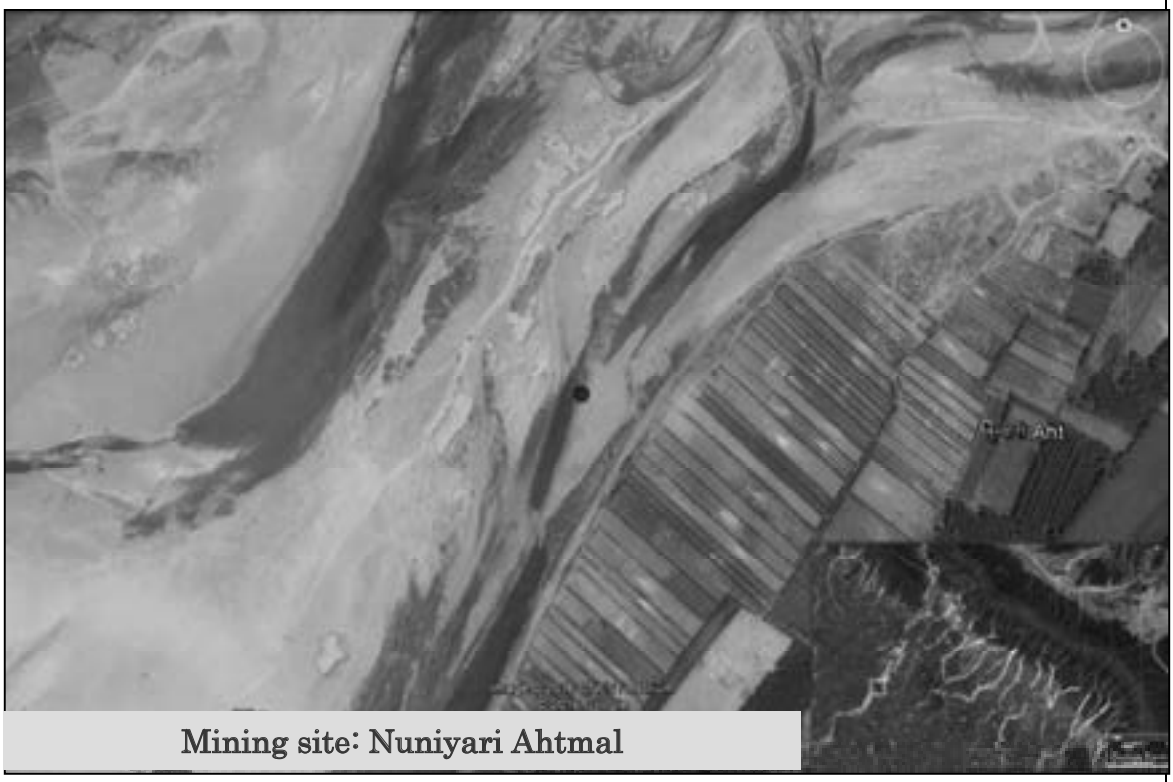
Plate3: Area need to be restored



Plate 4: Area need to be restored

7.17 2253 Nuniyari Ahtmal (12)

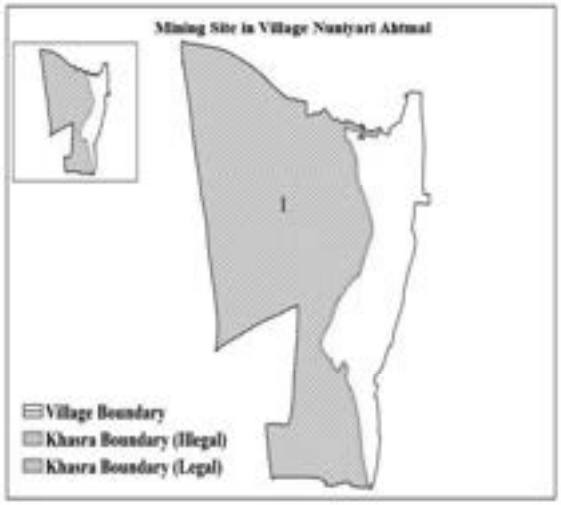
1.	**Mining cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Nunyari
3.	**Thana**	:	Behat
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y) : 30°10'50.7"
		:	Longitude (X) : 77°29'5.0"
		:	Elevation (m) : 269



Mining site: Nuniyari Ahtmal

6.	**Lease no. near illegal mining site(if any)**	:	37
7.	**Khasra nos. of the lease area**	:	1/1/1
8.	**Area under lease (ha)**	:	24.28
9.	**Khasra nos. of illegal mining**	:	Part of khasra no. 1

Revenue Map



10.	**Area under illegal mining(ha)**	:	62.4

2254

11.	**Distance of mine site from the road**	:	8 km from Todderpur - Chilkana road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and river bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	872
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	Sand mining and RBM in riverbed
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp.and Typha spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, On both side of river bed
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Poplar, Eucalyptus
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any others observation**	:	Out of the whole 134.022 ha area, 115 ha is riverbed and 19 ha. is flood plain; Sand mining and RBM in riverbed
25.	**Bank erosion due to mining, if any**	:	No
26.	**Suggested engineering measures**	:	Not required
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

2255
12. NuniyariAhtmal



Plate1: Heaps of riverbed material in flood plain area of mining site



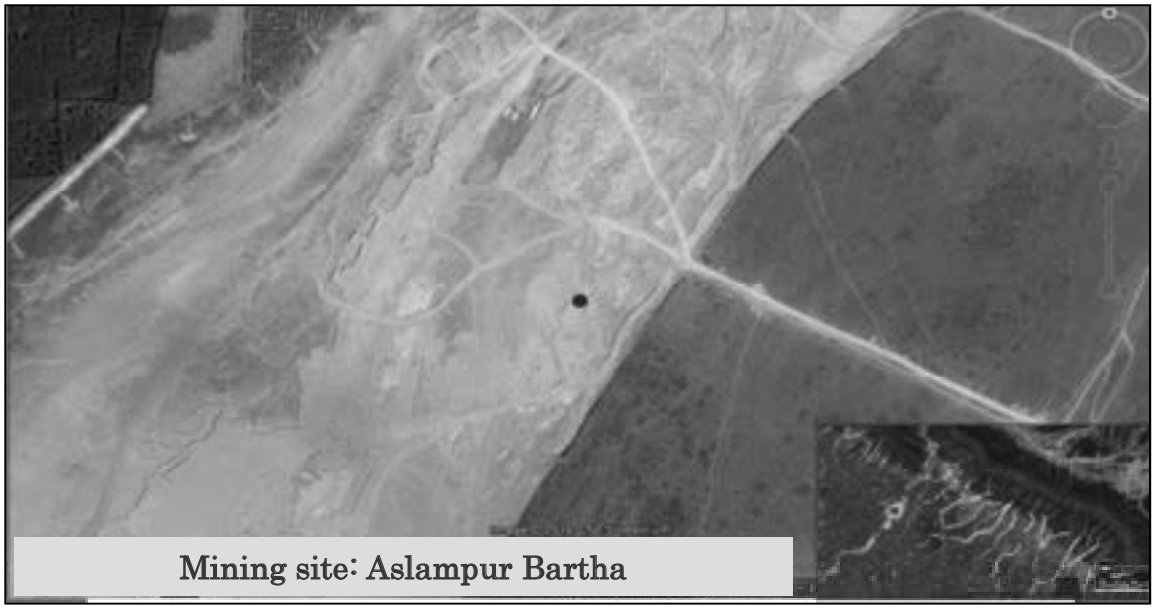
Plate2: Island formation at site



Plate 3: Area need to be restored

7.18 2256 Aslampur Bartha (13)

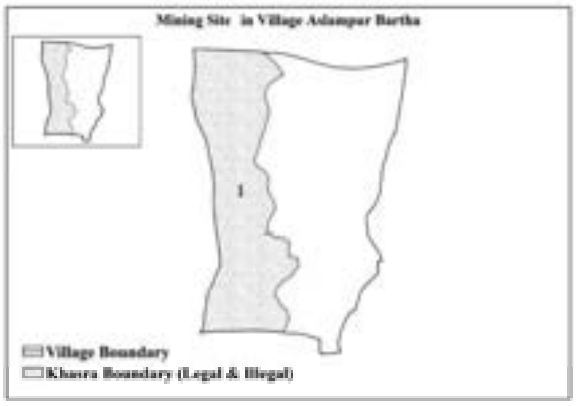
1.	**Mining cluster**	:	2: Yamuna river bed and bank
2.	**Panchayat**	:	AslampurBartha
3.	**Thana**	:	Behat
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude(Y) : 30°13'38.0"
		:	Longitude (X) : 77°30'53"
		:	Elevation (m) : 270



Mining site: Aslampur Bartha

6.	**Lease no. near illegal mining site(if any)**	:	40
7.	**Khasra nos. of the lease area**	:	1mj
8.	**Area under lease (ha)**	:	36.69
9.	**Khasra nos. of illegal mining**	:	Part of khasra no.1

Revenue Map



10.	**Area under illegal mining(ha)**	:	133.82
11.	**Distance of mine site from the road**	:	6 km from Chilkana-Gandevad road
12.	**Past land use of the mine site**	:	Riverbed and flood plain
13.	**Present land use of mine site**	:	Riverbed and flood plain

2257

14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	795m
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	Deposits of RBM in flood plain areas
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Ipomea carnea, Acacia catechu*
20.	**Dominant local species around the mining site**	:	Nil
21.	**Agriculture land adjoining the mining site (if any)**	:	No
22.	**Main crops cultivated in the area**	:	-
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	No
26.	**Suggested engineering measures**	:	No measure required
27.	**Area available for biological measure (ha)**		3.0

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Buteamono sperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens, Trewia nudiflora , Embllica officinalis, Ehretia laevis, Trema politoria, Wendlandia exserta Dendrocalamus strictus, *Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Mimosa himalayana*, *Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Typha species, Arundo donax, Pennisetum purpureum*

13. AslampurBartha



Plate1: Pits formed due to excavation of RBM



Plate 2: Primary successional stage observed in undisturbed flood plain

2259

7.19 Faizabad (14.1)

1.	**Mining cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Faizabad
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Latitude (Y) : 30°19'38.8"
			Longitude (X) : 77°35'25.5"
			Elevation (m) : 326



Mining site no.1: Faizabad

6.	**Lease no. near illegal mining site(if any)**	:	6
7.	**Khasra nos. of the lease area**	:	19mj, 20mj, 26mj, 27mj, 28mj, 29mj, 41mj
8.	**Area under lease (ha)**	:	12.39
9.	**Khasra nos. of illegal mining**	:	Part of Khasra no. 19mj, 20mj, 26mj, 27 mj, 28 mj, 29 mj, 41 mj

Revenue Map



2260

10. **Area under illegal mining(ha)**	:	3.43
11. **Distance of mine site from the road**	:	2 km, Badshaibag - Hathnikud road
12. **Past land use of the mine site**	:	River bed and bank
13. **Present land use of mine site**	:	River bed and bank
14. **The location of mining site**	:	River bed and bank
15. **Approximate width of river bed at present on the mine site (m)**	:	2000
16. **Landownership**	:	Gram Samaj
17. **Sign of mining**	:	Mining pits in riverbed
18. **Occurence of forest (if any) near the mining site**	:	Yes, towards north-west, Haryana side, Kaleshwar NP, at distance of 3km from mining site.
19. **Regeneration of species (if any) in the mined site**	:	*Lantana camara, Saccharum* spp.
20. **Dominant local species around the mining site**	:	*Saccharum* spp.
21. **Agriculture land adjoining the mining site (if any)**	:	Yes, left bank of River
22. **Main crops cultivated in the area**	:	Wheat, sugarcane and *Eucalyptus* plantation
23. **Significant damage, if any**	:	Damage to floodplain and riparian ecosystem in private land
24. **Any others observation**	:	Floodplain and riparian zone on west side of the river. About 3km wide island exists in middle of the river
25. **Bank erosion due to mining, if any**	:	No
26. **Suggested engineering measures**	:	No measure required
27. **Area available for biological measure (ha)**	:	No scope
28. **Suggested species**	:	No possibility of plantation

2261

7.20 Faizabad (14.2)

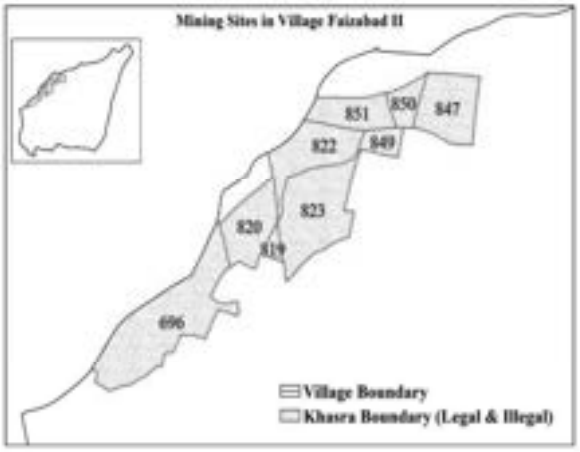
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Faizabad
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Latitude (Y) : 30°19'54.6"
			Longitude (X) : 77°36'2.2"
			Elevation (m) : 332



Mining site no.2: Faizabad

6.	**Lease no. near illegal mining site(if any)**	:	7
7.	**Khasra nos. of the lease area**	:	696mj
8.	**Area under lease (ha)**	:	2.42
9.	**Khasra nos. of illegal mining**	:	Part of Khasra no. 696 min

Revenue map



2262

10.	**Area under illegal mining(ha)**	:	5.95
11.	**Distance of mine site from the road**	:	2 km from Badshaibag-Hathnikud
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	50m
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Lantana camara, Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, Both side of Riverbank,
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus plantation
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	No
26.	**Suggested engineering measures**	:	No measure required
27.	**Area available for biological measure (ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

7.21 2263 Faizabad (14.3)

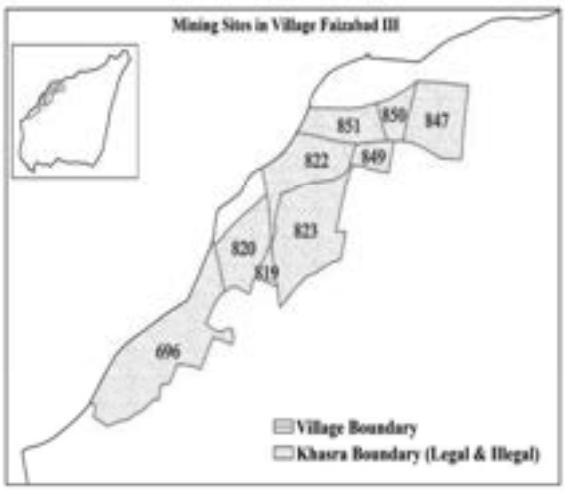
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Faizabad
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Latitude (Y) : 30°19'54.7"
			Longitude (X) : 77°36'37.9"
			Elevation (m) : 326



Mining site no.3: Faizabad

6.	**Lease no. near illegal mining site(if any)**	:	8
7.	**Khasra nos. of the lease area**	:	819, 820mj, 822, 823, 829, 847, 849, 850, 851
8.	**Area under lease (ha)**	:	6.88
9.	**Khasra nos. of illegal mining**	:	Part of Khasra no. 819, 820 mj, 822, 823, 829, 847, 849, 850, 851

Revenue Map



2264

10.	**Area under illegal mining(ha)**	:	12.96
11.	**Distance of mine site from the road**	:	2 km from Badshaibag-Hathnikud
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	50m
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Lantana camara, Saccharum* spp.
20.	**Dominant local species around the mining site**	:	*Saccharum* spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, Both side of Riverbank,
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus plantation
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	No
26.	**Suggested engineering measures**	:	No measure required
27.	**Area available for biological measure (ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

~~2265~~

14. Faizabad (1st)



Plate 1: Unsystematic mining inthe river bed



Plate 2: River bank cutting and diversion of flow path

2266

14. Faizabad (2nd&3rd)



Plate1: View of mining site at Faizabad



Plate 2: Natural stabilization of flood plain area



Plate3: Impression of RBM mining at river bed

7.22 Thapul Ismailpur (15.1)

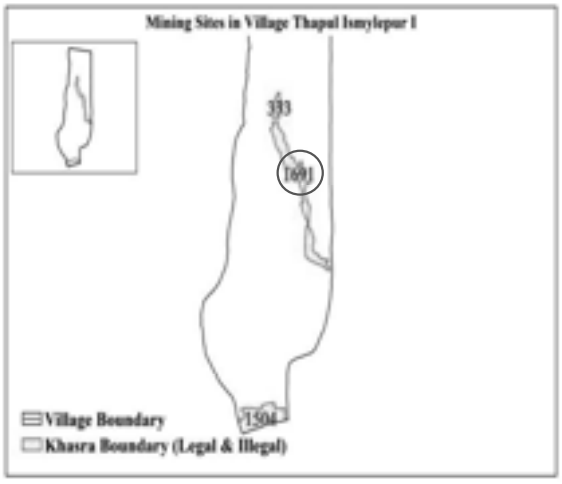
1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Thapul ismailpur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y): 30°07'44.9"
		:	Longitude (X):77°50'34.4"
		:	Elevation (m): 322



Mining site no.1: Thapul Ismailpur

6.	**Lease no. near illegal mining site(if any)**	:	9
7.	**Khasra nos. of the lease area**	:	1691द
8.	**Area under lease (ha)**	:	6.88
9.	**Khasra nos. of illegal mining**	:	Part of khasra no.1691 द

Revenue Map



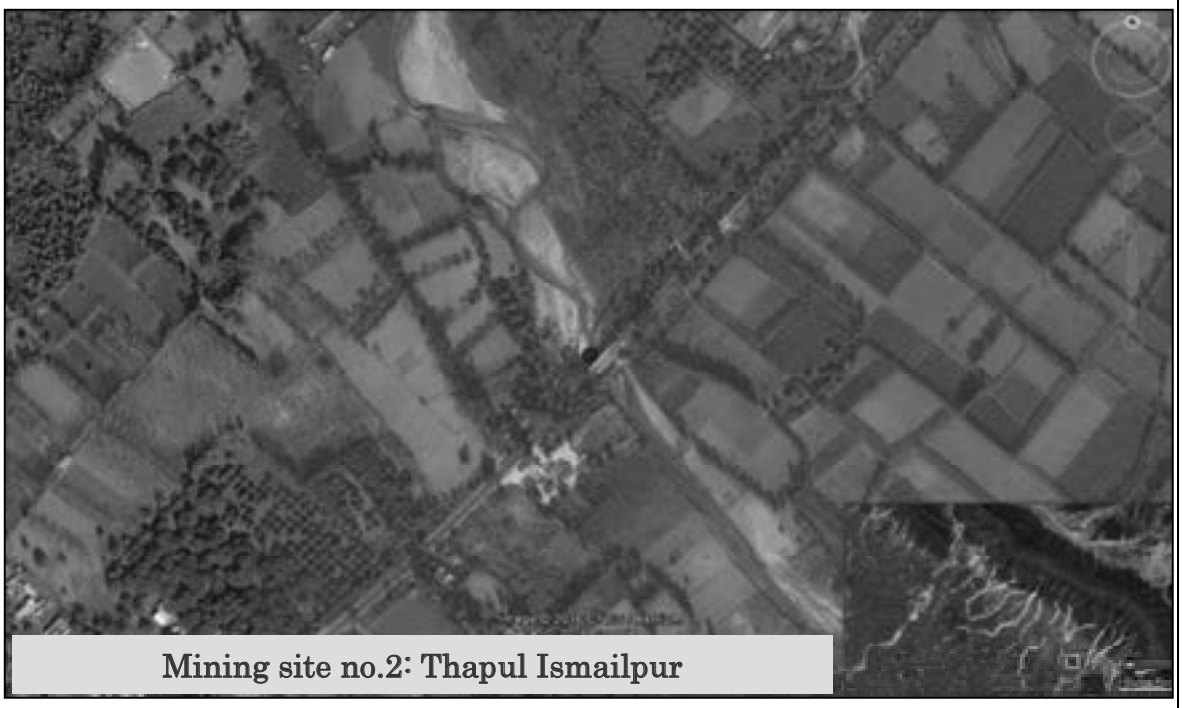
2268

10.	**Area under illegal mining(ha)**	:	16.365
11.	**Distance of mine site from the road**	:	2km from Saharanpur-Dehradun Highway
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of River bed at present on the mine site (m)**	:	35
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	No sign of mining
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Mimosa himalayana, Dalbergia sissoo, Wendlandia exserta*
20.	**Dominant local species around the mining site**	:	*Azadirachta indica, Dalbergia sissoo*
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, on both left and right banks
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Poplar plantation
23.	**Significant damage, if any**	:	Loss of agriculture land
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	-
26.	**Suggested engineering measures**	:	Yes
27.	**Gabion check dams (no.)**	:	NA
28.	**Spurs (no.)**	:	9(incl. 1/3,2/3,3/3)
29.	**Embankment/Protection wall (m)**	:	1200 (incl. 1/3,2/3,3/3)
30.	**Area available for biological measures(ha)**	:	No scope
31.	**Suggested species**	:	No possibility of plantation

2269

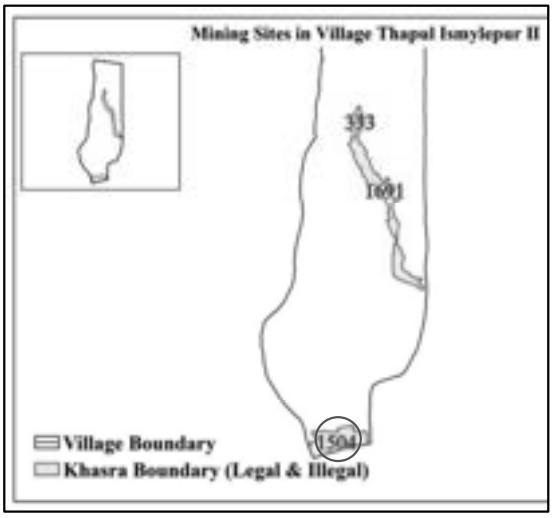
7.23 Thapul Ismailpur (15.2)

1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Thapul ismailpur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Lat (Y) : 30°06'20.4"
		:	Long (X) : 77°49'59.3"
		:	Elevation (m) : 322



Mining site no.2: Thapul Ismailpur

6.	**Lease no. near illegal mining site(if any)**	10	:	**Revenue Map**
7.	**Khasra nos. of the lease area**	1504 ट	:	
8.	**Area under lease (ha)**	12.14	:	
9.	**Khasra nos. of illegal mining**	Part of khasra no1504 ट	:	



10. **Area under illegal mining(ha)** : 1.56

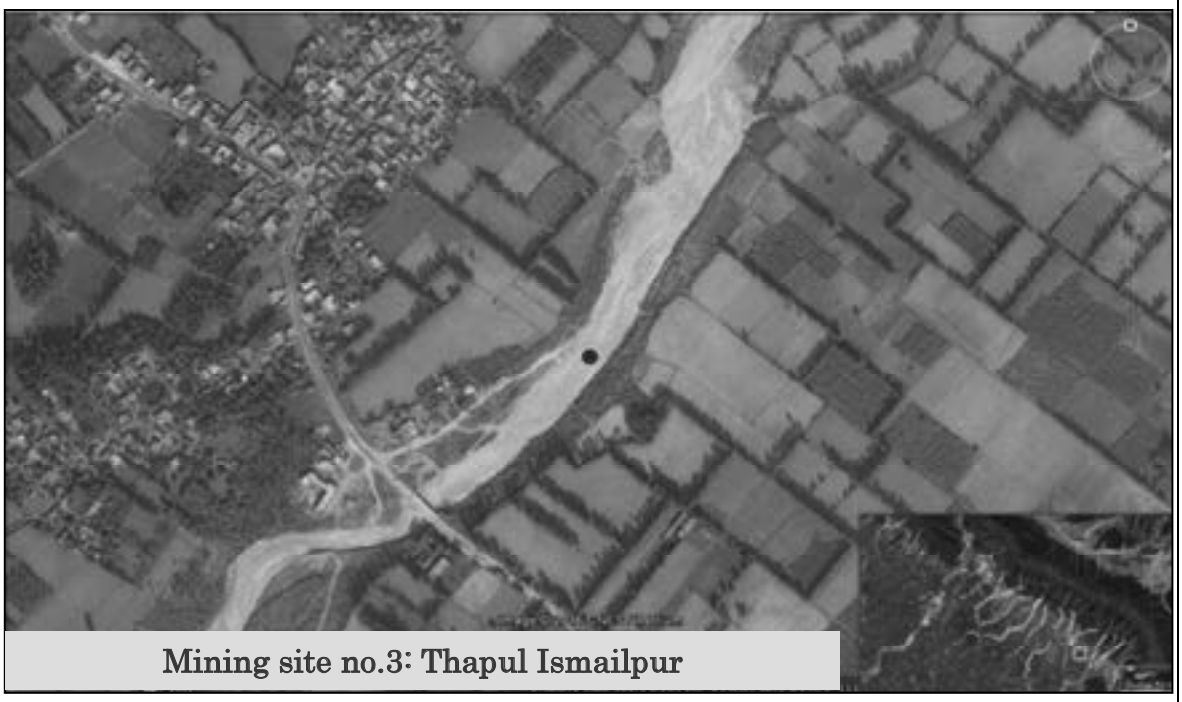
2270

11. **Distance of mine site from the road**	:	100m from Saharanpur-Dehradun road
12. **Past land use of the mine site**	:	River bed
13. **Present land use of mine site**	:	River bed
14. **The location of mining site**	:	-
15. **Approximate width of River bed at present on the mine site (m)**	:	30
16. **Land ownership**	:	Gram Samaj
17. **Sign of mining**	:	No sign of mining
18. **Occurence of forest (if any) near the mining site**	:	No
19. **Regeneration of species (if any) in the mined site**	:	*Mimosa himalayana, Lanea coromandelica ,Dalbergia sissoo, Wendlandia exserta*
20. **Dominant local species around the mining site**	:	*Azadirachta indica, Dalbergia sissoo*
21. **Agriculture land adjoining the mining site (if any)**	:	Yes, on both left and right banks
22. **Main crops cultivated in the area**	:	Wheat, Sugarcane and Poplar plantation
23. **Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24. **Any others observations**	:	Nil
25. **Bank erosion due to mining, if any**	:	No
26. **Suggested engineering measures**	:	Yes
27. **Gabion check dams (no.)**		_
28. **Spurs (no.)**		9(incl. 1/3,2/3,3/3)
29. **Embankment/Protection wall (m)**		1200 (incl. 1/3,2/3,3/3)
30. **Area available for biological measure (ha)**		No scope
31. **Suggested species**		No possibility of plantation

