BEFORE THE NATIONAL GREEN TRIBUNAL,
EASTERN ZONE, KOLKATA
ORIGINAL APPLICATION NO. 120 (EZ) OF 2025

IN THE MATTER OF:

YOUTH UNITED FOR SUSTAINABLE ENVIRONMENT TURST ..APPLICANT

VERSUS

STATE OF ODISHA & ORS. ...RESPONDENT(S)

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Dated: 18 August, 2025
Place: Bhubaneswar

NOTARY
B.K. NAYAK
CUTTACK TOWN
REGD. No.ON-29/03
EXP. DT.29.07.2023
GOVT. OF ORISSA

BEFORE THE NATIONAL GREEN TRIBUNAL

EASTERN ZONE, KOLKATA
ORIGINAL APPLICATION NO. 120 (EZ) OF 2025

IN THE MATTER OF:

YOUTH UNITED FOR SUSTAINABLE ENVIRONMENT TURST ... APPLICANT

VERSUS

STATE OF ODISHA & ORS. ...RESPONDENT(S)

REPLY AFFIDAVIT ON BEHALF OF RESPONDENT NO.6, DEPUTY DIRECTOR GENERAL OF FORESTS, MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE, REGIONAL OFFICE, BHUBANESWAR

I, Dr. Timir Haran Mahato, S/o Shri P.C Mahato, aged about 50 years, currently working as Scientist 'E' in the Ministry of Environment, Forest and Climate Change (MoEF&CC), Regional Office, Bhubaneswar do hereby solemnly affirm and state as under: -

1. That I, in my official capacity of Scientist 'E' in the Ministry Environment, Forest and Climate Change, Regional Office, Bhubaneswar i.e. Respondent No. 6 in the above-mentioned matter, am conversant with the facts and circumstances of the case on the basis of official records, and as such authorized and competent to swear this affidavit.

2. That I, the above named Deponent, am authorized and well conversant with the facts and circumstances of the present case and thus competent to swear the present Affidavit.

Timir Haran Mahato

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3. That I have read and understood the contents of the present Affidavit. The contents thereof are true and no part of it is false and no material has been concealed therefrom.

4. That without prejudice to the above and as an alternative submission, the deponent craves liberty to raise further required contentions during the course of the proceedings if sought by this Hon'ble Tribunal.

6. It is most respectfully submitted that, the present application has been filed against the illegal operation of sand mining in Gunadei Brahmani Sand Quarry over an area of 11.80acres or 4.77 ha in village Gunadei under Odapada Tahsil of Dhenkanal District, Odisha, bearing Plot No.01, Khata No.301 (Kisam-Nadi) in violation of Environmental Clearance Conditions, Sustainable Sand Mining Management Guideline (SSMG), 2016 and Enforcement and Monitoring Guidelines for Sand Mining (EMGSM), 2020. Further, it is also alleged herein that the sand mining is permissible only by Manual Method, but the use of mechanical methods/earth movers are in violation of the Mining plan, EC conditions, Consent to Operate conditions,SSMG 2016 and, EMGSM 2020.

7. That it is most respectfully submitted that the quarry has been granted three ECs by the State Environment Impact Assessment Authority (SEIAA), Odisha. The first in 2021 to the Tahasildar, Odapada, Dt: Dhenkanal, Odisha subsequently transferred to the present private respondent (Sri Tripurai Sahu) on 12.07.2023 and later amended on 06.05.2024.

8. That, it is most respectfully submitted that the Ministry of Environment, Forest & Climate Change has notified Environment Impact Assessment (EIA) Notification, 2006 under the provisions of the Environment

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(Protection) Act, 1986 which deals with the process to grant prior Environment Clearances (EC) for the new projects and activities listed in the Schedule of this notification, for expansion and modernization of the existing projects and for any change in product-mix in an existing manufacturing units.

9. That, it is most respectfully submitted that EIA involves assessing the potential environmental effects of a proposed project, encompassing interconnected socio- economic, cultural, and human-health impacts both positive and negative. Furthermore, it's crucial to note that the granting of EC to a project isn't a singular step; it follows a prescribed process outlined in the EIA Notification, 2006, which includes:

- Stage (1)-Screening
- Stage (2) Scoping i.e. prescribing Terms of Reference (TOR) or undertaking detailed Environment Impact assessment studies.
- Stage (3) Public Consultation to be conducted by the respective State Pollution Control Board/UT Pollution Control Committee.
- Stage (4) - Appraisal - by Expert Appraisal Committee (EAC).

9. That, it is most respectfully submitted that, in exercise of the powers conferred upon the Central Government under sub section (3) of section 3 of the Environment (Protection) Act, 1986 and in accordance with the procedures specified in the EIA Notification, 2006, SEIAAs have been constituted in different States/UTs to discharge the functions of the regulatory authorities for the respective States/UTs.

10. That, it is most respectfully submitted that, the Ministry vide notification no. S.O. 637 (E) dated 28.02.2014 delegated the power to SEIAA to issue show cause notice to project proponents in case of violation of the

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conditions of the Environmental Clearances (EC) issued by the said Authorities to projects or activities within their jurisdiction and to issue directions to the said project proponents for keeping such EC in abeyance or withdrawing them, if required, for violations. Copy of the Notification S.O. 637 (E) dated 28.02.2014 is marked and annexed herein as **Annexure No. R1/1.**

11. That, it is most respectfully submitted that, the Ministry vide notification S.O. 1886 (E) dated 20.04.2022 has delegated the power to the State Level Environment Impact Assessment Authority (SEIAA) to grant Environmental Clearances to all minor mineral mining projects, irrespective of mine lease area and ≤ 250 ha mining lease area in respect of major mineral mining lease other than coal. Copy of notification dated 20.04.2022 is marked and annexed herein as **Annexure No. R1/2.**

12. That, it is pertinent to note that the present issue pertains to sand mining. In this regard, the Answering Respondent has formulated guidelines, namely the 'Enforcement & Monitoring Guidelines for Sand Mining' (EMGSM-2020), which supplement the existing 'Sustainable Sand Management Guidelines, 2016' (SSMG-2016). These guidelines aim to enhance the monitoring of sand mining, covering the entire process from the identification of sand mineral sources to their dispatch and end-use by consumers and the general public. Additionally, EMGSM-2020 serves as a reference document for collecting critical information necessary for enforcing regulatory provisions and outlines essential infrastructural requirements for effective monitoring of sustainable sand mining. Furthermore, both EMGSM-2020 and SSMG-2016 shall be read and implemented in sync with each other. In the event of any ambiguity or inconsistency between the provisions of these documents, the provisions of the 'Enforcement & Monitoring Guidelines for Sand Mining-2020'

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shall prevail. Copy of the "Enforcement & Monitoring Guidelines for Sand Mining" (EMGSM-2020) is marked and annexed herewith as **ANNEXURE R1/3** and Sustainable Sand Mining Management Guidelines 2016 (SSMG-2016), is marked and annexed herewith as **ANNEXURE R1/4.**

14. That it is most respectfully submitted that, the State Department of Mines and Geology is the Nodal Authority in the State for dealing with the allotment of mining leases under the Mines and Minerals (Development and Regulation) Act (MMDR Act) and is entrusted with the enforcement and regulation of mining operations in a State including illegal mining. Further, the State Government is empowered under Section 23 C of the Mines and Minerals (Development and Regulation) Act 1957(MMDR Act) to make rules for prevention of illegal mining, transportation and storage of minerals.

15. That, Ministry of Mines has prepared a 'Sand Mining Framework' in consultation with Mining Departments of the States incorporating best practices amongst States and suggestions based on the objectives of sustainability, availability, affordability and transparency in the sand mining. The 'Sand Mining Framework' has been circulated to all the States for necessary action. Copy of the Sand Mining Framework is marked and annexed herein as **ANNEXURE R1/5**.

16. That it is most respectfully submitted that the State Pollution Control Board 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.

Tinia Hazra Mahat

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17. That in view of the aforementioned facts and circumstances, this Hon'ble Tribunal may kindly be pleased to pass appropriate order(s)/directions as the Hon'ble Tribunal may deem fit and proper in the interest of justice.

Timir Haran Mahat

DEPONENT

[redacted]

VERIFICATION

Verified at Bhubaneswar on this 18th day of August, 2025 that the contents of this affidavit based on official record(s) maintained and information available in the office are true and correct, no part of it is false and nothing has been concealed there from.

Timir Haran Mahat

VERIFICANT

[redacted]



The deponent being identified by Self Adv/Clerk swears on oath & solemnly affirms before me on dt: 18/08/2025 that the facts stated above are true to his/her knowledge.

18/08/2025

Notary for Cuttack Town
Govt. of Orissa
Regn. No ON-29/03

रजिस्ट्री सं० डी० एल०-33004/99 REGD. NO. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

असाधारण
EXTRAORDINARY
भाग II—खण्ड 3—उप-खण्ड (ii)
PART II—Section 3—Sub-section (ii)
प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 545] नई दिल्ली, मंगलवार, मार्च 4, 2014/फाल्गुन 13, 1935
No. 545] NEW DELHI, TUESDAY, MARCH 4, 2014/PHALGUNA 13, 1935

पर्यावरण और वन मंत्रालय

अधिसूचना

नई दिल्ली, 28 फरवरी, 2014

का.आ. 637(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 23 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए उक्त अधिनियम की धारा 5 के अधीन इसमें निहित शक्तियों को पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 की उप-धारा (3) के अधीन केंद्रीय सरकार द्वारा गठित किए गए सभी राज्य और संघराज्यक्षेत्र पर्यावरण समाघात प्राधिकरणों (जिन्हें इसमें इसके पश्चात् उक्त प्राधिकरण कहा गया है) को उक्त प्राधिकरणों द्वारा अपनी अधिकारिता के भीतर परियोजनाओ या क्रिया कलापों को जारी पर्यावरण अनापत्तियों की शर्तों के अतिक्रमण की दशा में परियोजना प्रस्तावकों को कारण बताओ नोटिस जारी करने तथा इस शर्त के अधीन कि केंद्रीय सरकार शक्तियों के ऐसे प्रत्यायोजन का प्रतिसंहरण कर सकेगी या उक्त अधिनियम की धारा 5 के उपबंधों को स्वयं अवलंब ले सकेगी, यदि केंद्रीय सरकार की राय में लोक हित में ऐसी कार्यवाही आवश्यक है, यदि अपेक्षित हो तो अतिक्रमणों के लिए उक्त परियोजना प्रस्तावकों को ऐसी पर्यावरण अनापत्तियों को उन्हें प्रास्थगित रखने या वापस लिए जाने हेतु निदेश जारी करने की शक्तियों का प्रत्यायोजन करती है।

[सं. जे-11013/2/2013-आई ए (आई)]

अजय त्यागी, संयुक्त सचिव

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 28th February, 2014

S.O. 637(E).—In exercise of the powers conferred by section 23 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby delegates the powers vested in it under section 5 of the said Act to all the State and Union Territory Environment Impact Assessment Authorities (Hereinafter referred to as the said Authorities) constituted by the Central Government under sub-section (3) of section 3 of Environment (Protection) Act, 1986, to issue show cause notice to project proponents in case of violation of the conditions of the envioronment clearances issued by the said Authorities to projects or activities within their jurisdiction and to issue directions to the said project proponents for keeping such environment clearances in abeyance or withdrawing them, if required, for violations, subject to the condition that the Central Government may revoke such delegations of powers or may itself invoke the provisions of section 5 of the said Act, if in the opinion of the Central Government such a Course of action is necessary in the public interest.

[No. J-11013/2/2013-IA. (I)]

AJAY TYAGI, Jt. Secy.

