

**BEFORE THE NATIONAL GREEN TRIBUNAL**  
**PRINCIPAL BENCH, NEW DELHI**  
**O. A. No. 200 of 2014**

In the matter of:

M. C. Mehta

... Applicant(s)

Versus

Union of India & Ors.

... Respondent(s)

**Next Date: 13.01.2026**

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Date: 10-01-2026

Place: New Delhi



**ADVOCATE FOR THE RESPONDENT:**

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**O. A. No. 200 of 2014**

**In the matter of:**

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**Reply Affidavit on behalf of Respondent National Mission for Clean Ganga (NMCG), Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti New Delhi in compliance of the order dated 25.08.2025**

I, Anup Kumar Srivastava, S/o Late P. L. Srivastava, aged 58 years presently working as the Executive Director, Technical in the NMCG, D/o WR, RD & GR, Ministry of Jal Shakti, New Delhi do hereby solemnly affirm and state as under:

1. That I have been authorized to swear this affidavit on behalf of the answering Respondent NMCG by the Competent Authority. Further, it is stated that I am well conversant with the facts and circumstances of the present case on the basis of the information derived from the official records in the present case.
2. That I have gone through the order dated 25.08.2025 passed in the matter by the Hon'ble National Green Tribunal, Principal Bench, New Delhi and has understood the contents therein.





**अनूप कुमार श्रीवास्तव/Anup Kumar Srivastava**  
**कार्यकारी निदेशक (तकनीकी)/Executive Director (Technical)**  
**साफ़ी मिशन स्वच्छ गंगा मिशन/National Mission for Clean Ganga**  
**जल संसाधन, नदी विकास और गंगा संरक्षण विभाग**  
**Dept. of Water Resources, River Development and Ganga Rejuvenation**  
**जल शक्ति विभाग /Ministry of Jal Shakti**  
**नया दिल्ली/ Govt. of India, New Delhi**

3. That it is humbly submitted that the Hon'ble NGT, while examining the compliance affidavit dated 28.05.2025 filed on behalf of the State of Uttarakhand, was pleased to observe, inter-alia, that the storm water drains in Uttarakhand are carrying sewage, which are being tapped and diverted to different STPs. If sewage is allowed to flow in the storm water drain, it will decrease the carrying capacity of the storm water drain. If the storm water drain is tapped, it will affect the natural flow. If the storm water drain is diverted to STP then during monsoon the STPs will be flooded and untreated sewage will flow to river Ganga. Hence, as a permanent solution, the storm water drains cannot be permitted to be tapped and diverted to the STP.
4. The Hon'ble Tribunal further noted that NMCG sought time to point out if any scheme exists for having the household connectivity and network of sewage line connecting the household to the STPs instead of discharging the sewage in the storm water drains.
5. That it is not out of place to mention that the main challenges for river governance envisages coordination and cooperation among various State Governments and their statutory organizations and agencies at state level . "Water" per-se is a state subject and the Central Pollution Control Board (CPCB) and the State Pollution Control Boards (SPCBs) have been constituted under the *Water (Prevention and Control of Pollution) Act, 1974* (the Water Act), as amended, at central and state level for the purpose of prevention, control and abatement of water pollution As per *Section- 25* of the Water Act, no person shall, without the previous consent of the State Board, (a)



A handwritten signature in blue ink, appearing to be "Anup".

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establish or take any steps to establish any industry, operation or process, or any treatment and disposal system or any extension or addition thereto, which is likely to discharge sewage or trade effluent into a stream or well or sewer or on land or (b) bring into use any new or altered outlet for the discharge of sewage; or (c) begin to make any new discharge of sewage.

6. That it is further submitted for consideration of this Hon'ble Tribunal that under *Article 243 (W)* of the Constitution of India, powers, authority and responsibilities have been devolved on the Municipalities and the Urban Local Bodies (ULBs), as may be necessary, to enable them to function as institutions of self-government and such Municipalities/ULBs are mandated to take necessary measures for the preparation of plans and performance of functions for the implementation of schemes, as may be entrusted to them by the State legislature, including those in relation to the matters listed in the *12<sup>th</sup> Schedule* which includes public health, sanitation conservancy and solid waste management, protection of the environment and promotion of ecological aspects.
7. That it is respectfully submitted that the answering respondent **NMCG is in agreement with the observations of this Hon'ble Tribunal that storm water drains and nalas are meant exclusively for carrying storm water/rain water and are not intended to carry or discharge sewage/sullage.** The primary objective of NMCG is to abate pollution in the river Ganga and its tributaries. Accordingly, NMCG is working on tapping drains that



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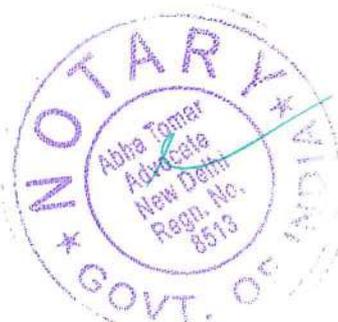
carry sewage and diverting it to treatment facilities. This interception & Diversion (I&D) approach serves as an interim solution and provides immediate relief to the river. Also, the State authorities are advised to develop permanent sewerage networks and integrate them with the STPs constructed under the *Namami Gange Program (NGP)*. ***The NMCG strategy focuses on end-of-pipe treatment, in line with the directions of the Hon'ble NGT contained in the judgment dated 13.07.2027 passed in the matter.*** The Hon'ble NGT at para 65 on page No.152-154 has held that-

*"... We have dealt with the end of the pipe treatment in great detail, the need of the hour is to clean the river as a priority and for that, treatment of the drains which are meeting the river and are carrying mixed effluents should be of antecedence. This also fits in with the river basin approach where entire river basin along with the tributaries and storm drain joining the river, being treated as one organic entity. The Tribunal had discussed in great detail with all the stakeholders and the only rational conclusion that emerges and is most appropriate is that the drain wise treatment should be adopted in preference to cleaning of cities, particularly when the cities consists of all kind of planned, unplanned, haphazard development and slum areas. Even the drains of a particular city can hardly be counted with certainty..."*

Copy of the relevant pages of the Judgement dated 13.07.2017 passed in O. A. No. 200 of 2014 is annexed and marked as **Annexure – R1.**



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सर्वकार, नई दिल्ली /Govt. of India, New Delhi



8. That the CPCB, under the Water Act, as amended from time to time, is mandated to take measures for the prevention, control and abatement of pollution at national level. The CPCB framed ***Indicative Guidelines on Restoration of Water Bodies***, identify drain interceptions, screen installations, diversion structures, and provisional pumping as critical first steps for preventing pollutant loads from entering rivers.

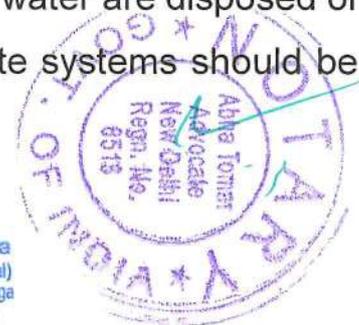
A copy of *CPCB Indicative Guidelines on Restoration of Water Bodies* is annexed and marked as **Annexure –R2**

9. That, the ***Swachh Bharat Mission Operational Guidelines, 2021*** emphasizes the need for immediate interventions—including drain diversion, de-silting, and pumping—to protect water bodies while long-term infrastructure is created. This approach promotes citywide inclusive sanitation, where all pathways of wastewater (including flowing drains) need to be managed.

A copy of the *Swachh Bharat Mission Operational Guidelines, 2021* is annexed and marked as **Annexure –R3**

10. That, the *Ministry of Housing and Urban Affairs (MoHUA)*, GOI has dealt with the question of whether wastewater and storm water should be disposed of separately. *MoHUA* in its publication “*A Guide to Decision-making: Technology Options for Urban Sanitation in India*”, has indicated as ‘Another consideration is whether to design on the assumption that wastewater and storm water are disposed of separately. The accepted view is that separate systems should be

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the norm but there are likely to be situations in which it is very hard to separate flows on-plot, in which case the possibility of a combined system should not be discounted.

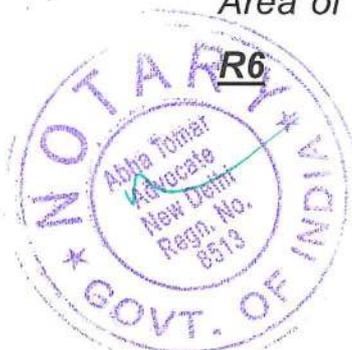
A copy of MoHUA's publication "A Guide to Decision-making: Technology Options for Urban Sanitation in India" is annexed and marked as **Annexure – R4**

11. That, The Energy Resources Institute (TERI) in its document 'Environmental and Social Management Framework (ESMF)' has also indicated the alternative approach of I&D of drains.

A copy of 'Environmental and Social Management Framework' (ESMF) is annexed and marked as **Annexure – R5**

12. That, NMCG duly recognizes the importance of developing a comprehensive and closed sewerage network completely connected with STPs and accordingly, while approving the projects, the States, through Administrative Approval and Expenditure Sanction (AA&ES) order, are advised to suitably align the project with the **Strategic Sanitation Plan/City Sanitation Plan/Master Plan** for the town and ensure synergy with other Central/State-sponsored programs like AMRUT etc.

A sample copy of an AA&ES order for the project "Interception, Diversion & Sewage Treatment Plants (STP) Works for Naini (District G) & Phaphamau (District F) in Allahabad City and Jhunsi Area of Allahabad district" is annexed and marked as **Annexure –**



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13. That it is further respectfully submitted that NMCG has adopted the strategy of interception of the drains, carrying wastewater to the STPs for treatment, i.e., I&D approach. Instead of developing a closed network of sewage conveyance connecting with individual households, the strategy for I&D has been adopted for reasons as under:

- (i) Most of the towns located along the rivers in Uttarakhand like **Dehradun, Haridwar, Uttarkashi, Badrinath, Joshimath, Gopeshwar, Srinagar, Devprayag, Rishikesh,** and **Tapovan,** etc. have partial sewerage network, while large town area is still not covered with comprehensive sewerage network. Further, projects for laying of sewerage network in **Haridwar, Rishikesh** and **Dehradun** have been sanctioned and are under implementation. The details thereof, are enclosed and marked as **Annexure – R7.**
- (ii) Currently, owing to the absence of comprehensive separate closed sewerage networks, the sewage might be being discharged into the storm water drains/nalas.
- (iii) Laying a comprehensive closed sewerage network in towns requires significant time, often more than 5 years, apart from being cost intensive. Further, owing to households located in small lanes/ sub-lanes, laying a comprehensive sewerage network and connecting these households becomes very difficult and, at times, infeasible.