2271

7.24 Thapul Ismailpur (15.3)

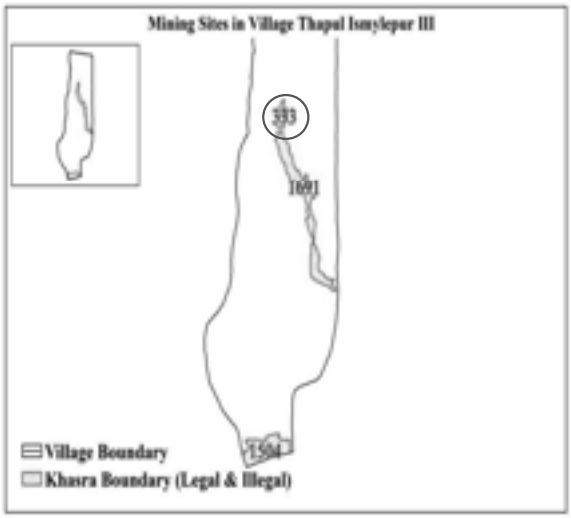
1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Thapul Ismailpur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Latitude (Y) : 30°07'43.7"
			Longitude(X) : 77°50'33.7"
			Elevation (m) : 322



Mining site no.3: Thapul Ismailpur

6.	**Lease no. near illegal mining site(if any)**	:	11
7.	**Khasra nos. of the lease area**	:	333 क
8.	**Area under lease (ha)**	:	7.02
9.	**Khasra nos. of illegal mining**	:	Part of khasra no 333 क (Allotted to weaker sections: 3.4 ha)
10.	**Area under illegal mining(ha)**	:	0.0

Revenue Map



2272

11. **Distance of mine site from the road**	:	2 km from Saharanpur-Dehradun Highway
12. **Past land use of the mine site**	:	River bed
13. **Present land use of mine site**	:	River bed
14. **The location of mining site**	:	-
15. **Approximate width of River bed at present on the mine site (m)**	:	45
16. **Landownership**	:	Gram Samaj
17. **Sign of mining**	:	No sign of mining
18. **Occurence of forest (if any) near the mining site**	:	No
19. **Regeneration of species (if any) in the mined site**	:	*Mimosa himalayana, Lanea coromandelica, Dalbergia sissoo, Wendlandia exserta*
20. **Dominant local species around the mining site**	:	*Azadirachta indica, Dalbergia sissoo*
21. **Agriculture land adjoining the mining site (if any)**	:	Yes, on both left and right banks
22. **Main crops cultivated in the area**	:	Wheat, Sugarcane and Poplar plantation
23. **Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24. **Any others observation**	:	Total leased area 7.026 ha out of which 3.62 ha allotted to farmers, at the time of chakbandi, Remaining 3.368 ha was under legal mining
25. **Bank erosion due to mining, if any**	:	Yes
26. **Suggested engineering measures**	:	Yes
27. **Gabion check dams (no.)**		_
28. **Spurs (no.)**		9(incl. 1/3,2/3,3/3)
29. **Embankment/Protection wall (m)**		1200 (incl. 1/3,2/3,3/3)
30. **Area available for biological measure (ha)**	:	No scope
31. **Suggested species**		No possibility of plantation

2273

15. ThapulIsmailpur



Plate 1: View of Thapulismypur mining site



Plate 2: View of river bank cutting at mining site

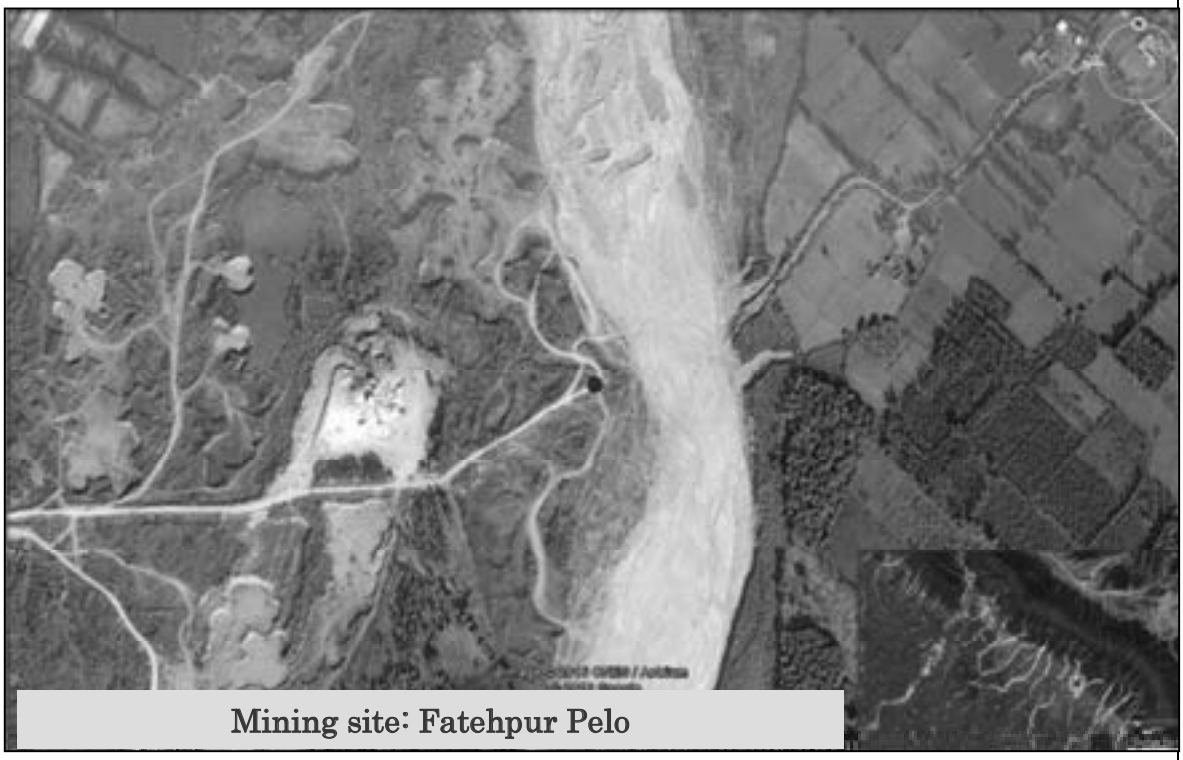


Plate 3: River bank cutting at the mining site

2274

7.25 Fatehpur Pelo (16)

1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Fatehpur Pelo
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Lat (Y) : 30°10'26.7"
			Long (X) : 77°49'25.7"
			Elevation (m) :



Mining site: Fatehpur Pelo

6.	**Lease no. near illegal mining site(if any)**	:	15,16
7.	**Khasra nos. of the lease area**	:	354, 361mj, 362, 363, 363mj, 367, 368
8.	**Area under lease (ha)**	:	11.25
9.	**Khasra nos. of illegal mining**	:	Part of Khasra No. 354, 361mj, 362, 363, 363 mj, 367, 368
10.	**Area under illegal mining(ha)**	:	12.39

Revenue Map



2275

11.	**Distance of mine site from the road**	:	3 km from Sunderpur- Shakumbhari road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of River bed at present on the mine site (m)**	:	100
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	Pits and heaps of RBM in Kaluwala Jahanpur near Fatehpur Pelo on right bank of the tributary
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp.,*Impomea cornea*
20.	**Dominant local species around the mining site**	:	*Saccharum* spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, on both left and right banks
22.	**Main crops cultivated in the area**	:	Wheat, maize, Eucalyptus and Popular
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any others observations**	:	Recent mining in about 25 % area of River bed. The private land on left bank is about 10 m high from riverbed
25.	**Bank erosion due to mining, if any**	:	Yes
26.	**Suggested engineering measures**	:	Yes
27.	**Gabion check dams (no.)**		_
28.	**Spurs (no.)**		13
29.	**Embankment/Protection wall (m)**		800
30.	**Area available for biological measure (ha)**	:	12.39

31. **Suggested species:**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Azadiracta indica, , Ziziphus mauritiana, Bombax ceiba, Pongamia pinnata , Butea monosperma, Bauhinia variegata , Embllica officinalis, ,Ehretia laevis , Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Arundo donax, Pennisetum purpureum

2276

16. FatehpurPelo



Plate 1: Deep pits formed due to mining in the river bed



Plate 2: View of severe river bank cutting

2277

7.26 Madhti Ahtmal and Mustakam (17)

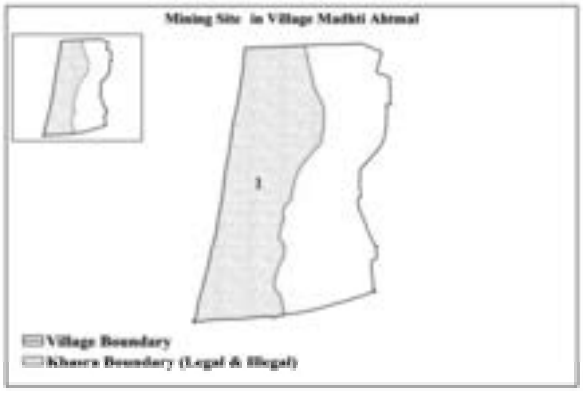
1.	**Mining cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	MadhtiAhtmal and Mustakam
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Latitude (Y) : 30°17'24.2"
			Longitude (X) : 77°33'48.8"
			Elevation (m) : 313



Mining site: Madhti Ahtmal and Mustakam

6.	**Lease no. near illegal mining site(if any)**	:	20
7.	**Khasra nos. of the lease area**	:	1/1mj
8.	**Area under lease (ha)**	:	12.39
9.	**Khasra nos. of illegal mining**	:	Part of khasra no.1/1mj

Revenue Map



10.	**Area under illegal mining(ha)**	:	102.55
11.	**Distance of mine site from the road**	:	13 km from Saharanpur - Chakrata road

2278

12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of River bed at present on the mine site (m)**	:	500m
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	Pits and heaps
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp.,*Impomea carnea*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, on both side of bank Eucalyptus plantation towards western (Haryana) side at distance of 500m from mine site
22.	**Main crops cultivated in the area**	:	Mainly Eucalyptus plantation on private land.
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)		NA
	Spurs (no.)		13
	Embankment/Protection wall (m)		450
27.	**Area available for biological measure (ha)**	:	1.38

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Trewia nudiflora , Embllica officinalis, Ehretia laevis , Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Arundo donax, Pennisetum purpureum.

2279

17. MadhtiAhtmal and Mustakam



Plate1: Damage of agriculture and tree plantation



Plate2: Area need to be restored

7.27 2280 Kaluwala Jahanpur (18)

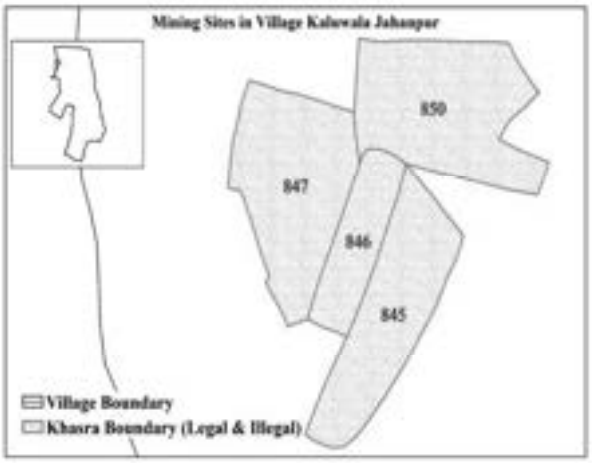
1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Kaluwala Jahanpur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y) : 30°10'42.2"
		:	Longitude (X) : 77°46'54.0"
		:	Elevation (m) : 341



Mining site: Kaluwala Jahanpur

6.	**Lease no. near illegal mining site(if any)**	:	33
7.	**Khasra nos. of the lease area**	:	845, 846, 847, 850
8.	**Area under lease (ha)**	:	6.47
9.	**Khasra nos. of illegal mining**	:	Part of khasra no. 845, 846, 847, 850

Revenue Map



10.	**Area under illegal mining(ha)**	:	0.228

2281

11.	**Distance of mine site from the road**	:	3km from Saharanpur-Mirjapur road
12.	**Past land use of the mine site**	:	River bed and bank
13.	**Present land use of mine site**	:	River bed and bank
14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of River bed at present on the mine site (m)**	:	40m
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	1.5m deep recent mining pits in riverbed
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum* spp., *Ipomoea carnea*
20.	**Dominant local species around the mining site**	:	*Saccharum* spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, on right bank at distance of 20m
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus plantation on private land.
23.	**Significant damage, if any**	:	Damage to surrounding habitat
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	Yes, on right side of bank
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	18
	Embankment/Protection wall (m)	:	500
27.	**Area available for biological measure (ha)**	:	4.50

28. **Suggested species:**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Azadiracta indica, , Ziziphus mauritiana, Bombax ceiba, Pongamia pinnata , Butea monosperma, Bauhinia varigeta, Embllica officinalis, ,Ehretia laevis , Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Arundo donax.

18. KaluwalaJahanpur



Plate 1: View of mining site



Plate2: Imprint of riverbed mining

2283



Plate3: Cutting of river bank and scope for engineering measures



Plate4: River bank area need to be restored

2284 7.28 Tatohal (19)

1.	**Mining cluster**	:	1: Yamuna river bed and bank
2.	**Panchayat**	:	Dhaulra
3.	**Thana**	:	Behat
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Lat (Y) : 30°12'12.7"
			Long (X) : 77°30'35.5'
			Elevation (m) : 277



Mining site: Tatohal

6.	**Lease no. near illegal mining site(if any)**	:	39
7.	**Khasra nos. of the lease area**	:	32, 33, 34, 35, 44, 46, 47, 48, 49, 50, 51, 52, 53, 54, 56, 57, 58
8.	**Area under lease (ha)**	:	9.31
9.	**Khasra nos. of illegal mining**	:	Part of khasra no. 32, 33, 34, 35, 44, 46, 47, 48, 49, 50, 51, 52, 53, 54, 56,

Revenue Map



2285

57, 58

10.	**Area under illegal mining(ha)**	:	0.482
11.	**Distance of mine site from the road**	:	7 km from Chilkana - Gandevad Road
12.	**Past land use of the mine site**	:	Agriculture
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and flood plain
15.	**Approximate width of River bed at present on the mine site (m)**	:	900
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	Heaps of boulder in flood plain
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Dalbergia sissoo, Calotropis procera*
20.	**Dominant local species around the mining site**	:	*Bombax ceiba*
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, adjacent to mining site in Tatohal village
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane
23.	**Significant damage, if any**	:	Damage to floodplain and agriculture land
24.	**Any others observation**	:	The river area was farmer land and got submerged into riverbed during 1978 floods.
25.	**Bank erosion due to mining, if any**	:	No
26.	**Suggested engineering measures**	:	Not required
27.	**Area available for biological measure (ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

2286

19. Tatohal



Plate1: Imprint of RBM mining in the riverbed



Plate2: View of piled up RBM in the riverbed



Plate3: Colonization of Saccharum grass in island formed in the riverbed

7.29 Abdullapur (20)

1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Abdullapur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Latitude (Y) : 30°10'08.0"
			Longitude (X) : 77°46'48"
			Elevation (m) : 332



Mining site: Abdullapur

6.	**Lease no. near illegal mining site(if any)**	25	**Revenue map**
7.	**Khasra nos. of the lease area**	85 ख, 81	
8.	**Area under lease (ha)**	5.58	
9.	**Khasra nos. of illegal mining**	Part of khasra no.85 ख, 81	



2288

10.	**Area under illegal mining(ha)**	:	9.82
11.	**Distance of mine site from the road**	:	15km from Saharanpur- Dehradun Road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of River bed at present on the mine site (m)**	:	100m
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	Deep mining pits and heaps
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp., *Ipomoea carnea*
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, on both left and right banks, adjacent to mining site
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Poplar plantation in private land
23.	**Significant damage, if any**	:	Loss of agriculture land due to bank cutting
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	Yes, on both side of river bank
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	11
	Embankment/Protection wall (m)	:	390
27.	**Area available for biological measure (ha)**	:	3

28. **Suggested species :**
Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Buteamono sperma, Bauhinia variegata , Ficus semicordata, Embllica officinalis, Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Arundodonax, Pennisetum purpureum.

~~2289~~

20. Abdullapur



Plate 1: Mining impressions in the riverbed



Plate 2: Area need to be restored

2290



Plate 3: View of bank erosion at the mining site



Plate 4: Sever river bank cutting at the mining site

2291

7.30 Khushalipur (21)

1.	**Mining cluster**	:	4: Ganga tributary
2.	**Panchayat**	:	Khushalipur
3.	**Thana**	:	Biharigarh
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Latitude (Y) : 30°08'37.3"
			Longitude (X) : 77°49'14.9"
			Elevation (m) : 320



Mining site: Khushalipur

6.	**Lease no. near illegal mining site(if any)**	:	30,31
7.	**Khasra nos. of the lease area**	:	559 mj, 572 mj, 576 mj, 585 mj
8.	**Area under lease (ha)**	:	29.08
9.	**Khasra nos. of illegal mining**	:	Part of khasra no. 559 mj, 572 mj, 576 mj, 585 mj
10.	**Area under illegal mining(ha)**	:	6.5

Revenue Map



2292

11.	**Distance of mine site from the road**	:	3km from Saharanpur-Dehradun road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of River bed at present on the mine site (m)**	:	100
16.	**Landownership**	:	Gram Samaj
17.	**Sign of mining**	:	No sign of mining
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, on both left and right banks, adjacent to mining site
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	Yes, on both side of river bank
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	13
	Embankment/Protection wall (m)	:	800
27.	**Area available for biological measure (ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

~~2293~~

21. Khushalipur



Plate 1: View of mining site



Plate 2: River bank cutting at mining site



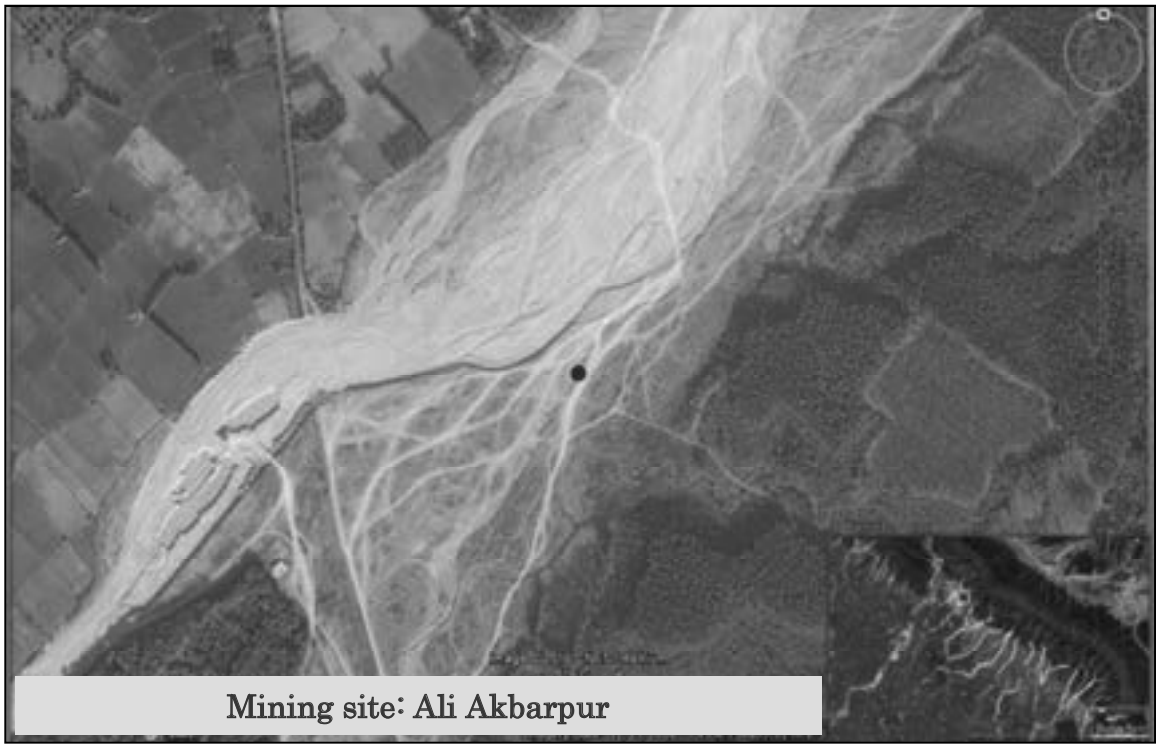
Plate 3: River bank cutting at the mining site



Plate 4: River bank cutting at the mining site

7.31 2295 Ali Akbarpur (22)

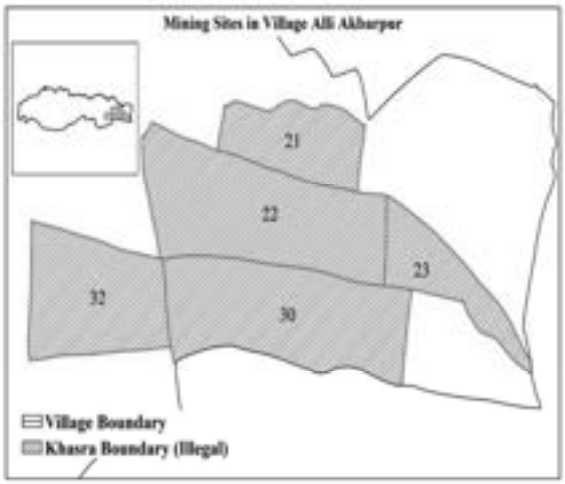
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Sherpur Pelo
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Lat (Y) : 30°18'19.2"
			Long (X) : 77°39'01.2"
			Elevation (m) : 273



Mining site: Ali Akbarpur

6.	**Lease no. near illegal mining site(if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	21, 22, 23, 30/3, 30/6, 32/6

Revenue Map



2296

10.	**Area under illegal mining(ha)**	:	44.17
11.	**Distance of mine site from the road**	:	2 km from Saharanpur- Chakrata Road
12.	**Past land use of the mine site**	:	Agriculture Land and Riverbed
13.	**Present land use of mine site**	:	Riverbed
14.	**The location of mining site**	:	In River bed
15.	**Approximate width of River bed at present on the mine site (m)**	:	800 m
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	No sign of mining
18.	**Occurence of forest (if any) near the mining site**	:	Yes, Shiwalik forest towards north adjacent to mining site
19.	**Regeneration of species (if any) in the mined site**	:	*Lantana camara, Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, right bank of river
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane
23.	**Significant damage, if any**	:	Damage to surrounding habitat
24.	**Any others observation**	:	-
25.	**Bank erosion due to mining, if any**	:	Yes, on the right side of bank
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)		_
	Spurs (no.)		13
	Embankment/Protection wall (m)		300
27.	**Area available for biological measure (ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation

~~2297~~

22. Ali Akbarpur



Plate 1: View of mining site



Plate 2: View of mining site

2298



Plate 3: River bank erosion



Plate 4: River bank erosion

2299

7.32 Shahpur Bans Ahtmal (23)

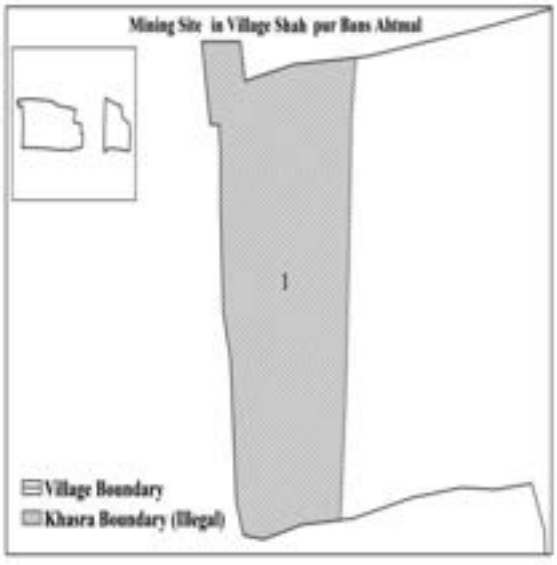
1.	**Mining cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Sahpur Bans
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**		Lat (Y) : 30°16'23.6"
			Long (X) : 77°32'48.8"
			Elevation (m) : 299



Mining site: Shahpur Bans Ahtmal

6.	**Lease no. near illegal mining site(if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



2300

10.	**Area under illegal mining(ha)**	:	16.32
11.	**Distance of mine site from approach road**	:	11 km from Saharanpur - Chakrata road
12.	**Past land use of illegal mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of River bed at present on the mine site (m)**	:	300
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land (if any) near mining site**	:	Yes, eastern side of the river bank
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Eucalyptus plantation on private land
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any others observation**	:	Nil
25.	**Bank erosion due to mining, if any**	:	Yes on right bank
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)		-
	Spurs (no.)		14
	Embankment/Protection wall (m)		450
27.	**Area available for biological measure (ha)**	:	4.58
28.	**Suggested species:**		

Dalbergia sissoo, Acacia catechu, Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata, Salix tetrasperma, Butea monosperma, Bauhinia variegata, Holarrhena pubescens,Trewia nudiflora, Embllica officinalis, ,Ehretia laevis, Trema politoria, Wendlandia exserta Dendrocalamus strictus, Woodfordia fruticosa, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Eriophorum comosum, Arundo donax, Pennisetum purpureum