अधिसूचना

नई दिल्ली, 28 फरवरी, 2014

का.आ. 638(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 19 के खण्ड (क) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए उक्त की धारा के प्रयोजन के लिए इससे उपाबद्ध उस सारणी के स्तंभ (3) में उनमे से प्रत्येक के सामने उल्लिखित अधिकारिता के साथ उस सारणी के स्तंभ (2) में उल्लिखित प्राधिकरण या अधिकारी को प्रातिकृत करती है:

सारणी

क्रम संख्यांक	प्राधिकरण/अधिकारी	अधिकारिता
(1)	(2)	(3)
1.	पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 की उपधारा (3) के अधीन केंद्रीय सरकार द्वारा गठित राज्य या संघ राज्यक्षेत्र स्तर पर्यावरण समाघात प्राधिकरण (एस.ई.आई.ए.ए.)	संपूर्ण राज्य या संघ राज्यक्षेत्र
2.	पर्यावरण और वन मंत्रालय (एम.ओ.ई.एफ.) के किन्हीं प्रादेशिक कार्यालयों में तैनात कोई निदेशक, वन संरक्षक या अपर प्रधान मुख्य वन संरक्षक	पर्यावरण और वन मंत्रालय द्वारा यथा-विनिश्चित प्रादेशिक कार्यालय की अधिकारिता

[सं. जे-11013/2/2013-आई ए (आई)]

अजय त्यागी, संयुक्त सचिव

NOTIFICATION

New Delhi, the 28th February, 2014

S.O. 638(E).—In exercise of the powers conferred by clause (a) of section 19 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby authorises the Authority or officer mentioned in column (2) of the Table hereto for the purpose of the said section with the jurisdiction mentioned against each of them in column (3) of that Table:

TABLE

S. No.	Authority/Officer	Jurisdiction
(1)	(2)	(3)
1.	State or Union Territory level Environment Impact Assessment Authority (SEIAA) constituted by the Central Government under sub-section (3) of section 3 of the Environment (Protection) Act, 1986.	Whole of State or Union Territory
2.	Any Director, Conservator of Forests or Additional Principal Chief Conservator of Forests Posted in any of the Regional Offices of the Ministry of Environment and Forests (MoEF).	Jurisdiction of the Regional Office as decided by the Ministry of Environment and Forests

[No. J-11013/2/2013-IA. (I)]

AJAY TYAGI, Jt. Secy.

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भारत का राजपत्र
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असाधारण
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)
PART II—Section 3—Sub-section (ii)

प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 1795] नई दिल्ली, बुधवार, अप्रैल 20, 2022/चैत्र 30, 1944
No. 1795] NEW DELHI, WEDNESDAY, APRIL 20, 2022/CHAITRA 30, 1944

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 20 अप्रैल, 2022

का.आ. 1886(अ).—केंद्रीय सरकार पर्यावरण और वन विभाग के पूर्ववर्ती मंत्रालय में पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा (3) की उप-धारा (1) और उप-धारा (2) के खंड (v) के अधीन प्रदत्त शक्तियों का प्रयोग करते हुए, पर्यावरण समाघात निर्धारण अधिसूचना, 2006 (जिसे इसमें इसके पश्चात ईआईए अधिसूचना, 2006 कहा गया है), परियोजनाओं की कतिपय प्रवर्ग के लिए पूर्व पर्यावरणीय मंजूरी आज्ञापक बनाने के लिए, संख्या का.आ.1533(अ), तारीख 14 सितंबर, 2006 द्वारा प्रकाशित की है।

और राज्य पर्यावरण समाघात निर्धारण प्राधिकरण (एसईआईएए) का गठन प्रवर्ग ख के अधीन सभी प्रस्तावों के लिए पर्यावरण मंजूरी (ईसी) पर विचार और अनुदान के लिए प्रत्यायोजित शक्तियों का प्रयोग करने हेतु राज्य स्तर पर ईआईए अधिसूचना, 2006 के कार्यान्वयन के लिए पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 3 की उप-धारा (3) के अधीन किया गया है;

और राज्य पर्यावरण समाघात निर्धारण प्राधिकरण ने पर्यावरण मंजूरी मूल्यांकन प्रक्रिया में पिछले पंद्रह वर्षों में पर्याप्त अनुभव प्राप्त किया है और राज्य स्तर पर पर्यावरण मंजूरी प्रस्तावों के कुशल और पारदर्शी निपटान के लिए परिवेश पोर्टल के माध्यम से पूरी तरह से ऑनलाइन कर दिया गया है;

और केंद्रीय सरकार राज्य स्तर पर मंजूरी की प्रसुविधा के लिए पर्यावरण मंजूरी प्रक्रिया को और विकेंद्रीकृत करना आवश्यक समझती है;

और आज की तारीख में, सुरक्षा भागीदारी के महत्वपूर्ण तत्वों के साथ राष्ट्रीय रक्षा और सामरिक महत्व से संबंधित प्रवर्ग ख की परियोजनाओं का राज्य स्तर पर भी मूल्यांकन किया जा रहा है, जिसे केंद्रीय सरकार राष्ट्रीय सुरक्षा चिंताओं को ध्यान में रखते हुए केंद्रीय रूप से मूल्यांकन करना आवश्यक समझती है;

अतः अब, केंद्रीय 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 उक्त नियमों के नियम 5 के उप-नियम (3) के खंड (क) के अधीन नोटिस की अपेक्षा को समाप्त करने के पश्चात, लोकहित में भारत सरकार की तत्कालीन पर्यावरण एवं वन मंत्रालय की अधिसूचना संख्यांक का.आ. 1533(अ), तारीख 14 सितम्बर, 2006,की अधिसूचना में निम्नलिखित और संशोधन करती है अर्थात्:-

उक्त अधिसूचना में-

(1) पैरा 4 में, उप-पैरा (iii क) के स्थान पर, निम्नलिखित रखा जाएगा, अर्थात्: -

(iii क) राष्ट्रीय रक्षा या सामरिक या सुरक्षा महत्व से संबंधित हैं या जिन्हें केंद्रीय सरकार द्वारा संकटकाल जैसे महामारी, प्राकृतिक आपदाओं जैसी अत्यावश्यकताओं के कारण ऐसी प्रवर्ग 'ख' परियोजनाओं को अधिसूचित किया गया है या राष्ट्रीय कार्यक्रमों या स्कीमों या मिशन या ऐसी परियोजनाओं के अधीन पर्यावरण के अनुकूल क्रियाकलापों का संवर्धन करने के लिए जो इस अधिसूचना में यथा अधिकथित समय-सीमा से अधिक विलंबित हैं और समय-समय पर इस संबंध में यथा-अधिकथित मानदंडों को पूरा करती हैं, उन्हें केंद्रीय स्तर पर प्रवर्ग 'ख' परियोजनाओं के रूप में विचार किया जाएगा;

(2) अनुसूची में, -

(i) मद 1(क) के सामने,-

(क) स्तंभ (3) में, -

(क) गैर-कोयला खनन पट्टे के संबंध में "> 100 हेक्टेयर खनन पट्टा क्षेत्र" के स्थान पर, निम्नलिखित रखा जाएगा, अर्थात्: -

"कोयले के अलावा अन्य प्रमुख खनिज खनन पट्टे के संबंध में >250 हेक्टेयर खनन पट्टा क्षेत्र";

(ख) ">150 हेक्टेयर" प्रतीक, अंक और अक्षर के स्थान पर, "> 500 हेक्टेयर" प्रतीक, आंकड़े और अक्षर रखे जाएंगे;

(ख) स्तंभ (4) में, -

(क) गैर-कोयला खनन के संबंध में <100 हेक्टेयर खनन पट्टा क्षेत्र के स्थान पर,

पट्टा", निम्नलिखित रखा जाएगा, अर्थात्: -

"लघु खनिज खनन पट्टों के संबंध में सभी खनन पट्टा क्षेत्र और कोयले के अलावा अन्य प्रमुख खनिज खनन पट्टे के संबंध में <250 हेक्टेयर खनन पट्टा क्षेत्र";

(ख) "<150 हेक्टेयर" के प्रतीकों, अंकों और अक्षरों के स्थान पर "<500 हेक्टेयर" के प्रतीक, अंक और अक्षर रखे जाएंगे;

(ii) मद 1(ग) के सामने, -

(क) स्तंभ (3) में, -

(क) क्रम संख्या (i) में, "> 50 मेगावाट, प्रतीकों, अंकों और अक्षरों के स्थान पर "> 100 मेगावाट "प्रतीक, आंकड़े और अक्षर रखे जाएंगे;

(ख) क्रम संख्या (ii) और उससे संबंधित प्रविष्टियों का लोप किया जाएगा;

(ख) स्तंभ (4) में, -

(क) क्रम संख्या (i) में, "<50 मेगावाट' प्रतीक, अंक और अक्षर के स्थान पर, "<100 मेगावाट' प्रतीक, आंकड़े और अक्षर रखे जाएंगे;

(ख) क्रम संख्या (ii) में, -

(I) "और <50,000 हेक्टेयर" शब्द, प्रतीक और अंक का लोप किया जाएगा;

(II) बिंदु (ग) में सारणी में, "से <50,000" शब्द, प्रतीक और अंक का लोप किया जाएगा; ।

(ग) स्तंभ (5) में, क्रम संख्या (ii) के पश्चात, निम्नलिखित क्रम संख्या अंत:स्थापित किया जाएगा, अर्थात् :-

"(iii) अंतर-राज्यीय मुद्दों से संबंधित सिंचाई परियोजनाओं का मूल्यांकन केंद्रीय स्तर पर श्रेणी में परिवर्तन के बिना किया जाएगा।";

(iii) मद 1(घ) के सामने,-

(क) स्तंभ (3) में, "> 50 मेगावाट" प्रतीकों, अंकों और अक्षरों के स्थान पर, "> 100 मेगावाट" प्रतीकों, अंकों और अक्षरों को रखा जाएगा;

(ख) स्तंभ (4) में, "<50 मेगावाट' प्रतीक, अंक और अक्षर के स्थान पर, "<100 मेगावाट" प्रतीक, आंकड़े और अक्षर रखे जाएंगे;

(iv) मद 2(क) के सामने, -

(क) स्तंभ (3) में, ">1" प्रतीकों और अंक के स्थान पर, ">2.5 "प्रतीकों और अंक को रखा जाएगा;

(ख) स्तंभ (4) में, "<1" प्रतीकों और अंक के स्थान पर, "< 2.5" प्रतीक और अंक रखे जाएंगे;

(ग) स्तंभ (5) में,विद्यमान पैरा के पश्चात, निम्नलिखित पैरा अंत:स्थापित किया जाएगा, अर्थात्: -

"खनन पट्टा क्षेत्र के भीतर स्थित धुलाई मशीनों के साथ एकीकृत कोयला खनन परियोजनाओं को कोयला खनन परियोजनाओं के लिए विद्यमान सीमा के अनुसार केंद्रीय स्तर या राज्य स्तर पर, यथास्थिति, विचार किया जाना जारी रहेगा।";

(v) मद 2 (ख) के सामने, -

(क) स्तंभ (3) में,विद्यमान प्रविष्टियों का लोप किया जाएगा;

(ख) स्तंभ (4) में, "<0.5 मिलियन टीपीए का उत्पादन" प्रतीक, अंक, शब्द और अक्षर के स्थान पर, "सभी खनिज परिष्करण परियोजना, परिष्करण की प्रक्रिया पर ध्यान दिए बिना" शब्द रखे जाएंगे;

(ग) स्तंभ (5) में,विद्यमान पैरा के पश्चात, निम्नलिखित पैरा रखा जाएगा,

अर्थात्: -

"भीतर स्थित लाभकारी संयंत्रों के साथ एकीकृत खनन परियोजनाएं खनन पट्टा क्षेत्र पर केन्द्रीय स्तर पर विचार किया जाता रहेगा या यथास्थिति, राज्य स्तर, खनन परियोजनाओं के लिए विद्यमान सीमा के अनुसार।";

(vi) मद 7 (क) के सामने,-

(क) स्तंभ (3) में, "सभी परियोजनाओं" शब्दों के स्थान पर "सभी नई परियोजनाएं" शब्द रखे जाएंगे;

(ख) स्तंभ (4) में, निम्नलिखित अंत:स्थापित किया जाएगा, अर्थात्: -

"सभी विस्तार परियोजनाएं, जिनमें हवाई पट्टियां भी सम्मिलित हैं, जो वाणिज्यिक उपयोग के लिए हैं।"

[फा. सं. आईए 3-22/10/2022-आईए. III]

डॉ. सुजीत कुमार बाजपेयी, संयुक्त सचिव

टिप्पण : मूल अधिसूचना भारत के राजपत्र, असाधारण, भाग II, खंड III, उप-खंड (ii), संख्या का.आ. 1533(अ), तारीख 14 सितंबर, 2006 द्वारा प्रकाशित की गई थी और अधिसूचना संख्या का.आ. 1807(अ), तारीख 12 अप्रैल, 2022 द्वारा अंतिम संशोधन किया गया था ।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 20th April, 2022

S.O. 1886(E).—WHEREAS, the Central Government in the erstwhile Ministry of Environment and Forests, in exercise of its powers under sub-section (1) and clause (v) of sub-section (2) of section (3) of the Environment (Protection) Act, 1986 has published the Environment Impact Assessment Notification, 2006 (hereinafter referred to as the EIA Notification, 2006), vide number S.O.1533 (E), dated the 14th September, 2006 for mandating prior environmental clearance for certain category of projects;