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- (iv) As the rivers are important water bodies that are being used by a significant population, directly and indirectly through withdrawal of water for treatment and supply to the towns and villages, there is a need to prioritize the abatement of pollution of rivers. Accordingly, in order to abate the pollution of rivers in the shortest feasible time, the I&D approach has been adopted.
- (v) **The hydraulic loading based on the dry weather flow in the storm water drains is also considered for the design of the STPs, constructed on I&D approach, under the *Namami Gange Programme*.**
- (vi) **The adoption of I&D approach does not mean that the work on the development of a closed comprehensive network is abandoned, but the same is also continuing with the Government of India providing support to the States under schemes such as *AMRUT*. The comprehensive sewerage networks, as and when developed, shall be dovetailed and integrated with the I&D and STP projects being constructed.**
- (vii) **As and when the closed sewerage networks are laid and connected to the STPs, the I&D structures on the storm water drains shall be removed, and storm water drains shall function only as storm water drains.**
- (viii) **In the lean flow conditions of the river that prevail for nearly 9 to 10 months in a year, the I&D approach ensures that the untreated water is not discharged directly to the river thereby giving relief to the river.**



  
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- (ix) During high flow/ flood conditions of the river, which remain for 2 to 3m months a year, the gates of the Interception structures are opened to allow the flood water to find its way to river **while diversion structures are closed to avoid excessive hydraulic loading of the STPs.**
- (x) While it is true that during floods, when the gates of the Interception structures are opened and diversion structures closed, the untreated wastewater finds its way to the river but its impact on the river gets significantly reduced owing to the huge dilution water available from the flood waters. Further, during the flood events, the direct use of the river by the public is significantly reduced, thus the impact of the highly diluted untreated wastewater is minimized.
14. That it is humbly stated that that I&D strategy is adopted to provide immediate relief to the river in the shortest possible time frame. Moreover, this strategy is being complemented through the development of comprehensive closed sewerage networks and connecting them directly to the STPs. Further, it is submitted that there is no hydraulic loading of STPs due to storm water when the I&D structures are under flood and closed during monsoon. **However, the status of storm water hydraulic loading of STPs during scattered rains, is to be provided by the State Agency.**
15. That, it is submitted for consideration of the Hon'ble Tribunal that the development, augmentation, and long-term management of comprehensive sewage networks within cities rests with the MoHUA



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in cooperation with ULBs, as mandated under current statutory and executive instruments, to ensure sustainable and permanent abatement of riverine pollution. In this transitional period, the I&D approach stands as an enforceable and essential provision until such time that robust sewerage infrastructure is achieved and made operational in accordance with national urban and river management policies.

16. That, it is further submitted that under prevailing urban sanitation conditions within the Ganga River Basin, wherein a substantial proportion of cities lack adequate sewerage infrastructure resulting in the unchecked discharge of untreated sewage into the river system; it is both expedient and necessary that immediate abatement measures, such as the interception and diversion (I&D) of sewage from open drains to treatment facilities, be implemented as an interim strategy. This aligns with the core mandate initially set forth under the *Ganga Action Plan (GAP)* and *National River Conservation Plan (NRCP)*, which prioritize I&D schemes to prevent the pollution load entering the river.
17. That, under the *Namami Gange Programme*, sewerage infrastructure including interception and diversion of drains, development of sewer networks, and establishment of STPs is being undertaken to ensure that domestic sewage from households is conveyed through underground sewerage systems for treatment, instead of being discharged into storm water drains or nalas or rivers. Moreover, Household sewer connections are to be ensured through



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convergence with **AMRUT/AMRUT 2.0** and ULBs, thereby achieving the objective of complete sewage capture, treatment, and prevention of river pollution.

18. That in view of the above submissions, schemes and documents, mentioned supra the answering respondent while do not subscribing to the principle of storm water diversions towards the STP, however, respectfully submits before this Hon'ble Tribunal that **I&D is a necessary and unavoidable interim measure, till the laying of the sewerage network is achieved by the State Government, their municipalities and ULBs.**
19. That it is humbly submitted before the Hon'ble Tribunal that the NMCG is supplementing the efforts of the State Government for pollution abatement of River Ganga by providing requisite financial assistance. NMCG has provided funding support with sanctioning of multiple projects in Uttarakhand aimed at preventing discharge of untreated sewage into the river Ganga and its tributaries. At present, no major project pertaining to the main-stem of River Ganga in the State of Uttarakhand is pending with NMCG. However, it is submitted that the timely execution and oversight of these projects, largely rests with the State Govt., ULBs and Statutory Authority, i.e., UKPCB.
20. That the statement made in forgoing paragraphs are true to my knowledge and enclosed annexures are true copy of its original.



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- 21. That, the answering respondent herein craves leave of the Hon'ble Tribunal to file additional reply, in future, if required.
- 22. In light of the above submission, it is respectfully submitted that this Answering Respondent NMCG, shall abide by any order(s) or direction(s) passed by this Hon'ble tribunal in this Application.

 Deponent

अनूप कुमार श्रीवास्तव/Anup Kumar Srivastava  
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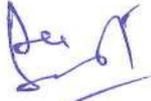
**VERIFICATION:**

09 JAN 2026

Verified at Delhi on this the day of ..... January, 2026 the averments and facts stated herein above are true and correct to my knowledge and belief and nothing material has been concealed therefrom.

  
 I certify the deponent's statement  
 and has signed in my presence



 Deponent

अनूप कुमार श्रीवास्तव/Anup Kumar Srivastava  
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Date:  
 Place: New Delhi

Certified that the following statement  
 was declared on solemn affirmation  
 before me which has been read over  
 to the deponent who has admitted

It is correct  Notary DELHI

09 JAN 2026

BEFORE THE NATIONAL GREEN TRIBUNAL  
PRINCIPAL BENCH  
NEW DELHI

.....

**ORIGINAL APPLICATION NO. 200 OF 2014**

**(C.WRIT PETITION No. 3727/1985)**

**(M.A. No. 594/2017 & 598/2017)**

**IN THE MATTER OF:**

M.C. Mehta

.....Applicant

Versus

Union of India

.....Respondents

AND

**ORIGINAL APPLICATION NO. 501 OF 2014**

**(M.A. No. 404 of 2015)**

Anil Kumar Singhal

.....Applicant

Versus

Union of India & Ors.

.....Respondents

AND

**ORIGINAL APPLICATION NO. 146 OF 2015**

Society for Protection of Environment &  
Biodiversity & Anr.

.....Applicant

Versus

Union of India & Ors.

.....Respondents

AND

**APPEAL NO. 63 OF 2015**

Confederation of Delhi Industries & CEPT Societies  
(An Organisation of CETP Societies)

.....Applicant

Versus

D.P.C.C. & Ors.

.....Respondents

AND

**ORIGINAL APPLICATION NO. 127 OF 2017**

J.K. Srivastava

.....Applicant

Versus

Central Pollution Control Board &amp; Ors.

.....Respondents

AND

**ORIGINAL APPLICATION NO. 133/2017****(WRIT PETITION (C) No. 200/2013)**

Swami Gyan Swarop Sanand

.....Applicant

Versus

Ministry of Home Affairs &amp; Ors.

.....Respondents

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JUDGEMENT**PRESENT:****HON'BLE MR. JUSTICE SWATANTER KUMAR (CHAIRPERSON)****HON'BLE DR. JUSTICE JAWAD RAHIM (JUDICIAL MEMBER)****HON'BLE MR. JUSTICE R. S. RATHORE (JUDICIAL MEMBER)****HON'BLE MR. BIKRAM SINGH SAJWAN (EXPERT MEMBER)****HON'BLE DR. AJAY A DESHPANDE (EXPERT MEMBER)****HON'BLE DR. NAGIN NANDA (EXPERT MEMBER)**Reserved on: 31<sup>st</sup> May, 2017Pronounced on: 13<sup>th</sup> July, 2017

1. Whether the judgement is allowed to be published on the net?
2. Whether the judgement is allowed to be published in the NGT Reporter?

**JUSTICE SWATANTER KUMAR (CHAIRPERSON)**

तवजलममलयेननिपीतंपरमपदंखलुतेनगृहीतम्।  
मातर्गङ्गेत्वयियोभक्तः कलतंद्रष्टुंनयमःशक्तः

Ganga is Holy, thus, as stated above, "he who has drunk your pure water, indeed he will obtain the highest abode". This depicts the extent to which millions of Indians and people from abroad have put their faith in Ganga. It is pristine, it is perennial and probably one of the most celebrated river of all times. Ganga is considered sacred by people for providing life-giving and life-sustaining succour for the environment and ecology. Ganga is not an ordinary river. It is a life-line, a symbol of purity and of virtue, for countless people of India. Millions of Ganga devotees and lovers still throng the river just to have a holy dip, Aachman (Mouthful with holy water), and absolve themselves of their sins. We Indians are raised to consider Ganga as a goddess, as sacred. We tell our children and

Sanctioned Schemes	76 (including 6 institutional development schemes) NON EAP-49 World Bank-26 JICA-1 (Varanasi)
STP Capacity Sanctioned	659.23 MLD
Sewer Network Sanctioned	2469.53 KM
No of Projects Completed	16
STP Capacity Created	110.50 MLD
Sanctioned Amount	Rs. 4974.79 Crores
Expenditure till June, 2014	Rs. 910.57 Crores

65. We have discussed in great detail the deficiencies in execution of GAP-I and GAP-II, by referring to supporting Reports and data. Thus, we have to find a way ahead which is devoid of such deficiencies and is capable of attaining the object of cleaning and rejuvenating River Ganga. The IIT Consortium, other technical experts, the stakeholders' consultative process, the Principal Committee constituted by the Tribunal and finally the Tribunal itself find that adhocism was one of the principal factors for rendering GAP I and GAP II ineffective and unsuccessful. There is no use of treating only the hot spots or treating one or two segments in a city located at the riverbank and leaving all the drains, which are carrying mixed waste to join the river. Even the point where STP/CETP is constructed to treat the effluents or sewage, it joins other bigger drains downstream and thus, even the

treated water again gets highly polluted. There has to be a systematic approach, which will help in cleaning the entire segment on a watershed basis rather than the particular spot, which may be a highly polluting spot, but treating it by itself without taking other required steps for prevention and control of pollution would be of no consequence and without effective results. The Tribunal has to take a holistic view and not a view, which will not stand the test of scrutiny, technically, scientifically and in terms of implementation. The experience in the past must educate all stakeholders not to repeat the mistakes and spend public funds in an indiscriminate manner and thus avoid improper utilization of public funds on the one hand and increase of pollution on the other. The growing population, unplanned and even planned development with industrialisation enhancement itself will in a big way cause the pollution levels to go up, unless appropriate steps are taken without delay and default and in a planned manner. We have dealt with the end of the pipe treatment in great detail, the need of the hour is to clean the river as a priority and for that, treatment of the drains which are meeting the river and are carrying mixed effluents should be of antecedence. This also fits in with the river basin approach where entire river basin alongwith the tributaries and storm drain joining the river, being treated as one organic entity. The Tribunal had discussed in great detail

with all the stakeholders and the only rational conclusion that emerges and is most appropriate is that the drain-wise treatment should be adopted in preference to cleaning of cities, particularly when the cities consists of all kind of planned, unplanned, haphazard development and slum areas. Even the drains of a particular city can hardly be counted with certainty. Thus, we would deal with all the drains which are joining the river Ganga and its tributaries in Segment B of Phase-I.