~~2301~~

23. ShahpurBans Ahtmal



Plate1: View of mining site



Plate2: Submerged pits and piled up heaps of RBM in riverbed



Plate3: Submerged pits and piled up heaps of RBM in riverbed



Plate 4: Severe river bank cutting

2303

7.33 Mahmoodpur Nagli (24. Yamuna)

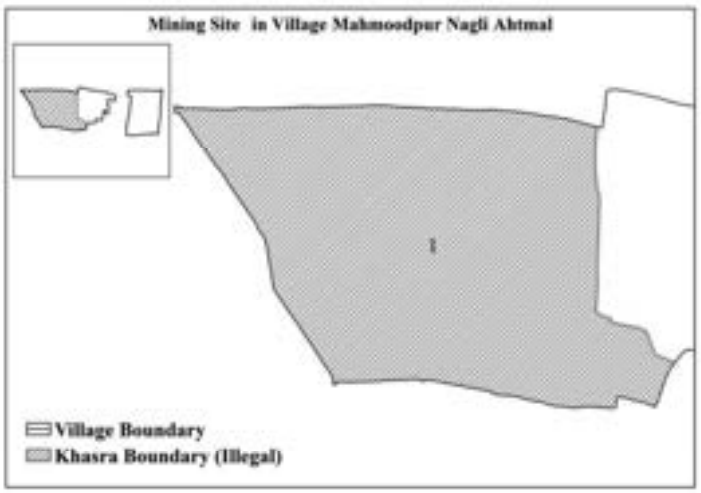
1.	**Mining cluster**	:	2: Yamuna river bed and bank
2.	**Panchayat**	:	Mahmoodpur Nagli
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'58.3" Longitude (X):77°32'36.6" Elevation (m):292



Mining site: Mahmoodpur Nagli (Yamuna)

6.	**Lease no. near illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



10.	**Area under illegal mining(ha)**	:	No
11.	**Distance of mine site from the road**	:	4 km from Raipur -Bahet-Chakrata Road

2304

12.	**Past land use of the mine site**	:	River bed and bank
13.	**Present land use of mine site**	:	River bed and bank
14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	180
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Pits and heaps of RBM throughout river bed and bank
18.	**Occurence of forest (if any) near the mining site**	:	Yes, towards west, adjacent to mining site.
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp., *Ipomoea carnea, Lantana camara*
20.	**Dominant local species around the mining site**	:	*Acacia nilotica, Acacia catechu, Diospyros melanoxylon, Syzygium cumini, Zizyphus mauritiana, Ehretia laevis, Anogeissus latifolia, Cordia myxa, Mitragyna parviflora*
21.	**Agriculture land (if any) near mining site**	:	No
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Groundnut, Mustard
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any others observation**	:	Mining in 6.56 ha area is riverbed including water course and 21.691 ha area in flood-plain; Extraction of material upto about 2m depth
25.	**Bank erosion due to mining**	:	Yes, both sides of river bank
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	_
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	21

28. **Suggested species** :

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Psidium guajava,Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens,Trewia nudiflora , Embllica officinalis, ,Ehretia laevis , Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera,Mimosa himalayana, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Arundo donax, Pennisetum purpureum

~~2305~~

24. MahmoodpurNagaliAhtmal



Plate 1: View of riverbed mining



Plate 2: Sign of mining in the flood plain



Plate 3: Sign of mining in the flood plain



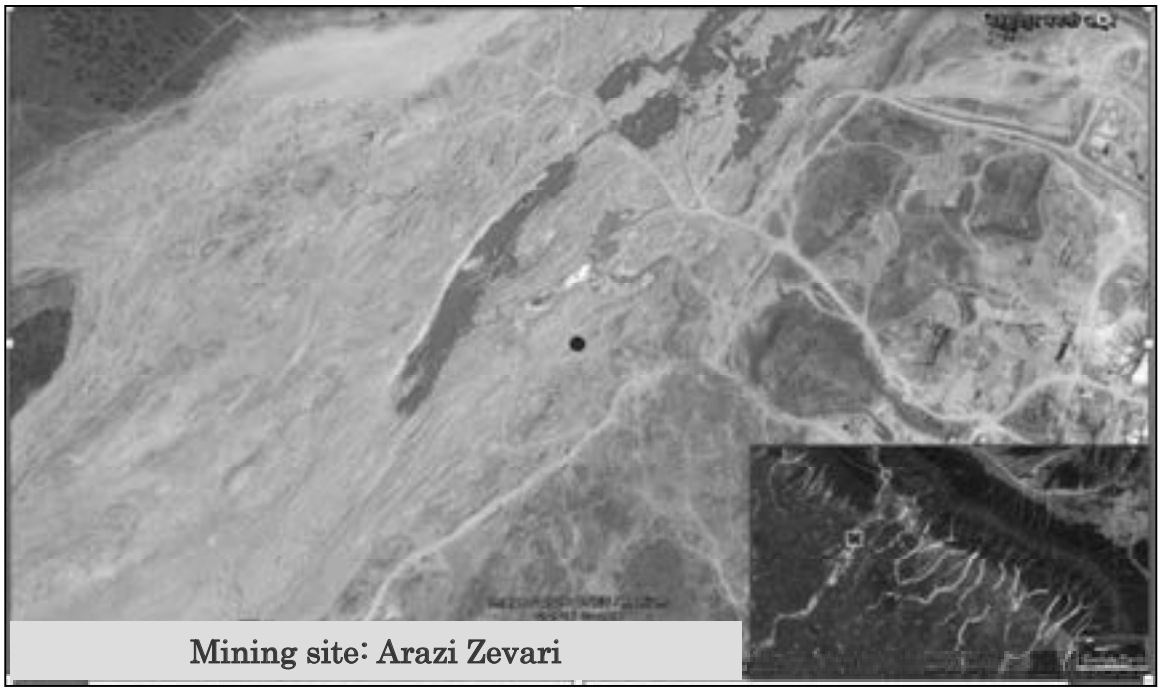
Plate 4: Area to be restored in the flood plain



Plate 5: Area need to be restored in the flood plain

7.34 Arazi Zevari (25)

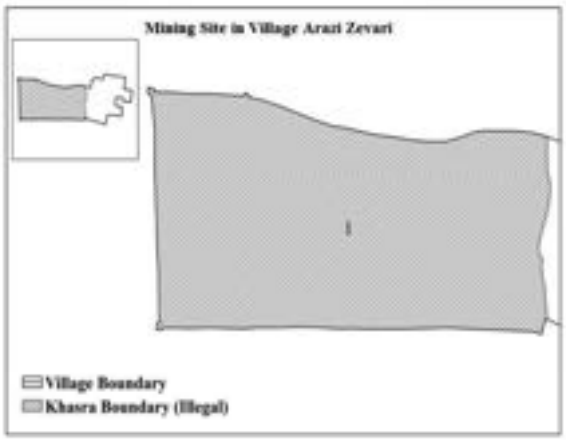
1.	**Mining cluster**	:	2: Yamuna river bed and bank
2.	**Panchayat**	:	Mahmoodpur Nagli
3.	**Thana**	:	Mirzapur Pelo
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'53.6" Longitude (X):77°32'20.4" Elevation (m): 292



Mining site: Arazi Zevari

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



10.	**Area under illegal mining(ha)**	:	17.3
11.	**Distance of mine site from the road**	:	13 km from Raipur -Bahet-Chakrata road
12.	**Past land use of the mine site**	:	River bed and bank
13.	**Present land use of mine site**	:	River bed and bank

2308

14.	**Illegal mining carried**	:	River bed and bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	280
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	About 2 m deep pits in river bed and 4-5 m deep in flood plain area
18.	**Occurence of forest (if any) near the mining site**	:	Yes, towards west, adjacent to illegal mining site, Mixed Deciduous Forest
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp. on the bank*, Ipomoea carnea, Lantana camara*
20.	**Dominant local species around the mining site**	:	*Acacia nilotica, Acacia catechu, Diospyros sp., Syzygium cumini, Zizyphus mauritiana, Ehretia laevis, Anogeissus latifolia, Cordia myxa, Mitragyna parviflora*
21.	**Agriculture land (if any) near mining site**	:	No
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Groundnut, Mustard
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Mining in 5.274 ha area in riverbed and 12.028 ha area in flood plain
25.	**Bank erosion due to mining**	:	No
26.	**Suggested Engineering measures**	:	Not required
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	_
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	12

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Psidium guajava, Magnifera indica, Aegle marmelos, Holarrhena pubescens,Trewia nudiflora , Embllica officinalis, ,Ehretia laevis , Trema politoria,Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Arundo donax,Pennisetum purpureum

~~2309~~

25. AraziZewari



Plate 1: Area need to be restored



Plate 2: Impressions of mining at river bank



Plate 3: Sign of mining at river bank

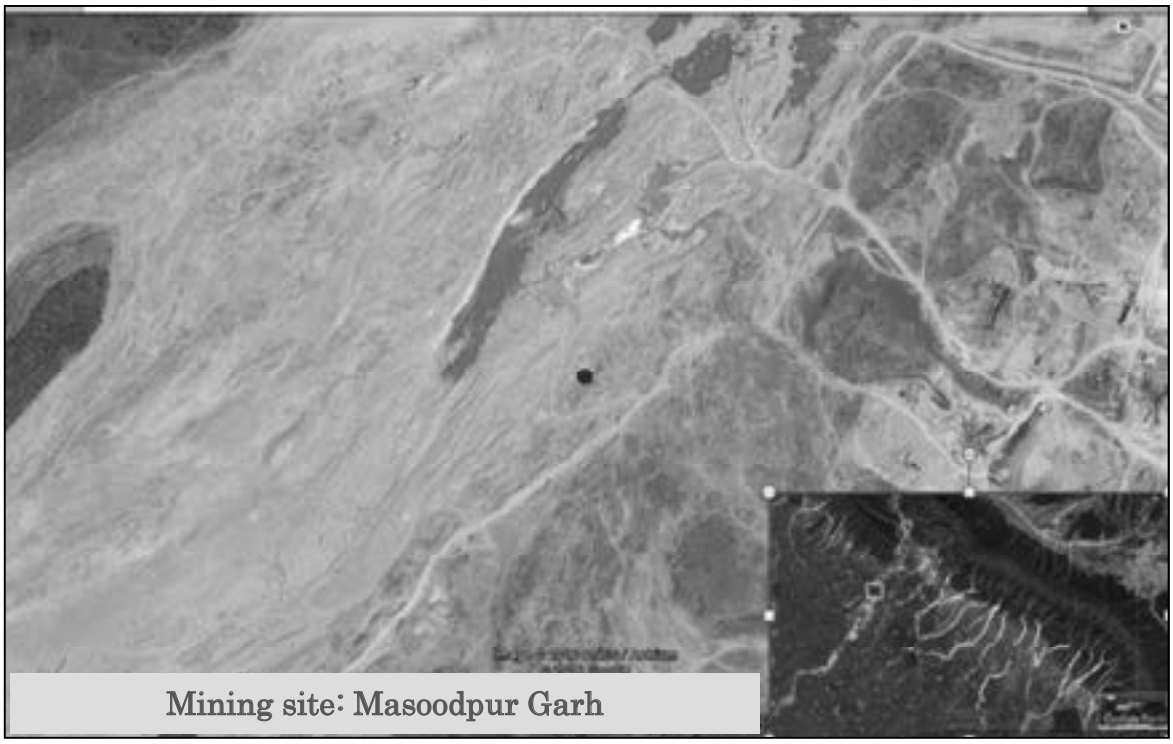


Plate 4: Sign of mining in the flood plain

2311

7.35 Masoodpur Garh (26)

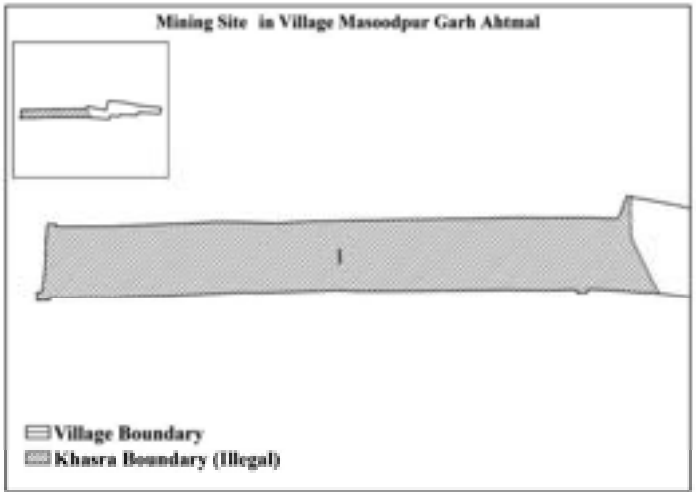
1.	**Mining Cluster**	:	2: Yamuna river bed and bank
2.	**Panchayat**	:	Syed Mohmmadpur
3.	**Thana**	:	Mirzapur Pelo
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'51.3" Longitude (X):77°32'18.8" Elevation (m): 293



Mining site: Masoodpur Garh

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



10.	**Area under illegal mining(ha)**	:	4.57
11.	**Distance of mine site from the road**	:	12 km from Saharanpur - Chakrata road

2312

12.	**Past land use of the mine site**	:	River bed and bank
13.	**Present land use of mine site**	:	River bed and bank
14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	180
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	About 3 m deep pits in river bed and 5-6 m deep in flood plain area
18.	**Occurence of forest (if any) near the mining site**	:	Yes, towards west, adjacent to illegal mining site.
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp., *Ipomoea carnea* , *Lantana camara*
20.	**Dominant local species around the mining site**	:	*Acacia nilotica, Acacia catechu, Diospyros sp., Syzygium cumini, Zizyphus mauritiana, Ehretia laevis, Anogeissus latifolia, Cordia myxa, Mitragyna parviflora*
21.	**Agriculture land (if any) near mining site**	:	No
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Groundnut, Mustard
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Mining in 1.908 ha area in riverbed and 2.66 ha area in flood-plain
25.	**Bank erosion due to mining**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	_
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	2.50

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Bauhinia variegata , Psidium guajava, Magnifera indica, Aegle marmelos, Ficus semicordata, Holarrhena pubescens,Trewia nudiflora , Embllica officinalis, ,Ehretia laevis , Trema politoria,Wendlandia exserta, Dendrocalamus strictus,Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Arundo donax,Pennisetum purpureum.

26. MasoodpurGarhAhtmal



Plate 1: Depression formed at river bed due to mining



Plate 2: Impression of mining at site

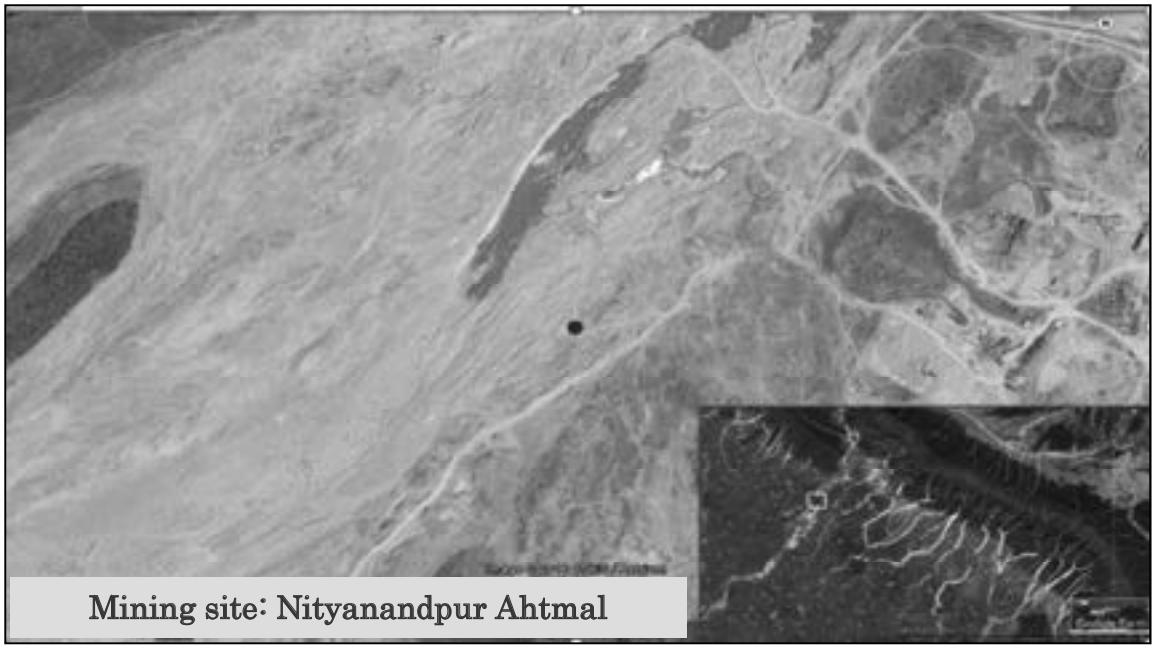


Plate 3: Area available for restoration

2314

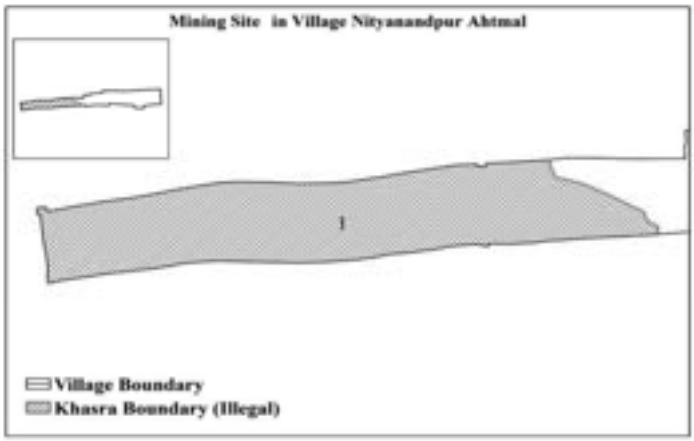
7.36 Nityanandpur Ahtmal (27)

1.	**Mining Cluster**	:	2: Yamuna river bed nad bank
2.	**Panchayat**	:	Syed Mahmoodpur
3.	**Thana**	:	Mirzapur Pelo
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'50.1" Longitude (X):77°32'17.6" Elevation (m):-



6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



10.	**Area under illegal mining(ha)**	:	7.826
11.	**Distance of mine site from the road**	:	14 km from Saharanpur - Chakrata road
12.	**Past land use of the mine site**	:	River bed and bank
13.	**Present land use of mine site**	:	River bed and bank

2315

14.	**The location of mining site**	:	River bed and bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	180
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits about 3 m deep in river bed and 5-6 m in flood plain area
18.	**Occurence of forest (if any) near the mining site**	:	Yes, towards west, adjacent to mining site
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp. on the bank, *Ipomoea carnea, Lantana camara*
20.	**Dominant local species around the mining site**	:	*Acacia nilotica, Acacia catechu, Diospyros sp., Syzygium cumini, Zizyphus mauritiana, Ehretia laevis, Anogeissus latifolia, Cordia myxa, Mitragyna parviflora*
21.	**Agriculture land (if any) near mining site**	:	No
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Sugarcane, Mustard
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	_
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	5.70

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Psidium guajava, Aegle marmelos, Magnifera indica, Azadiracta indica, ,Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens,Trewia nudiflora , Embllica officinalis, ,Ehretia laevis , Trema politoria,Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Arundo donax,Pennisetum purpureum.

2316

27. Nityanandpur Ahtmal



Plate 1: View of RBM mining in the riverbed



Plate 2: View of RBM mining in river bank

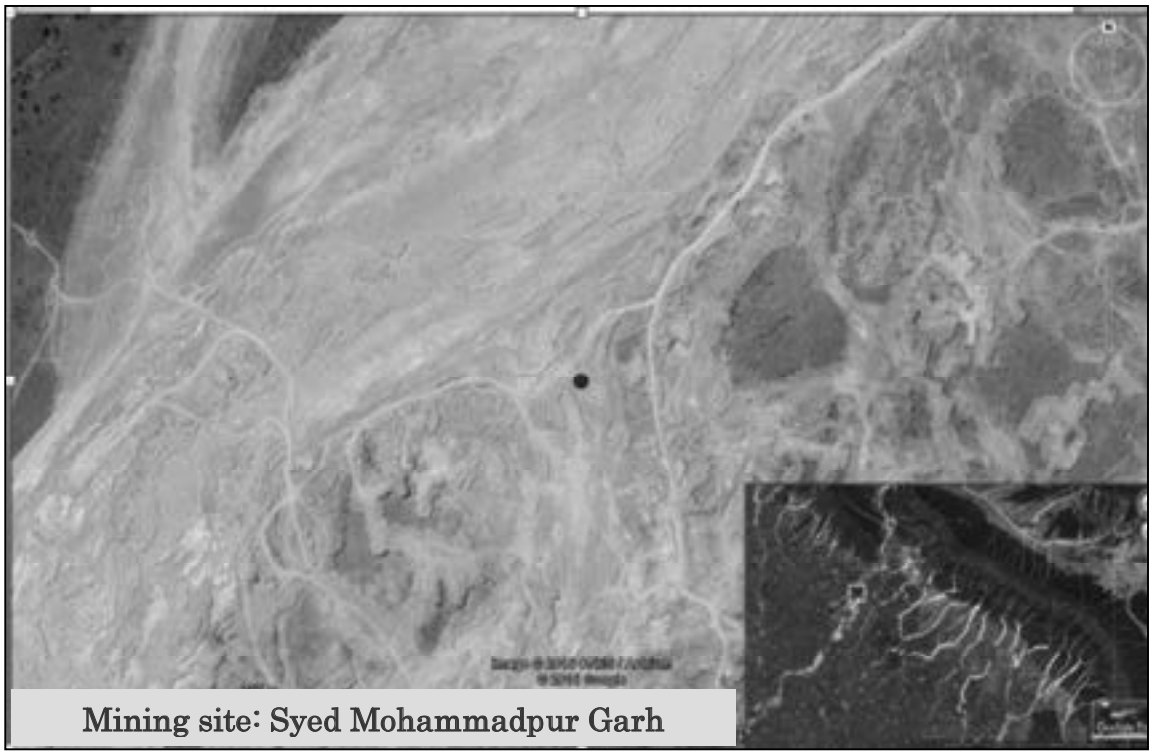


Plate 3: Area need to be restored in river bank

2317

7.37 Syed Mohammadpur Garh Ahtmal (28)

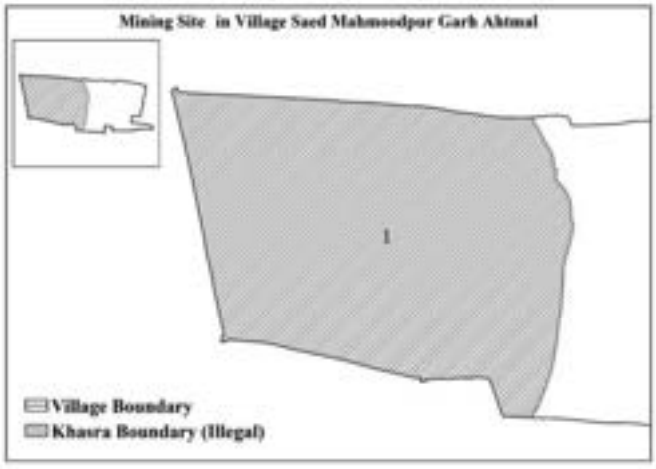
1.	**Mining Cluster**	:	2: Yamuna river bed and bank
2.	**Panchayat**	:	Syed Mohammadpur
3.	**Thana**	:	Mirzapur Pelo
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'38.2" Longitude (X):77°32'06.2" Elevation (m): 293



Mining site: Syed Mohammadpur Garh

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



10.	**Area under illegal mining(ha)**	:	24.64
11.	**Distance of mine site from the road**	:	11 km from Saharanpur-Chakrata road

2318

12.	**Past land use of the mine site**	:	River bed bank
13.	**Present land use of mine site**	:	River bed bank
14.	**The location of mining site**	:	River bed bank
15.	**Approximate width of river bed at present on the mine site (m)**	:	150
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Dumps of RBM in River bed and at River bank
18.	**Occurence of forest (if any) near the mining site**	:	Yes, forest in western side, adjacent to the mining site
19.	**Regeneration of species (if any) in the mined site**	:	*Acacia catechu*
20.	**Dominant local species around the mining site**	:	*Acacia catechu*
21.	**Agriculture land (if any) near mining site**	:	No
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Sugarcane,Mustard
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	14
	Embankment/Protection wall (m)	:	500
27.	**Area available for biological measures(ha)**	:	17

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens,Trewia nudiflora , Embllica officinalis, ,Ehretia laevis , Trema politoria,Wendlandia exserta,Aegle marmelos,Psidium guajava,Magnifera indica, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera,Mimosa himalayana, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Typha species, Arundo donax,Pennisetum purpureum

2319

28. Syed MohammadpurGarhAhtmal



Plate 1: Diversion of river flow path due to sand deposition in riverbed



Plate 2: Submerged pits of RBM excavated from riverbed



Plate 3: Pits formed due to RBM excavated in river bank



Plate 4: Deepening of riverbed due to excess extraction of RBM

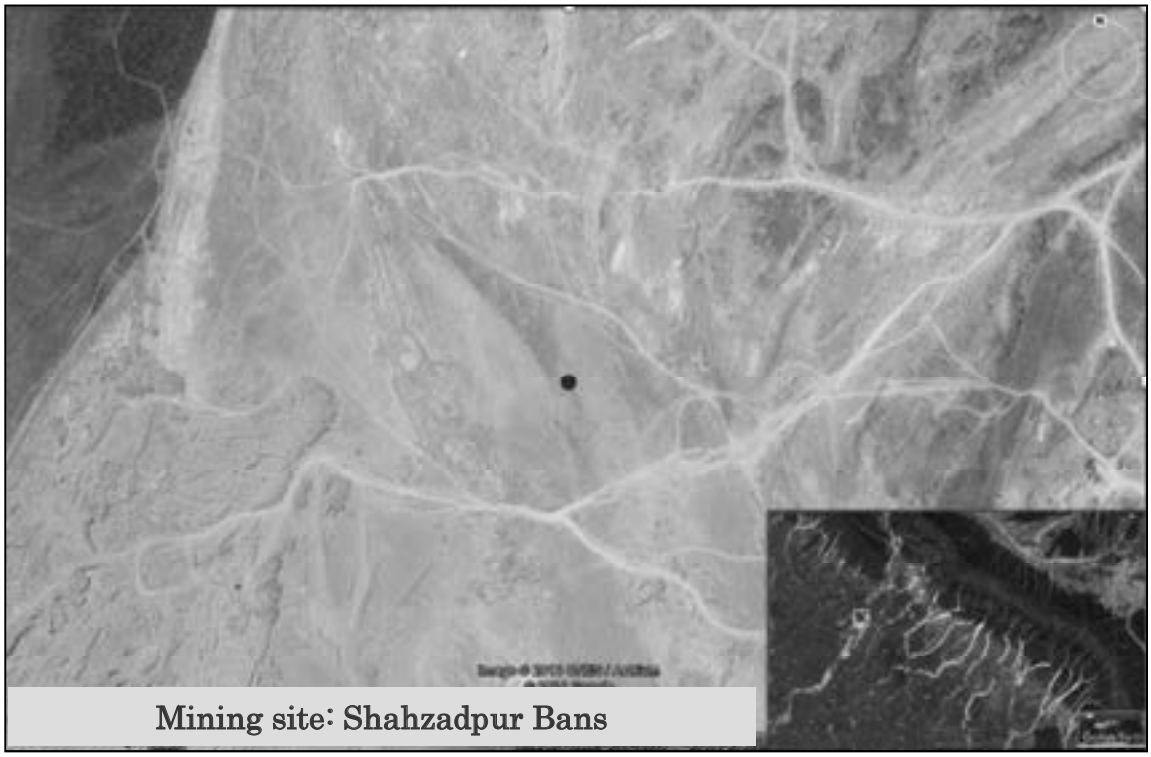


Plate 5: Area available for restoration in river bank

2321

7.38 Shahzadpur Bans (29)

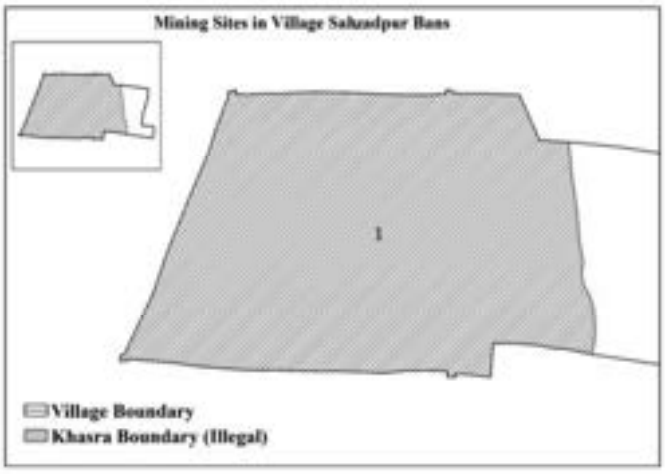
1.	**Mining Cluster**	:	2: Yamuna River bed and bank
2.	**Panchayat**	:	Kasabagarh
3.	**Thana**	:	Mirzapur Pelo
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'05.5" Longitude (X):77°31'46.9" Elevation (m): 290