And whereas, the State Environment Impact Assessment Authorities (SEIAAs) have been constituted under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 for implementation of the EIA Notification, 2006 at State level for exercising delegated powers to consider and grant Environmental Clearance (EC) for all proposals under Category B;

And whereas, the SEIAAs have gained substantial experience over the past fifteen years in the EC appraisal process and the process at the State level has also been made completely online through the PARIVESH portal for efficient and transparent disposal of EC proposals;

And whereas, the Central Government deems it necessary to further decentralise the EC process for facilitating clearances at State level;

And whereas, as on date, category 'B' projects, relating to national defence and strategic importance with significant element of security involvement are also being appraised at the State level which, the Central Government deems it necessary to be appraised centrally taking into account national security concerns;

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 rule 5 of the said rules, in public interest, hereby makes the following further amendments in 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, namely:-

In the said notification,-

(1) in paragraph 4, for sub-paragraph (iii a), the following shall be substituted, namely:-

(iii a) Such Category 'B' projects, relating to the National defence or strategic or security importance or those as notified by the Central Government on account of exigencies such as pandemics, natural disasters or to promote environmentally friendly activities under National Programmes or Schemes or Missions or such projects which are inordinately delayed beyond the stipulated timeline as laid down in this notification and also meet the criteria as laid down in this regard from time to time, shall be considered at the Central level as Category 'B' projects;

(2) in the Schedule,–

(i) against item 1(a),–

(a) in column (3),–

(A) for ">100 ha. of mining lease area in respect of non-coal mining lease", the following shall be substituted, namely:–

">250 ha mining lease area in respect of major mineral mining lease other than coal";

(B) for the symbol, figures and letters "> 150 ha", the symbol, figures and letters "> 500 ha" shall be substituted;

(b) in column (4),–

(A) for "≤ 100 ha of mining lease area in respect of non-coal mine lease", the following shall be substituted, namely:–

"All mining lease area in respect of minor mineral mining leases and ≤ 250 ha mining lease area in respect of major mineral mining lease other than coal";

(B) for the symbols, figures and letters "≤ 150 ha", the symbols, figures and letters "≤ 500 ha" shall be substituted;

(ii) against item 1(c),–

(a) in column (3),–

(A) in serial number (i), for the symbols, figures and letters "≥ 50 MW", the symbols, figures and letters "≥100 MW" shall be substituted;

(B) serial number (ii) and the entries relating thereto shall be omitted;

(b) in column (4),–

(A) in serial number (i), for the symbol, figures and letters "< 50 MW", the symbol, figures and letters "< 100 MW" shall be substituted;

(B) in serial number (ii),–

(I) the word, symbol and figures "and < 50,000 ha." shall be omitted;

(II) in point (c) in the table, the word, symbol and figures "to < 50,000" shall be omitted;

(c) in column (5), after serial number (ii), the following serial number shall be inserted, namely:–

"(iii) Irrigation projects involving Inter-State issues shall be appraised at Central level without change in category.";

(iii) against item 1(d),–

(a) in column (3), for the symbols, figures and letters "≥ 50 MW", the symbols, figures and letters "≥100 MW" shall be substituted;

(b) in column (4), for the symbol, figures and letters "< 50 MW", the symbol, figures and letters "< 100 MW" shall be substituted;

(iv) against item 2(a),–

(a) in column (3), for the symbols and figure "≥1", the symbols and figures "≥ 2.5" shall be substituted;

(b) in column (4), for the symbols and figure "<1", the symbols and figures "< 2.5" shall be substituted;

(c) in column (5), after the existing paragraph, the following paragraph shall be inserted, namely:–

"Integrated coal mining projects with washeries located within mining lease area shall continue to be considered at Central level or State level, as the case may be, as per the extant threshold for coal mining projects.";

(v) against item 2 (b),–

(a) in column (3), the existing entries shall be omitted;

(b) in column (4), for the symbol, figures, words and letters "< 0.5 million TPA throughput", the words "All mineral beneficiation projects irrespective of the procedure for beneficiation" shall be substituted;

(c) in column (5), after the existing paragraph, the following paragraph shall be inserted, namely:–

"Integrated mining projects with beneficiation plants located within mining lease area shall continue to be considered at Central level or State level, as the case may be, as per the extant threshold for mining projects.";

(vi) against item 7 (a),–

(a) in column (3), for the words "All projects", the words "All new projects" shall be substituted;

(b) in column (4), the following shall be inserted, namely:–

"All expansions projects, including airstrips, which are for commercial use.".

[F. No. IA3-22/10/2022-IA.III]

Dr. SUJIT KUMAR BAJPAYEE, Jt. Secy.

Note : The principal notification was published in the Gazette of India, Extraordinary, Part II, Section III, sub-section (ii), vide, number S.O. 1533(E), dated the 14th September, 2006 and was last amended, vide, the notification number S.O. 1807(E), dated the 12th April, 2022.

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Annexure - R1/3



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.

सत्यमेव जयते

SUSTAINABLE SAND MINING MANAGEMENT GUIDELINES 2016



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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:

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2. Dr. U. Sridharan, Scientist 'F'
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SUSTAINABLE SAND MINING MANAGEMENT GUIDELINES

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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.

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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.

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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.

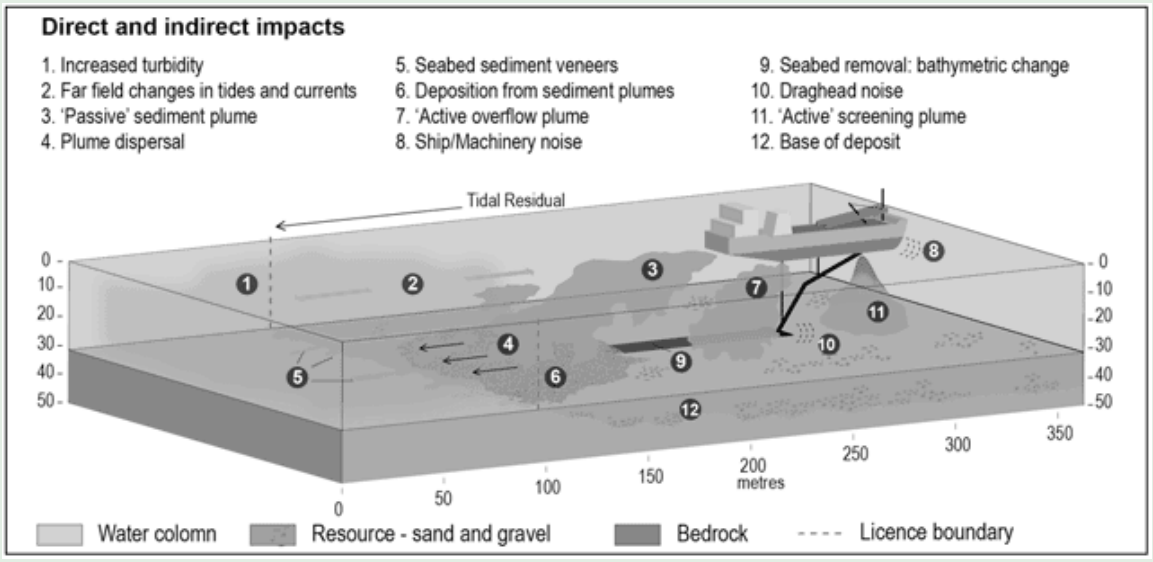


Figure: Direct and indirect consequences of aggregates dredging on the marine environment.

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.

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

GOVERNMENT OF INDIA
MINISTRY OF MINES

Sand Mining Framework



March 2018

नरेन्द्र सिंह तोमर
NARENDRA SINGH TOMAR

सत्यमेव जयते

ग्रामीण विकास,
पंचायती राज और खान मंत्री
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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.

15/3/16

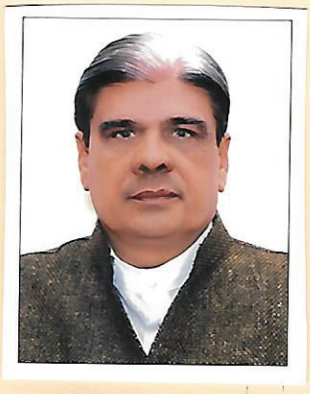
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Minister of State for Mines and Coal
Government of India
New Delhi-110011



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.

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सचिव

ARUN KUMAR, I.A.S.
Secretary

सत्यमेव जयते

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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.

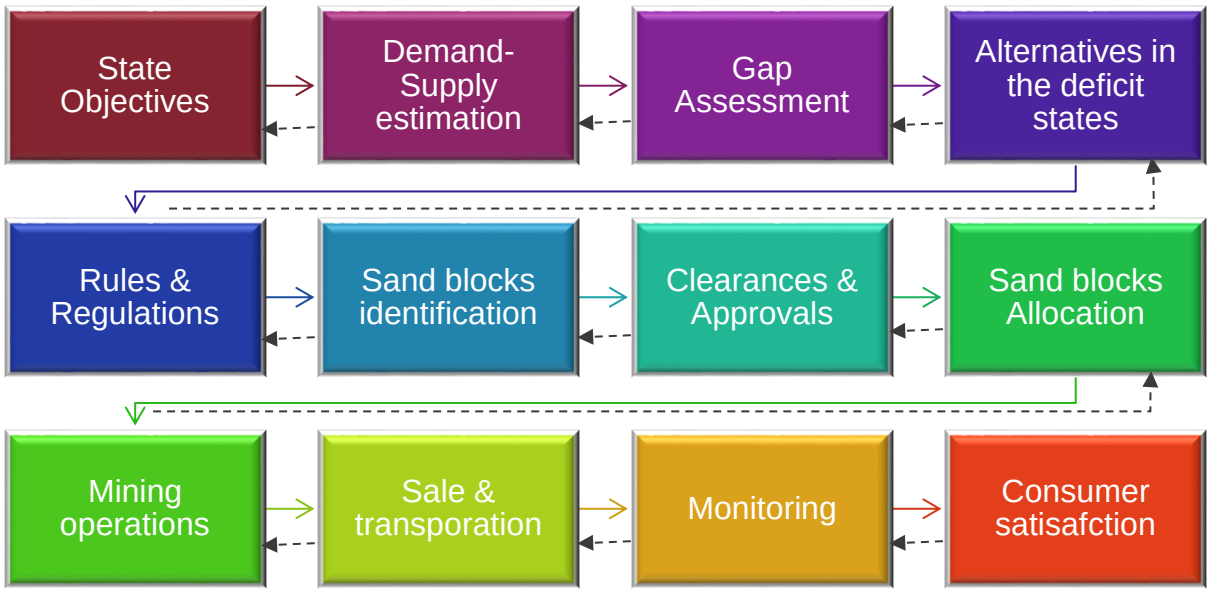
1.1.4 States face different geological endowments, demand & supply scenario and have different objectives of their sand policies. The group visited 14 States and experience was gathered by the visits of the group to the field to document existing/ best practices, as well as to analyze and evaluate the 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

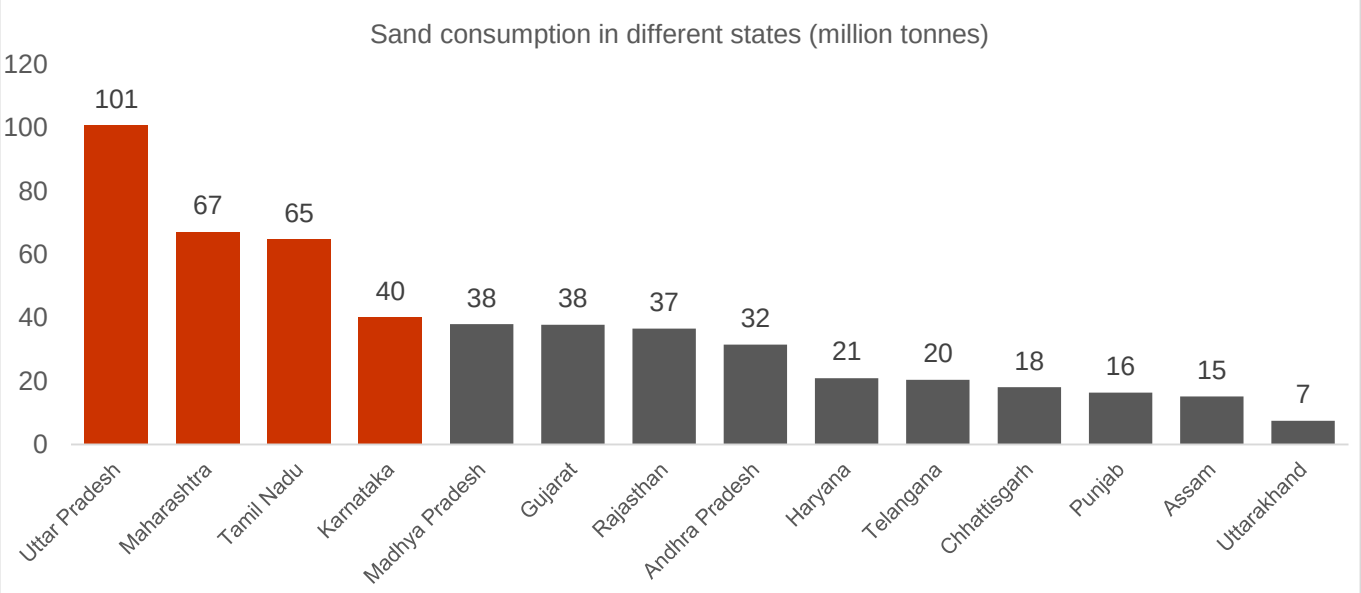
The State-wise demand of sand in India for FY17 has been estimated based on the following factors:

- 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

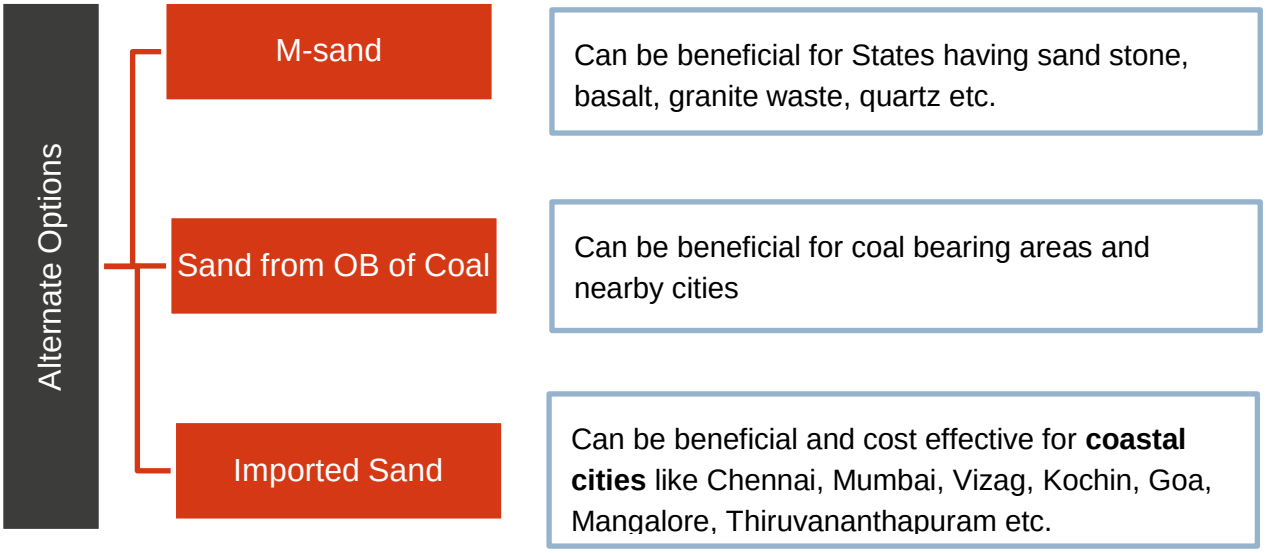
After estimation of gap derived from demand supply assessment, States need to analyse the alternate options for sand, available with them. Considering the large deficits in demand and supply of sand, alternate options need to be promoted, as:

- ✓ 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.

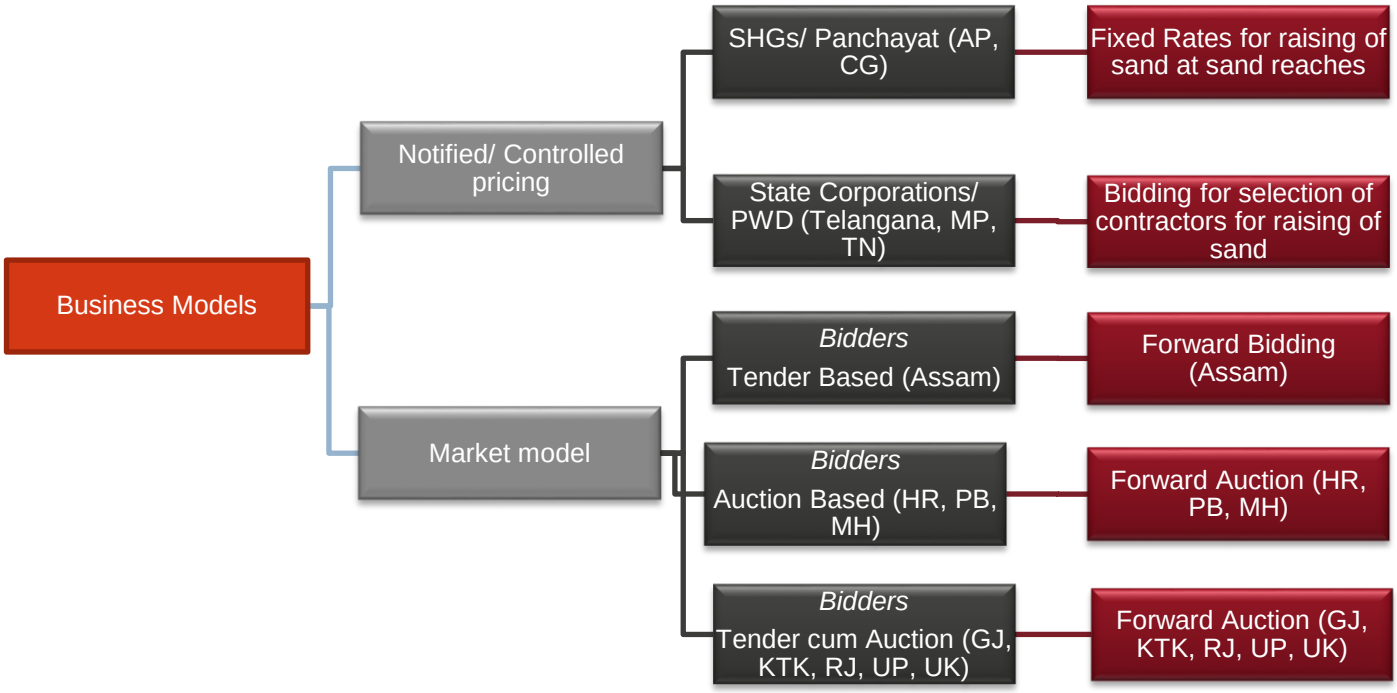
1.2.9.3 Market model

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.

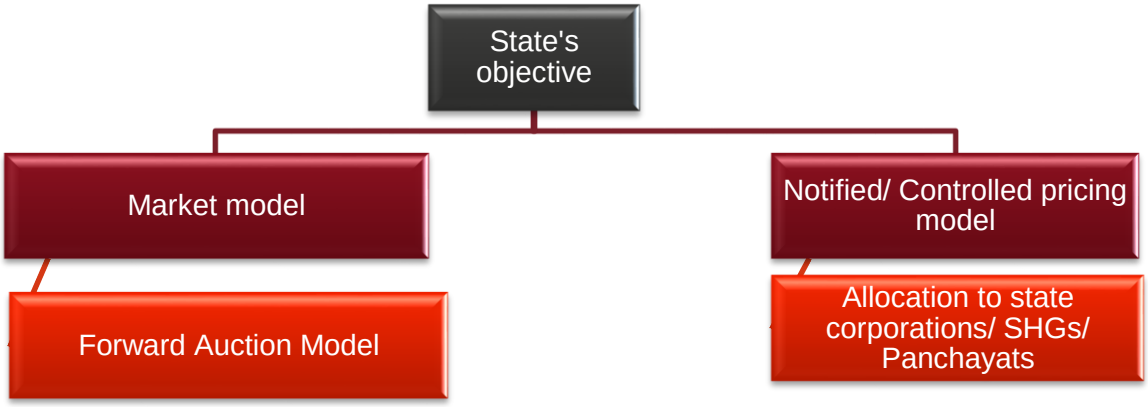
Figure 1- 5 Types of Business Models followed by the States



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.

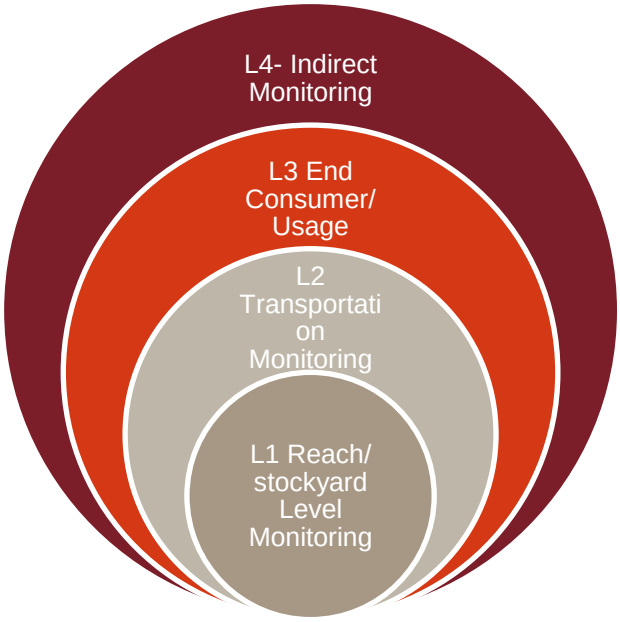
All sand carrying vehicles should have a valid transport permit. The transport permit for transportation of sand should be generated at the stockyard after verification of the payment. The transport permit should have a scan code to ensure that the single transport pass is not photocopied and used more 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.

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.

"

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

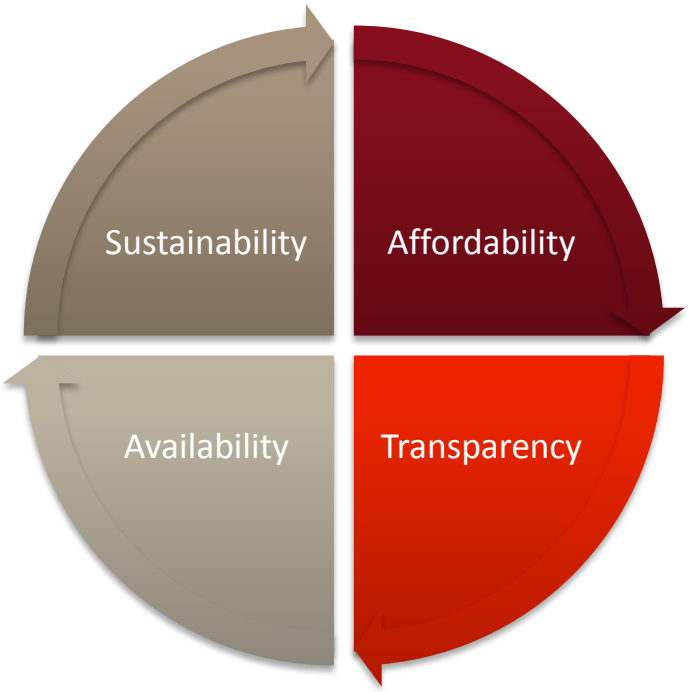
Due to various issues in sand mining and in pursuance to the deliberations of the State Mining Minister's Conference held on 4th May 2017 held at New Delhi, a committee chaired by the Secretary, Ministry of Mines, Government of India along with officials from State Governments was constituted by order 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

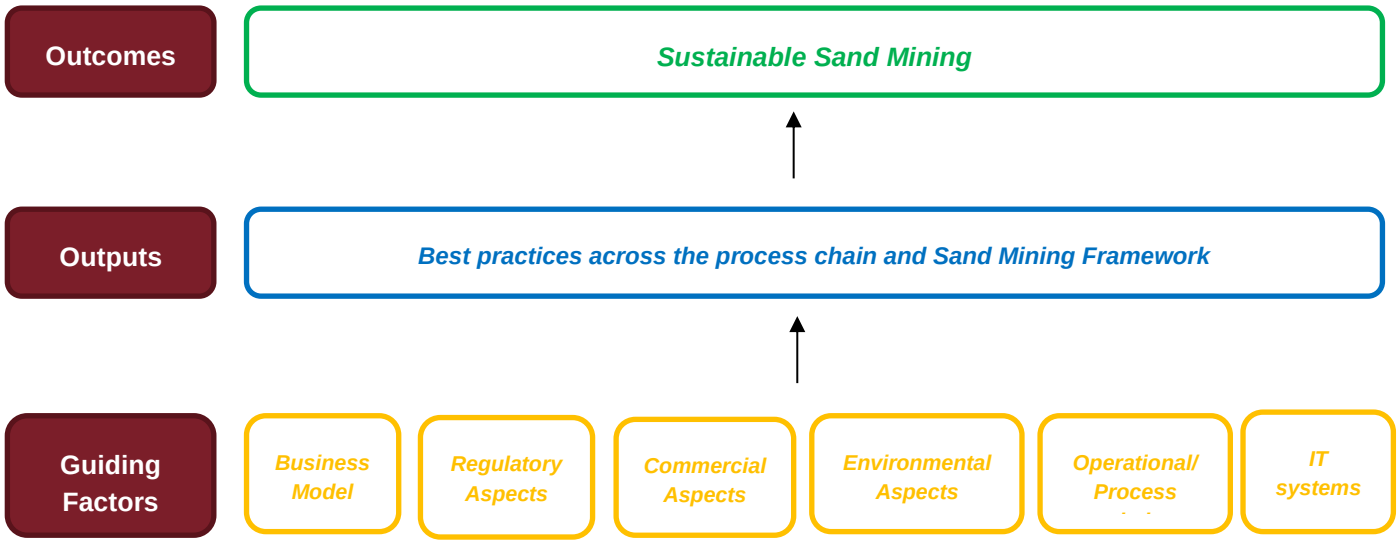
Transparency in any process is a measure of control of flaws in the system and also builds trust among the stakeholders. It is extremely important to have utmost transparency in the entire process including allocation, operations and sale of sand so as to tackle the challenges facing the sector. To enhance 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.