**DIMENSIONS OF THE PROJECT FOR CLEANING AND REJUVENATION OF RIVER GANGA IN SEGMENT-B OF PHASE-I**

66. Though Segment-B of Phase-I primarily falls in the geographical limits of State of UP but it was considered appropriate to involve all the stakeholders in finalizing the scope of the project and facets of its implementation in relation to Segment-B. The primary stakeholders are MoWR, NMCG, MoEF&CC, CPCB, UPPCB, State of UP and UPJN. The Principal Committee had been constituted by the Tribunal *vide* its order dated 14th November, 2014 consisting of Senior Most officers of above stakeholders i.e. MoWR, NMCG, MoEF&CC, CPCB, UPPCB, State of UP and UPJN and most importantly the experts from IITs particularly IIT Delhi and IIT Roorkee. The purpose was to receive input of the highest echelons in the field of technology for treatment and consequential use of treated water, while ensuring cleaning of river Ganga in preference

# **“Indicative Guidelines for Restoration of Water Bodies”**

(in compliance to Hon’ble NGT Order dated 10.05.2019 in M.A.No. 26/2019 in OA.No. 325 of 2015)



## **Central Pollution Control Board**

(Ministry of Environment, Forest and Climate Change, Govt. of India)

Parivesh Bhawan, East Arjun Nagar

DELHI-10 032

([www.cpcb.nic.in](http://www.cpcb.nic.in))

June 2019

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# **Indicative Guidelines for Restoration of Water Bodies (Polluted Lakes, Ponds and Rivers)**

## **1 Introduction**

Adequate availability of water of required quality is pre-requisite for survival and quality of human life. Surface water bodies like lakes, ponds, reservoirs, tanks and rivers were treated as community resource or asset over the centuries. In urban areas also such water bodies played an important role as a source of drinking water, absorption of flood water and a conduit for ground water recharge. They were being nurtured, protected, conserved and managed by the active participation of the local community without any code of conduct or rule. In turn, these water bodies have been catering the local human and livestock populations. The introduction of public water supply and ground water development through tube wells and hand pumps in the modern times, coupled with urbanization and industrialization induced pollution, a tectonic shift in the attitude of the people towards these water bodies has been witnessed. Both locals as well as the government have started neglecting this asset and have stopped caring, nurturing and conserving these community resources. Mushrooming urban, industrial and infrastructure development has further changed the status of these water bodies from community resources to a mere dumping ground or sink for solid wastes, construction debris, domestic sewage, industrial effluents, religious offering etc. resulting in severe degradation in the quality of such resources.

India has had abundant supply of water resources. However, from being a water abundant country India is gradually progressing towards water scarcity due to increasing population pressure, urbanization and uncontrolled growth. At present it is sustaining 18 per cent of world population with 4 per cent of global water

resources. Therefore, management of water resources has assumed great importance. Today availability of water resources is a major issue and is a big challenge facing our country.

In order to revive, restore and rehabilitate the traditional water bodies, the Government of India launched a Scheme for Repair, Renovation and Restoration (RRR) of water bodies which has multiple objectives like comprehensive improvement and restoration of water bodies thereby increasing tank storage capacity, ground water recharge, increased availability of drinking water, improvement in agriculture/horticulture productivity, improvement of catchment areas of tank commands, environmental benefits through improved water use efficiency by promotion of conjunctive use of surface and ground water, community participation and self-supporting system for sustainable management for each water body, capacity Building of communities in better water management and development of tourism, cultural activities, etc. by providing Central Grant to State Governments under a Pilot Scheme directly linked to agriculture during the remaining period of X<sup>th</sup> Five Year Plan in January 2005. Keeping in view the benefits arising out of the implementation of the scheme, it was extended to XII Plan as well. Further, the Ministry of Environment, Forest and Climate Change is implementing a Centrally Sponsored Scheme of National Plan for Conservation of Aquatic Eco-systems (NPCA) since February, 2013 for conservation and management of identified lakes and wetlands in the 11 country in a holistic and integrated manner. Under the scheme financial assistance is provided to the concerned State Governments for undertaking various activities for conservation of wetlands and lakes, which also include a small component of lake front development and beautification, especially in urban lakes.

The National Water Policy (2012) formulated by MoWR, RD&GR advocates conservation, promotion and protection of water and highlights the need for augmenting the availability of water through rain water harvesting, direct use of

rainfall and other management measures. Further, the Standing Committee on Water Resources (2012-13) in their 16<sup>th</sup> Report on “Repair, Renovation and Restoration (RRR) of Water Bodies” also substantiated that *encroachment on water bodies is threatening the existence of a large number of water bodies and throwing consequent challenges of depleting ground water resources, occurrence of devastating floods in urban areas as well as water scarcity. Afore-said Committee suggested steps required to remove encroachment and to restore the water bodies.*

In recent years several metro cities such as Mumbai and Chennai have witnessed unprecedented flood. Encroachment of river bed is one of the reasons of flooding since it reduces the desired waterway of the river. Inadequacies of flood protection works, reduction in the water holding capacity of natural reservoirs in the basin due to progressive siltation, breaching of river banks, raising of river bed caused by deposition of silt are also the reasons. Encroachments happen due to number of local factors, thus issue is to be looked into by concerned State Government as per the prevailing rules and regulations of the respective State/UT.

*As per MoWR, RD & GR, total number of water bodies have declined in the States which may be attributed to (i) increase in population and density of population per square kilometer; (ii) change in land use pattern; (iii) shift from paddy based agriculture to cash crop cultivation; (iv) depletion of ground water; (v) rapid Urbanization; (vi) unplanned urbanization and development activities; (vii) boom in construction activity; (viii) new water bodies have been developed to meet the additional requirement of water for drinking water and irrigation arising due to increase in population; (ix) some of the water bodies mainly, wells in southern group of islands were lost due to submergence of coastal area during tsunami in 2004.*

NITI Aayog based on a study warning that India is facing its 'worst' water crisis in history and that demand for potable water will outstrip supply by 2030 if remedial steps are not taken. Nearly 600 million people faced high to extreme water stress. Also, made predictions that twenty-one cities, including Delhi, Bengaluru, Chennai and Hyderabad will run out of groundwater by 2020, affecting 100 million people. If matters are to continue, there will be a 6% loss in the country's Gross Domestic Product (GDP) by 2050. Moreover, critical groundwater resources, which accounted for 40% of India's water supply, are being depleted at "unsustainable" rates and up to 70% of India's water supply is "contaminated" 'Therefore, *water resource available to the country should be brought within the category of utilizable resources to the maximum possible extent.*

*Therefore, existing scenario necessitates formulation of guidelines for restoration of water bodies keeping in view (i) to make pollution free water bodies and to meet the desired water quality criteria; (ii) to preserve excess water during monsoon, (iii) to restore and augment storage capacities of water bodies (iv) to serve and enhance ground water recharge; (v) increased availability of water for different intended purposes etc., These guidelines are only indicative guidelines and limited to restoration of ponds, lakes, polluted rivers or streams and divided into two parts i.e., stagnated surface water bodies such as ponds, lakes and rolling surface water bodies such as rivers or streams. However, concerned stakeholders are advised to conduct detailed gap analysis to enable to include related action plans for restoration of water bodies for ensuring compliance to Hon'ble NGT order dated 10.05.2019. For understanding aspects relating to restoration of water bodies, the documents already published or issued by Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD & GR), Ministry of Housing and Urban Development also be referred as given at Sl. No. 7 References of these indicative guidelines.*

This requires an understanding on the status of the water bodies, their suitable use, need for management and conservation so that they serve as a good

resource for future, potential strategies for long-term management especially in the urban areas, which are facing severe water shortage. It should include (i) Recognition Phase, (ii) Restoration Phase; (iii) Protection Phase; (iv) Improvement Phase and (v) Sustenance phase

## **2. Recognition Phase**

Identification and recognition of the problem (inventory of existing and lost water bodies (due to encroachment, pollution, diversion etc.), analysis of cause of the problem and its effect and development of alternative solutions of problem as detailed below: -

### **2.1 Collection and maintenance of historical information relating to the water bodies**

Based on the records available or remote sensing data or GIS maps, interaction with the public living in the vicinity of the water body, following information relating to the water bodies should be collected and records maintained by the concerned department in the State/UT: -

#### **2.1.1 Stagnated water bodies such as ponds/lakes**

**A. Geographical details of the water body:** - GPS Location and address of the water body, size or dimensions, area, elevation above mean sea level, ownership of the water body, boundaries with earmarking, map of water body (Digital map or remote sensing or satellite map over the years/National Wetland Atlas) with salient features

**B. Hydrological description of the water body:** - area, category of lake or pond (natural or man-made), average and maximum depth of stored water (during monsoon and non-monsoon period), total storage capacity, main source of water (rainfall/groundwater seepage/catchment

runoff/direct or indirect flow from any river or stream or creek), water permanence ( permanent or intermittent), destination of excess water from pond or lake, purpose used to serve (like drinking water source, fisheries and agriculture or cultivation of aquatic food plants, recreational and aquatic sports, ground water recharge, act as a sink for sediments, habitat for noteworthy animal species, migratory birds or any other purpose), status of lakes or ponds in terms of % open water and aquatic vegetation.

**C. *Catchment Description***

- Details on natural drains or flood channels and their flows contributing to water accumulation.
- Major Towns, total population living around the water body, any sewage contribution from the towns, total sewage generation, total no. of existing STPs and their treatment capacities, if any.
- Major industrial clusters or estates contributing to pollution in water body, total no. of industries (sector-wise), sector-wise total industrial effluent generation, existing industrial effluent treatment capacity [(both captive and Common Effluent Treatment Plants (CETPs)], if any.
- Total waste generation (waste like municipal solid waste, plastic waste, industrial hazardous waste, construction and demolition waste), existing provision for collection, transportation, treatment and disposal practices in the vicinity;
- Any other relevant information such as: - (i) Declared Wetland Ramsar sites, (ii) Bio-diversity details such as flora and fauna biodiversity (list of plant species, list of animal species, species of conservation significance (rare, endangered, threatened, endemic species), major plant invasive alien species and extent of invasion, major animal invasive alien species and extent of invasion.