Mining site: Shahzadpur Bans

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



10.	**Area under illegal mining(ha)**	:	31.29
11.	**Distance of mine site from the road**	:	12 km from Saharanpur - Chakrata road

2322

12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed and floodplain area
15.	**Approximate width of river bed at present on the mine site (m)**	:	250
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Deep pits and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	Yes, west side of river, adjacent to the illegal mining site
19.	**Regeneration of species (if any) in the mined site**	:	*Lantanacamara*, *Tremapolitoria*, *Ipomoeacarnea*
20.	**Dominant local species around the mining site**	:	*Acacia catechu*
21.	**Agriculture land (if any) near mining site**	:	No
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Sugarcane, Mustard
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	_
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	13

28. **Suggested species :**

Dalbergia sissoo, Acacia catechu, Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata, Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens,Trewia nudiflora, Embllica officinalis, Ehretia laevis , Trema politoria,Wendlandia exserta, Psidium Guavaja, Aegle marmelos, Dendrocalamus strictus,Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Eriophorum comosum, Phragmites karka, Arundo donax,Pennisetum purpureum

2323

29. Shahzadpur Bans



Plate 1: Depression formed in riverbed due to excavation of RBM



Plate 2: Heaps of piled up RBM

2324



Plate 3: Deep pit formed due extraction of RBM

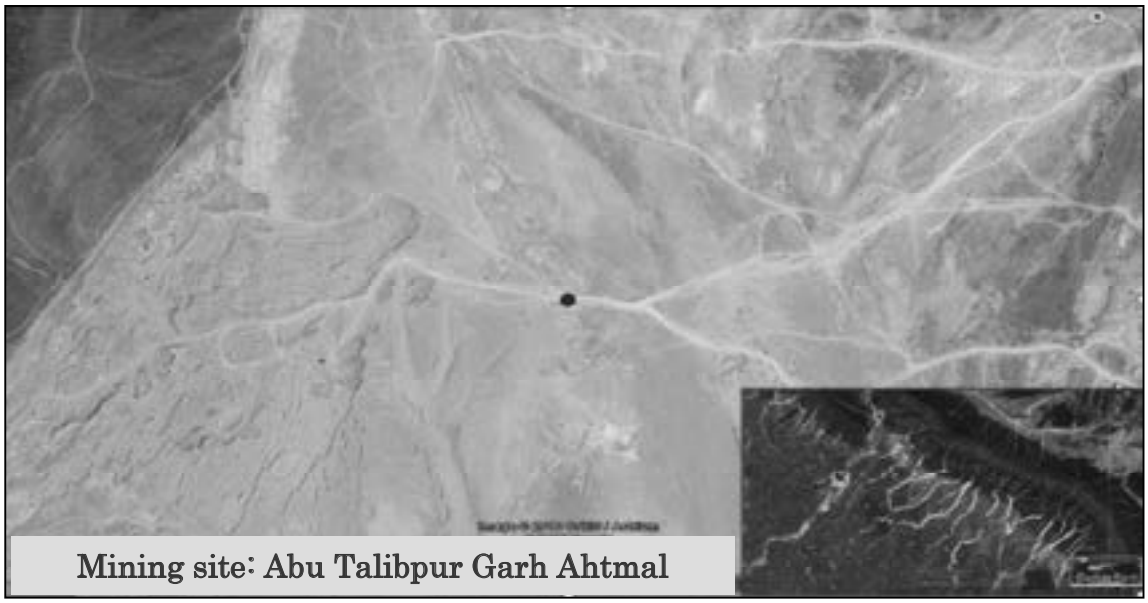


Plate 4: Area need to be restored

2325

7.39 Abu Talibpur Garh Ahtmal (30)

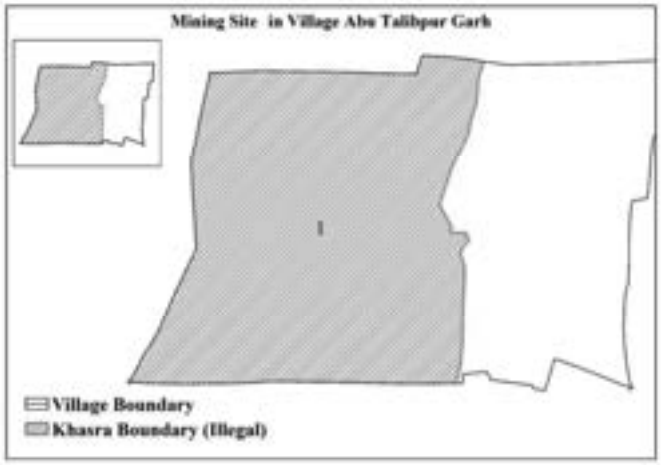
1.	**Mining Cluster**	:	2: Yamuna river bed and bank
2.	**Panchayat**	:	Kasaba garh
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'01.5" Longitude (X):77°31'43.8" Elevation (m): 288



Mining site: Abu Talibpur Garh Ahtmal

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



10.	**Area under illegal mining(ha)**	:	73.088
11.	**Distance of mine site from the road**	:	14 km, Saharanpur - Chakrata road
12.	**Past land use of the mine site**	:	River bed and flood plain
13.	**Present land use of mine site**	:	River bed and flood plain

2326

14.	**The location of mining site**	:	River bed and flood plain
15.	**Approximate width of river bed at present on the mine site (m)**	:	950
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Dumping of RBM at River-bank
18.	**Occurence of forest (if any) near the mining site**	:	Yes, north west, about 500m from the mining site.
19.	**Regeneration of species (if any) in the mined site**	:	*Acacia catechu, Trema politoria*
20.	**Dominant local species around the mining site**	:	*Acacia catechu*
21.	**Agriculture land (if any) near mining site**	:	No
22.	**Main crops cultivated in the area**	:	Wheat, maize, Sugarcane, Mustard
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	14
	Embankment/Protection wall (m)	:	950
27.	**Area available for biological measures(ha)**	:	4.21

28. **Suggested species :**

Dalbergia sissoo, Acacia catechu, Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata, Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens,Trewia nudiflora, Embllica officinalis, Ehretia laevis, Trema politoria,Wendlandia exserta, Aegle marmelos, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera,Mimosa himalayana,Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Typha species, Arundo donax,Pennisetum purpureum

2327

30. Abu TalibpurGarh



Plate 1: Submerged pit in the riverbed



Plate 2: Heaps of RBM mining in the riverbed

2328



Plate 3: Area need to be restored



Plate 4: Area available for restoration

2329

7.40 Bartha Korsi (31)

1.	**Mining Cluster**	:	2: Yamuna river bed and bank
2.	**Panchayat**	:	Aslampur Bartha
3.	**Thana**	:	Behat
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°13' 55.7" Longitude (X):77° 31' 11.2" Elevation (m): 284



Mining site: Bartha Korsi

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1
10.	**Area under illegal mining(ha)**	:	137.6
11.	**Distance of mine site from the road**	:	5 km from Chilkana - Gandevad road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed

Revenue Map



2330

14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	500
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits, RBM heaps in flood plain areas
18.	**Occurence of forest (if any) near the mining site**	:	Yes, towards west
19.	**Regeneration of species (if any) in the mined site**	:	*Ipomea carnea , Wenlandia exserta, Acacia catechu*
20.	**Dominant local species around the mining site**	:	*Acacia catechu*
21.	**Agriculture land (if any) near mining site**	:	No
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Sugarcane,Mustard
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams(no.)	:	_
	Spurs (no.)	:	13
	Embankment/Protection wall (m)	:	750
27.	**Area available for biological measures(ha)**	:	21.60
28.	**Suggested species** :		

Dalbergia sissoo, Acacia catechu, Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata, Salix tetrasperma, Butea monosperma, Bauhinia variegata, Ficus semicordata, Holarrhena pubescens,Trewia nudiflora, Embllica officinalis, Ehretia laevis,Trema politoria,Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Phragmites karka, Arundo donax,Pennisetum purpureum

2331

31. BarthaKorsi



Plate 1: Heaps of past RBM mining in the flood plain



Plate 2: Deep pit formed due to RBM extraction

2332



Plate 3: River flow diversion due to mining

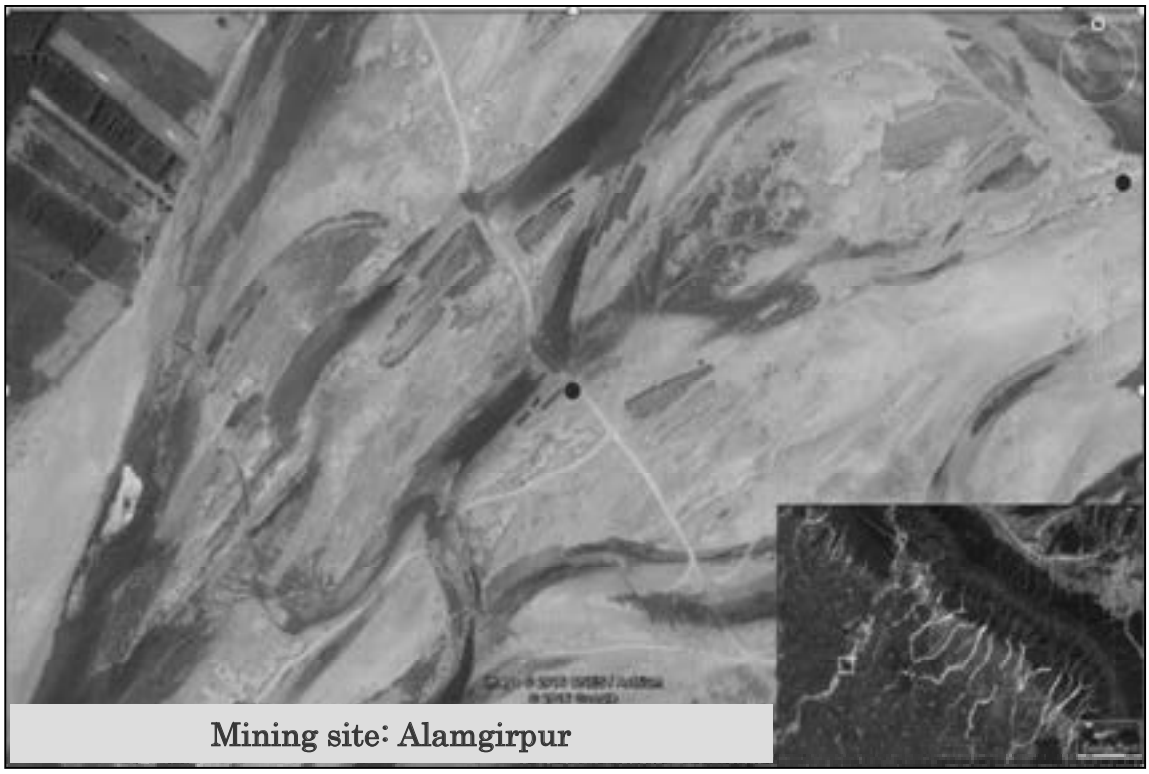


Plate 4: River flow diversion cutting

2333

7.41 Alamgirpur (32)

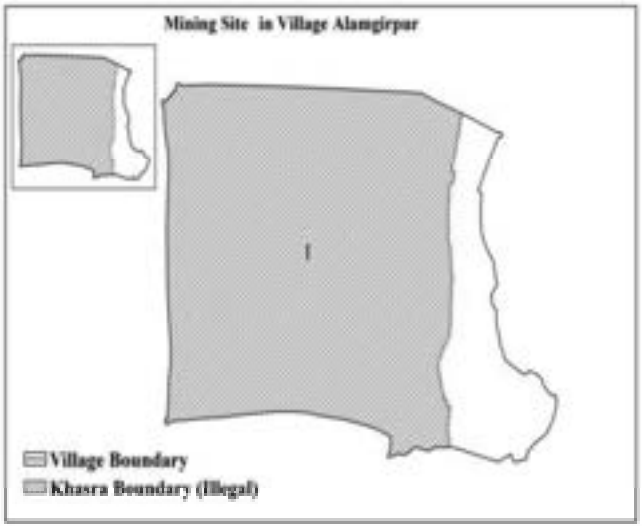
1.	**Mining Cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Dhaulra
3.	**Thana**	:	Behat
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°11'07.0" Longitude (X):77°29'17.3" Elevation (m): 268



Mining site: Alamgirpur

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1
10.	**Area under illegal mining(ha)**	:	64.55

Revenue Map



2334

11.	**Distance of mine site from the road**	:	8 km from Todderpur to Chilkana Road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	700
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	3-4 m deep mining pits and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp., *Typha* spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land (if any) near mining site**	:	Yes, adjacent to river bank
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize, Groundnut and Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Mining pits about 3-4m deep, and RBM heaps in riverbed
25.	**Bank erosion due to mining**	:	Yes, on right bank
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	_
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species :**		No possibility as whole area is in riverbed

2335

32. Alamgirpur



Plate 1: Impressions of mining in riverbed



Plate 2: Impressions of mining in riverbed



Plate 3: Area need to be restored inflood plain area

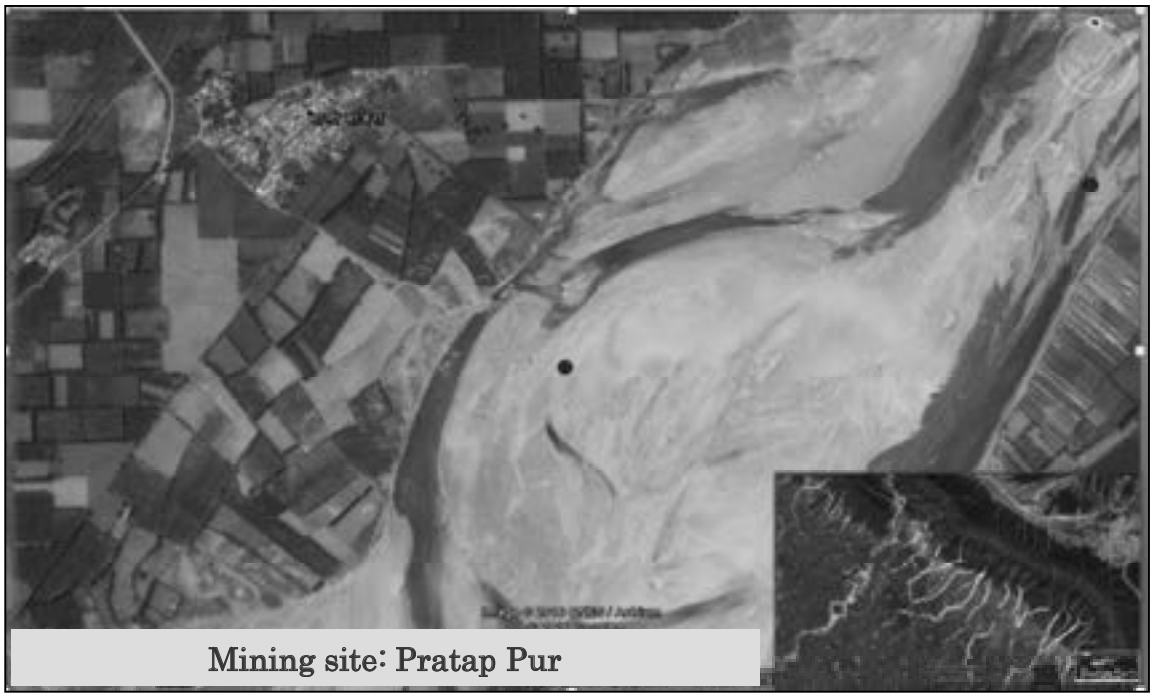


Plate 4: Area need to be restored in flood plain area

2337

7.42 Pratap Pur (33)

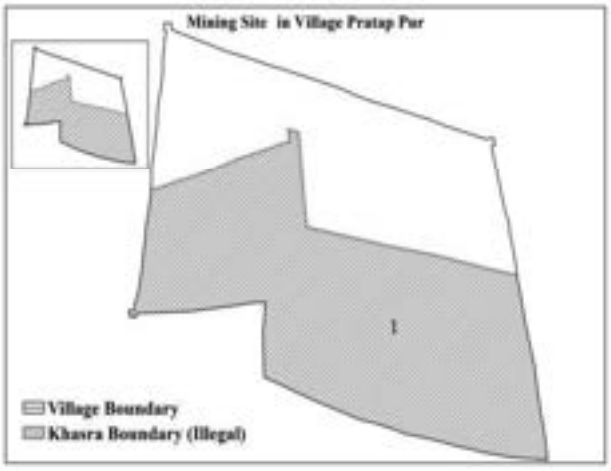
1.	**Mining Cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Nunyari
3.	**Thana**	:	Behat
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°10'40.0" Longitude (X):77°28'30.7" Elevation (m): 269



Mining site: Pratap Pur

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1

Revenue Map



10.	**Area under illegal mining(ha)**	:	15.39
11.	**Distance of mine site from the road**	:	10 km from Todderpur - Cilkana road
12.	**Past land use of the mine site**	:	River bed

2338

13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	250
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	No sign of mining
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp. species cover whole area
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land (if any) near mining site**	:	Yes, adjacent to riverbank
22.	**Main crops cultivated in the area**	:	Sugarcane, Poplar in private field Wheat, Maize
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Whole area is under riverbed
25.	**Bank erosion due to mining**	:	Yes, right side of riverbank
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	9
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species**	:	No possibility of plantation in riverbed

2339

33. PratapPur



Plate 1: Imprint of mining in riverbed



Plate 2: Damage to agriculture land due river flow change



Plate 3: Damage to agriculture land due river flow change

7.43 Dhaulra (34)

1.	**Mining Cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Dhaulra
3.	**Thana**	:	Behat
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°11'13.4" Longitude (X):77°29'38.1" Elevation (m): 272



Mining site: Dhaulra

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	2, 2/1, 9/1, 54, 59, 60, 61/1, 63/1, 65/1, 66, 67, 69, 86

Revenue Map



10.	**Area under illegal mining(ha)**	:	5.4
11.	**Distance of mine site from the road**	:	7 km from Chilkana - Gandevad road

2341

12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	74
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits and heaps of RBM
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land (if any) near mining site**	:	Yes, adjacent to mining area
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Sugarcane, Mustard and Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	3m deep mining pits and 3m high heaps of RBM in river bed
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	9
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species :**	:	No possibility on riverbed.

34. Dhaulra



Plate 1: Heaps of riverbed material in flood plain



Plate 2: Heaps of Riverbed material in flood plain

2343



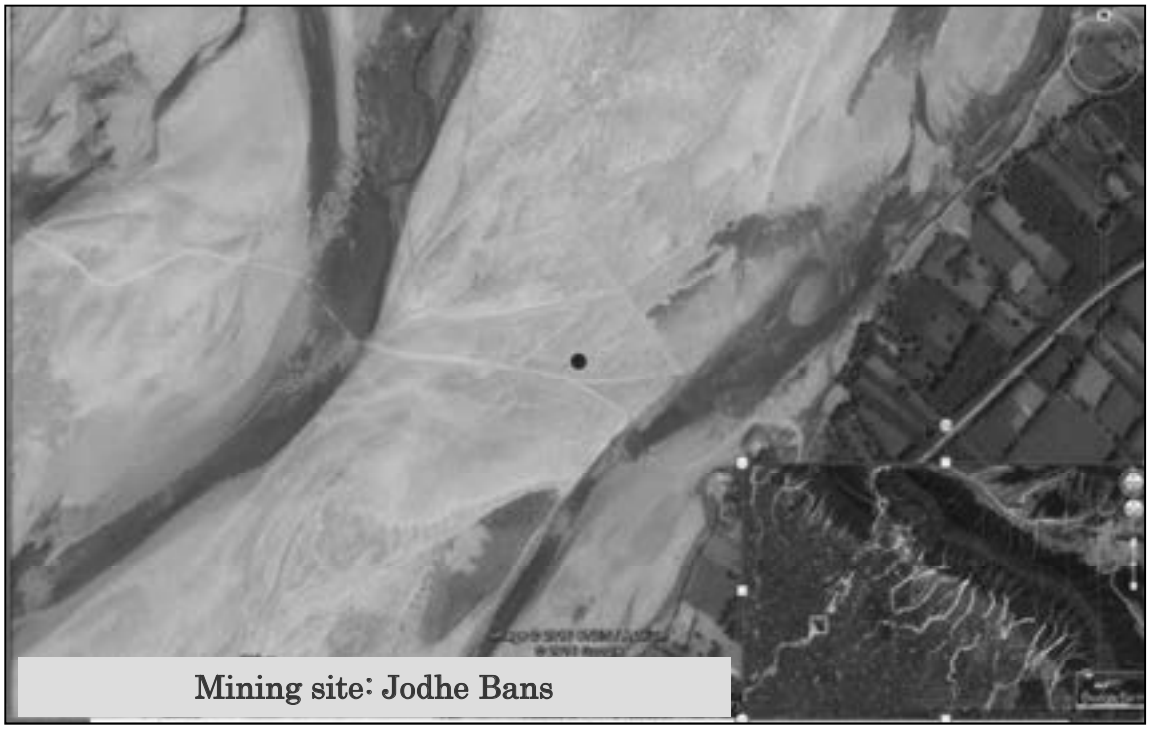
Plate 3: Colonization of Saccharum grass on the river bank



Plate 4: Colonization of Saccharum grass on river bank

7.44 2344 Jodhe Bans (35)

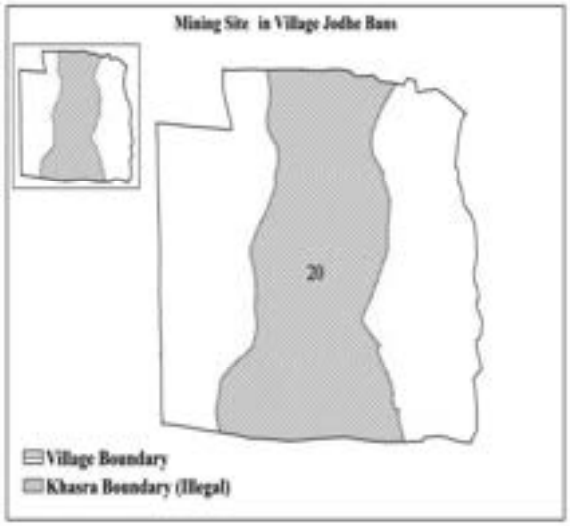
1.	**Mining Cluster**	:	1: Yamuna river bed
2.	**Panchayat**	:	Nunyari
3.	**Thana**	:	Chilkana
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°10'10.1" Longitude (X):77°28'33" Elevation (m): 267



Mining site: Jodhe Bans

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	20
10.	**Area under illegal mining(ha)**	:	102.42

Revenue Map



11.	**Distance of mine site from the road**	:	6 km from Chilkana - Gandevad Road

2345

12.	**Past land use of the mine site**	:	Agriculture (Agricultural land submerged) into river bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	600
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits and heaps of RBM in river bed
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp. grass in riverbed
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land (if any) near mining site**	:	Yes, adjacent to mining area
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize, Groundnut, Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to floodplain and riparian ecosystem
24.	**Any other observation**	:	Whole area is under mining and requires engineering measures for rehabilitation
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	9
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species :**	:	No possibility on riverbed.