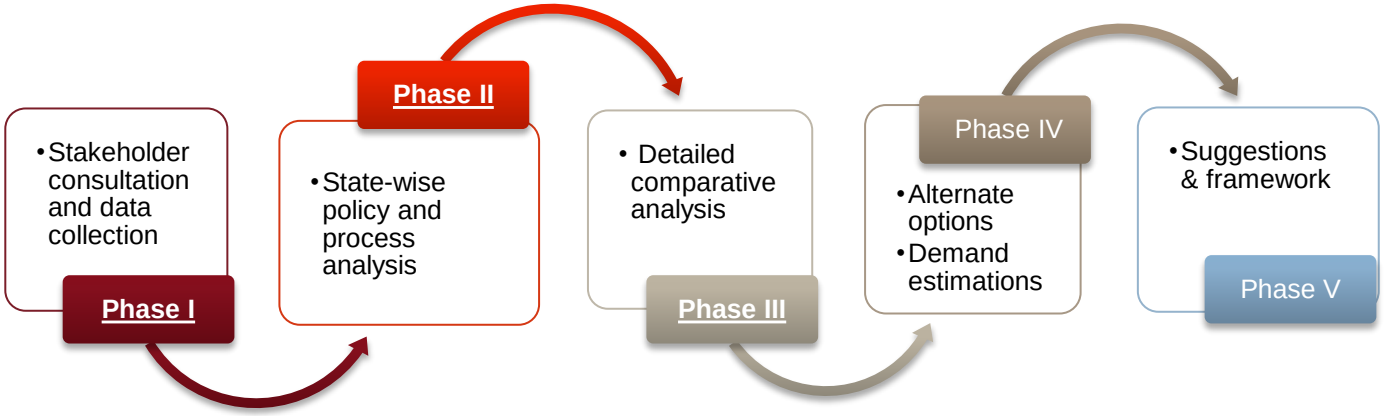
Figure 2- 3 Overall approach



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



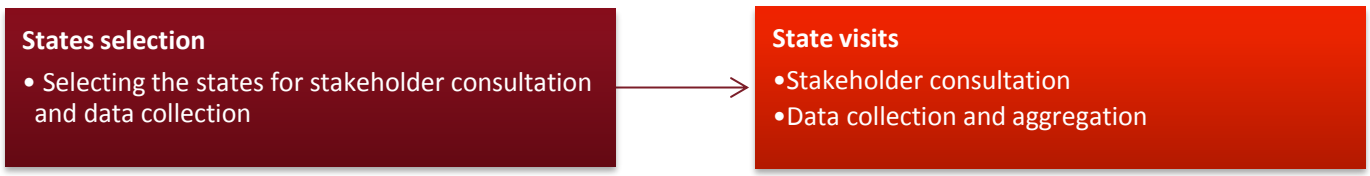
The approach and methodology was developed to comprehensively cover all required aspects of the study, as discussed below.

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

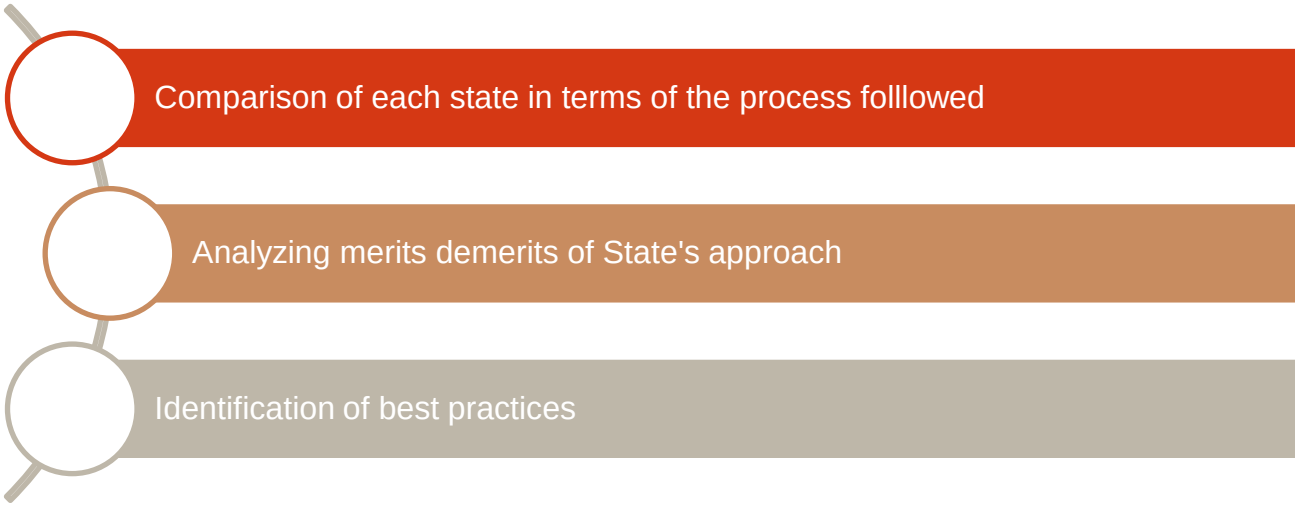
given on the steps taken by the respective authorities to curb illegal mining in the States and its effects. These outcomes play an important role in formation of the sand mining framework.

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***

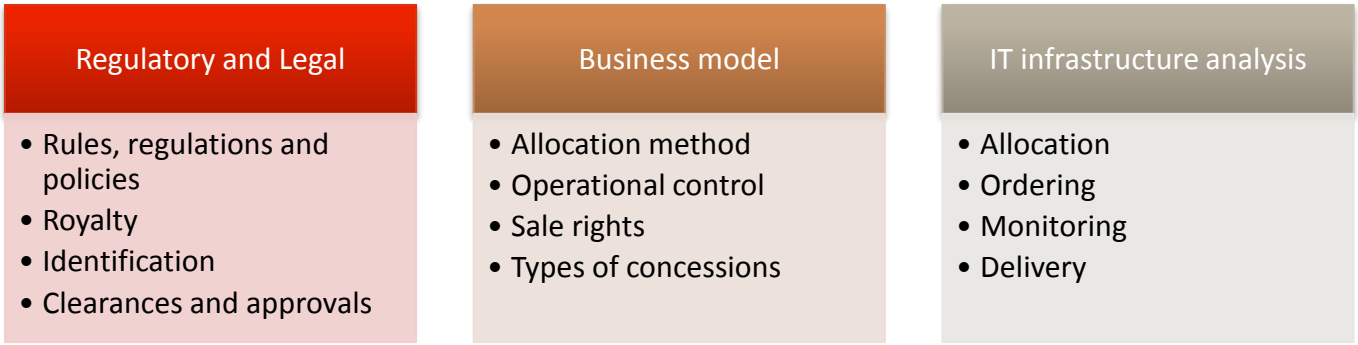
This phase involved comparison of States against different parameters across the sand mining chain to identify best practices.

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.

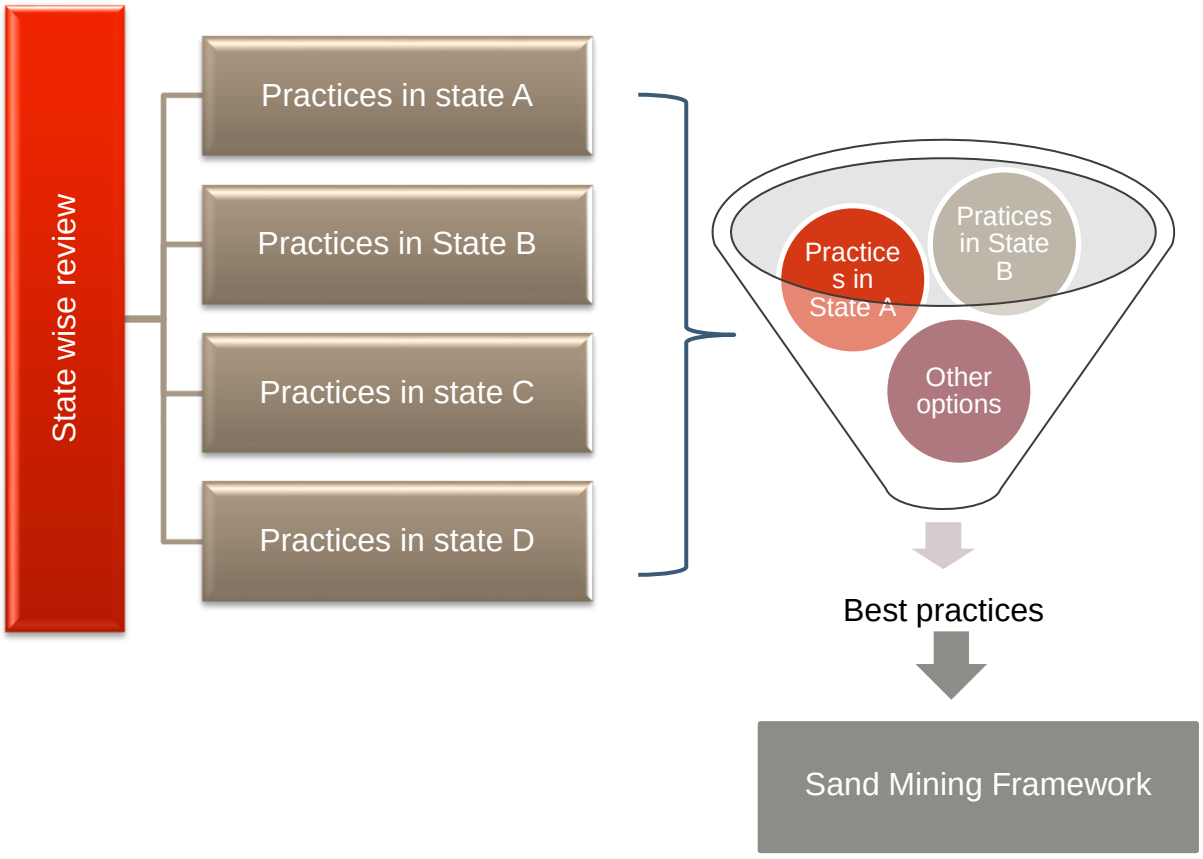
- Pricing mechanisms followed by different States including their royalty structures were analyzed. The team analyzed the different mechanisms followed by States and analyzed the factors which hinder and encourage the revenues of the Government from sand mining.

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



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

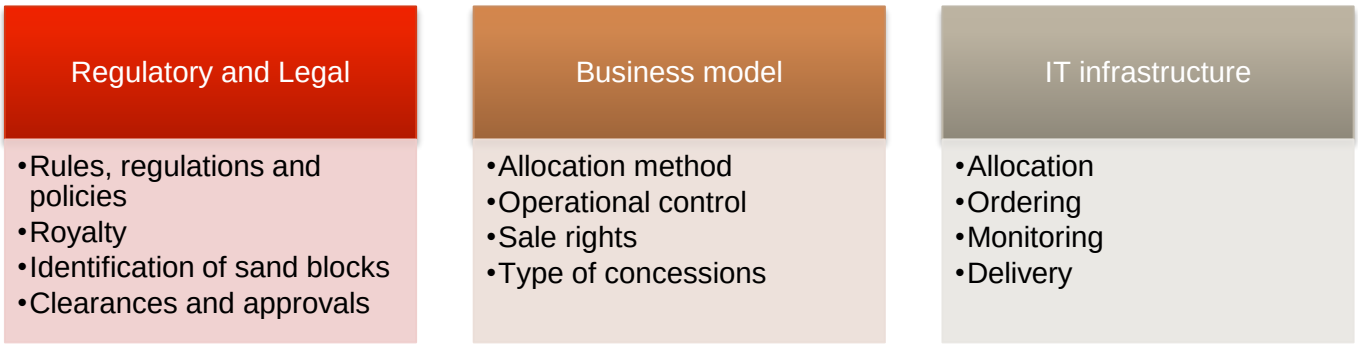
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance.	Continuous	Offline
	Contractor	• Issuance of “e-rawana” by the contractor	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery 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.