### 2.1.2 River or streams

**A. *Digital map*** of river under consideration with its tributaries showing salient features.

**B. *Geographical and Hydrological description of polluted river***

Origin of the river and confluence with any other water body, length of travel of the river before confluence with any other water body, velocity of flow (in m/sec), average cross-sectional area (in m<sup>2</sup>), average depth of flow (in m) during monsoon and non-mon-soon period, volume of flow or discharge (in m<sup>3</sup>/sec), tributaries of the river under consideration for restoration, GPS location details of all the tributaries and drains confluence with the river or stream; drains or channels contributing to river pollution;

**C. *Catchment description***

- Purpose used to serve by the river or streams
- Major towns along the banks of the river, town-wise total population (with projection for the next 20 years), total water consumption (both supply by local or urban bodies and the ground water consumption), total sewage generation pattern, no. of STPs and the treatment capacity.
- Major industrial estates or clusters along the banks of the river, Industry-sector –wise no. of industries, total water consumption, total industrial effluent generation and existing mechanism for treatment of industrial effluent.
- GPS location details of STPs, CETPs and their capacities, if any
- Ground water status, its utilization and the quality.

- Agricultural practices and the control measures with respect to agricultural runoff.
- Flora and fauna including biodiversity etc.

*Also, water being state subject, the State Government or Union Territory Administration should assign the task of maintaining historical records pertaining to each water body to concerned Department in the State/UT and also to designate one responsible Department to enable to take necessary remedial actions as and when situation demands.*

## **2.2 Digital Mapping of all the collected information**

All the collected information to be located on the map and such details to be periodically updated and maintained by the concerned department in the State/UT.

- 3. Restoration Phase** includes declaring the 'designated best use' in order to formulate strategies and to decide degree of treatment required for restoration of such water body, if required, selection of best solution to problems identified and application of the solution to the problems of the land which vary from case-to-case, to achieve the designated best use water goals as detailed below: -.

### **3.1 Designation of water body for its use by the State/UT**

The landscape of India is dotted with large number of lakes, reservoirs and wetlands. Historically, the water bodies such as ponds or lakes have met water demands of the population for centuries and a community management system had sustained them for a long period of time.

In a water body or its part, water is subjected to several types of uses. Depending on the types of uses and activities, water quality criteria have been specified to determine its suitability for a particular purpose. Among the various

types of users there is one use that demands highest level of water quality or purity and that is termed as “Designated Best Use” in that stretch of water body. Based on this, water quality requirements have been specified for different uses in terms of primary water quality criteria. The Primary Water Quality Criteria for bathing water already prescribed under Environment (Protection) Rules, 1986.

*Every pond, lake, river or stream falling under the jurisdiction of the concerned Department of the State Government or UT Administration is required to declare for its ‘designated best use’ in order to formulate strategies and to decide degree of treatment required for restoration of such water body, if required. In the absence of such information, it would be difficult for the regulatory authorities to formulate the strategies to be prepared in case restoration of such water bodies is required.*

Water being the State subject, such list of water bodies with designated best use with all the relevant information collected by the concerned Department of the State/UT Administration is required to be submitted to the concerned State Pollution Control Board (SPCB)/Pollution Control Committee (PCC), Central Pollution Control Board (CPCB) as well as MoEF & CC, MoWR, RD & GR.

### **3.2 National Restoration Goals (Ponds, Lakes and Rivers)**

‘Water quality criteria-designated best use’ water quality parameters as given at **Annexure-I** is required to be followed as ‘National Restoration Goals (for Ponds, Lakes or Rivers)’. However, this national restoration goals or criteria given at Annexure-I is only indicative and national restoration goals issued from time to time need to be followed for restoration of water bodies.

Monitored water quality of the water body (lakes and ponds) for relevant parameters (monitored at least 8 times in a year) (average mean value) is compared with the ‘National Restoration Goals’. In case of ponds or lakes, if the monitored water quality of the selected water body is complying at least i.e.,

6 out of 8 times to the designated best use water quality parameters, then such pond or lake is fit for the 'designated best use' and if not then requires remedial measures for its restoration. *This criterion is applicable only in case of ponds and lakes.*

*In case of rivers or streams, the criteria issued from time to time by CPCB for categorization of monitoring location need to be followed and accordingly, the strategies to be formulated for its restoration to achieve at least bathing water quality criteria. Criteria for categorization of river monitoring location is ~~are~~ given in **Annexure-II**. **This criterion is to screen the potential locations having pollution (w.r.t bathing water quality parameters i.e., BOD and Faecal Coliform only) and requires more comprehensive examination to identify all the possible sources of pollution.***

### **3.3 Steps to be followed for restoration of stagnated polluted ponds or lakes**

Conservation and restoration requires a systematic and comprehensive plan to study selective and representative freshwater ecosystems. Details of the study should include the status of ponds or lakes or rivers, their suitable use, management and conservation so that they serve as a good resource for future use and formulation of strategies for long-term management especially in the urban areas.

#### **3.3.1 World Lake Vision**

The World Lake Vision has been developed by International Lake Environment Committee (ILEC), Japan (<https://www.ilec.or.jp/en/pubs/>), in collaboration with UNEP , aiming at illuminating the growing crisis in management of lake ecosystem, articulating principles to guide the transition towards managing lakes for their sustainable use and to provide a practical blueprint for ensuring long-term health of lakes and integrity of their survival and economic development. The Seven Principles of Sustainable Lake Management are:

- A harmonious relationship between humans and nature is essential for the sustainable use of lakes.
- A lake drainage basin is the logical starting point for planning and management actions for sustainable lake use.
- A long-term, preventive approach directed to preventing the causes of lake degradation is essential.
- Policy development and decision making for lake management should be based on sound science and best available information.
- The management of lakes for their sustainable use requires the resolution of conflicts among competing users of lake resources taking into account the needs of present and future generations and of nature.
- Citizens and other stakeholders should be encouraged to participate meaningfully in identifying and resolving critical lake problems.
- Good governance, based on fairness, transparency and empowerment of all stakeholders, is essential for sustainable lake use.

The restoration of any water body should be considered only based on the needs and its utilities. *General steps to be followed for restoration of water bodies includes following: -*

### **3.3.2 Assessment of water quality of the selected water body**

Water quality of all the designated best use water bodies are required to be monitored for relevant parameters and as per frequency prescribed under 'guidelines for water quality monitoring 2017' by Ministry of Environment, Forest and Climate Change (MoEF & CC). *Wherever, frequency is not suggested, water bodies are required to be monitored following the standard protocols for collection of samples by the concerned department at least once in a month or but not less than 08 months in a year ( covering pre and post-monsoon period)*

### 3.3.3 Need for restoration of water body

The monitored values of the water body is analyzed based on the criteria suggested under these guidelines or criteria issued from time to time by CPCB for identification of polluted lakes or ponds or rivers or streams and decision be taken for restoration of water body. The criteria suggested for river monitoring location is to use for initial screening and identification of potential hotspots on the river. A comprehensive examination of water quality is required for identifying sources.

### 3.3.4 Identification of sources of pollution, quantification and assessing detailed gap analysis

*Following steps to be followed for identification of sources of pollution, its quantification and for carrying out detailed gap analysis*

#### **A. Desk Review and Reconnaissance Survey**

Identification of various sources contributing to pollution in ponds or lakes—need to be carried out based on desk survey (available information or data/ google map/ historical records) and physical reconnaissance survey (based on physical visual observations, interactions with the local public etc.,) for identification and ascertaining the sources of pollution of ponds or lakes. All the possible sources of pollution should be identified which may be

- open channels or drainage channels contributing untreated sewage or untreated or partially treated effluent discharge from existing sewage treatment plant in the vicinity (or)
- any untreated industrial effluent discharges either from the individual industry or any common effluent treatment plant (CETP) located in the vicinity (or)

- improper disposal of solid waste (plastic waste/ municipal solid waste/industrial hazardous waste/sludges from septic tanks or sewage treatment plants (STPs) or hazardous waste disposal from common effluent treatment plants (CETPs) (or)
- Run off from nearby agricultural fields, if any.
- Social and cultural misuse of ponds or lakes by local communities especially for immersion of idols during festival seasons.
- Any open-defecation around the ponds or lakes by the people living in the vicinity due to lack of sanitary facilities in their dwellings or colonies and fencing all around such water body.
- Physical condition of weed growth and necessity for dredging- Aquatic plants growing in ponds and lakes are beneficial for fish and wildlife as they provide food, dissolved oxygen, and spawning and nesting habitat for fish and waterfowl. Aquatic plants can trap excessive nutrients and detoxify chemicals. However, dense growths (over 25% of the surface area) of algae and other water plants can cause (i) Fish kills; (ii) Fish flavor problems; (iii) Pond water odor problems; (iv) Drinking water taste problem and (v) Stunted fish growth.
- Silting or sediments in the ponds or lakes due to improper disposal of waste including construction and demolition waste or silt contribution from drainage channels which reduces storage capacity and accumulation of contaminated sludges.
- Status of aesthetic conditions around the water body
- Condition of the banks or bunds, spill over (provision to ensure smooth flow of excess floods on downstream especially during monsoon period) or flood channels including obstructions if any.

- Encroachment of waterbodies due to urbanization
- Condition of Eutrophication of lakes or ponds due to inadequate measures (due to indiscriminate discharge of Industrial effluents, run-off from agricultural fields, refuse and discharge of sewage, domestic wastes like food remnants, soaps, detergents cause depleted levels of dissolved oxygen in water lead to a situation where other aquatic life-forms cannot survive).
- Available In-situ available technological options for restoration of ponds or lakes (such as aeration, bio-remediation) in lakes or plants)

## **B. Detailed gap analysis**

Detailed gap analysis to be made w.r.t municipal sewage, industrial effluent and waste management with a projection of at least 15 to 20 years, existing infrastructure for management of municipal sewage, industrial effluents and waste management in the catchment area of the water body under consideration for its restoration including volumetric flow details of all the channels or drains contributing to pollution in water body, as detailed below: -

- **Sewage management:** - Total population (with projected population at least for the next 20 years) living around the water body, total water consumption (taking into account both water supply by local/urban bodies as well as ground water consumption), total sewage generation (with projected generation quantities), total no. of existing STPs and their treatment capacities and the observed gap with regard to the sewage management (gap may be estimated in the catchment of waterbody).

- **Industrial effluent management:** - Industrial clusters or estates contributing to pollution in water bodies, total no. of industries, estimation of total water consumption by the industries, total industrial effluent generation, existing treatment capacity (both captive and common effluent treatment plants (CETPs), gap in industrial effluent management and the requirement for captive or common effluent treatment plants
  
- **Waste Management:** - waste-wise total waste generation, existing provisions for collection, transportation, treatment and disposal (in compliance to the concerned rules) with their capacities and waste-wise gap analysis and the requirements for their management

**C. Identification of other associated issues which requires attention as a part of restoration of pond or lake**

Apart from identification of all possible pollution sources, detailed gap analysis, additional measures required on case-to-case basis to be identified especially in case of ponds or lakes w.r.t the following aspects: -

- Buffer Zone development maintenance and the existing activities within the buffer zone.
- Feasibility for Bio-diversity park in case adequate land is available in the vicinity of ponds or lakes.
- Greenery development in the vicinity of the ponds or lakes.
- Introduction of recreation facilities such as paddle boats, building jetty.
- Machinery and the man power requirement for maintenance of

the restored water body.