2346

35. Jodhe Bans

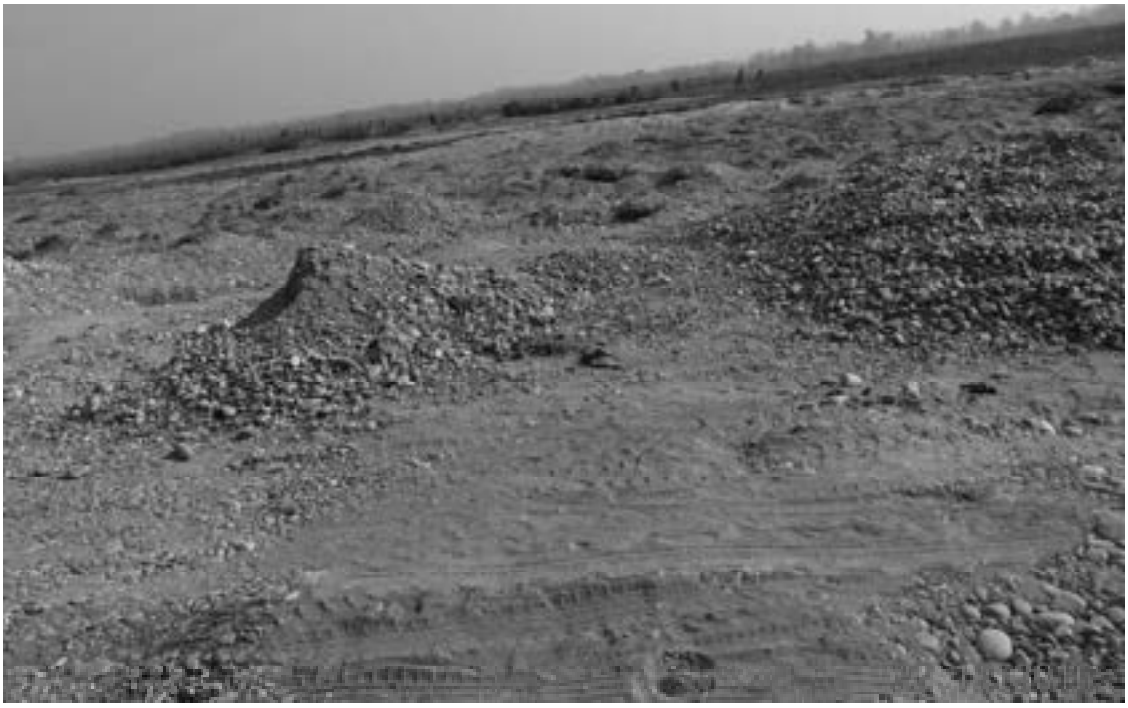


Plate 1: Heaps of RBMin river bed



Plate 2: Heaps and pitsin river bed

2347



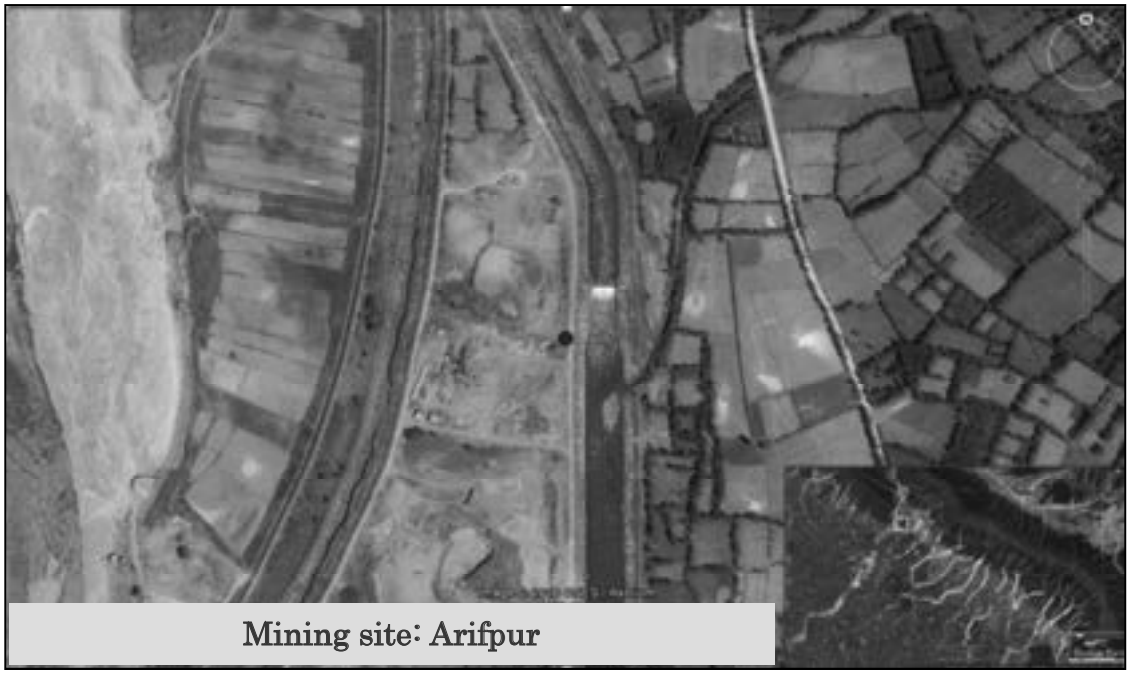
Plate 3: Agriculture land damaged due to river bank cutting



Plate 4: Agriculture land damaged due to river bank cutting

2348 7.45 Arifpur (36)

1.	**Mining cluster**	:	5: Away from river bed and bank
2.	**Panchayat**	:	Faizabad
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):38°18'29.4" Longitude (X):77°35'31" Elevation (m): 321



Mining site: Arifpur

6.	**Lease no. near illegal mining site(if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	1
10.	**Area under illegal mining(ha)**	:	102.42

Revenue Map



11.	**Distance of mine site from the road**	:	15 km from Raipur -Hathnikund Barrage Road

2349

12.	**Past land use of the mine site**	:	Agriculture
13.	**Present land use of mine site**	:	Abandoned mined out area
14.	**The location of mining site**	:	Private agricultural land
15.	**Approximate width of river bed at present on the mine site (m)**	:	NA (The site is away from river Yamuna and tributaries)
16.	**Land ownership**	:	Private land
17.	**Sign of mining**	:	Deep mining pits and heap of excavated material
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Wendlandia exserta, Acacia catechu, Lantana camara*
20.	**Dominant local species around the mining site**	:	*Acacia catechu*
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, adjacent to mining area
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize, Poplar and Eucalyptus plantation.
23.	**Significant damage, if any**	:	Loss of agriculture land
24.	**Any others observation**	:	Agriculture is being practiced in abandoned mined sites at certain places.
25.	**Bank erosion due to mining, if any**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)		-
	Spurs (no.)		-
	Embankment/Protection wall (m)		-
27.	**Area available for biological measures(ha)**	:	1.58

28. **Suggested species :**
Dalbergia sissoo , Acacia catechu , Acacia nilotica, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Butea monosperma, Bauhinia variegata , Ficus semicordata, Embllica officinalis, ,Ehretia laevis , Trema politoria,Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Arundo donax,Pennisetum purpureum

2350

36. Arifpur



Plate 1: Deep pit formed due to mining



Plate 2: Area need to be restored

2351

7.46 Fatehpur (37)

1.	**Mining cluster**	:	5: Away from river bed and bank
2.	**Panchayat**	:	Fathepur
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°18'26.7" Longitude (X):77°35'30.8" Elevation (m): 321



Mining site: Fatehpur

6.	**Lease no. near illegal mining site(if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	252/20/1, 252/20/24, 252/23/10
10.	**Area under illegal mining(ha)**	:	17.2

Revenue Map



11.	**Distance of mine site from the road**	:	13 km from Raipur -Hathnikund Barrage road
12.	**Past land use of the mine site**	:	Agriculture
13.	**Present land use of mine site**	:	Abandoned mined area

2352

14.	**The location of mining site**	:	Agricultural land
15.	**Approximate width of river bed at present on the mine site (m)**	:	NA (The site is away from river Yamuna and tributaries)
16.	**Land ownership**	:	Gram Samaj, Private
17.	**Sign of mining**	:	Deep pits of mining numerous heaps of boulders forming undulating landscape.
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Calotropis procera, Trema politoria, Dalbergia sissoo*
20.	**Dominant local species around the mining site**	:	*Dalbergia sissoo*
21.	**Agriculture land adjoining the mining site (if any)**	:	Yes, in past, mining was done in agricultural land
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize, Mustard and plantation of Poplar, Eucalyptus in private lands
23.	**Significant damage, if any**	:	Loss of agriculture land
24.	**Any others observation**	:	Mining in private land, a stone crusher on SW end
25.	**Bank erosion due to mining, if any**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	-
	Embankment/Protection wall (m)	:	-
27.	**Area available for biological measures(ha)**	:	6.0

28. **Suggested species:**

Dalbergia sissoo, Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Salix tetrasperma, Butea monosperma, Bauhinia variegata , Ficus semicordata, Holarrhena pubescens,Trewia nudiflora , Embllica officinalis, Ehretia laevis , Trema politoria,Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Calotropis procera, Mimosa himalayana, Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Imperata cylindrica, Eriophorum comosum, Phragmites karka, Typha species, Arundo donax,Pennisetum purpureum

~~2353~~

37. Fatehpur



Plate 1: Extensive excavation of RBM at mining site



Plate 2: Pits and heaps formed due to mining



Plate 3: Area need to be restored

7.47 Kheri Ahtmal (38) 2354

1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Kheri Ahtmal
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'59.7" Longitude (X):77°34'44.4" Elevation (m): 318



Mining site: Kheri Ahtmal

6.	**Lease no. near illegal mining site(if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	115/4/3
10.	**Area under illegal mining(ha)**	:	10.32

Revenue Map



11.	**Distance of mine site from the road**	:	100 m from Raipur-Bahet road
12.	**Past land use of the mine site**	:	River Bed
13.	**Present land use of mine site**	:	River Bed

2355

14.	**The location of mining site**	:	River Bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	80
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Piled up stacks pf boulders on right bank near the mining sides but source of excavation not known
18.	**Occurence of forest (if any) near the mining site**	:	Yes, towards east side, adjacent to the mining site.
19.	**Regeneration of species (if any) in the mined site**	:	*Lantana camara, Saccharum*spp., *Acacia catechu*
20.	**Dominant local species around the mining site**	:	*Acacia catechu*
21.	**Agriculture land (if any) near mining site**	:	Yes, towards right bank tributary(Budhi Yamuna)
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize, Mustard and Eucalyptus-Poplar plantation in private lands
23.	**Significant damage, if any**	:	Damage to surrounding habitat and agriculture land
24.	**Any other observation**	:	Adjoining to this site, minor mineral mining was also seen in farmers land at about 200m distance towards west of the tributary
25.	**Bank erosion due to mining**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	-
	Embankment/Protection wall (m)	:	-
27.	**Area available for biological measures(ha)**	:	2.17

28. **Suggested species :**

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, Ziziphus mauritiana, Bombax ceiba, Pongamia pinnata, Butea monosperma, Bauhinia variegata , Embllica officinalis, Trema politoria,Wendlandia exserta,Dendrocalamus strictus, Woodfordia fruticosa, Carissa opaca,, Tamarix dioica, Vitex negundo, Ziziphus nummularia, Saccharum spontaneum, Saccharum munja, Arundo donax,Pennisetum purpureum

2356

38. KheriAhtmal



Plate 1: View of mining site

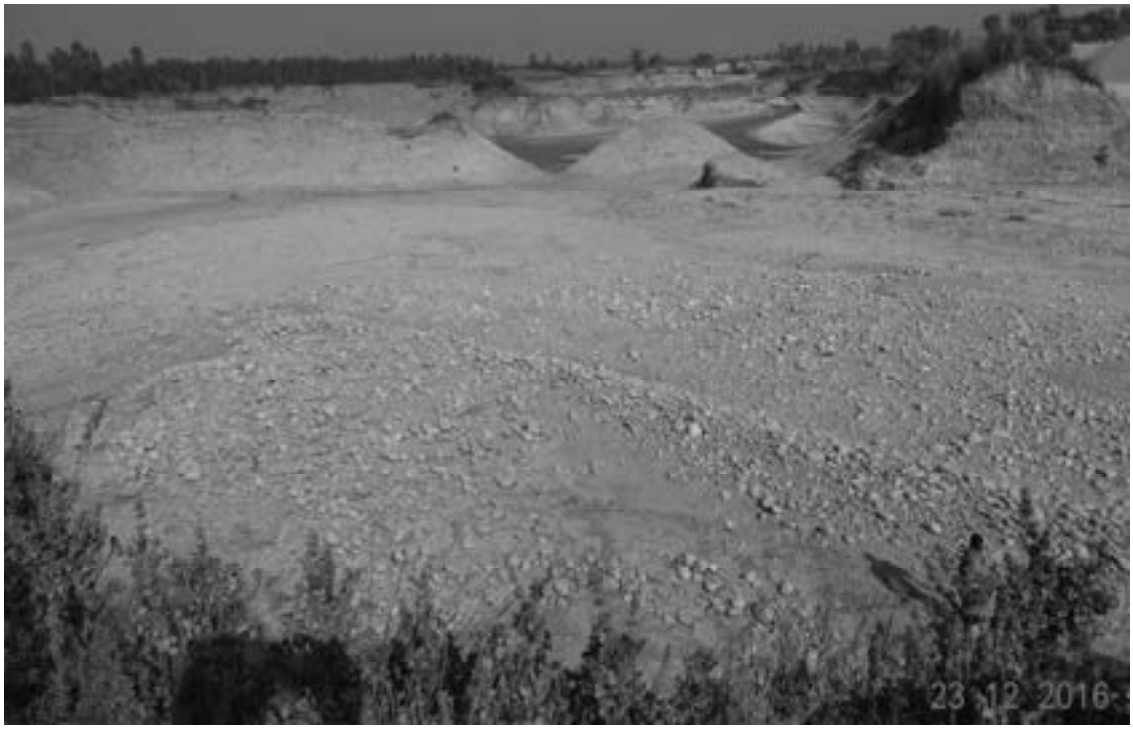


Plate2: Mining in private land near to mining site at KheriAhtmal

2357 7.48 Matka (39)

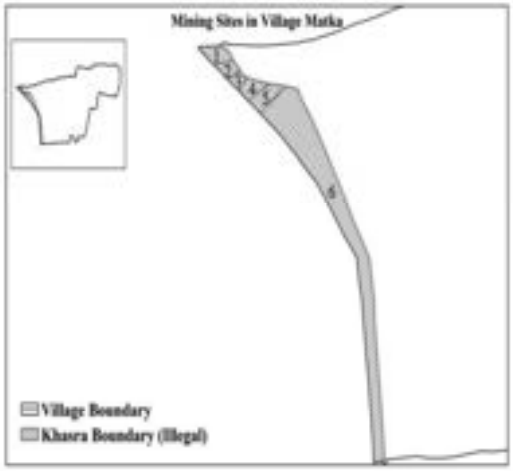
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Naushera Tarpur
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°16'28.2" Longitude (X):77°34'59.9" Elevation (m): 317



Mining site: Matka

6.	**Lease no. near illegal mining site(if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	115/4/3
10.	**Area under illegal mining(ha)**	:	10.32

Revenue Map



11.	**Distance of mine site from the road**	:	100 m from Raipur Bahet Road
12.	**Past land use of the mine site**	:	Seasonal tributary
13.	**Present land use of mine site**	:	Canal has also been constructed

2358

			in this site
14.	**The location of mining site**	:	-
15.	**Approximate width of river bed at present on the mine site (m)**	:	Canal Constructed
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits were noticed adjoining Matka. The ownership of the mined land not known
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp., *Lantana camara, Calotropis procera, Dalbergia sissoo*
20.	**Dominant local species around the mining site**	:	*Adina cordifolia, Adhatoda vasica, Mallotus philippensis, Mytragyna parviflora, Ipomea carnea*
21.	**Agriculture land (if any) near mining site**	:	Yes, on both side of canal
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize and Eucalyptus and Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to surrounding habitat
24.	**Any other observation**	:	Agriculture on left and right bank; on the left side plantation of Eucalyptus and crop cultivation
25.	**Bank erosion due to mining**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	-
	Embankment/Protection wall (m)	:	-
27.	**Area available for biological measures(ha)**	:	No scope
28.	**Suggested species:**		No possibility of plantation

2359

39. Matka



Plate1: View of mining site along with canal



Plate2: Scrub vegetation at the mining site

2360

7.49 Akbarpur Bans Mustkam (40)

1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Akbarpur Bans
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y):30°15'52.6" Longitude (X):77°34'30.5" Elevation (m):309



Mining site: Akbarpur Bans Mustakam

6.	**Lease no. near illegal mining site(if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	120, 121, 122, 136, 147, 129, 130, 137
10.	**Area under illegal mining(ha)**	:	6.4

Revenue Map



11.	**Distance of mine site from the road**	:	1.5 km from Raipur - Bahet road
12.	**Past land use of the mine site**	:	River Bed

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13.	**Present land use of mine site**	:	River Bed
14.	**The location of mining site**	:	River Bed
15.	**Approximate width of river bed at present at the mine site (m)**	:	20 m
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Excavation of mining material noticed
18.	**Occurence of forest (if any) near the mining site**	:	Yes, towards eastern side adjacent of river bed.
19.	**Regeneration of species (if any) in the mined site**	:	*Acacia catechu, Lantana camara, Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Acacia catechu*
21.	**Agriculture land (if any) near mining site**	:	Yes, towards western side
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize and Eucalyptus and Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to surrounding habitat
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	-
	Embankment/Protection wall (m)	:	-
27.	**Area available for biological measures(ha)**	:	0.23
28.	**Suggested species:**		

Dalbergia sissoo , Acacia catechu , Acacia nilotica, Syzygium cumini, Azadiracta indica, , Ziziphus mauritiana, Terminalia arjuna, Bombax ceiba, Pongamia pinnata , Butea monosperma, Bauhinia variegata , Embllica officinalis, Trema politoria, Wendlandia exserta, Dendrocalamus strictus, Woodfordia fruticosa, Vitex negundo, Ziziphus nummularia, Grass: *Saccharum spontaneum, Saccharum munja, Vetiveria zizanioides, Arundo donax, Pennisetum purpureum*

2362

40. Akbarpur Bans Mustakam



Plate 1: Mining near river bank at Akbarpur Bans Mustakam



Plate 2: Area to be restored

2363

7.50 Syed Mohammadpur (41)

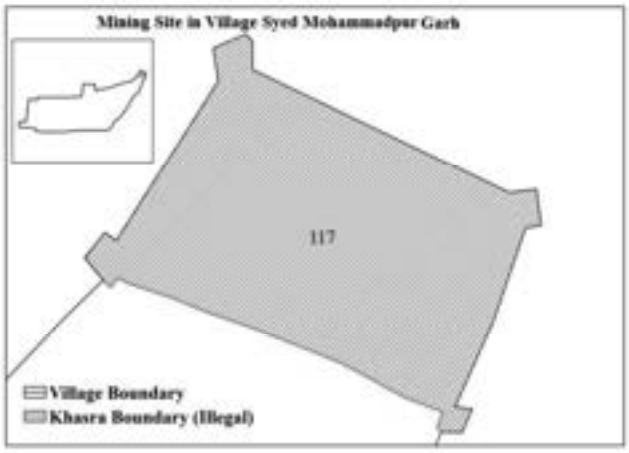
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Syed Mohammadpur Garh
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y): 30°14'57.6"
		:	Longitude (X):77°33'44.8"
		:	Elevation(m): 294



Mining site: Syed Mohammadpur

6.	**Lease no. of nearby illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	117/3
10.	**Area under illegal mining(ha)**	:	0.41

Revenue Map



2364

11.	**Distance of mine site from the road**	:	2.5 km from Raipur Bahet road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	30 m
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	No sign of mining at present
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land (if any) near illegal mining site**	:	Yes, on both sides of river bed
22.	**Main crops cultivated in the area**	:	Wheat, Maize, Sugarcane and Eucalyptus, Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to surrounding habitat
24.	**Any other observation**	:	Nil
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	5
	Spurs (no.)	:	9
	Embankment/Protection wall (m)	:	50
27.	**Area available for biological measures(ha)**	:	No Scope
28.	**Suggested species**	:	No possibility of plantation

2365

41. Syed Mohmmadpur



Plate 1: View of Syed Mohmmadpurmining site



Plate 2: View of natural stabilizing of the bank erosion

2366

7.51 Murtazapur Saur (42)

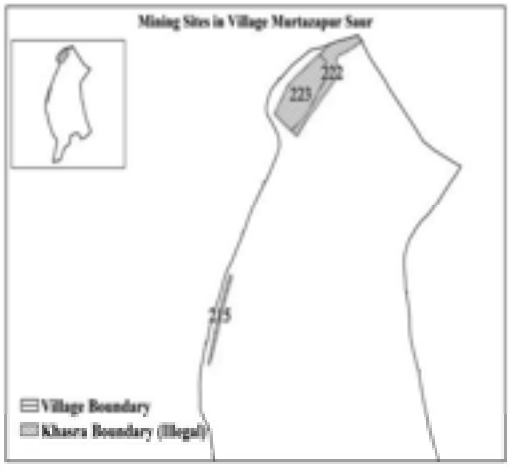
1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Raipur
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y): 30°15'01.6"
		:	Longitude (X):77°33'45.7"
		:	Elevation(m): 297



Mining site: Murtazapur Saur

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	215, 222, 223
10.	**Area under illegal mining(ha)**	:	16.86

Revenue Map



11.	**Distance of mine site from the road**	:	11 km from Saharanpur - Chakrata road
12.	**Past land use of the mine site**	:	River bed as well as agricultural land converted into river bed

2367

13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	No sign of mining
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Mining pits noticed
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Wenlandia exserta, Ipomea carnea,Lantana camara, Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land (if any) near illegal mining site**	:	Yes, on east side of riverbed
22.	**Main crops cultivated in the area**	:	Wheat, Maize and Eucalyptus and poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to surrounding habitat
24.	**Any other observations**	:	Deep mining pit in farmer land adjacent to the site was also seen
25.	**Bank erosion due to mining**	:	No
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	-
	Spurs (no.)	:	-
	Embankment/Protection wall (m)	:	-
27.	**Area available for biological measures(ha)**	:	No Scope
28.	**Suggested species :**	:	No possibility of plantation

2368

42. Murtazapur Saur



Plate 1: View of mining site



Plate 2: Deep pit near the mining site

2369

7.52 Allauddinpur (43)

1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Allaudinpur
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y): 30°15'18.1"
		:	Longitude (X): 77°33'53.4"
		:	Elevation(m): 297



Mining site: Allauddinpur

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	14/2,16 mj,17m j,18mj
10.	**Area under illegal mining(ha)**	:	0.543

Revenue Map



11.	**Distance of mine site from the road**	:	Raipur- Bahet- Chakrata road
12.	**Past land use of the mine site**	:	River bed

2370

13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at present on the mine site (m)**	:	25
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Recently mined material used for bund formation
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Saccharum*spp.
21.	**Agriculture land (if any) near illegal mining site**	:	Yes, on both side of river bank
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane, Maize and Eucalyptus and Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to surrounding habitat
24.	**Any other observations**	:	Nil
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Yes
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	14
	Embankment/Protection wall (m)	:	250
27.	**Area available for biological measures(ha)**	:	No Scope
28.	**Suggested species**	:	No possibility of plantation

2371

43. Allauddinpur



Plate 1: Material dug out for bund formation



Plate 2: River bank cutting at the mining site

2372

7.53 Mahmoodpur Nagli (44. Budhi Yamuna)

1.	**Mining cluster**	:	3: Yamuna tributary
2.	**Panchayat**	:	Mahmoodpur Nagli
3.	**Thana**	:	Mirzapur Pole
4.	**Tehsil**	:	Behat
5.	**GPS Coordinates**	:	Latitude (Y): 30°15'12.8"
		:	Longitude (X): 77°33'45.7"
		:	Elevation(m): 294



Mining site: Mahmoodpur Nagli (Budhi Yamuna)

6.	**Lease no. near the illegal mining site (if any)**	:	No
7.	**Khasra nos. of the lease area**	:	No
8.	**Area under lease (ha)**	:	No
9.	**Khasra nos. of illegal mining**	:	80,81,82,83
10.	**Area under illegal mining(ha)**	:	1.65
11.	**Distance of mine site from the road**	:	2 km from Raipur -Bahet-Chakrata Road
12.	**Past land use of the mine site**	:	River bed
13.	**Present land use of mine site**	:	River bed
14.	**The location of mining site**	:	River bed
15.	**Approximate width of river bed at**	:	30

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	present on the mine site (m)		
16.	**Land ownership**	:	Gram Samaj
17.	**Sign of mining**	:	Deep pits noticed
18.	**Occurence of forest (if any) near the mining site**	:	No
19.	**Regeneration of species (if any) in the mined site**	:	*Saccharum*spp.
20.	**Dominant local species around the mining site**	:	*Acacia nilotica, Saccharum*spp.
21.	**Agriculture land (if any) near illegal mining site**	:	Yes, adjoining of mined area
22.	**Main crops cultivated in the area**	:	Wheat, Sugarcane and Eucalyptus-Poplar plantation in private land
23.	**Significant damage, if any**	:	Damage to surrounding habitat
24.	**Any other observations**	:	Nil
25.	**Bank erosion due to mining**	:	Yes
26.	**Suggested engineering measures**	:	Not required
	Gabion check dams (no.)	:	_
	Spurs (no.)	:	_
	Embankment/Protection wall (m)	:	_
27.	**Area available for biological measures(ha)**	:	No Scope
28.	**Suggested species:**	:	No possibility of plantation

44. MahmoodpurNagali



Plate 1: River bank cutting near to MahmoodpurNagali mining site



Plate 2: View extensive mining at MahmoodpurNagali mining site

Annexure 1

प्रेषक,

जिलाधिकारी,
सहारनपुर।

सेवा में,

प्रमुख सचिव,
भूतत्व एंव खनिकर्म,
उत्तर प्रदेश शासन,
लखनऊ।

संख्याः–911 /खनिज

दिनांकः 2 जुलाई,2012

विषयः– मा0 उच्चतम न्यायालय के आदेश दिनांक 16–01–2012 के अनुपालन में जिला सहारनपुर में जब्त किये गये उप खनिजों की सार्वजनिक नीलामी के सम्बन्ध में।