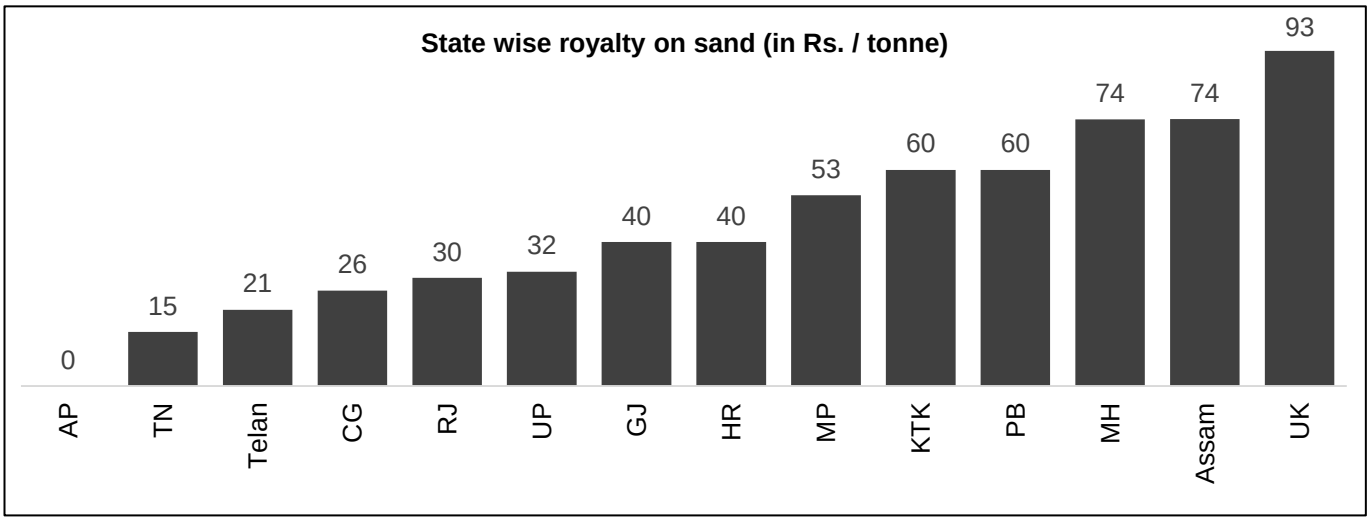
Table 18 Royalty applicable in different States

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.

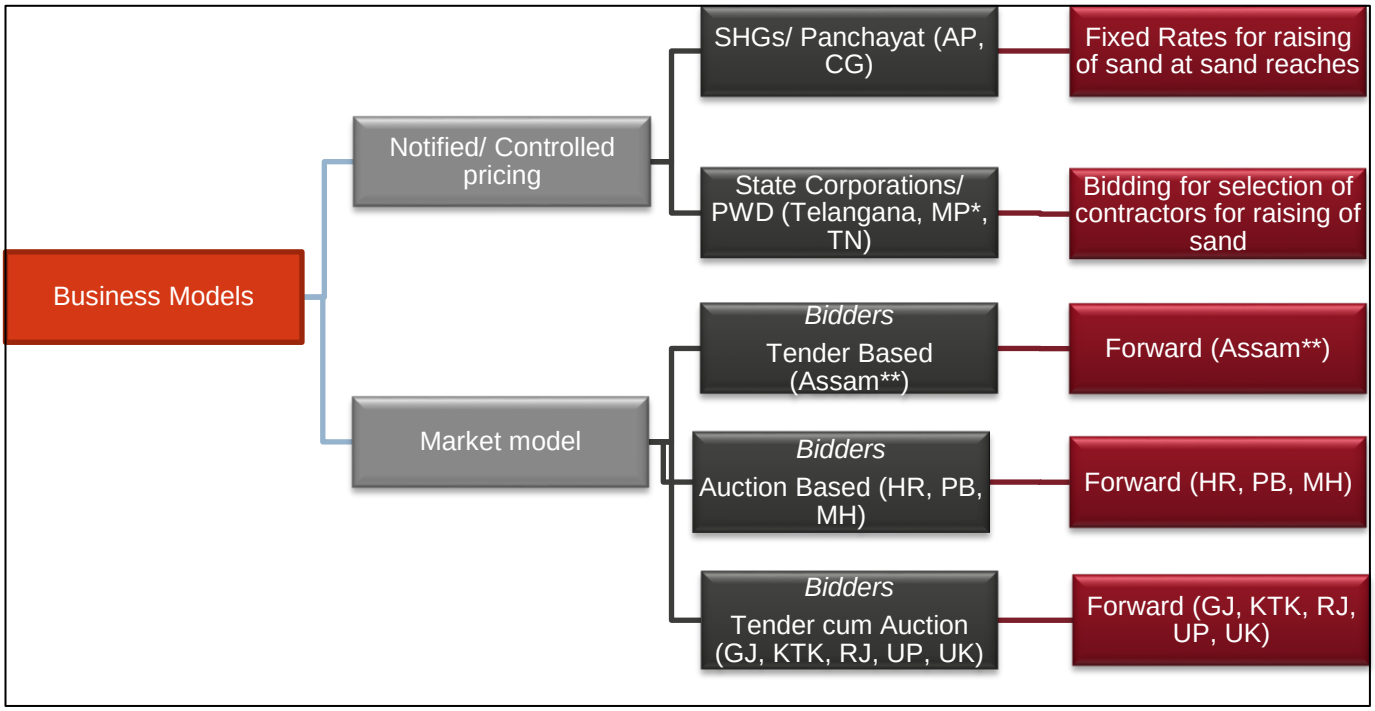
4.2 Business Model

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

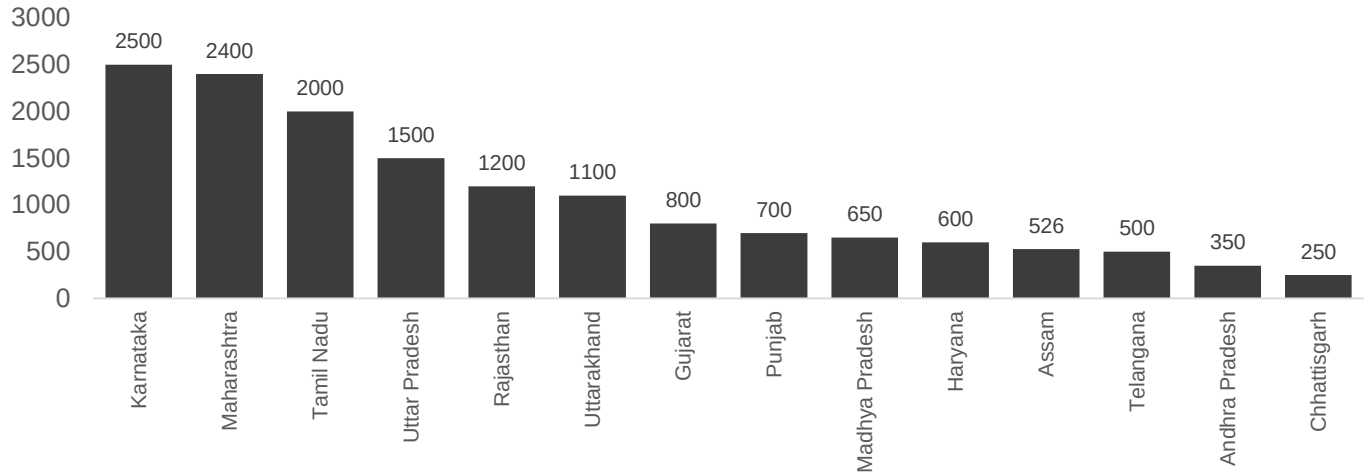
State	Sales Right	Sand Prices (Market determined / Regulated)	Business Model followed	Landed price of sand (Converted to Per tonne Basis) in normal season	Landed price of sand (Converted to Per tonne Basis) during monsoon	Sand Deficit*
Andhra Pradesh	With Department	Free of cost (only	Notified or controlled 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 360º 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.

5. Framework

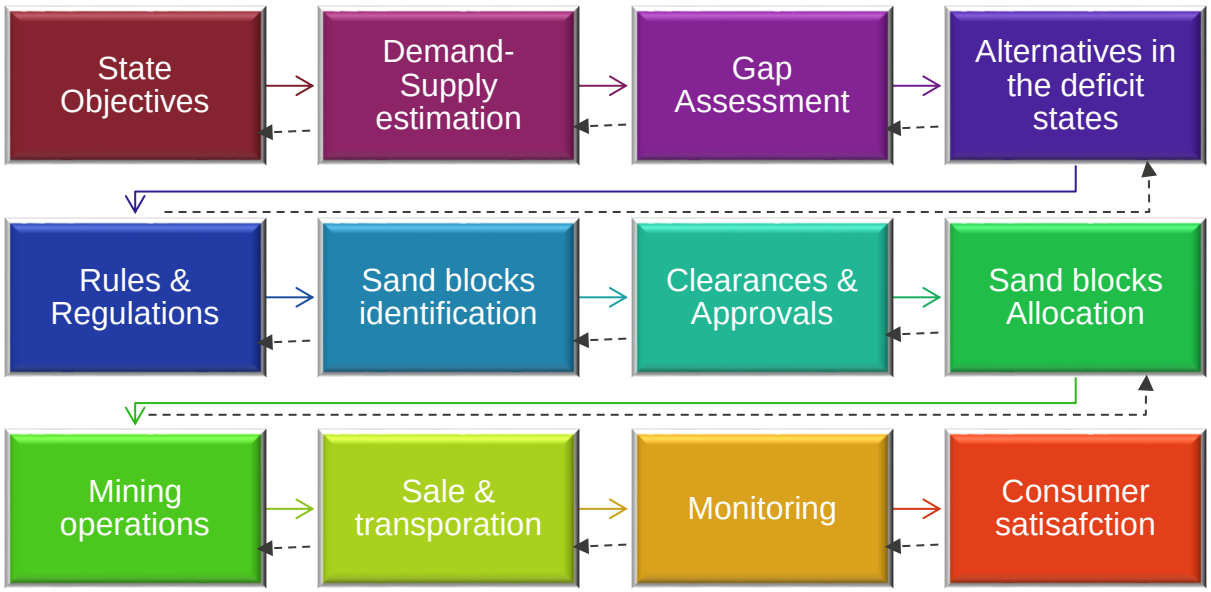
This chapter presents the suggestions for the States on the analysis and best practices identified in the preceding chapters.