- Existing provision for disposal of waste arising from the desiltation and de-weeding activity of a pond or lake.
- Awareness and training requirements.
- Any other related measures required also be analyzed for inclusion of such actions while making action plans for restoration of water body (E.g., aesthetic point of view, bins for rubbish management which may be generated due to visitors).

4. **Protection Phase** that takes care of the general health of the water body and ensures normal functioning. A long-term, preventive approach directed to preventing the causes of waterbody degradation is essential.

#### 4.1 Preparation of action plans

Action plans to be prepared based on the historical information collected, desk review, reconnaissance survey conducted, detailed gap analysis for ensuring additional measures required for restoration of water body (vary from case-to-case) covering both direct and indirect measures with specific time targets and the organization responsible for implementation of action plans with budget estimates. Action plans should include covering following aspects: -

- A. **Sewage Management:** - for management of sewage inflow if any (which is causing eutrophication of lake or pond) by having adequate infrastructure for treatment of sewage through adequate capacity of sewage treatment plants (STPs) or combination of other low cost treatment technologies for ensuring discharge norms notified under Environment (Protection) Act, 1986 and same should be ensured by an individual generator of sewage as well as by the concerned local or urban body.

**B. Industrial effluent management:** - for management of industrial effluent inflow by having adequate infrastructure for treatment of industrial effluent in the form of captive industrial effluent treatment plants or through common effluent treatment plants by the respective industry contributing to the pollution of water bodies and same also should be ensured by the respective State Industrial Development Corporations or State Pollution Control Board (SPCB) or Pollution Control Committee (PCC). Adoption of state-of-the technologies for production processes and for ensuring treatment of generated industrial effluent (feasibility adoption of zero liquid discharge).

**C. Management of waste**

- Adequate infrastructure should be ensured for management of wastes (such as municipal solid waste, industrial hazardous waste, construction and demolition waste, plastic waste, e-waste) in accordance with the respective provisions notified under the Environment (Protection) Act, 1986, by all the concerned.
- Periodic physical removal of improperly disposed wastes (such as municipal solid waste, construction and demolition waste, plastic waste, industrial hazardous waste, human and animal night soils) by the concerned local or urban body.

**D. De-siltation**

- Periodic removal of nutrient enriched accumulated sludges in ponds and lakes helps in ground water recharge potential, removal of contaminated sediments as well as increases storage capacity of lakes or ponds.

- Sediments removed from the ponds or lakes should be stored in a designated area (till moisture is completely drained out) at a suitable distance away from ponds or lakes and such dried sediments should be removed immediately so that sediments will not become a part of ponds or lakes once again especially in the event of any rain fall. Depending on the characteristics, such sediments after draining may be used as manure (complying to the manure quality prescribed under Solid Waste Management Rules, 2016 as amended from time to time or disposed of in accordance with the relevant provisions notified under Environment (Protection) Act, 1986.

#### **E. De-weeding**

- **Periodic dredging** (once in three months) of 80 % of dense and thickly covered aquatic plants viz., floating plants such as algae, duckweed, watermeal, water hyacinth; submerged plants such as milfoil, hydrilla, water lettuce, curly-leaf pondweed, clasping-leaf pondweed, coontail, sago pondweed, water lily, water shield etc., bottom sediment, and associated nutrients should be carried out. De-weeding methods include: -
  - **Preventive measures**
    - such as proper design and construction of ponds or lakes including levelling and smoothing of banks
  - **Manual or physical control measures**
    - Manual or physical control measures such as non-chemical and non-motorized measures be taken for removal of weeds (manual harvesting) using hand pulling, rakes, cutters, benthic barriers, drawdown, aeration, shading and weed rollers as these measures are typically very low, however, such measures

are labor intensive and are therefore better suited to small, less established weed populations. Hand pulling and raking may result in turbid or murky water and may create plant fragments that can subsequently spread to new sites.

➤ **Mechanical control measures**

- Using motor-driven under water weed cutters or floating weeds, rotovators essentially large-scale underwater rototillers for tilling up lake or pond sediments as well as to chop and loosen plant roots, or draglines (in case of underwater pond or lake dredging) (or) dry-land excavation machinery such as bulldozers (in case of drained ponds or lakes) shall be used (or)
- Limiting the amount of sunlight available to aquatic plants by floating black plastic sheeting on the water surface (or) use of dark-colored and nontoxic water dyes (such as nigrosine, aniline and aqua-shade)

➤ **Biological controls** i.e., introducing aquatic animals and plants that eat or compete with waterweeds. Herbivorous animals (those that eat plants) include a wide variety of insects, snails, crayfish, tadpoles, turtles, fish (sterile, triploid grass carp), ducks, geese, and swans which can be stocked in ponds or lakes to consume aquatic plant.

➤ **Application of common aquatic herbicides for control of lake or pond weeds**

Use of herbicides is not recommended as it may kill fish in ponds or lakes. Herbicides should be used in a controlled and systematic way under the supervision of the expert and general herbicides that may be used for weed control are as given below-

- *For Algae (microscopic, filamentous, Chara) control- Herbicides such as copper sulfate, copper chelates, endothall,, simazine)*
- *Submerged Plants (coontail, watermilfoil, pondweeds such as sago, curlyleaf, leafy) control- Herbicides such as Endothall, Diquat, simazine, fluridone may be used*
- *Free-floating plants (duckweed, watermeal) control:- Herbicides such as Diquat, simazine may be used*
- *Rooted-floating plants such as (waterlilies, spanerdock) control- Herbicides such as Glyphosate and 2,4,-D may be used*
- *Emergent plants (cattails, perennial grasses, and broadleaves) control: - Herbicides such as Glyphosate may be used*

**F. Prohibition of discharges or disposal of waste or washing activity and action against violators**

- Ban on discharge of industrial effluent or sewage or waste (such as municipal solid waste or industrial hazardous waste or plastic waste or construction and demolition waste or sludges from septic tanks/ STPs/CETPs) into lakes or ponds or drainage channels connected with ponds or lakes or open defecation in the vicinity as well as washing of clothes or wading of cattle
- Stringent actions be taken against violating industry by the SPCB/PCC as per provisions under Water (Prevention and Control of Pollution) Act, 1974 as well as Environment (Protection) Act, 1986

- Levying of fine or Environmental Compensation on the violators for improper disposal of sewage or industrial effluent or wastes into lakes or ponds.

**G. Stabilization of earthen bunds and the drainage channels as well as silt and soil erosion control measures**

- Stabilization of earthen embankments, shore line protection with vegetative or rock riprap to avoid soil erosion and the inflow drainage channels with the stone revetment or pitching so as to avoid rapid seepage or leakages
- All the inflow drainage channels should be provided with suitable silt barriers or sediment traps or sediment detention basins at suitable intervals for control of silt especially during monsoon.
- Also, at all the outfalls of drainage channels, suitable strains or traps should be provided to control inflow of all the floating materials and periodic removal of floating materials should be ensured.

**H. Protection drainage basin including preservation of drainage channels**

A lake or pond drainage basin is the logical starting point for planning and management actions for sustainable lake or pond use. A long-term, preventive approach for preventing the causes of degradation is essential.

- Historically the drainage channels which used to carry natural runoff from the drainage basin and presently carrying either untreated municipal sewage or industrial effluent or both and contributing to pollution of water bodies eventually due to encroachment in view of urbanization. All such drainage channels need to be restored by interventions such as (i) stoppage of inflow of untreated municipal

sewage or industrial effluent. If required, interaction and diversion of untreated sewage or industrial effluent from such drainage channels by routing through properly designed dedicated sewerage network to ensure conveyance and for ensuring treatment and disposal through STPs/CETPs. Feasibility of in-situ treatment of treated sewage and industrial effluent within drainage channels and prior to the inflow into the water bodies also be explored by the concerned authorities.

- Major channels running from the larger watersheds should be identified based on the historical data and such drainage channels should be preserved and protected with suitable buffer land without any impervious cover. This aspect should be ensured by the State Local/ Urban Development/Town Planning authorities while planning or expansion of a locality.

#### **I. Removal of encroachments and blockades**

- The State Government or UT Administration should maintain records pertaining to the boundaries of each pond or lake in the respective State/UT and necessary steps should be taken and ensured removal of all encroachments in the water body spread area/water body boundary as and when required.
- Removal of encroachments in the drainage channels should be carried out periodically to facilitate enhancement in aeration naturally in the water body
- Refrain from granting any consent for establishment for large scale projects in the catchment areas.

- Pond or lake boundary should be provided with fence (permanent / temporary fencing) to avoid unauthorized entry.

#### **J. Flood Control Measures**

- Excess floods from drainage basin be controlled with a provision of properly designed 'spill way' with a provision of controlled gates for smooth flow of excess water or run off during monsoon.
- Remove all encroachments (lake bed, storm water drains) to prevent calamities related to floods and to facilitate inter connectivity of water bodies.
- Removal all blockades at inlet or outlets should be ensured to avoid stagnation or blockage of storm water.

**5. Improvement phase** that deals with overall improvement in the water body and its uses including resolution of conflicts among competing users of lake resources taking into account the needs of present and future generations and of nature.