महोदय,

कृपया उपरोक्त विषयक के सम्बन्ध में अवगत कराना है कि मा0 उच्चतम न्यायालय के आदेश दिनांक 16–01–2012 के अनुपालन में जब्त उप खनिजों की सार्वजनिक नीलामी किये जाने हेतु इस कार्यालय के विज्ञप्ति संख्या 815/खनिज दिनांक 29 मई, 2012 द्वारा प्रकाशित की गयी है, जिसमें नीलामी की तिथि 02 जुलाई, 2012 को नियत थी। उक्त विज्ञप्ति के विरूद्ध मा0 उच्च न्यायालय इलाहाबाद तथा खण्डपीठ लखनऊ में रिट याचिका संख्या 4773/2012 मैक्सवेल ट्रेडिंग कम्पनी बनाम उत्तर प्रदेश राज्य व अन्य में पारित आदेश दिनांक 14–06–2012, रिट याचिका संख्या 5028/2012 घाड मिनरलस इण्डस्ट्रीज बनाम उत्तर प्रदेश राज्य में पारित आदेश दिनांक 21–06–2012,रिट याचिका संख्या–5068/2012, मार्कण्डेय स्टोन केशर बनाम उत्तर प्रदेश राज्य व अन्य में पारित आदेश दिनांक 22–06–2012, व अन्य दायर रिट याचिकाओं में याची द्वारा मा0 उच्च न्यायालय के पारित आदेश की प्रति प्राप्त न होने के कारण शपथ पत्र प्रस्तुत कर अवगत कराया है कि मा0 उच्च न्यायालय द्वारा के द्वारा यह निर्देश दिये गये है कि याची अपना प्रत्यावेदन जिलाधिकारी के समक्ष प्रस्तुत करे। जिलाधिकारी द्वारा प्रत्यावेदन का निस्तारण न होने तक याचीगण के जब्त उप खनिज को नीलाम से मुक्त रखा जाये। तदानुसार 15 स्टोन केशर/भण्डारण स्थल को छोडते हुए जब्त उप खनिजों का भौतिक सत्यापन में कुल अवैध उप खनिज 39,61,728 घनमीटर जिसका मूल्यांकन 101,46,82,878 रूपये था, इसमें से मा0 उच्च न्यायालय/मा0 उच्चतम न्यायालय के आदेश से उपरोक्त खनिज की कुल मात्रा 2,50,967 घनमीटर जिसका कुल मूल्यांकन 6,18,12,294 रूपये होता है, को घटाने पर अवशेष मात्रा 37,40,761 घनमीटर नीलामी धनराशि रूपये 95,28,70,584 निर्धारित कर आज दिनांक 02–07–2012 को जिसमें निदेशक, भूतत्व एंव खनिकर्म, लखनऊ व आयुक्त, सहारनपुर मण्डल,सहारनपुर द्वारा प्रयवेक्षक के रूप में नामित नगर आयुक्त, सहारनपुर एवं नामित कमेटी के सदस्यों की उपस्थिति में नीलामी की कार्यवाही सम्पन्न की गयी। नीलामी में 1– अपर माईन्स मैनेजमेन्ट सर्विसिज प्राइवेट लि0,निदेशक सौरभ मुकुन्द निवासी 2बी/2345 साऊथ सिटी शिवाजी नगर,सहारनपुर। 2–सेण्ड एण्ड स्टोन 13 प्राइवेट लि0,

(2)

डी–37 अयोध्या मार्ग हनुमान नगर जयपुर (राजस्थान) 3–श्री अशोक चाण्डक पुत्र श्री मदनलाल चाण्डक 203 जी ब्लाक, श्री गंगानगर राजस्थान। 4–शिवा एसोसिएट्स,3बी 23 जवाहरनगर श्री गंगानगर, राजस्थान प्रोपराईटर का नामः– श्री सन्दीप चाण्डक पुत्र श्री मदनलाल चाण्डक 203जी ब्लाक श्री गंगानगर राजस्थान। द्वारा प्रतिभाग किया गया, जिसमें अधिकतम बोली सेण्ड एण्ड स्टोन 13 प्राइवेट लि0,डी–37 अयोध्या मार्ग हनुमान नगर जयपुर (राजस्थान) के द्वारा रूपये 95,62,13,000 (पिचानवे करोड बासठ लाख तेरह हजार) की लगाई गयी। इस प्रकार नीलामी सेण्ड एण्ड स्टोन 13 प्राइवेट लि0,डी–37 अयोध्या मार्ग हनुमान नगर जयपुर (राजस्थान) के पक्ष में छोडी गयी।

अतः सूचनार्थ सादर प्रेषित।

भवदीय,

02/07/12

(अजय कुमार सिंह)
जिलाधिकारी,
सहारनपुर।

प्रतिलिपिः– आयुक्त,सहारनपुर मण्डल,सहारनपुर को सादर प्रेषित।

02/07/12

जिलाधिकारी,
सहारनपुर।

Annexure 2

प्रेषक,

जिलाधिकारी
सहारनपुर

सेवा में,

श्री डी0 पी0 सिन्हा
अध्यक्ष सब कमेटी, एडीशनल पी0 सी0 सी0 एफ0
पर्यावरण एवं जलवायु परिवर्तन मंत्रालय, क्षेत्रीय कार्यालय (मध्य),
केन्द्रीय भवन पंचम तल, सेक्टर –एच
अलीगंज, लखनऊ

पत्र सं0–334 / खनिज /2016–2017 दिनांक:–2.5.04 .2016

विषय– जनपद सहारनपुर में अवैध खनन से पर्यावरणीय क्षति के आंकलन के संबंध में।

महोदय,

कृपया उपर्युक्त विषयक ओ0ए0 नं0–184/2013 गुरप्रीत सिंह बग्गा बनाम उ0प्र0 सरकार व अन्य में पारित मा0 एन0जी0टी0 के आदेश दिनांक 18.02.2016 के कम में गठित हाई पावर कमेटी की बैठक दिनांक 18.04.2016 में दिये गये निर्देशों के अनुपालन में उ0प्र0 राज्य हेतु गठित सब कमेटी द्वारा जनपद सहारनपुर में अवैध खनन से पर्यावरणीय क्षति का आंकलन किया जाना है। उक्त के कम में अपने पत्र सं0–XXI/ENV/NGT/CC/26/2016/10 दिनांक 19.04.2016 जो प्रमुख सचिव, भूतत्व एवं खनिकर्म विभाग,उत्तर प्रदेश शासन, लखनऊ को सम्बोधित है, जिसकी प्रतिलिपि अधोहस्ताक्षरी को की गयी है, का सन्दर्भ ग्रहण करने का कष्ट करें, जिसके द्वारा जनपद सहारनपुर में पूर्व में पाये गये अवैध खनन के क्षेत्रों का विवरण मांगा गया है। इन अवैध खनन के क्षेत्रों तथा खनन पट्टा क्षेत्रों को दर्शाते हुये मानचित्र तीन दिवस के अन्दर उपलब्ध कराया जानां अपेक्षित है।

उक्त के परिपेक्ष्य में सादर अवगत कराना है कि उपरोक्त निर्देश के कम में जनपद सहारनपुर में पूर्व में पाये गये अवैध खनन के क्षेत्रों तथा खनन पट्टा क्षेत्रों को मानचित्र पर दर्शा दियां गया है। जिनका विवरण निम्न प्रकार है।

जनपद सहारनपुर में पूर्व में किये गये अवैध खनन ग्रामों की सूची

क्रम सं0	तहसील	ग्राम	काम्प्रीहेन्सिव माइनिंग प्लान में प्रस्तावित जोन
1.	बेहट	शेरपुर पैली	
2.	बेहट	रहना	
3.	बेहट	जयन्तीपुर अहतमाल	C3
4.	बेहट	गणेशपुर	C3
5.	बेहट	नौरंगपुर	C1
6.	बेहट	अकबरपुर बांस अ0	A
7.	बेहट	छज्जा अ0	A
8.	बेहट	अलाउद्दीनपुर बास	A
9.	बेहट	मायापुर रूपपुर	
10.	बेहट	बादशाहपुर	C3
11.	बेहट	रसूलपुर उर्फ रसूली	A
12.	बेहट	नुनियारी अहतमाल	A
13.	बेहट	असलमपुर बरथा	A
14.	बेहट	फैजाबाद	
15.	बेहट	थापुल इस्माइलपुर	C3
16.	बेहट	फतेहपुर पैली	
17.	बेहट	गढ़ती अहतमाल व गढ़ती	A

		मुस्तकम	
18.	बेहट	कालूवाला जहानपुर	C2
19.	बेहट	टटोहल	A
20.	बेहट	अब्दुल्लापुर	C2
21.	बेहट	खुशहालीपुर	C3
22.	बेहट	अलीअकबरपुर	C1
23.	बेहट	शाहपुर बास	A
24.	बेहट	महमूदपुर नगली	A
25.	बेहट	अराजी जेवड़ी	A
26.	बेहट	मसूदपुर गढ़	A
27.	बेहट	नित्यानंदपुर	A
28.	बेहट	सैदमोहम्मदपुरगढ़	A
29.	बेहट	शहजादपुर बास	C2
30.	बेहट	अबुतालिबपुरगढ़	A
31.	बेहट	बरथा कोरसी	A
32.	बेहट	आलमगीरपुर	A
33.	बेहट	प्रतापपुर	A
34.	बेहट	खौखरा	A
35.	बेहट	जोधेबास	A
36.	बेहट	आरिफपुर	A
37.	बेहट	फतेहपुर	
38.	बेहट	खेड़ी अ0	A
39.	बेहट	गटका	A
40.	बेहट	अकबरपुर बास मु	A
41.	बेहट	सैद मोहम्मदपुर	A
42.	बेहट	मुर्तजापुर	A
43.	बेहट	असाउद्दीनपुर	A
44.	बेहट	महमूदपुर नगली	A

अतः जनपद सहारनपुर में पूर्व में पाये गये अवैध खनन के क्षेत्रों तथा खनन पट्टा क्षेत्रों को दर्शाये गये मानचित्र के अनुसार अवैध खनन से पर्यावरणीय क्षति का आंकलन किये जाने हेतु प्रस्तावित है।

भवदीय

(पवनी कुमार)
जिलाधिकारी
सहारनपुर

Annexure 3

जनपद सहारनपुर में खनिज पट्टा क्षेत्रों का विवरण

क्र0 सं0	लॉट संख्या	पट्टेधारक का नाम व पता	खनिज	क्षेत्र का विवरण			पर्यावरण स्वच्छता प्रमाण पत्र की स्थिति	क्षमता (TPA)	अभियुक्ति
				ग्राम	गाटा संख्या	क्षेत्रफल (एकड़)			
1	2	3	4	5	6	7	9	10	11
1	01	श्री महमूद अली व दिलशाद, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	शेरपुर पैली	खo नo–430,431,428,429,434,405 ,406/1, 404/1, 403	19.00	I-11015/ 124/2010-1A.ii(m) दिनांक 26.10.12	45,000	–
2	04	–तदैव–	मिश्रित बालू बजरी,बोल्डर	रहना	खo नo–1म, 6म, 7म, 8म	25.50	I-11015/ 123/2010-1A.ii(m) दिनांक 26.10.12	1,08000	–
3	05	–तदैव–	मिश्रित बालू बजरी,बोल्डर	रहना	खo नo–1म, 10म	25.50	I-11015/ 100/2010-1A.ii(m) दिनांक 26.10.12	90,000	–
4	12	मो0 इमाम व महबूब आलम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	गणेशपुर	खo नo–101/1, 101–1/1	16.92	I-11015/ 119/2010-1A.ii(m) दिनांक 26.10.12	45,000	–
5	13	मो0 इमाम व महबूब आलम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	नौरंगपुर	खo नo–494/3, 495/1	31.00	I-11015/ 106/2010-1A.ii(m) दिनांक 09.4.2012	54,000	–
6	17	श्री अमित जैन व नसीम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	अकबरपुर बांस	खo नo–1	56.00	I-11015/ 105/2010-1A.ii(m) दिनांक 25.10.2012	81,000	–
7	18	मो0 इमाम व महबूब आलम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	छज्जा अहतमाल	खo नo–1 /1	26.00	I-11015/ 116/2010-1A.ii(m) दिनांक 25.10.2012	54,000	–
8	21	श्री अमित जैन व नसीम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	अलाउद्दीनपुर बांस	खo नo–1	49.00	I-11015/ 113/2010-1A.ii(m) दिनांक 26.10.2012	72,000	–

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9	27	श्री अनिल जैन व नसीम, निवासीगण निर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	गाजापुर रूपपुर	खo नo–42म,43म,44म,55म, 85/1म, 85/2म, 82,81म,56म,89म,86म, 87,83म, 84म,264,265,266म,258म,257म, 268म, 267म, 269म, 271म, 274म, 275म, 276, 277/1म, 279म, 278म,	36.72	j-11015/ 101/2010-1A.ii(m) दिनांक 25.10.2012	1,17,000	–
10	29	श्री विकास अग्रवाल व वाजिद अली, निवासीगण निर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	बादशाहपुर	खo नo–2/1म, 2/2, 3, 4/4/1म, 4/4/2, 6म, 7म, 8/1म, 9/2, 17, 18, 19म, 20म, 21म, 23म, 24,25, 26,27,28म, 30म, 32म, 57म, 59म, 62/3, 62/2	33.00	j-11015/ 107/2010-1A.ii(m) दिनांक रहित	72,000	–
11	38	श्री महमूद अली, पुनीत जैन व मुकेश जैन, निवासीगण निर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	रसूलपुर उर्फ रसूला	खo नo–1 म	36.00	j-11015/ 110/2010-1A.ii(m) दिनांक 9.4.2012	1,08,000	–
12	37	–तदैव–	मिश्रित बालू बजरी,बोल्डर	नुनियारी अहतमाल	खo नo–1/1/1	60.00	j-11015/ 108/2010-1A.ii(m) दिनांक 25.10.2012	90,000	–
13	40	श्री महमूद अली, पुनीत जैन व मुकेश जैन, निवासीगण निर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	असलमपुर बरथा	खo नo–1म	90.60	j-11015/ 111/2010-1A.ii(m) दिनांक 18.10.2012	1,08,000	–
14	24	श्री अनिल जैन व नसीम, निवासीगण निर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	उजरौंदीपुर अहतमाल	खo नo–5म, 221	19.00	j-11015/104/2010-1a.ii(m) दिनांक 12.08.2014	45,000	–
15	34	श्री विकास अग्रवाल व वाजिद अली, निवासीगण निर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	कालूवाला पहाड़ीपुर	खo नo– 92/93/1, 94, 116/1, 117/1, 118/1, 119/1, 120/1, 192/1	46.32	j-11015/128/2010-1a.ii(m) दिनांक 06.03.2014	90,000	–
16	39	श्री विकास अग्रवाल व वाजिद अली, निवासीगण निर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	टटीहल	खo नo–32,33,34,35,44,46,47,48,49,50,51,52,53,54,56,57,58	23.00	j-11015/120/2010-1a.ii(m) दिनांक 07.05.2014	54,000	–
17	03	श्री महमूद अली व दिलशाद, निवासीगण निर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी,बोल्डर	रहना	खo नo–03	19.00	पर्या एवं पर्यावरण मंत्रालय भारत सरकार की अधिसूचना संख्या–2006 की धारा–06 में दी गई व्यवस्था के आधार पर	1,26,000	
18	06	–तदैव–	मिश्रित बालू	फैजाबाद	खo नo–19म, 20म, 26म, 27म, 28म,	30.60	पर्या एवं पर्यावरण मंत्रालय भारत सरकार की	1,26,000	

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			बजरी,बोल्डर		41म, 29म		नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर		
19	07	–तदैव–	मिश्रित बालू, बजरी,बोल्डर	फैजाबाद	खo नo–696म	6.00 2.4281	वन एवं पर्यावरण मंत्रालय भारत सरकार की नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर	1,20,000	
20	06	–तदैव–	मिश्रित बालू, बजरी,बोल्डर	फैजाबाद	खo नo–820म, 819, 823, 822, 829, 849, 850, 851, 847,	17.00 6 87946	वन एवं पर्यावरण मंत्रालय भारत सरकार की नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर	90,000	
21	10	मो0 इनाम व महबूब आलम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू, बजरी,बोल्डर	धनपुल इस्माईलपुर	खo नo–1504ट	30.00 12.1406	वन एवं पर्यावरण मंत्रालय भारत सरकार की नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर	45,000	
22	11	मो0 इनाम व महबूब आलम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू, बजरी, बोल्डर	धनपुल इस्माईलपुर	खo नo–333क	17.30 7.881042	वन एवं पर्यावरण मंत्रालय भारत सरकार की नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर	45,000	
23	15	मो0 इनाम व महबूब आलम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू, बजरी, बोल्डर	फतेहपुर पैली	खo नo–354, 362, 361म, 363म,	15.44 6 24853	वन एवं पर्यावरण मंत्रालय भारत सरकार की नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर	54,000	
24	16	मो0 इनाम व महबूब आलम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू, बजरी, बोल्डर	फतेहपुर पैली	खo नo–363, 367, 368	12.35 4.997877	वन एवं पर्यावरण मंत्रालय भारत सरकार की नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर	1,20,000	
25	20	श्री अमित जैन व नसीम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू, बजरी, बोल्डर	भड़ती अहतमाल	खo नo–1/1म,	30.60 12.38218	वन एवं पर्यावरण मंत्रालय भारत सरकार की नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर	72,000	
26	22	श्री अमित जैन व नसीम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू, बजरी, बोल्डर	जयन्तीपुर अहतमाल	खo नo–14, 15, 16, 18, 19, 20, 21, 22,	9.88 3.99827	वन एवं पर्यावरण मंत्रालय भारत सरकार की नोटिफिकेशन संख्या–2006 की धारा–08 में दी गई व्यवस्था के आधार पर	1,20,000	
27	23	श्री अमित जैन व नसीम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू, बजरी, बोल्डर	जयन्तीपुर अहतमाल	खo नo–1, 2, 3, 4, 5म	9.88	वन एवं पर्यावरण मंत्रालय भारत सरकार की	1,20,000	

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							नोटिफिकेशन संख्या–2006 के सलाह–08 में दी गई व्यवस्था के आधार पर		
28	26	–तदैव–	मिश्रित बालू बजरी,बोल्डर	मायापुर रुपपुर	खा0नं0–14/1म, 14/2म, 14/3म, 31/1म, 37/2/1म, 49म, 51म, 50/2म, 53म, 30म, 70म, 71म,	23.00 P 30777	वन एवं पर्यावरण मंत्रालय भारत सरकार के नोटिफिकेशन संख्या–2006 के सलाह–08 में दी गई व्यवस्था के आधार पर	1,08,000	
29	9	श्री महमूद अली व दिलशाद, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी, बोल्डर	थापल ढकाईलपुर	खा0नं0– 1691द,	17.00 6.87966	J-11015/126/2010-1A.II(M) दिनांक 09.11.2011	45,000	
30	25	श्री अमित जैन व नसीम, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी, बोल्डर	अब्दुल्लापुर	खा0नं0– 81ख, 85	13.80 5.58766	J-11015/103/2010-1A.II(M) दिनांक 31.10.2011	45,000	
31	28	श्री विकास अग्रवाल व वाजिद अली, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी, बोल्डर	बादशाहपुर	खा0 नं0– 96म, 132म, 133म/3म, 129म, 128म, 123म	22.00 8.90306	वन एवं पर्यावरण मंत्रालय भारत सरकार के नोटिफिकेशन संख्या–2006 के सलाह–08 में दी गई व्यवस्था के आधार पर	72,000	
32	30	श्री विकास अग्रवाल व वाजिद अली, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी, बोल्डर	खुशहालीपुर	खा0नं0– 585म, 576म, 572म	25.50 10.31942	वन एवं पर्यावरण मंत्रालय भारत सरकार के नोटिफिकेशन संख्या–2006 के सलाह–08 में दी गई व्यवस्था के आधार पर	72,000	
33	31	श्री विकास अग्रवाल व वाजिद अली, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी, बोल्डर	खुशहालीपुर	खा0 नं0– 585म, 576म, 572म, 559म	46.32 18.74509	वन एवं पर्यावरण मंत्रालय भारत सरकार के नोटिफिकेशन संख्या–2006 के सलाह–08 में दी गई व्यवस्था के आधार पर	72,000	
34	33	श्री विकास अग्रवाल व वाजिद अली, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी, बोल्डर	बालूवाला जहानपुर	खा0 नं0– 845, 846, 847, 850	16.00 6.47457	वन एवं पर्यावरण मंत्रालय भारत सरकार के नोटिफिकेशन संख्या–2006 के सलाह–08 में दी गई व्यवस्था के आधार पर	45,000	
35	38	श्री महमूद अली, पुनीत जैन व मुकेश जैन, निवासीगण मिर्जापुर पोल, तहसील बेहट	मिश्रित बालू बजरी, बोल्डर	नर्सेयारी अहतमाल	ख नं0– 1/1/1	60.00 24.28111	J-11015/115/2010-1A.II(m) दिनांक 19.12.2011	99,000	

9 परीवर्ध 35 ग्राम पट्टे वर्तमान समय में संचालित नहीं है।

खान अधिकारी
सहारनपुर

खान अधिकारी
सहारनपुर

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Annexure 4

Geology and Mining Department.Uttar Pradesh
District- Saharanpur.

Dated From 01 April 2012 to March, 2013 detail of action against illegal Mining/Transportation vehcles/ Overloading

Month	No. of illegal Mining/Transportation vehcles	No. of Overloading vehcles	No. of illegal Mining/Transportation FIR	Received Revene	Inspection Officer	Remarks
April	20	18	-	746992.00	Mine Officer Saharanpur	-
May	24	22	-	584384.00	Mine Officer Saharanpur	-
June	30	22	-	1383237.00	Mine Officer Saharanpur	-
July	07	10	-	204928.00	Mine Officer Saharanpur	-
August	06	05	2 FIR	60428.00	Mine Officer Saharanpur	-
September	12	07	-	372561.00	Mine Officer Saharanpur	-
October	25	15	1 FIR	265630.00	Mine Officer Saharanpur r	-
November	06	04	-	17920.00	Mine Officer Saharanpur	-
December	06	06	2 FIR	110562.00	Mine Officer Saharanpur	-
January, 2013	04	02	-	21360.00	Mine Officer Saharanpur	-
Fecruary	04	03	1 FIR	22540.00	Mine Officer Saharanpur	-
March	03	02	-	50000.00	Mine Officer Saharanpur	
Total	**147**	**116**	**6 FIR**	**3838542.00**	-	-

Mine Officer
Saharanpur

खान अधिकारी
सहारनपुर

Geology and Mining Department.Uttar Pradesh
District -Saharanpur.

Dated From 01 April 2013 to March, 2014 detail of action against ellegal Mining/Transportation vehcles/ Overloading .

Month	No. of illegal Mining/Transportation vehcles	No. of Overloading vehcles	No. of illegal Mining/Transportation FIR	Received Revene	Inspection Officer	Remarks
April	06	04	04FIR	7880.00	Mine Officer Saharanpur	-
May	04	03	04FIR	3880.00	Mine Officer Saharanpur	-
June	10	05	-	56474.00	Mine Officer Saharanpur	-
July	03	02	-	10520.00	Mine Officer Saharanpur	-
August	04	02	06Criminal case	-	Mine Officer Saharanpur	-
September	02	03	05 Criminal case	-	Mine Officer Saharanpur	-
October	-	-	-	-	Mine Officer Saharanpur r	-
November	-	-	-	-	Mine Officer Saharanpur	-
December	-	-	-	-	Mine Officer Saharanpur	-
January, 2014	05	-	04 Criminal case	36520.00	Mine Officer Saharanpur	-
February	02	-	02FIR	-	Mine Officer Saharanpur	-
March	05	-	05 Criminal case	50000.00	Mine Officer Saharanpur	
Total	41	19	10 FIR 20 Criminal case	165274.00	-	-

Mine Officer
Saharanpur

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Geology and Mining Department.Uttar Pradesh 3

District Saharanpur.

Dated From 01 April, 2014 to 31 March, 2015 detail of action against illegal Mining/Transportation vehcles/ Overloading .

Month	No. of illegal Mining / Transportation vehcles	No. of Overloading vehcles	No.of illegal Mining/ Transportation FIR	Received Revene	Inspection Officer	Remarks
April	03	05	01 FIR	1,24,360.00	Mine Officer Saharanpur	-
May	14	20	-	5,27,222.00	Mine Officer Saharanpur	-
June	20	22	9 Criminal case 8 FIR	8,34,843.00	Mine Officer Saharanpur	-
July	06	09	6 Criminal case	1,58,368.00	Mine Officer Saharanpur	-
August	&	02	-	44,752.00	Mine Officer Saharanpur	-
September	-	24	-	3,33,061.00	Mine Officer Saharanpur	-
October	05	&	-	78,688.00	Mine Officer Saharanpur	-
November	12	13	-	2,83,584.00	Mine Officer Saharanpur	-
December	08	06	-	75,508.00	Mine Officer Saharanpur	Issue Notice of illegal Mining 21 Stone cresher against amount 11,19,01,824.00
January, 2015	22	24	-	8,09,004.00	Mine Officer Saharanpur	Issue Notice of illegal Mining 56 Stone cresher against amount 6,54,28,450.00
February	15	06	-	21,87,222.00	Mine Officer Saharanpur	-
31March, 2015	18	03	-	11,57,112.00	Mine Officer Saharanpur	-
Total	123	134	09 FIR 15 Criminal case	66,13,724.00	-	-

Mine Officer
Saharanpur
खान अधिकारी
सहारनपुर

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Geology and Mining Department.Uttar Pradesh

District -Saharanpur.

Dated From April, 2015 to March, 2016 detail of action against illegal Mining/Transportation vehicles/ Overloading.

Month	No. of illegal Mining/Transportation vehicles	No. of Overloading vehicles	No. of illegal Mining/Transportation FIR	Received Revenue	Inspection Officer	Remarks
April	09	07	-	1,67,902.00	Mine Officer Saharanpur	-
May	15	10	-	2,94,138.00	Mine Officer Saharanpur	-
June	07	02	-	1,15,556.00	Mine Officer Saharanpur	-
July	04	-	-	51,722.00	Mine Officer Saharanpur	-
August	05	02	-	1,55,102.00	Mine Officer Saharanpur	-
September	05	03	\-	1,80,910.00	Mine Officer Saharanpur	-
October	06	03	-	1,62,946.00	Mine Officer Saharanpur r	-
November	05	03	-	1,20,216.00	Mine Officer Saharanpur	-
December	18	09	04 -FIR 10 Criminal case	3,71,574.00	Mine Officer Saharanpur	-
January,2016	20	08	04 -FIR	3,19,574.00	Mine Officer Saharanpur	-
February	10	10	-	3,34,190.00	Mine Officer Saharanpur	-
March	06	07	-	3,40,990.00	Mine Officer Saharanpur	-
Total	110	64	08 -FIR 10 Criminal case	26,14,820.00	-	-

Mining Officer
Saharanpur खान अधिकारी
सहारनपुर

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Geology and Mining Department.Uttar Pradesh

District -Saharanpur.

Dated From April,2016 to September,2016 detail of action against illegal Mining/Transportation vehicles/ Overloading.