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

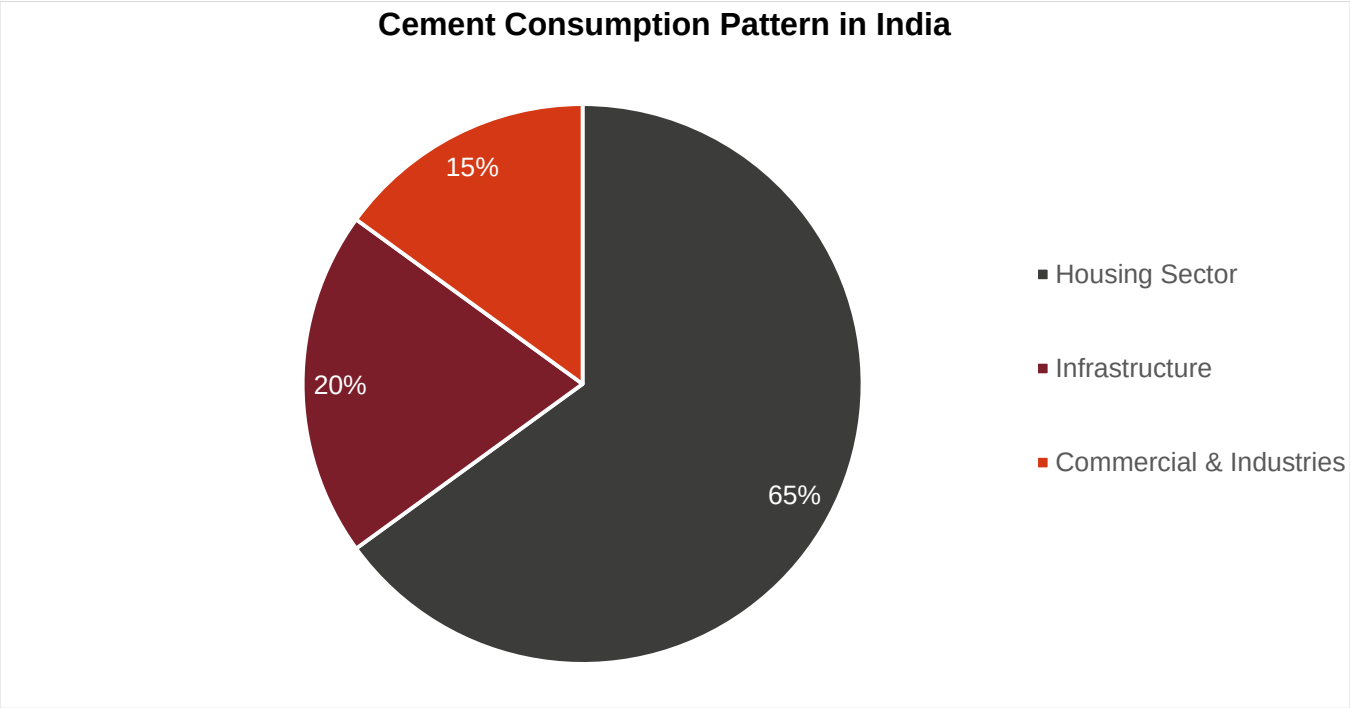
A rough estimate shows that sand consumption factor is around 2.5 for each unit of cement consumed, i.e. if cement consumption in the district is 1 Million Tonnes, then the sand consumption shall be around 2.5 million tonnes.

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

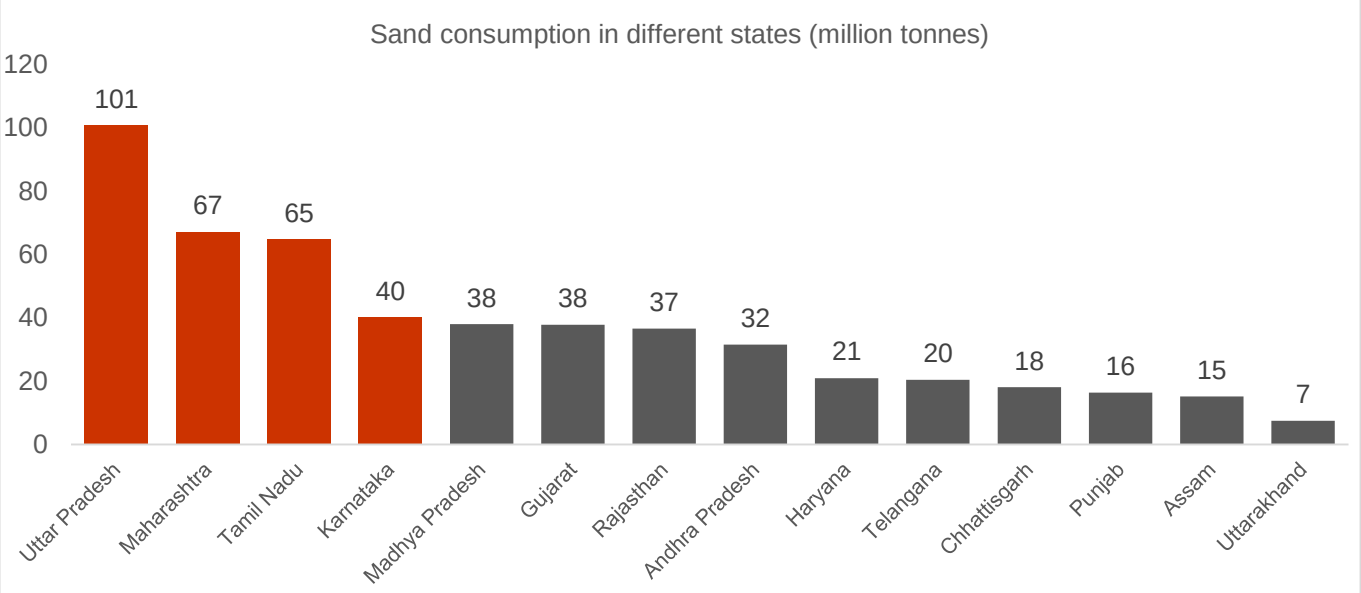
The ratio of sand and cement is different in different sectors depending on strength of concrete required to meet the standards. In housing sector, the average ratio in which cement and sand are mixed is 1:2, in infrastructure sector it is 1:4 and it is 1:8 in commercial & industries sector. Using the 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

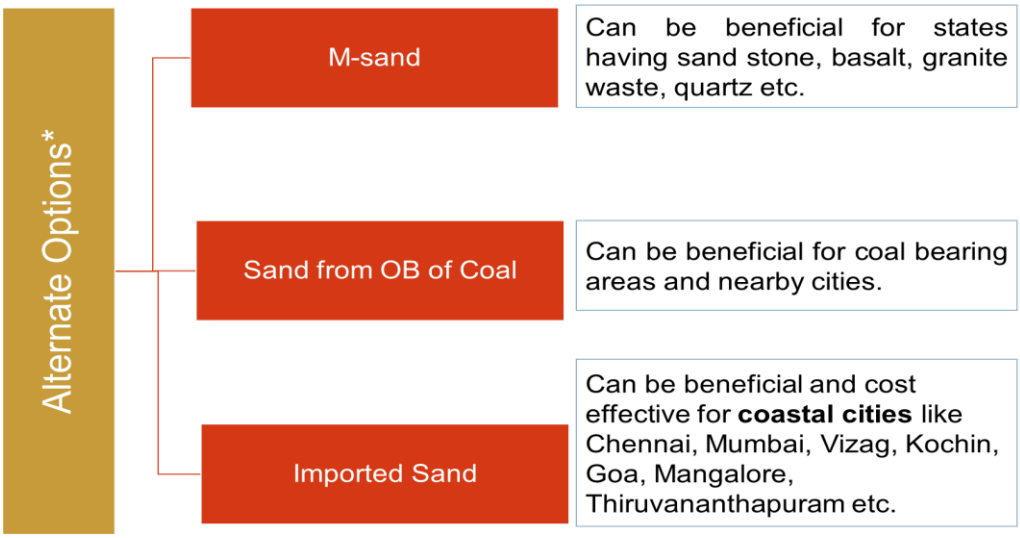
After estimation of gap derived from demand-supply assessment, States need to analyse the alternatives options of natural sand available with them. Considering large demand-supply deficit, alternate options need to be promoted for below reasons:

- ✓ 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

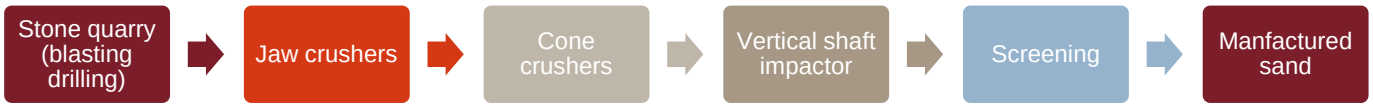


** Another option can be construction & demolished (C&D) waste.*

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

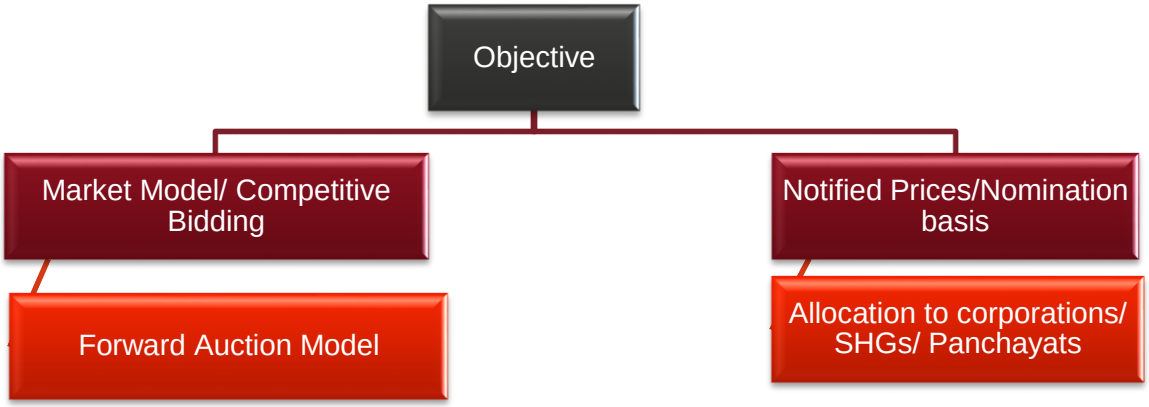
A detailed technical report/ geological report containing details of the area, DGPS survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status (if any), geological mapping, laboratory studies of the samples etc. of each sand block should be prepared by 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.

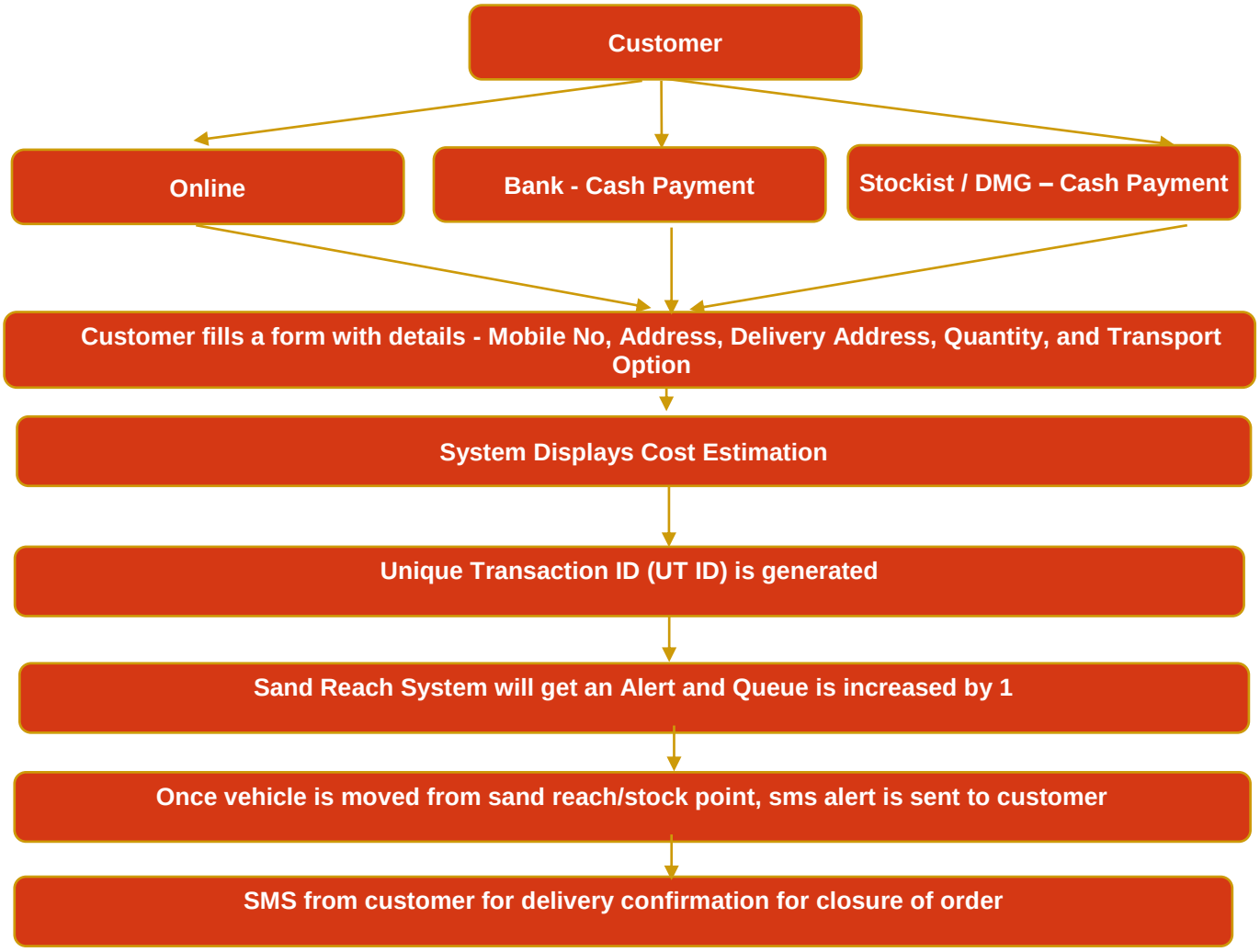
Controlled Market Prices

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.