#### **5.1 Adoption of In-situ techniques for in-situ remediation of ponds or lakes**

##### **A. *Physical treatment approaches***

Aeration (using surface aerators or , submerged aerators or a combination of both may be used to increase the dissolved oxygen in the water body, which is used by microorganisms to degrade the pollutants. Aeration also aids in mixing the different thermal layers of the water body, resulting in de-stratification, exposing the lower-most layers to atmospheric air. The need and extent of aeration is calculated based on the water quality parameters, depth of water body, ambient temperatures, wind conditions

etc.). Apart from aeration, methods such as wastewater diversion, periodic de-weeding and sediment dredging, proper maintenance of drainage channels or feeder channels also helps in increase in dissolved oxygen)

### **B. Chemical treatment approaches**

Flocculation using chemicals like alum and neutralizing chemicals especially during acidification (increase in pH level of the stagnated water body)

### **C. In-situ techniques**

- *Using aquatic plants* (Macrophytes such as water hyacinth (*Eichhornia crassipes*) and water lettuce (*Pistia stratiotes*), Whorl-leaf watermilfoil (*Myriophyllum verticillatum*), pondweed (*Potamogeton* spp.), common reed (*Phragmites communis*), cattail (*Typha latifolia*), duckweed (*Lemna gibba*) and canna (*Canna indica*)
- *Using aquatic animals* such as clams, snails and other filter-feeding shellfish
- *Using biological techniques* may be used to decompose, transform and absorb water pollutants. However, concentration and frequency of dosing of the microbial cultures is decided based on the volume of the water body, water quality parameters, ambient temperatures and extent of algal growth [as per literature (i) an enzyme namely Phycoplus and the nutrients are mixed thoroughly and sprayed into the pond within 2-3 weeks' time significance difference may be seen; (ii) treatment method based on hydroponics technique that cleans the lake by absorbing nutrients dissolved in the water and thereby supporting living species inside the lake; (iii) floating

treatment wetlands (FTW) which are artificial islands made of chemically inert materials, gravel having floating characteristics with plants that stay afloat on the lake or ponds such as wetland plants, water hyacinth, mosquito repellents and ornamental plants like cattails, bulrush, citronella, canna, hibiscus, fountain grass, flowering herbs, tulsi and ashwagandha) which helps in cleaning the lake or pond through hydroponics system, (iv) Introduction of mixture of nutrients to grow algae formed by diatoms (the most basic, single-cell life form found in water bodies) which helps in release of oxygen into water and in turn aerobic bacteria present in water body helps to break down the organic matter and convert the pollutants to base constituents and also reduces odors from the lakes or ponds. The diatoms are eaten by zooplanktons that are, in turn, consumed by fish].

## 5.2 Drainage basin management

- Drainage basin management includes control of non-point sources, structural and land treatment measures (regular monitoring of structures and systems and carrying out necessary rehabilitation and modernization programmes), interception and diversion of nutrients, sediments control (terracing, contour farming, grassed water ways, prior to reaching stagnated water body.
- Crop management, crop residue management and creation of shelter belts, good Irrigation practices, run off control provisions from agriculture runoff laden with excess fertilizers and pesticides

### 5.3 Green or Buffer Zone

- Buffer Zone around a lake or pond (at least 50 to 100 m periphery) should be maintained as green belt zone or no activity zone and no activity is allowed within the buffer zone by the concerned Departments in the State/UT. In case, any activity presently existing within the buffer zone (50 to 100 m), such as residential or commercial or industrial activity should take necessary measures to prevent discharge of any wastes into the water body.
- Within the buffer zone, no impervious cover is allowed and mainly plantation with a dense population of deeply rooted plants, trees, shrubs and grasses should be created so as to absorb nutrients (which promotes aquatic plant growth and a shift in the water quality ) that comes directly from the anthropogenic activities.

### 5.4 Creation of biodiversity environment

In case the water body happens to be a site for the visit by migratory birds the number and type of trees by the side of the water body and water channels have also to be monitored to ensure adequate shelter as well as suitable environment for egg laying and propagation of bird species.

### 5.5 Monitoring of Implementation of action plans for restoration of ponds or lakes

The action plans are to be prepared and submitted to CPCB for seeking approval. The action-plan should include activity-wise action points, specific time lines, organization responsible for implementation, budget estimates as well as Program Evaluation and Review Technique (**PERT**) chart for implementation of action plans within the specified timelines, Upon approval of action plans for restoration

of ponds or lakes, thereafter, execution of action plans to begin and to be mentioned on monthly basis by the Monitoring Committee to be constituted under the Chairmanship of Principal Secretary (Environment) of the respective State Government or Union Territory Administration. The monitoring committee should review the progress on implementation of the action plans at least once in three months and apprise the Chief Secretary of the State/UT periodically.

A model lake restoration technique is given at **Figure 1** and a model flow chart for restoration of Ponds or Lakes is given in **Figure 2**.

## LAKE OR POND RESTORATION TECHNIQUES

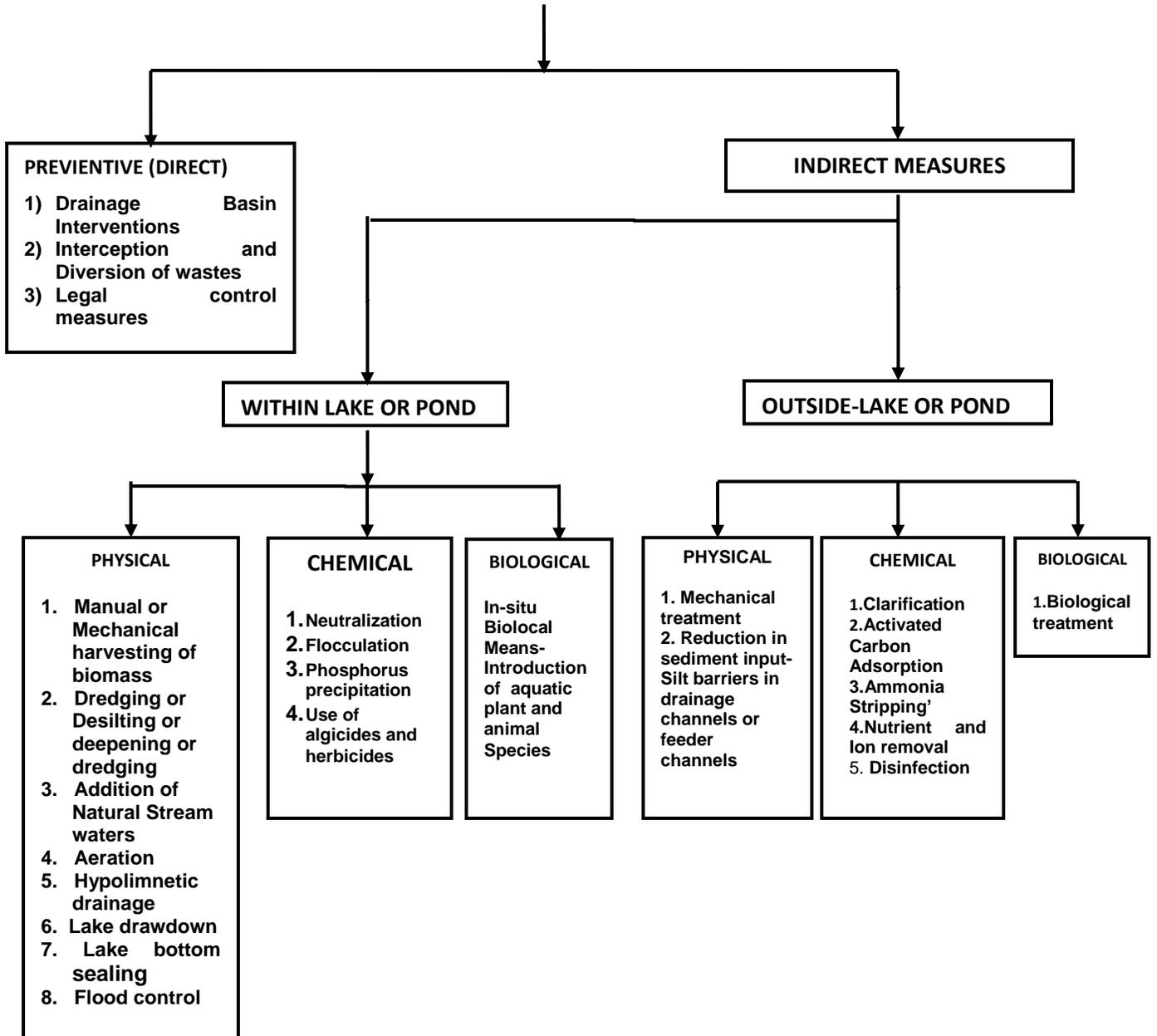


Figure 1. A Model Lake or Pond Restoration Technique

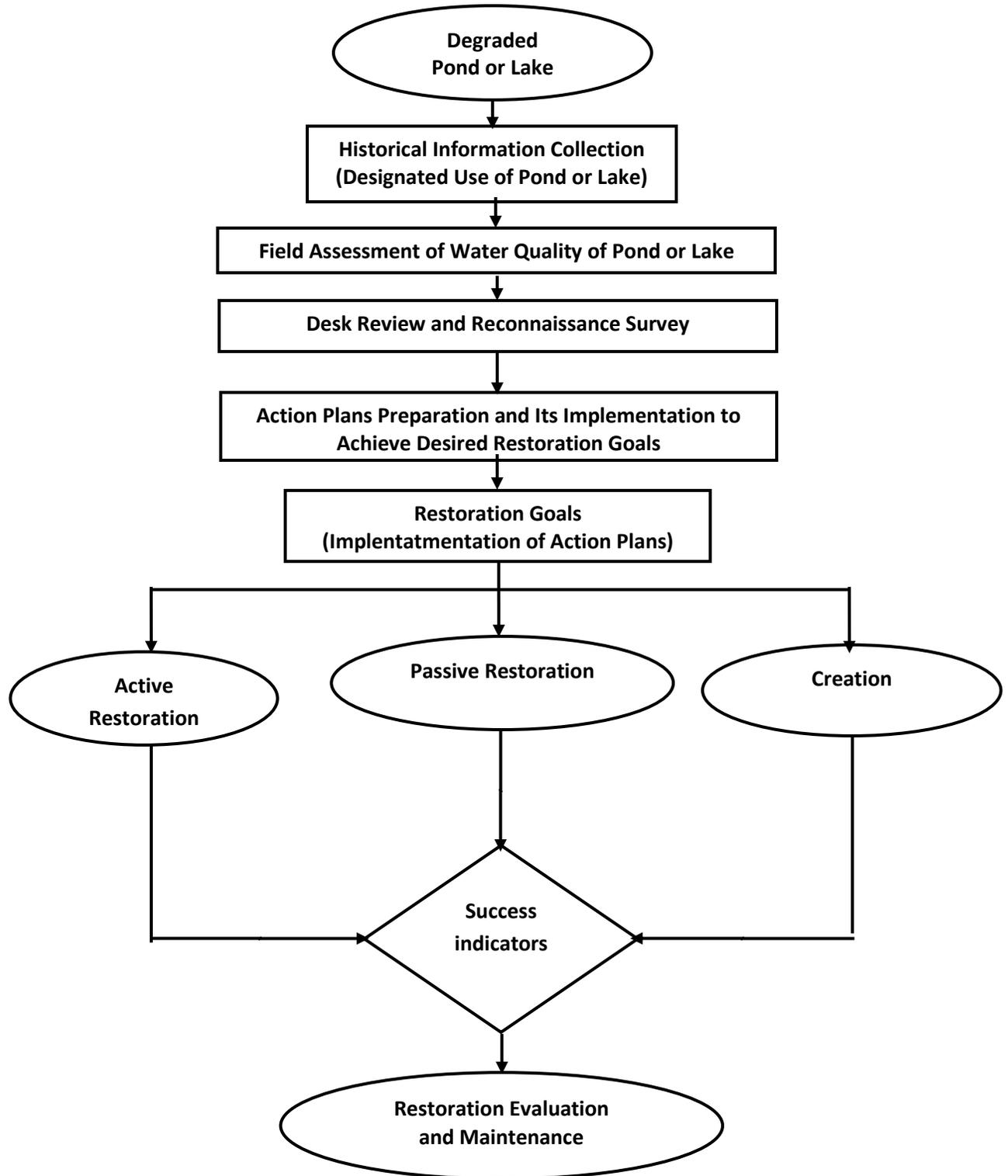


Figure 2. Model Flow Chart for Restoration of Pond or Lake

## 5.6 Steps involved in preparation of Action Plan for rejuvenation of polluted river stretches

### A. Background Information (Refer to Sl. No. 2.1.2)

- (i) Digital map of identified polluted river with its tributaries
- (ii) Geographical and hydrological description of polluted river
- (iii) Catchment description- uses of river, towns, cities and villages, industries (sector-wise no. of industries), ground water status and its utilisation, agricultural practices, flora and fauna etc.