Month	No. of illegal Mining/Transportation vehicles	No. of Overloading vehicles	No. of illegal Mining/Transportation FIR	Received Revenue	Inspection Officer	Remarks
April	09	10	-	3,43,860.00	Mine Officer Saharanpur	-
May	15	14	-	6,05,620.00	Mine Officer Saharanpur	-
June	15	16	-	4,96,440.00	Mine Officer Saharanpur	-
July	20	24	40 Criminal case	1,49,110.00	Mine Officer Saharanpur	-
August	07	-	07 Criminal case	-	Mine officer Saharanpur	-
September	10				Mine officer Saharanpur	
TOTAL	66	64	47 Criminal case	15,95,030.00		

Mining Officer
Saharanpur खान अधिकारी सहारनपुर

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Forest Research Institute

(Indian Council of Forestry Research and Education)

PO: New Forest, Dehradun – 248006

http://fri.icfre.gov.in/



3. List of Mining Leases in the District with location, area and period of validity

Sl. No	Tehsil	River	Village	Gata No. / Khand No. / Zone No.	Area (ha.)	Pillar	Latitude	Longitude	Annual Production (cum)	Period of Validity (lease deed period)
1	Behat	Badshahbagh Rao	Mayapur Rooppur	Gata No. 14/1	3.100	A	30° 19' 21.41" N	77° 38' 26.35" E	69750.00	15/06/2020 to 14/06/2025
						B	30° 19' 17.62" N	77° 38' 30.56" E		
						C	30° 19' 13.68" N	77° 38' 25.07" E		
						D	30° 19' 17.44" N	77° 38' 20.78" E		
2	Behat	Yamuna	Bartha Korsi	Gata No. - 1	36.000	A	30° 14' 00.94" N	77° 31' 13.91" E	756000.00	01/04/2021 to 31/03/2026
						B	30° 14' 16.50" N	77° 31' 24.43" E		
						C	30° 14' 13.69" N	77° 31' 31.19" E		
						D	30° 14' 19.59" N	77° 31' 37.85" E		
						E	30° 14' 37.10" N	77° 31' 40.80" E		
						F	30° 14' 39.19" N	77° 31' 36.25" E		
						G	30° 14' 26.08" N	77° 31' 29.05" E		
						H	30° 14' 09.19" N	77° 31' 02.18"E		
3	Behat	Badkala Ra	Haidarpur Hindwala	Khand No / Gata No. - 8/1 , 19 & 22	4.200	A	30° 15' 20.64" N	77° 40' 42.10" E	94500.00	06/10/2020 to 05/10/2025
						B	30° 15' 20.54" N	77° 41' 00.42" E		
						C	30° 15' 17.98" N	77° 41' 01.84" E		
						D	30° 15' 17.71" N	77° 40' 42.89" E		
4	Behat	Khurwali Ra	Sherpur Pelon	Gata No. - 378/2 &379/2	7.000	A	30° 15' 52.04" N	77° 39' 22.56" E	197500.00	09/02/2021 to 08/02/2026
						B	30° 15' 51.84" N	77° 39' 27.43" E		
						C	30° 16' 06.24" N	77° 39' 31.26" E		
						D	30° 16' 07.18" N	77° 39' 25.03" E		
5	Behat	Yamuna	Nuniyari Achatmal	Gata No. - 1/1/1 Lost 38	24.290	A	30°11'00.90" N	77°29'25.83"E	437247.00	03/01/2022 to 02/01/2027
						B	30°11'12.98" N	77°29'12.21" E		
						C	30°11'24.95" N	77°29'26.28" E		
						D	30°11'21.79" N	77°29'29.68" E		
						E	30°11'20.39" N	77°29'33.03" E		
						F	30°11'18.64" N	77°29'33.83" E		
						G	30°11'17.01" N	77°29'34.70" E		
						H	30°11'14.93" N	77°29'32.91" E		
						I	30°11'09.54" N	77°29'31.35" E		
						J	30°11'03.46" N	77°29'29.55" E		
6	Behat	Yamuna	Rehna	Khand No. / Gata no. - 03, Lot No - 03	8.050	A	30° 21' 36.45" N	77° 36' 05.61" E	138462.00	20/06/2020 to 19/06/2025
						B	30° 21' 29.62" N	77° 36' 00.26" E		
						C	30° 21' 37.95" N	77° 35' 50.38" E		
						D	30° 21' 41.71" N	77° 36' 02.50" E		
7	Behat	Gaisara Rao	Rahena	Gata No. 179/2	3.750	A	30° 19' 56.17" N	77° 36' 33.21" E	67500.00	06/06/2020 to 05/06/2025
						B	30° 19' 52.90" N	77° 36' 33.93" E		
						C	30° 19' 50.54" N	77° 36' 20.87" E		
						D	30° 19' 53.90" N	77° 36' 20.01" E		
8	Nakur	Yamuna	Dhikkan Kalan	Gata No. - 839, 841 to 856, 858, 859, 860, 861, 863,864,865,866,867, 871, 872, 888, 889, 406 , 407	52.63	A	30° 1'20.61"N	77°17'23.68"E	947368.00	16/11/2019 to 15/11/2024
						B	30° 1'24.58"N	77°17'15.45"E		
						C	30° 1'32.77"N	77°17'19.87"E		
						D	30° 1'42.25"N	77°17'24.49"E		
						E	30° 1'41.34"N	77°17'31.04"E		
						F	30° 1'52.02"N	77°17'39.09"E		
						G	30° 1'54.80"N	77°17'51.61"E		
						H	30° 1'56.88"N	77°17'52.96"E		
						I	30° 2'2.71"N	77°18'5.82"E		
						J	30° 1'59.86"N	77°18'8.25"E		
						K	30° 1'57.85"N	77°18'7.25"E		
						L	30° 1'58.76"N	77°18'5.82"E		
						M	30° 1'57.46"N	77°18'4.89"E		
						N	30° 1'57.00"N	77°18'1.96"E		
						O	30° 1'53.50"N	77°18'0.53"E		
						P	30° 1'47.64"N	77°17'52.52"E		

139.02 = 2708327

						Q	30° 1'42.10"N	77°17'46.53"E		
						R	30° 1'32.38"N	77°17'39.44"E		
						S	30° 1'27.11"N	77°17'31.55"E		
9	Behat	Khairawali Ra	Sherpur Pelon	403, 404/1, 405, 406/1, 416/2, 421/1, 422/2, 423/2, 424/2, 429 and 431	6.475	A	30°16'35.16"N	77°39'44.44"E	77300.00	Vacant
						B	30°16'32.34"N	77°39'51.41"E		
						C	30°16'21.11"N	77°39'36.26"E		
						D	30°16'22.11"N	77°39'34.41"E		
10	Behat	Kaluwala	Kaluwala Pahadipur	119/1, 120/1, 192/1, 193/1, 125/1	14.900	A	30°12'08.76"N	77°45'17.77"E	178800.00	Vacant
						B	30°12'06.03"N	77°45'42.25"E		
						C	30°12'00.52"N	77°45'38.93"E		
						D	30°11'40.91"N	77°45'32.39"E		
						E	30°11'41.72"N	77°45'25.51"E		
						F	30°12'02.80"N	77°45'33.06"E		
11	Behat	Yamuna	Akbarpur Bass Aehatmal	1	17.900	A	30°16'27.80"N	77°32'46.96"E	322200.00	Vacant
						B	30°16'34.01"N	77°32'47.53"E		
						C	30°16'42.58"N	77°32'53.94"E		
						D	30°16'43.84"N	77°32'58.19"E		
						E	30°16'50.96"N	77°32'47.76"E		
						F	30°16'46.69"N	77°32'43.28"E		
						G	30°16'39.98"N	77°32'41.04"E		
						H	30°16'36.08"N	77°32'32.91"E		
12	Behat	Yamuna	Arazi Jevadi Ahatmal and Masoodpur Garh Aehatmal	1 and 1	13.800	A	30°15'51.33"N	77°32'21.84"E	248400.00	Vacant
						B	30°15'58.45"N	77°32'08.63"E		
						C	30°15'45.65"N	77°32'03.15"E		
						D	30°15'41.84"N	77°32'13.01"E		
13	Behat	Yamuna	Shehjadpur Bass Aehatmal	1	13.000	A	30°15'24.84"N	77°31'57.01"E	234000.00	Vacant
						B	30°15'12.32"N	77°31'47.88"E		
						C	30°15'16.91"N	77°31'36.94"E		
						D	30°15'28.43"N	77°31'48.83"E		
14	Behat	Yamuna	Alauddinpur Bass Aehatmal	1/1	9.580	A	30°16'14.92"N	77°32'39.76"E	172440.00	Vacant
						B	30°16'17.99"N	77°32'32.74"E		
						C	30°16'08.09"N	77°32'23.84"E		
						D	30°16'02.92"N	77°32'31.72"E		
15	Behat	Yamuna	Mehmoodpur Nangli Aehatmal	1	15.700	A	30°16'02.98"N	77°32'30.74"E	282600.00	Vacant
						B	30°16'10.84"N	77°32'18.84"E		
						C	30°16'00.40"N	77°32'11.56"E		
						D	30°15'51.70"N	77°32'23.64"E		
16	Behat	Yamuna	Shahpur Bass Aehatmal	1/1	15.600	A	30°16'27.75"N	77°32'46.14"E	280800.00	Vacant
						B	30°16'16.01"N	77°32'38.50"E		
						C	30°16'20.43"N	77°32'28.70"E		
						D	30°16'35.53"N	77°32'33.20"E		
17	Behat	Yamuna	Nityanandpur Aehatmal and Said-mohamadpur Aehatmal	1 and 1ma	17.700	A	30°15'25.77"N	77°31'57.79"E	318600.00	Vacant
						B	30°15'41.32"N	77°32'12.89"E		
						C	30°15'46.16"N	77°32'00.64"E		
						D	30°15'28.87"N	77°31'50.13"E		
18	Behat	Yamuna	Abutalibpur GarhAehatmal	1	37.000	A	30°14'41.78"N	77°31'38.30"E	666000.00	Vacant
						B	30°14'49.46"N	77°31'21.34"E		
						C	30°15'16.20"N	77°31'36.25"E		
						D	30°15'11.96"N	77°31'46.05"E		
19	Behat	Yamuna	Nuniyari Athmal – Khand Second	1/1/1	19.000	A	30°11'6.47"N	77°29'18.52"E	342000.00	Vacant
						B	30°11'4.27"N	77°29'16.54"E		
						C	30°10'59.70"N	77°29'14.05"E		
						D	30°10'55.37"N	77°29'10.53"E		
						E	30°10'46.29"N	77°29'4.02"E		
						F	30°10'39.87"N	77°29'0.42"E		
						G	30°10'46.96"N	77°28'51.89"E		
						H	30°10'51.56"N	77°28'56.76"E		
						I	30°10'49.46"N	77°28'58.83"E		
						J	30°11'2.30"N	77°29'11.12"E		
						K	30°11'7.26"N	77°29'5.46"E		
						L	30°11'12.52"N	77°29'11.64"E		
20	Behat	Yamuna	Aslampur Bartha – First	1/1M	36.600	A	30°13'45.87"N	77°31'09.07"E	658800.00	Vacant
						B	30°13'23.05"N	77°30'53.85"E		
						C	30°13'13.45"N	77°30'42.33"E		
						D	30°13'16.67"N	77°30'36.60"E		
						E	30°13'50.98"N	77°30'57.80"E		

448640

21	Behat	Yamuna	Rasoolpur Urf Rasooli	1:1	31 000	A	30°12'17.09"N	77°30'18.81"E	612000.00	Vacant
						B	30°12'16.12"N	77°30'17.32"E		
						C	30°12'05.34"N	77°30'11.17"E		
						D	30°11'59.82"N	77°30'01.24"E		
						E	30°11'46.33"N	77°29'58.50"E		
						F	30°11'59.32"N	77°29'43.47"E		
						G	30°12'21.10"N	77°30'16.04"E		
22	Behat	Yamuna	Aslampur Bartha – Second	1/1 M	28 160	A	30°13'04.93"N	77°30'44.59"E	506880.00	Vacant
						B	30°12'35.50"N	77°30'28.50"E		
						C	30°12'38.19"N	77°30'18.84"E		
						D	30°13'09.39"N	77°30'35.57"E		

279.415
139.0030
418.435

1,18,880

कृपया कार्यालय जिलाधिकारी, सहारनपुर, खनन अनुभाग के कार्यालय आदेश 2501/ख0अनु0/2023–24 दिनांक 02.12.2023 के अनुपालन में दिनांक 11.12.2023 को बाबा बंसी स्टोन क्रेशर का स्थलीय निरीक्षण स्टोन क्रेशर के प्रतिनिधि श्री राकेश कुमार पुत्र श्री हंसराज निवासी जैदरी यमुनानगर हरियाणा की उपस्थिति में किया गया। स्थलीय निरीक्षण के दौरान भण्डारणकर्ता के पॉर्टल पर प्रदर्शित उपखनिज की मात्रा 1378 घनमीटर के सापेक्ष कुल 745 घनमीटर पाया गया, जिसका विवरण निम्नानुसार है:–

क्र0सं0	उपखनिज का नाम	मात्रा
1	कोरसैण्ड	360
2	गिटटी	185
3	RBM	200

जोकि उपरोक्त तालिकानुसार 633 घनमीटर कम पाया गया। उक्त के अतिरिक्त राजस्व विभाग द्वारा चिन्हित 01 गढढें की जी0पी0एंस0 डिवाईस से पैमाईश की गई (कॉर्डिनेसटस् अक्षांन्तर–**30^0 13' 53.93" N And** देशान्तर – **77^0 31' 57.30' E** के समीप) व पैमाईश के उपरान्त, उक्त गढढें का क्षेत्रफल 649 वर्गमीटर पाया गया व गढढें की औसत गहराई 1.825 मीटर पायी गई। इस प्रकार भण्डारण स्थल के समीप प्रथम दृष्टया 1184.425 घनमीटर का अवैध खनन भी किया जाना पाया गया।

कृपया आख्या आवश्यक कार्यवाही हेतु सादर प्रेषित।

संलग्नक:–1. मौके के फोटोगाफस्।

2. प्रतिनिधि द्वारा दिया गया बयान।

11/12/2023
M.I.

11.12.2023
M.I.

11.12.2023
(NT)(M)

कार्यालय
कृ० निम्नानुसार आवश्यक
कार्यवाही हेतु।
04.01.24
M.O.

2393

जांच आख्या

मैसर्स बालाजी ट्रैडिंग कम्पनी प्रो0 श्री विशम्बर दयाल गोयल पुत्र श्री मदन लाल गोयल निवासी कोसीरोड कामॉ जिला भरतपुर राजस्थान के पक्ष में अनुबंधित बालू खनन पटटा क्षेत्र ग्राम ढिक्काकलां के गाटा संख्या 839, 841 से 856, 858, 859, 860, 861, 863, 864, 865, 866, 867, 871, 872, 888, 889, 406, 407 रकबा 52.63हे0 का क्षेत्रीय भ्रमण के दौरान औचक निरीक्षण दिनांक 16.12.2023 को पटटाधारक के प्रतिनिधि श्री सचिन मारकण्डें की उपस्थिति में किया गया। जांच के दौरान खनन पटटा क्षेत्र में **पी0टी0जेड कैमरा** लगा हुआ नही पाया गया तथा मौके पर सीमारतम्भ भी नही पाये गये साथ ही खनन पटटा क्षेत्र का विवरण बोर्ड भी नही पाया गया। पटटाधारक द्वारा स्वीकृत क्षेत्र के बिन्दु B व बिन्दु C के मध्य स्वीकृत क्षेत्र के अन्दर से बाहर की ओर दक्षिण दिशा में अवैध खनन किया गया है।

खनन पटटाधारक द्वारा अपने स्वीकृत खनन पटटा क्षेत्र के बाहर खनन कर परिवहन किया गया है, जिसकी पैमाईश की गयी, जो निम्नवत् हैः–

1. पिट नं0–1–उपखनिज की मात्रा 3,075 घनमीटर

इस प्रकार पटटेधारक द्वारा अपने स्वीकृत खनन पटटा क्षेत्र के बाहर कुल 3,075 घनमीटर साधारण बालू का खनन कर परिवहन किया गया है, जो अवैध खनन की श्रेणी में आता है। खनन पटटा क्षेत्र के बाहर किये गये खनन पिटस् के जियो कॉर्डिनेटस् निम्न प्रकार हैः–

पिट नं0–1–

Name of Pillars	Latitude	Longitude
B	**30^0 01' 24.55''**	**77^0 17' 15.45''**

आख्या अग्रिम कार्यवाही हेतु प्रेषित।

संलग्नक–अवैध खनन क्षेत्र के लिये गये जियोकॉर्डिनेटस् के अनुसार गुगल मैप की प्रति।

M. I.

M.O.

निरीक्षण आख्या

कृपया अवगत कराना है कि दिनांक 20.12.2023 में क्षेत्रीय भ्रमण के दौरान मैसर्स रॉयल स्टोन क्रेशर ग्राम असलमपुर बरथा तहसील बेहट जिला सहारनपुर का स्थलीय निरीक्षण किया गया। स्थलीय निरीक्षण के दौरान मैसर्स रॉयल स्टोन क्रेशर ग्राम असलमपुर बरथा तहसील बेहट जिला सहारनपुर के उत्तर दिशा में (पिट नं0 1) तथा पश्चिम दिशा (पिट नं0 2) की ओर खनन के गढ्ढें पाये गये, जिनकें जियो कॉर्डिनेटस् भी लिये गये है, जिनका विवरण निम्नवत् है-

1. पिट नं0 –1:– खनन किये गये उपखनिज की मात्रा 3,060 घनमीटर

पिट नं0:–1 के जियो कॉर्डिनेटस्

N of P	Latitude	Longitude
A	30° 13' 08.08"	77° 31' 16.30"
B	30° 13' 09.90"	77° 31' 17.46"
C	30° 13' 08.90"	77° 31' 21.00"
D	30° 13' 06.55"	77° 31' 19.66"

2. पिट नं0 –2:– खनन किये गये उपखनिज की मात्रा 892 घनमीटर

पिट नं0:–2 के जियो कॉर्डिनेटस्

N of P	Latitude	Longitude
A	30° 12' 21.41"	77° 31' 06.64"

इस प्रकार स्थलीय निरीक्षण के दौरान मैसर्स रॉयल स्टोन क्रेशर द्वारा स्वीकृत क्षेत्र के बाहर उपखनिज की कुल मात्रा 3,950 घनमीटर का अवैध खनन किया जाना पाया गया।

आख्या आवश्यक कार्यवाही हेतु सादर प्रेषित।

Tehsil)

संयुक्त जांच आख्या

कृपया कार्यालय के पत्र संख्या–2426/खा0नि0/2023–24 दिनांक 23.11.2023 का सन्दर्भ ग्रहण करने का कष्ट करें, जिसके द्वारा मैसर्स अम्बे एण्टरप्राइजेज ग्राम बरथाकोरसी तहसील बेहट, मै0 शाकुम्बरी स्टोन क्रेशर ग्राम असलमपुर बरथा तहसील बेहट व मै0 नेशनल स्टोन क्रेशर ग्राम असलमपुर बरथा तहसील बेहट की विस्तृत जांच हेतु संयुक्त टीम गठित की गयी है। संयुक्त टीम द्वारा दिनांक 30.11.2023 को जांच/पैमाईश की गयी। विस्तृत जांच आख्या निम्नवत् है:

4. **मैसर्स अम्बे एण्टरप्राइजेज ग्राम बरथाकोरसी परगना फैजाबाद तहसील बेहट:–** अम्बे एण्टरप्राईजेज ग्राम बरथा कोरसी में संचालित है की जांच क्रेशर के पार्टनर श्री शक्ति सिंह व मुंशी श्री अनिल पुत्र श्री गंगाराम की उपस्थिति में की गयी। इनके द्वारा अपने स्वीकृत भण्डारण स्थल से अवैध खनन कर परिवहन किया गया है किये गये अवैध खनन क्षेत्र के जियो कोर्डिनेट्स लिये गये। जियो कोर्डिनेट्स के अनुसार इनके द्वारा कुल 7726 वर्गमीटर भाग से औसतन 2.25 मीटर गहराई तक कुल 17,383.5 घनमीटर आर0बी0एम0 का खनन किया गया है। किये गये अवैध खनन क्षेत्र के जियो कोर्डिनेट्स निम्न प्रकार है:–

N of P	Latitude	Longitude
A	30° 14' 05.49"	77° 31' 42.63"
B	30° 14' 05.91"	77° 31' 42.05"
C	30° 14' 07.77"	77° 31' 42.90"
D	30° 14' 07.15"	77° 31' 44.86"
E	30° 14' 07.23"	77° 31' 45.25"
F	30° 14' 06.65"	77° 31' 46.23"
G	30° 14' 06.17"	77° 31' 45.84"
H	30° 14' 05.50"	77° 31' 46.57"
I	30° 14' 04.33"	77° 31' 45.91"
J	30° 14' 04.84"	77° 31' 44.20"

5. **मै0 शाकुम्बरी स्टोन क्रेशर ग्राम असलमपुर बरथा तहसील बेहट:–** मै0 शाकुम्बरी स्टोन क्रेशर ग्राम असलमपुर बरथा में संचालित है की जांच क्रेशर के प्रतिनिधि श्री गुरदयाल की उपस्थिति में की गयी। इनके द्वारा अपने स्वीकृत भण्डारण स्थल से अवैध खनन कर परिवहन किया गया है अवैध खनन स्थल दो गहराईयों में है। जिसकी पैमाईश दो पिट्स में की गई। पिट्–1 में जियो कोर्डिनेट्स के अनुसार कुल 5372 वर्गमीटर भाग में औसतन 0.6 मीटर गहराई तक कुल 3223 घनमीटर व पिट्–2 में जियो कोर्डिनेट्स के अनुसार कुल 5179 वर्गमीटर में 0.45 मीटर गहराई तक 2330 घनमीटर का खनन किया गया है। इस प्रकार इनके द्वारा कुल 5553 घनमीटर आर0बी0एम0 का खनन किया गया है। जिसके जियो कोर्डिनेट्स निम्न प्रकार है:–

Pit-1		
N of P	Latitude	Longitude
A	30° 13' 19.64"	77° 31' 44.33"
B	30° 13' 22.35"	77° 31' 45.74"
C	30° 13' 22.73"	77° 31' 43.34"
D	30° 13' 20.74"	77° 31' 41.97"
Pit-2		
N of P	Latitude	Longitude
C	30° 13' 22.73"	77° 31' 43.34"
D	30° 13' 20.74"	77° 31' 41.97"
E	30° 13' 22.25"	77° 31' 39.75"
F	30° 13' 24.22"	77° 31' 41.34"

6. **मै0 नेशनल स्टोन क्रेशर ग्राम असलमपुर बरथा तहसील बेहट:–** मै0 नेशनल स्टोन क्रेशर ग्राम असलमपुर बरथा में संचालित है की जांच क्रेशर के स्वामी श्री अनिल शर्मा की उपस्थिति में की गयी। इनके द्वारा अपने स्वीकृत भण्डारण स्थल से बाहर खसरा संख्या–282म, में 798 घनमीटर आर0बी0एम0 का अवैध भण्डारण किया हुआ पाया गया।

आख्या महोदय की सेवा में सादर प्रेषित।

वरिष्ठ सर्वेक्षक
क्षे0का0 गा0बाद।

खान निरीक्षक
सहारनपुर।

खान निरीक्षक
सहारनपुर।

सहायक सम्भागीय
परिवहन अधिकारी
सहारनपुर।

क्षेत्रीय अधिकारी,
उ0प्र0 प्रदूषण
नियंत्रण बोर्ड,
सहारनपुर।

क्षेत्राधिकारी पुलिस
बेहट।

डिप्टी कलेक्टर
सहारनपुर।

उपजिलाधिकारी बेहट।

अपर जिलाधिकारी (वि0/रा0)

संयुक्त निरीक्षण

2396

खान अधिकारी महोदय के मौखिक निर्देशों के अनुपालन में राजस्व व खनन विभाग द्वारा दिनांक 04.02.2024 को तहसील बेहट अन्तर्गत यमुना नदी की समीपवर्ती क्षेत्रों का स्थलीय निरीक्षण किया गया, निरीक्षण के दौरान मौके पर अवैध खनन के कई गड्ढे पाये गये जिनकी पैमाईश की गयी जिनके विवरण निम्नवत् है:-

क्र0 स0	ग्राम	समीपवर्ती कॉर्डिनेटस्	अवैध खनन के गढ्ढे का क्षेत्रफल (वर्गमी0 में)	औसत गहराई (मी0 में)	अवैध खनन की मात्रा (घ0मी0 में)
1	बरथा कोरसी	30° 13' 53.23" N 77° 31' 01.69" E के समीप	917	0.8	733
		30° 13' 50.74" N 77° 31' 00.16" E के समीप	49	1.8	88
		30° 13' 50.06" N 77° 30' 59.49" E के समीप	44	0.7	30
		30° 13' 53.63" N 77° 31' 06.93" E के समीप	2413	0.7	1689
					कुल योग–2540
2	असलमपुर बरथा	30° 12' 21.31" N 77° 30' 23.27" E के समीप	87	1.5	130
		30° 12' 27.20" N 77° 30' 18.22" E के समीप	552	0.6	331
		30° 12' 27.08" N 77° 30' 17.81" E के समीप	867	0.6	520
					कुल योग–981
3	रसूलपुर उर्फ रसूली	30° 12' 04.03" N 77° 30' 09.30" E के समीप	332	0.4	132

अतः उपरोक्त तालिकानुसार तहसील बेहट अन्तर्गत ग्राम बरथा कोरसी में लगभग 2540 घ0मी0, ग्राम असलमपुर बरथा में लगभग 981 घ0मी0 एवं रसूलपुर उर्फ रसूली में लगभग 132 घ0मी0 आर0बी0एम0 का अवैध खनन का किया जाना प्रथम दृष्टया परिलक्षित होता है।

कृपया आख्या नियमानसुार आवश्यक कार्यवाही हेतु सादर प्रेषित।

संलग्नक: 1. मौके के फोटोग्राफ्स।

Pankaj
04/02/2024
पंकज कुमार लोकपाल
क्षेत्र.....नानौता.....
तह0 बेहट जि0 सहारनपुर

Irfan
04/02/2024
(NT)(M)

04/02/2024
M.I.