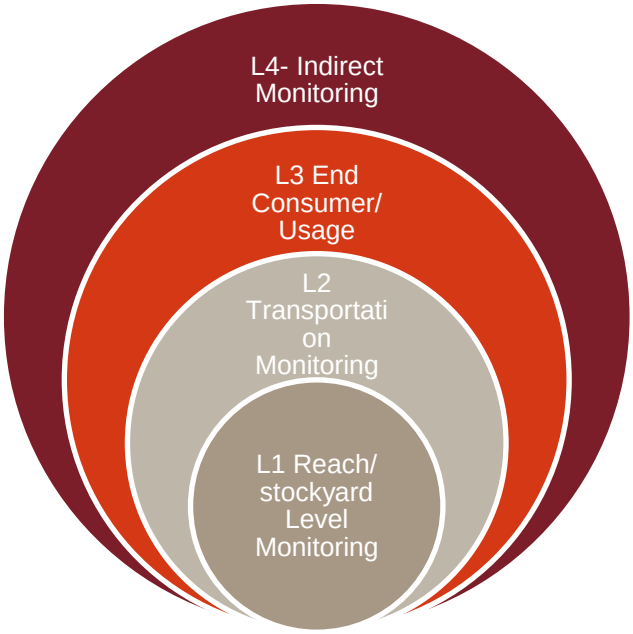
5.11 Monitoring

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.

6. Annexures

6.1 Annexure I: Formation of Sand Mining Committee

(12

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:

PSO 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.	

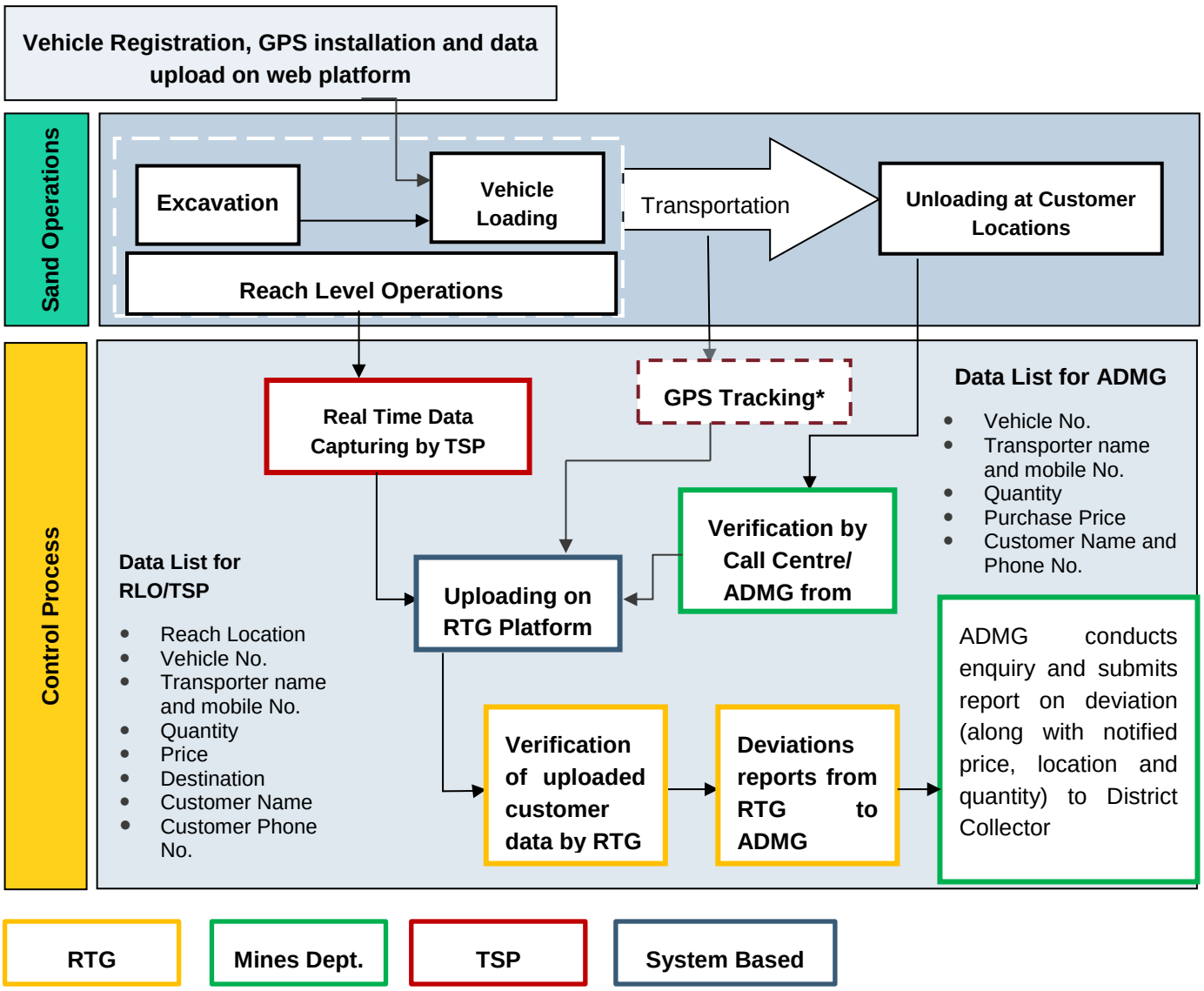
2.	Types of concession for sand mining and minimum and maximum size of the concession (area wise) in the State
3.	Are mines allocated using e-tenders/e-auction etc. or used offline method.
4.	Estimated time for identification up to starting of the mine.
5.	Estimated time taken for clearances and approvals 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:

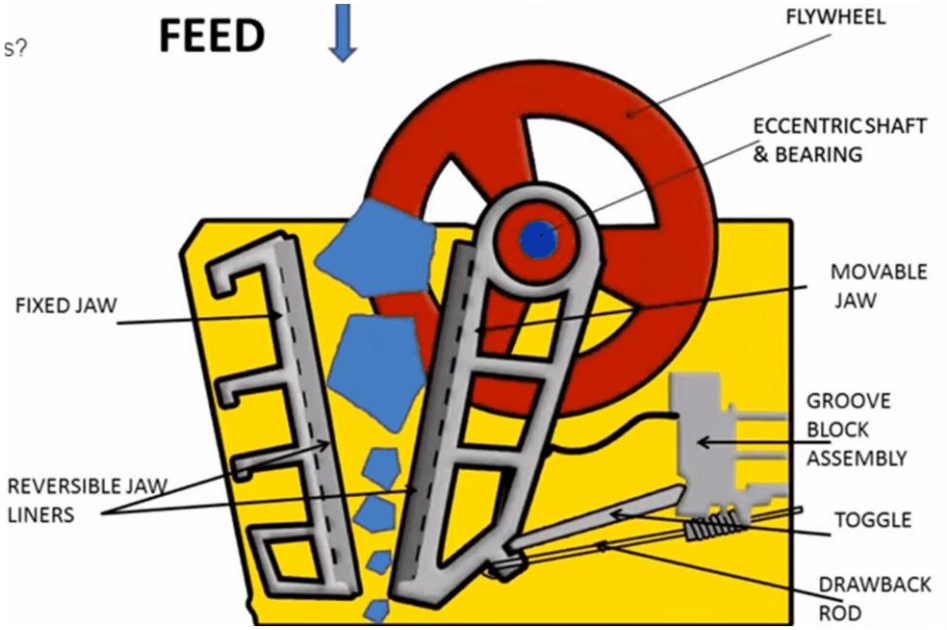
1. **Drilling & Blasting**- The foremost activity in quarrying is the Drilling. It consists of Drill machine with drill a bit powered with compressor with range of 6 – 12 bars of pressure. Diameter of the drill bit is typically varies between 105 mm – 115mm. Holes are drilled perpendicular to the ground 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.

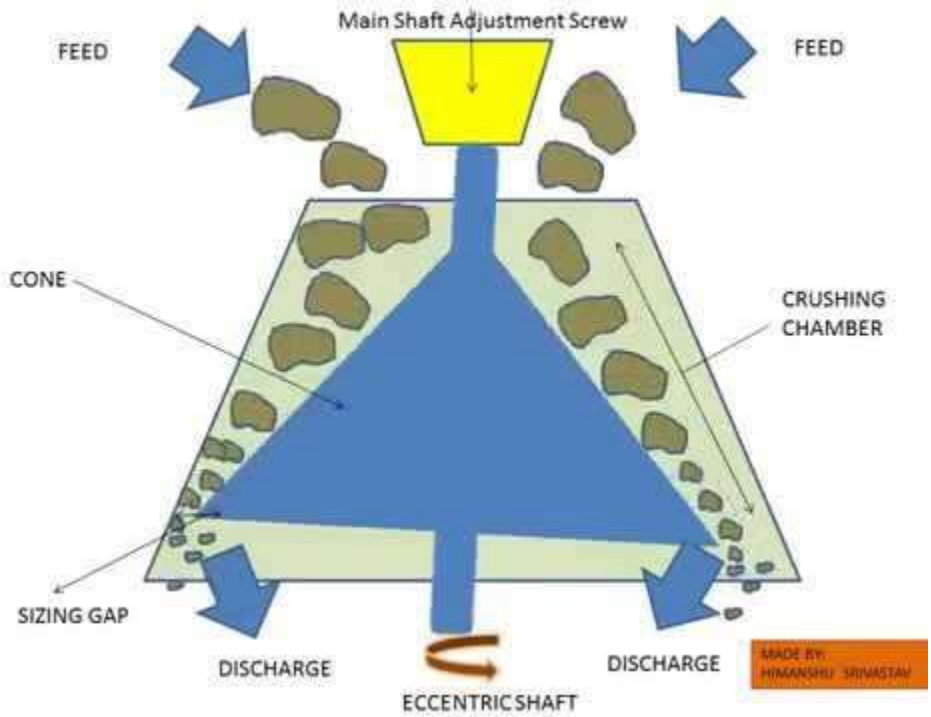
❖ **Crushing**

The Blasted rock from quarry transported through tippers are finally unloaded in the crushing unit and Crushing is primarily divided into three stages:

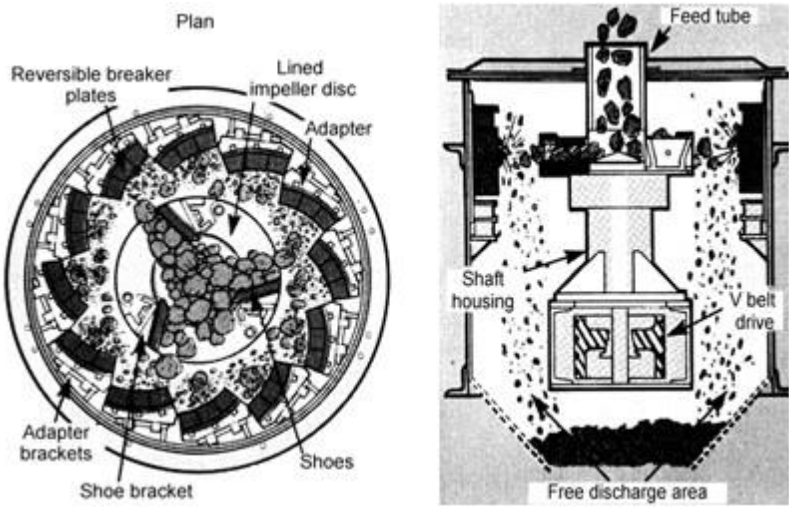
Primary Crusher – Jaw Crusher



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. MSME

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. Large, Mega, Ultra Mega, Super Mega Enterprises

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:

I. MICRO, SMALL AND MEDIUM ENTERPRISES

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) <u>Demand and Supply of Sand:</u>

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) <u>Future demand for sand:</u>

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) <u>Manufactured Sand and Potential for establishment of Manufacturing Units:</u>

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) <u>Availability of Raw Material for Manufactured Sand in the State:</u>

(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) Incentives to be provided for the Manufactured Sand Industry in A.P:

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) 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:

100% of net VAT/CST/SGST shall be reimbursed for a period of 5 years from the date of commencement of commercial production.

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 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.

सत्यमेव जयते

भारत सरकार

खान मंत्रालय

शास्त्री भवन, डॉ. राजेन्द्र प्रसाद रोड, नई दिल्ली–110001

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