### B. Water Quality of River and Its Tributaries

- (i) Water quality of river and its tributaries ( at least for five years)
- (ii) Quality assigned as per modified Water Quality Criteria (**Annexure-I**)

### C. Identification of Causes of Pollution in Catchment Area of the River

#### ➤ Industrial Pollution

- (i) List of water polluting industries, industry sector-wise: water consumption, effluent generation and quantity of industrial effluent discharged into river
- (ii) Status on granting of Consent under Water (Prevention and Control of Pollution) Act, 1974
- (iii) Status on granting of authorization under the Hazardous & Other Waste (Management & Transboundary Movement) Rules, 2016 as amended (as applicable)
- (iv) Compliance status and action taken (Placing in public domain)
- (v) Final disposal mode of treated industrial effluents (i.e., disposal on land or drain or ZLD or drain connected to CETP etc.,)
- (vi) Performance status of captive Effluent Treatment Plants (if applicable)
- (vii) Existing Common Effluent Treatment Plants (CETPs) and their performance status.
- (viii) Regulation of small scale industries/tiny units'/service units discharging effluents/sludge disposal into drains/landfill or any other mode of disposal

#### ➤ Ground water management

- (i) Status of ground water level-reserves in the catchment area of river under consideration
- (ii) Blocks identified as over exploited, critical, semi-critical and safe (as per Central Ground Water Board (CGWB) if any)

- (iii) Status of permissions granted by Central Ground Water Board (CGWB) to the industries and other Development projects in the catchment area of river.
- (i) Compliance of conditions stipulated by CGWB and subsequently by SPCB.
- (ii) Ground water sources (Hand –pumps, Wells, Tube Wells) identified in the catchment area of the river and the characteristics (at least for the period of two years);
- (iii) Ground water sources (Hand –pumps, Wells, Tube Wells) identified as non-potable for human consumption in river stretch with Geo-genic/or polluted due to industries.
- (iv) Compliance on ground water charging imposed by Rain Water Harvesting Mechanism.
- (v) Existing mechanism for supply of potable water to the human population in the affected areas.
- (vi) Health deformities /clinical reports in polluted river stretch areas in view of ground water contamination.

➤ **Sewage treatment and disposal: -**

- (i) Cities, towns and villages located on the bank of river stretches discharging sewage effluents through drains into the river.
- (ii) Quantification and pollution load of sewage generated by a city/town/village.
- (iv) Status of septage management.
- (v) Listing of drains carrying sewage and trade effluents joining river and determining flow and characteristics with details of catchment contributing sources (drainage maps from major /minor irrigation development of State/or local body).
- (vi) Existing sewage treatment capacities and performance of Sewage Treatment Plants and their compliance Status
- (vii) Final mode of disposal of treated sewage as well as sludge management

➤ **Waste management in the catchment area of river: -**

- (i) Area-wise Hazardous waste generation, treatment and final mode of disposal and the existing infrastructure.
- (ii) Area-wise Status on municipal solid waste generation, treatment and final mode of disposal and the existing infrastructure
- (iii) Area-wise Status on bio-medical waste generation, treatment and final mode of disposal and the existing infrastructure
- (iv) Any other waste generation, treatment and final mode of disposal and the existing infrastructure

➤ **River catchment information**

- (i) Regulation of Flood Plain Zone
- (ii) Encroachment in Flood Plain Zone
- (iii) Plantation status
- (iv) Flow data of river/tributary

➤ **Gap Analysis and Identification of the problems in the identified polluted river catchment: -**

- (i) Sewage generation, existing infrastructure with treatment capacities and the observed gaps w.r.to infrastructure for sewage management
- (ii) Industrial effluent generation, existing infrastructure with treatment capacities and the observed gaps w.r.to infrastructure for industrial effluent management
- (iii) Waste generation, existing infrastructure with treatment capacities, designed life of the treatment and disposal facilities as applicable and the observed gaps w.r.to infrastructure for waste management
- (iv) Any other relevant issues

*(Note: - All the details such as river and its tributaries, area-wise population, sources and water consumption quantities, sewage generation, existing infrastructure for sewage management and the gaps observed, area-wise industries (industry sector-wise no. of industries), sources of water and water consumption quantities (industry-sector-wise), industrial effluent generation, existing infrastructure for treatment ( like Captive ETPs, CETPs), final mode of disposal of industrial effluents, waste generation and its management with existing infrastructure, characteristics of river and its tributaries, identified contaminated ground water resource areas has to be detailed in the map preferably a digital map)*

**D. The River Rejuvenation Action Plan:-**

After having complete based information as detailed under earlier paras A to D above, Action Plans on each Activity with time-lines can be framed. The key components of action plan may follow the suggested points as given the Table below:

S. No	Key Activity and Components		Agency to perform the task	Proposed Specific Time Frame for implementation of action plan
1	<b>Industrial Pollution Control</b>			
	(a)	Inventorisation of water polluting industries	SPCB	
	(b)	Grant of consents	SPCB	
	(c)	Compliance verification	SPCB/ District Magistrate (DM)	
	(d)	Planning for CETP (as applicable)	SPCB+ State Industries Department or of Industries	
	(e)	Insisting on ZLD measures, recycling/reuse of treated industrial effluents	SPCB	
	(f)	Prohibition of disposal of effluents into drains except during rainy season subject to complying to effluent discharge norms for disposal in surface water.	SPCB + DM	
	(g)	Covering small and tiny units and not allowing discharge of effluents either individually or combined	SPCB+ Local Body/ Urban Body	
	(h)	Publishing list of defaulting industries in local newspapers and involving public in reporting deliberate discharges (without entering in the premises-backyard water and reporting running of industry against the closure orders.	SPCB + DM	
	(i)	Hazardous or Non Hazardous Waste Management Plan and no dumps anywhere except at identified locations	SPCB + DM	
	(j)	Reporting Non-Compliance of CGWB	SPCB +	

		conditions and closure of Non complying units.	CGWB	
	(k)	Levying compensation or fines for non-compliances as empowered to UPPCB under the Hon'ble NGT Order Dtd. 13/07/2017 in Ganga Matter in case of Tanneries.	SPCB	
	(l)	Other Action as relevant	SPCB + Concerned Agency of State	
<b>2</b>	<b>Ground Water Protection</b>			
	(a)	Declaration of Polluted Blocks	CGWB	
	(b)	Embargo on Water pollution /over-abstraction of industries as per block status	CGWB	
	(c)	Rain water harvesting	Local Body + DM	
	(d)	Identification of Geo-genic contamination (as applicable)	CGWB	
	(e)	Identification of industries discharging industrial effluent illegally and levying fine on such industries including closure of such industries	SPCB + CGWB	
	(f)	Remediation of contaminated ground water (due to discharge of industrial /sewage) with the recovered funds from the default industry	SPCB + CGWB	
	(g)	Capping of contaminated tube wells and Potable water supply through alternate measures in the affected areas of groundwater	Water Supply Department	
<b>3</b>	<b>Sewage Management</b>			
	(a)	Identification of cities, towns and villages discharging sewage into river/tributary	State Local and Urban Development and Executing Agencies	
	(b)	Identifying drains joining river and their quantification and characterizations of pollution load		
	(c)	Preparation of Detailed Project Report (DPR) for interception and diversion ( I & D) of drains to sewage treatment plant (STP) for which suitable site to be identified and plan for utilization of treated sewage.		

	(d)	Execution of STP works and necessary infrastructure and ensuring household sewer connection for full utilization of STP		
	(e)	Regular cleaning of drains and prohibiting disposal of garbage/plastic and filthy material into drains including dairy waste		
	(f)	Restoration of natural drains for carrying only storm water (but not sewage)	Local and Urban Bodies + State Water Resources + State Irrigation Department + SPCB	
	(g)	Ensuring utilization of treated sewage for beneficial use such as agriculture, construction activity, washing/flushing/cleaning, industrial cooling etc.,	Local and Urban Bodies + State Irrigation Department + SPCB	
	(h)	Interception and Diversion of sewage from Drains and connectivity to STPs	Local and Urban Bodies	
<b>4</b>	<b>Flood Plain Zone (FPZ) Protection</b>			
	(a)	Demarcation of FPZ and not permitting encroachments	State Irrigation Department	
	(b)	Adopting good irrigation practices to conserve water	State Irrigation Department /DFO	
	(c)	Plantation and bio-diversity parks in FPZ	State Forest Department	
<b>5</b>	<b>E-Flow</b>			
	(a)	E-Flow determination/gauging	State Irrigation Department	
	(b)	Regulation of flow from barrages	State Irrigation Department	
<b>6</b>	<b>Health Impact Assessment Reports-Treatment Services</b>			

	(a)	Epidemiological survey in the catchment to find out water-born diseases/ health issues	State Health Department	
	(b)	Providing treatment services to the diseased persons in the catchment area		
<b>7</b>	<b>Education and Awareness</b>			
	(a)	Regular involvement of educational institutions for creating awareness and conservation programmes	State Education Department with concerned Departments	
<b>8</b>	<b>Funding for execution of Action Plans</b>			
	(a)	Pooling of financial resources of state and central assistance	State Finance Commission/ MoUD and MoWR, RD & GR	

**E. Monitoring of Implementation of Action Plans for Rejuvenation of Polluted River Stretches:-**

- (i) In compliance with Hon'ble NGT Order dated 20/09/2018 (OA No. 673 of 2018), State/UT Level 'River Rejuvenation Committee (RRC)' constituted firstly has to ensure timely preparation of action plans (before 20/11/2018).
- (ii) Prepared actions plans need to be submitted to CPCB for random scrutiny as well as for approvals.
- (iii) Thereafter, execution of action plans to begin and to be mentioned on monthly basis by the 'RRC' under overall supervision of the Principal Secretary (Environment) of the respective State Government or Union Territory Administration.