आख्या

श्रीमान उपजिलाधिकारी बेहट के आदेशानुपालन में नायब तहसीलदार फैजाबाद के नेतृत्व में राजस्व विभाग व खनन विभाग की संयुक्त टीम द्वारा ग्राम असलमपुर बरथा तहसील बेहट जिला सहारनपुर में मैसर्स मोदी स्टोन क्रेशर के पीछे हरियाणा की सीमा से लगती हुयी यमुना नदी में हरियाणा के स्टोन क्रेशरों द्वारा खनन किये गये क्षेत्र का निरीक्षण किया गया। स्थलीय निरीक्षण के दौरान ग्राम असलमपुर बरथा में खनन क्षेत्र के जियो कोर्डिनेट (अक्षांन्तर–**30° 12' 36.8" N And** देशान्तर – **77° 30' 07.0' E**) के समीप पाये गये अवैध खनन सम्बन्धी गढढों की **GPS** डिवाईस से पैमाईश की गई, जिसके अनुसार अवैध खनन सम्बन्धी गढढों का कुल क्षेत्रफल 35,420 वर्गमीटर पाया गया व गढढों की औसत गहराई 0.72 मीटर पायी गई, जिसके अनुसार प्रश्नगत क्षेत्र से प्रथम दृष्टया लगभग 25,502 घनमीटर **RBM** का अवैध खनन/परिवहन किया जाना परिलक्षित होता है।

आख्या आवश्यक कार्यवाही हेतु सादर प्रेषित।

संलग्नकः–1. मौके के फोटोग्राफस्।

14/12/2023
Lekhpal Kasbagar

19/12/2023

14/12/2023
M.J.

संयुक्त निरीक्षण आख्या

अपर जिलाधिकारी (वि0/रा0), खान अधिकारी व उप जिलाधिकारी सदर के मौखिक निर्देशों के अनुपालन में, राजस्व विभाग व खनन विभाग द्वारा दिनांक 24.01.2024 व 27.01.2024 को तहसील सदर अन्तर्गत ग्राम पंचकुआ व मकसूदपुर का संयुक्त स्थलीय निरीक्षण किया गया, जिसका विवरण निम्नवत् है:-

क0 सं0	ग्राम	खसरा/रकबा (हे0 में)	भूस्वामी का नाम	भूमि का प्रकार	सन्दर्भ कॉर्डिनेट्स्		अवैध खनन के गढढें का क्षेत्रफल (वर्गमी0 में)	औसत गहराई (मी0 में)	अवैध खनन की मात्रा (घ0मी0 में)
1	पंचकुआ	200/40.25 के आंशिक भाग में	यमुना नदी की भूमि	सार्वजनिक उपयोग की भूमि (धारा-77)	A	30° 09' 07.98" N 77° 27' 48.49" E	2269	1.43	3,245
					B	30° 09' 07.36" N 77° 27' 48.73" E			
					C	30° 09' 06.99" N 77° 27' 48.48" E			
					D	30° 09' 06.62" N 77° 27' 48.77" E			
					E	30° 09' 06.24" N 77° 27' 49.10" E			
					F	30° 09' 06.06" N 77° 27' 49.63" E			
					G	30° 09' 07.36" N 77° 27' 50.34" E			
					H	30° 09' 07.65" N 77° 27' 49.92" E			
					I	30° 09' 08.23" N 77° 27' 50.24" E			
					J	30° 09' 08.33" N 77° 27' 49.95" E			
2	मकसूदपुर	1/1म/54.288 के आंशिक भाग में	श्री अंकित कुमार पुत्र श्री रफल व अन्य	संक्र0 भूमिधर	Pit 1	30° 08' 24.33" N 77° 27' 02.73" E के समीप	367	1.90	697
					Pit 2	30° 08' 25.22" N 77° 27' 03.55" E के समीप	832	1.65	1,373
					Pit 3	30° 08' 24.13" N 77° 24' 04.00" E के समीप	661	1.30	859

अतः उपरोक्त तालिकानुसार तहसील सदर अन्तर्गत ग्राम पंचकुआ के खसरा संख्या-200/40 जोकि यमुना नदी में दर्ज कागजात है के आंशिक भाग से लगभग 3245 घ0मी0 उपखनिज आर0बी0एम0 व मकसूदपुर के खसरा संख्या-1/1म जोकि श्री अंकित कुमार व रफल व अन्य के नाम दर्ज कागजात है के आंशिक भाग से लगभग 2929 घ0मी0 आर0बी0एम0 का अवैध खनन किया जाना प्रथम दृष्टया परिलक्षित होता है।

कृपया आख्या नियमानसुार आवश्यक कार्यवाही हेतु सादर प्रेषित।

संलग्नकः 1. मौके के फोटोग्राफ्स।

01/02/2024
M.I.

01/02/24
AE

01/02/24
(SDM-S)

Details of 10 Working Blocks/Unit of District Yamuna Nagar

Sr No	Name of Mining Unit/Block	Area (in Hect.)	Coordinates	
			Latitudes	Longitudes
1	Mandoli Ghaggar East Block (YNR B3)	20.18	N 30° 08' 10" N 30° 08' 28"	E 77° 24' 41" E 77° 25' 01"
2	Devdhar (YNR B24)	31.87	N 30° 15' 03.0" N 30° 15' 02.7" N 30° 14' 49.6" N 30° 14' 49.9"	E 77° 28' 06.0" E 77° 28' 31.3" E 77° 28' 25.2" E 77° 28' 57.7"
3	Malikpur Khadar Block/YNR 28	23.20	N 30° 15' 29" N 30° 15' 47"	E 77° 26' 55" E 77° 27' 22"
4	Kanalsi Block/YNR B5	44.14	N 30° 08' 09" N 30° 08' 31"	E 77° 24' 00" E 77° 24' 46"
5	Jathlana Block/YNR B12	101.27	N 30° 00' 30" N 30° 00' 34" N 30° 00' 34" N 30° 00' 36" N 30° 00' 36" N 30° 00' 35.5"	E 77° 14' 46" E 77° 14' 58" E 77° 15' 11" E 77° 15' 11" E 77° 15' 23.5" E 77° 15' 56"

			N 30° 00′ 20″ N 30° 00′ 12″ N 30° 00′ 19″ N 30° 00′ 19″ N 30° 00′ 20″ N 29° 59′ 48″ N 29° 59′ 51″ N 30° 00′ 00″ N 30° 00′ 11″ N 30° 00′ 15″	E 77° 16′ 00″ E 77° 15′ 54″ E 77° 15′ 13.5″ E 77° 15′ 02″ E 77° 14′ 59″ E 77° 14′ 39″ E 77° 14′ 37″ E 77° 14′ 37.5″ E 77° 14′ 43.5″ E 77° 14′ 42″
6	Gumthala South Block /YNR B 17	49.67	N 29° 57′29.08″ N 29° 56′24.74″	E 077° 12′43.32″ E 077° 12′53.06″

7	Jaidhari Block/YNR B33	48.60	N 30° 14' 25" N 30° 14' 25" N 30° 13' 58" N 30° 13' 58" N 30° 14' 08" N 30° 14' 08" N 30° 14' 14" N 30° 14' 14" N 30° 14' 11" N 30° 14' 10" N 30° 14' 10.5"	E 77° 25' 30" E 77° 26' 05" E 77° 26' 05" E 77° 25' 55" E 77° 25' 55" E 77° 25' 48" E 77° 25' 48" E 77° 25' 35" E 77° 25' 35" E 77° 25' 32" E 77° 25' 30"
8	M T Karhera Block / *YNR* B 13	67.79	N 30° 00' 10" N 30° 00' 10" N 30° 00' 09" N 29° 59' 59" N 29° 59' 58" N 29° 59' 46.5" N 29° 59' 46" N 29° 59' 42" N 29° 59' 42" N 29° 59' 38" N 29° 59' 36" N 29° 59' 36" N 29° 59' 28" N 29° 59' 28" N 29° 59' 07" N 29° 59' 06" N 29° 59' 06.5" N 29° 59' 16" N 29° 59' 24" N 29° 59' 40" N 29° 59' 50" N 29° 59' 50" N 29° 59' 52" N 29° 59' 52" N 29° 59' 54" N 29° 59' 54"	E 77° 13' 38.5" E 77° 14' 39.5" E 77° 14' 40" E 77° 14' 36.5" E 77° 14' 37.5" E 77° 14' 37" E 77° 14' 39" E 77° 14' 39" E 77° 14' 32.5" E 77° 14' 27.5" E 77° 14' 27.5" E 77° 14' 25" E 77° 14' 25" E 77° 14' 22.5" E 77° 14' 15" E 77° 14' 13.5" E 77° 14' 12" E 77° 14' 07" E 77° 14' 07" E 77° 14' 09" E 77° 14' 17" E 77° 14' 18.5" E 77° 14' 19" E 77° 14' 17.5" E 77° 14' 17.5" E 77° 14' 21"

			N 30° 00′ 02″ N 30° 00′ 02″ N 30° 00′ 04″ N 30° 00′ 04″ N 30° 00′ 06″ N 30° 00′ 06″	E 77° 14′ 25″ E 77° 14′ 27.5″ E 77° 14′ 30″ E 77° 14′ 35″ E 77° 14′ 35″ E 77° 14′ 33″
9	Nagli Block/Ynr B-15	77.25	N 29° 58′ 29″ N 29° 58′ 30″ N 29° 58′ 16″ N 29° 58′ 02″ N 29° 58′ 02″ N 29° 57′ 38″ N 29° 57′ 24″ N 29° 57′ 38″ N 29° 57′ 40″ N 29° 57′ 46″ N 29° 58′ 06″ N 29° 58′ 10″ N 29° 58′ 10″ N 29° 58′ 10″ N 29° 58′ 15″ N 29° 58′ 25″	E 77° 13′ 47″ E 77° 13′ 50.5″ E 77° 13′ 48.5″ E 77° 13′ 46″ E 77° 13′ 45″ E 77° 13′ 45″ E 77° 13′ 37″ E 77° 13′ 13″ E 77° 13′ 20.5″ E 77° 13′ 27″ E 77° 13′ 28″ E 77° 13′ 32″ E 77° 13′ 39″ E 77° 13′ 43″ E 77° 13′ 42″ E 77° 13′ 42″
10	Nagla Rangran /YNR B-14	89.48	N 29° 58′ 56″ N 29° 58′ 55″ N 29° 59′ 06″ N 29° 59′ 24″ N 29° 59′ 19.49″ N 29° 59′ 17″ N 29° 59′ 08″ N 29° 59′ 01″ N 29° 59′ 09.5″ N 29° 59′ 08.6″ N 29° 59′ 12″ N 29° 59′ 06.37″ N 29° 58′ 35.53″ N 29° 58′ 27″ N 29° 58′ 30.91″	E 77° 13′ 52″ E 77° 13′ 54.5″ E 77° 13′ 54.5″ E 77° 13′ 59″ E 77° 14′ 05.12″ E 77° 14′ 06.08″ E 77° 14′ 04.3″ E 77° 14′ 04.3″ E 77° 14′ 14.1″ E 77° 14′ 15″ E 77° 14′ 19″ E 77° 14′ 18.7′ E 77° 13′ 58.45″ E 77° 13′ 59.4″ E 77° 13′ 54.35′

			N 29° 58′ 31.08″ N 29° 58′ 30.26″ N 29° 58′ 26.37″ N 29° 58′ 19″ N 29° 58′ 14.5″ N 29° 58′ 10″ N 29° 58′ 10.6″ N 29° 58′ 18″ N 29° 58′ 30″ N 29° 58′ 40″ N 29° 58′ 51″	E 77° 13′ 49.79″ E 77° 13′ 46.08′ E 77° 13′ 41.89′ E 77° 13′ 40′ E 77° 13′ 42.5″ E 77° 13′ 38.6′ E 77° 13′ 32′ E 77° 13′ 32′ E 77° 13′ 34.5″ E 77° 13′ 39.4′ E 77° 13′ 46.8″

DIGITAL FRAMEWORK FOR THE REGULATION OF SAND MINING IN RIVERBED

1.0 PREAMBLE:

The committee in the matter of Balbir Sandhu & others. Vs. State of Uttar Pradesh & Anr (O.A no.481/2023) met on a periodical basis and finally met on 18.03.24 under the chairmanship of Chairman, CPCB. In the final meeting, a sub-group was constituted to prepare the “Digital framework for regulation of sand mining in riverbed”. The sub-group consisted the members from IIT Roorkee, NIH Roorkee, NIT Kurukshetra, CPCB, G.B. Pant National Institute of Himalayan Environment and Space Application Centre, ISRO, Ahmedabad.

2.0 THE ISSUE

The Yamuna River, a vital water resource in India, is facing significant challenges due to unsustainable sand mining activities. To address these challenges and promote sustainable development, a digital framework for sand mining in the Yamuna River basin is proposed. This framework integrates advanced technologies to enhance efficiency, transparency, and environmental stewardship in sand mining operations.

3.0 The Enforcement & Monitoring Guidelines for Sand Mining has been published by MoEF&CC in the year 2020. The broad objectives of the guidelines are:

3.1 OBJECTIVE OF GUIDELINES

- Identification and Quantification of Mineral Resource and its optimal utilization.
- To regulate the Sand & Gravel Mining in the Country from its identification to its final end-use by the consumers and the general public.
- Use of IT-enabled services & latest technologies for surveillance of sand mining at each step.
- Reduction in demand & supply gaps.
- Setting up the procedure for replenishment study of Sand.
- Post Environmental Clearance Monitoring.
- Procedure for Environmental Audit.
- To control the instances of illegal mining.

3.2 REPLENISHMENT STUDY

The need for replenishment study for river bed is required in order to nullify the adverse impacts arising due to excessive sand extraction. Mining within or near the riverbed has a direct impact on the stream's physical characteristics, such as channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature, etc. Alteration or modification of the above attributes may cause an impact on the ecological equilibrium of the riverine regime, disturbance in channel configuration and flow-paths. This may also cause an adverse impact on instream biota and riparian habitats. It is assumed that the riparian habitat disturbance is minimal if the replenishment is equal to excavation for a given stretch. Therefore, to minimize the adverse impact arising out of sand mining in a given river stretch, it is imperative to have a study of the replenishment of material during the defined period.

3.3 Generic Structure of Replenishment Study

Initially, the replenishment study requires four surveys. The first survey needs to be carried out in the month of April to record the level of mining lease before the monsoon. The second survey is at the time of closing of mines for monsoon season. This survey will provide the quantity of the material excavated before the offset of the monsoon. The third survey needs to be carried out after the monsoon to know the quantum of material deposited/replenished in the mining lease. The fourth survey at the end of March to know the quantity of material excavated during the financial year. For the subsequent years, there will be a requirement of only three surveys. The results of year-wise surveys help the state government to establish the replenishment rate of the river. Based on the replenishment rate, future auctions may be planned.

The replenishment period may vary on nature of the channel and season of deposition arising due to variation in the flow. Such periods and seasons may vary on the geographical and precipitation characteristics of the region and require to be defined by the local agencies, preferably with the help of the Central Water Commission and Indian Meteorological Department. The excavation will, therefore, be limited to estimated replenishment with consideration of other regulatory provisions.

3.4 Methodology for Replenishment Study

The replenishment estimation is based on the estimation of bed load transport comprising analytical models. The iso-pluvial maps of IMD can be used for estimation of rainfall. Catchment yield is computed using different standard empirical formulas relevant to the geographical and channel attributes. eg. Strange’s Monsoon runoff curves for runoff coefficient. Peak flood discharge for the study area can be calculated by using Dickens, Jarvis and Rational formula at 25, 50 and 100 years

return period. The estimation of bed load transport using Ackers and White Equation or similar. A simulation model is used with basic data generated from the field in the pre-study and post-study periods (preferably pre-monsoon and post-monsoon) to estimate the volume of replenished material. The particle size distribution and bulk density of the deposited material are required to be assessed from a NABL recognized laboratory. Considering the bulk density and the volume, the estimation of replenishment in weight will be calculated after considering safeguards and stability of the slopes and riverine regime. Some of the common methods used for field data acquisition for replenishment

3.5 Physical survey of the field by the conventional method

i. The conventional survey, DGPS and other survey tools are used to define the topography, contours and offsets of the lease area. The survey should clearly depict the important attributes of the stretch of the river and its nearby important civil and other features of importance. Such information will provide the eligible spatial area for mining. The contour and the elevation benchmarks will provide the baseline data for assessing the pre and post-study period scenario.

ii. Physical benchmarks are to be fixed at appropriate intervals (preferably 1 in 30 m), and the Reduced Level (RL) shall be validated from a nearby standard RL. These RL should be engraved on a steel plate (Bench Plate) and shall be fixed and placed at locations which are free from any damages and are available in pre and post-study periods. The bench plates shall be available for use during the mining period as a reference for all mining activity. Reference pillars may also be used in place of Bench Plates with visible and readable demarcation on the ground as common reference points to control the topographic survey and mining activity.

iii. Baseline data on elevation status for a grid of 10 m x 10 m is preferred to have accuracy in the assessment. It is expected that two consecutive cross-sections in longitudinal and lateral directions should not be more than 10 meters apart. However, the regulatory authority may fix these intervals depending on the geographical and site-specific conditions only after providing the scientific reason for such deviation.

iv. The changes observed in the elevation in pre and post-scenario at each node should be depicted in graphical forms with an appropriate scale to estimate the area of deposition and erosion. These graphical presentations should depict the active channel regime and the flow bed elevation with other important features required to be considered for estimation of the mining area. The area of deposition and erosion shall be identified for each reach after giving due regard to the stability and safety of active channel banks, and other features of importance. The elevation level shall be in reference to the nearest bench plates established for the purpose.

v. The levels (MSL & RL) of the corner point of each grid should be identifiable and safety barriers (non-Mining) be demarcated as restricted in consensus with Mineral

Concession Rules of the respective State and the provision mentioned in the Sustainable Sand Mining Management Guidelines.

vi. A clear identification is required to be highlighted between grids under the mineable and grids under the non-mineable area. These baseline data (pre and post) will be subjected to stimulation with the help of data mine software to derive the replenishment area and corresponding volume and estimated weight.

vii. The database should be structured in a tabulated form clearly depicting the nomenclature of the section lines, latitude and longitude of the starting point, chainage and respective levels of all the points taken on that section line.

viii. Net area shall be derived after the summation of the area of deposition minus the area of erosion for each cross-section. The volume will be estimated by multiplying the distance between two cross-sections with the average of net area of these two consecutive cross-sections.

ix. One sample per 900 square meters (30 m x 30 m) shall be the preferred for assessment of bulk density for estimation of deposition rate. Care should be taken that the sample for assessment of bulk density is taken from the deposition zone and not from erosion. However, depending on the site condition, river morphology and geographical condition, sample density may be adjusted. The reason for such deviation shall be appropriately highlighted in the report with supporting scientific data.

3.6 Use of UAV/Drone and other image data processing techniques

With the development in image data processing tools and their accuracy and acceptability, Drone/UAVs fitted with advanced cameras are used for survey purposes. Such technology has promising potential in the survey of sand mining zones due to its fast and reliable output deliveries. The survey is conducted using a set of instruments and compatible software to utilise the properly referenced data for depicting the topography of the study area. Instrument calibration and software compatibility and its validation with the ground data are an essential requirement for using this technique. The details of the instruments, their limitation, and the software used shall be demonstrated in the form of the accuracy assessment report through a chapter in the replenishment study report. Other details to be incorporated in the report with regard to the study using such imaginary techniques shall highlight the following:

a) Flight Planning: - The lease coordinates and the flight plan are devised to capture the front and side overlap percentages for each flight in reference to the global coordinates (Kml or SHP file) system. The software used for the purpose with basic analytical assumptions and its details, along with limitations, should be recorded.

b) Block file generation: - This operation concerns the selection of the sensor model the definition of block properties, the addition of Enforcement & Monitoring Guidelines for Sand Mining imagery to the block file, marking of GCPs, generation of tie points and refining of the model.

c) Interior orientation: - The interior orientation of the stereo pair rational polynomial coefficients (RPC) should be bundled with the scenes. RPCs are coefficients which are used by photogrammetric software to represent the ground-to-image viewing geometry.

d) Exterior orientation: For exterior orientation, ground control points shall be used, which are collected from the DGPS survey.

e) Aero Triangulation: - A critical phase in photogrammetric mapping is to rectify the satellite imagery at an appropriate tract on the surface of the earth. This is accomplished by collecting horizontal and vertical data [GCPs] to ascertain the spatial location of a number of features that are visible and measurable on the aerial images – this process is often called control bridging, which refers to passing horizontal and vertical information from one aerial image to the next.

f) Ortho Generation: - After running the above steps; the software shall automatically generate orthorectified imagery.

g) DTM extraction: For extraction of DTM, Generated point cloud data is classified manually to extract bare earth.

3.7 Accuracy Assessment of Aerial Data:

To check the accuracy of DTM generated by Aerial data, few points are selected and compared with on-site by using DGPS instrument for the ground-truthing purpose. It is preferred to do ground-truthing at minimum 5 locations spread evenly across the lease area. The readings from the DGPS instrument are then compared with the Drone data for accuracy assessment. A comparative chart will be prepared in comparison of Data related to ground-truthing (by DGPS) and from Drone. Such accuracy assessment report shall be a chapter of the replenishment study.

3.8 Replenishment study shall have the details of

1. List of instruments

2. List of software

3. Establishment of Benchmark by putting No. of pillar points and various Ground Control Points (GCP) at the site.

4. Ground Control Points (GCP) Collection: - Various GCPs were observed by using DGPS for Permanent Benchmarks and for control points.

5. The summary of the elevation data from each section's profile based on the post-monsoon survey should be mentioned in the table form.

6. The details of post-monsoon survey data in the tabular form shall be attached

7. The detailed comparison of both pre-monsoon and post-monsoon elevation data shall be attached

8. Cross-sectional depiction of deposition and erosion for each section in pre and post-deposition season shall be supported by relevant field study data and plan.

4.0 The Digital Framework with advanced technology may include the following components:

1. Develop a comprehensive GIS database for mapping sand deposits and identifying suitable mining sites.
2. Implement real-time monitoring systems to track mining activities and environmental parameters.
3. Enhance regulatory compliance through digitized permit management and reporting tools.
4. Facilitate community engagement and transparency through digital communication platforms.
5. Promote safety and risk management through digital systems and training programs.

5.0 Components of the Digital Framework:

5.1 GIS Mapping and Spatial Analysis:

Geomorphological surveys examine changes in river morphology caused by sand mining activities. Techniques such as remote sensing, GIS mapping, aerial photography, and field surveys are used to analyze river channel morphology, bank erosion, channel widening or narrowing, and changes in sedimentation patterns.

- Utilize GIS technology to map sand deposits, river morphology, and land use patterns.
- Conduct spatial analysis to identify environmentally sensitive areas and optimal mining sites.

5.2 Remote Sensing and Monitoring

For monitoring sand mining activities using GIS and remote sensing technologies, high-resolution satellite data would be highly beneficial. Here are

some satellite, UAV and ground-based data sources that are suitable for this purpose:

A. Space-borne multispectral sensors

- Resourcesat (LISS III), Landsat OLI series of 23-30m spatial resolution
- Sentinel-2 MSI, Resourcesat LISS IV, Planet Lab of 3-10m spatial resolution
- WorldView-3, WorldView-4, Cartosat – 3, Planetscope, Pleiades-1A and 1B of sub-meter spatial resolution

B. Space-borne Synthetic Aperture Radar (SAR)

- Sentinel-1, RISAT-1A (EOS-04), RADARSAT-2 of 10-30m spatial resolution

C. UAV/Drone-based sensors

- Multispectral camera (with GPS / DGPS) having centimeter spatial resolution
- LiDAR cloud points. Ground-based TLS (Terrain Laser Scanner) in combination with UAV-based LiDAR can provide high-precision vertical height and surface volumetry.

D. Google Earth Engine provides a powerful cloud-based platform

E. Other tools

- Deploy satellite imagery and drones for regular monitoring of mining activities.
- Use IoT sensors to collect real-time data on water quality, sediment transport, and land degradation.

5.3 Data Management and Integration:

- Establish a centralized database to store geological, environmental, and operational data.
- Integrate with regulatory agencies' systems for permit management and compliance monitoring.

5.4 Regulatory Compliance and Permit Management:

This assessment ensures that river sand mining activities comply with applicable laws, regulations, permits, and licensing requirements. It involves reviewing mining leases, environmental clearances, land use permits, and monitoring reports to verify compliance with legal frameworks.

- Develop an online platform for permit applications, approvals, and compliance reporting.

- Implement automated systems for tracking permit status and regulatory updates.

5.5 Environmental Impact Assessment (EIA) Tools:

EIA involves evaluating the potential environmental effects of sand mining activities on river ecosystems. It includes assessing impacts on water quality, sediment transport, aquatic habitats, flora and fauna, river morphology, and downstream areas. EIA helps in identifying mitigation measures to minimize adverse impacts.

- Integrate EIA tools to assess the environmental consequences of sand mining activities.
- Use predictive modelling to forecast impacts and evaluate mitigation measures.

5.6 Community Engagement and Transparency:

Engaging stakeholders, including government agencies, local communities, NGOs, industry representatives, and scientific experts, is essential throughout the assessment process. Participatory methods such as workshops, public hearings, consultations, and collaborative decision-making facilitate knowledge-sharing, consensus-building, and informed decision-making.

- Create digital platforms for stakeholders to provide feedback, access information, and participate in decision-making.
- Ensure transparency in permit issuance, monitoring reports, and environmental assessments.

5.7 Safety and Risk Management Systems:

- Establish digital systems for safety training, incident reporting, and emergency response.
- Monitor occupational health hazards and implement preventive measures.

6. Implementation Strategy:

By implementing these methods in a coordinated manner, authorities can effectively control sand mining activities while promoting environmental protection, social equity, and economic development. Continuous monitoring, adaptive management, and stakeholder engagement are essential for ensuring the long-term sustainability of sand mining operations.

1. Collaborate with government agencies, research institutions, and local communities to gather data and build consensus.
2. Pilot test the digital framework in selected sand mining sites within the Yamuna River basin.
3. Iterate based on feedback and lessons learned to refine the framework for broader implementation.

4. Provide training and capacity-building support to stakeholders to ensure the effective utilization of digital tools.

7.0 Conclusion:

The proposed digital framework offers a holistic approach to address the challenges of regulation of sand mining in the Yamuna riverbed. By integrating advanced technologies with regulatory mechanisms and community engagement strategies, sustainable sand mining practices can be promoted, ensuring the long-term health and resilience of the river ecosystem.

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