A model flow chart for rejuvenation of polluted river is given in **Figure 3**

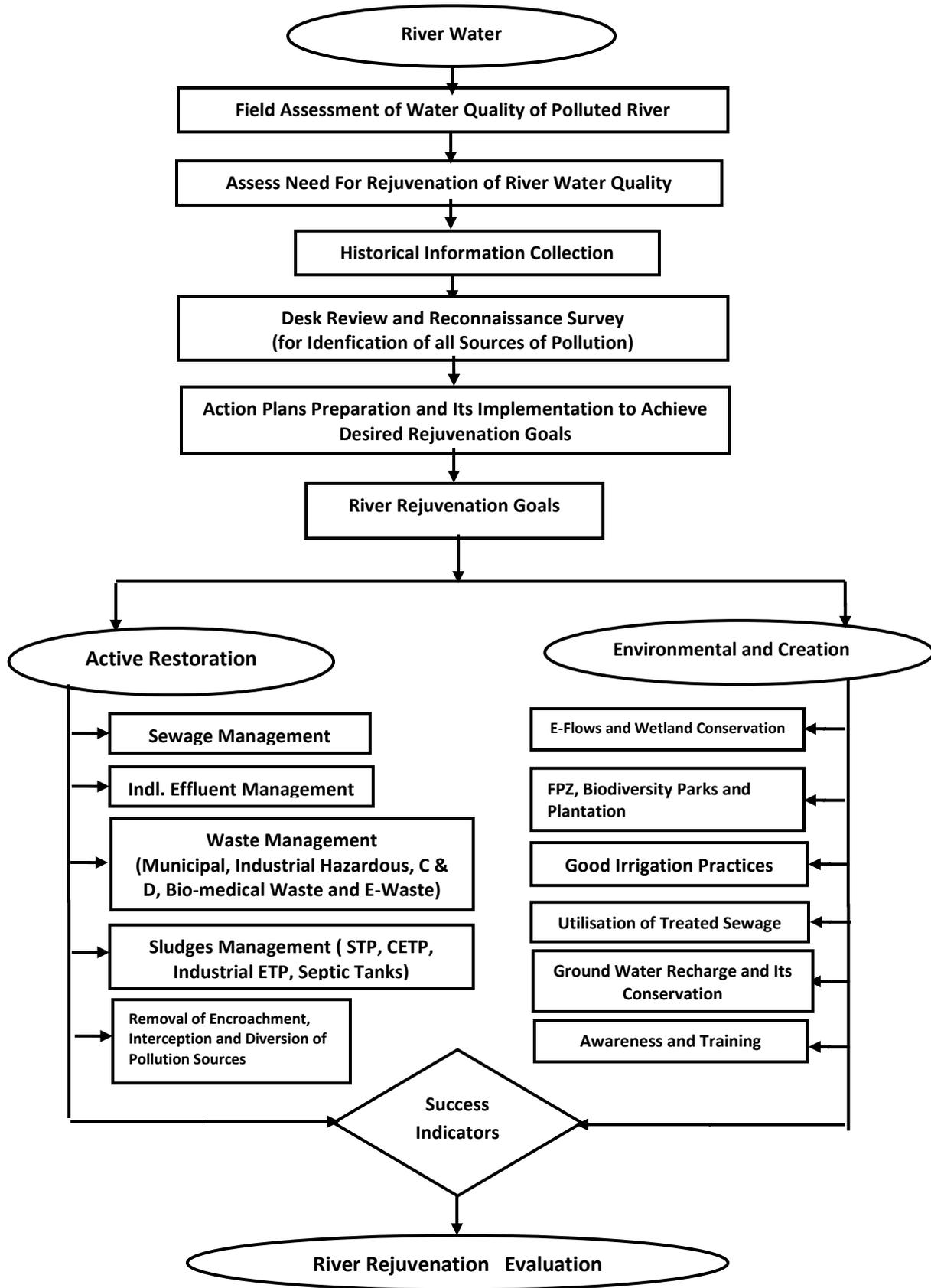


Figure 3. Model Flow Chart for Rejuvenation of Polluted Rivers

## **6. Sustenance Phase**

Good governance, based on fairness, transparency and empowerment of all stakeholders, is essential to sustain the restoration efforts. Also, ownership of each waterbody should be decided, as most of them face indefinite sustenance due to multiplicity of administrative control and/or lack of specific action by singular authority. The in charge authority should treat the water body as 'natural resources', to act as the potential catalysts to better civic health, provide recreation, improve tourism, possibly meet water-needs of local people, etc. Such gains shall be attained only after the water bodies are treated on eco system based approach.

### **6.1 Awareness**

Awareness for citizen's groups, resident welfare associations, local organizations, activist groups, green organizations, political organizations, educational institutions and government agencies in protection of the water bodies should be organized periodically by the concerned authorities through campaigns, electronic media in vernacular languages also be ensured by the concerned authorities

### **6.2 Training**

Organizing periodic trainings through identified and reputed institutions for all the concerned on aspects relating to maintenance during post- restoration phase of the water body.

### **6.3 Promoting Public Participation**

Promoting active public participation (with the help of schools, colleges and universities, NGOs) for identifying and resolving critical lake or pond problems as

well as periodic maintenance and restoration of water body from aesthetic and restoration point of view should be organized.

#### 6.4 Dissemination of Information

Water quality of the pond or lake should be displayed at the main entrance of the pond or lake boundary and such water quality data also connected to the servers of concerned custodian State Department (s) as well as State Environment Department, respective State Pollution Control Board (SPCB)/Pollution Control Committee (PCC). Display boards also should be provided at all the salient points on '**Do's and Don'ts**' for the public.

#### 6.5 Recreational Centre

Creation of pond or lakes can be converted into recreational centers with boating activities, walkways and benches for visitors on charge basis so as to generate revenue for operation and maintenance of the lake or pond areas

### 7. References

- Parliamentary Standing Committee Report 2016-“Repair, Renovation and Restoration of Water Bodies- Encroachment on Water Bodies and Steps Required to Remove the Encroachment and Restore the Water Bodies” ([https://eparlib.nic.in/handle/123456789/65926?view\\_type=browse](https://eparlib.nic.in/handle/123456789/65926?view_type=browse))
- Report of Niti Aayog (2018)- COMPOSITE WATER MANAGEMENT INDEX (CWMI) A NATIONAL TOOL FOR WATER MEASUREMENT MANAGEMENT & IMPROVEMENT <http://pibphoto.nic.in/documents/rlink/2018/jun/p201861401.pdf>
- GUIDELINES FOR REPAIR, RENOVATION AND RESTORATION OF WATER BODIES WITH DOMESTIC SUPPORT (2009)

[https://www.indiawaterportal.org/sites/indiawaterportal.org/files/Repair%2C%20Renovation%20and%20Restoration Water%20Bodies Domestic%20Support MoWR 2009.pdf](https://www.indiawaterportal.org/sites/indiawaterportal.org/files/Repair%2C%20Renovation%20and%20Restoration%20Water%20Bodies%20Domestic%20Support%20MoWR%202009.pdf)

- GUIDELINES FOR REPAIR, RENOVATION AND RESTORATION OF WATER BODIES WITH EXTERNAL ASSISTANCE (2009)

[https://www.indiawaterportal.org/sites/indiawaterportal.org/files/Repair%2C%20Renovation%20and%20Restoration Water%20Bodies %20External%20Assistance MoWR 2009.pdf](https://www.indiawaterportal.org/sites/indiawaterportal.org/files/Repair%2C%20Renovation%20and%20Restoration%20Water%20Bodies%20External%20Assistance%20MoWR%202009.pdf)

- Advisory on Conservation and Restoration of Water Bodies in Urban Areas published by Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development (August 2013)

<http://mohua.gov.in/upload/uploadfiles/files/Advisory%20on%20Urban%20Water%20Bodies.pdf>

- OA No. 200 of 2014 Titled M.C. Mehta Vs Union of India -(River Ganga) Order of HON'BLE NGT Dated 10/12/2015; and 13/07/2017.
- OA No. 231 of 214 Titled Doaba Paryavaran Samiti Vs State of UP & Ors. (on river Hindon) Order of HON'BLE NGT Dated 08/08/2018
- OA No. 673 of 2018 Titled News item published in "The Hindu" authored by Shri Jacob Koshy titled "More river stretches are now critically polluted: CPCB" Order of HON'BLE NGT Dated 20.09.2018, 19.12.2018 and 08.04.2019

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## Annexure-I

## Water Quality Criteria-Designated Best Use

Designated-Best-Use	Class of Water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism in MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B*	Faecal Coliform in MPN/100ml: 500 (desirable) and 2500 (Maximum Permissible) Faecal streptococci in MPN/100 ml: 100 (desirable) and 500 (maximum Permissible) pH between 6.5 to 8.5 Dissolved Oxygen: 5mg/l or more Biochemical Oxygen Demand 3 Day BOD, 27 ° C: 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling	E	pH between 6.0 to 8.5 Electrical Conductivity at 25 °C micro mhos/cm Max.2250 Sodium Absorption Ratio Max. 26 Boron Max. 2mg/l

\* ***Class B as per Primary Water Quality Criteria for Bathing Water (Water Used for Organised Outdoor Bathing) as per Environment (Protection) Rules, 1986***

## Annexure-II

**CRITERIA FOR CATEGORISATION OF  
RIVER MONITORING LOCATION****1. Introduction**

Water Quality monitoring is an essential component to maintain and restore the wholesomeness of resources by way of prevention and control of pollution as prescribed under the Water (Prevention and Control of Pollution) Act, 1974. However, the Water (Prevention and Control of Pollution), Act, 1976 does not define the level of wholesomeness to be maintained or restored in different water bodies of the country. In view of the said reason, the Central Pollution Control Board (CPCB) has tried to define the wholesomeness of water in terms of safe human uses, and thus, taken human uses of water as base for identification of water quality objectives for different water bodies in the Country. It is considered ambitious to maintain or restore all natural water body at pristine level which is possible only by taking proper control measures. The level and degree of treatment required can be decided depending on the categorization of the polluted river locations/stretch, as per the criteria detailed below:-

**2. Categorization of River Monitoring Location**

The water quality data is required to be analyzed and primarily mean or average values of Biochemical Oxygen Demand (BOD) and Faecal Coliform (FC) need to be estimated. Then, based on the total score estimated for the parameters BOD (weightage- 70 %) and FC (Weightage- 30 %), based on the criteria, the monitoring location is categorized as 'polluted' location. The polluted monitoring locations in a continuous sequence are defined as 'polluted river stretch'. However, actual self-purification distance need to be estimated based on the requisite input parameters which depend on the case-to-case and the local conditions.

The monitoring locations may be categorized in five classes from Category I to Category –VI. i.e., critically polluted to Good or Fit for Bathing i.e., Category –I indicates 'critically polluted'; Category-II indicates 'severely polluted'; Category-III indicates 'moderately polluted', Category –IV indicates 'less polluted', Category – V indicates 'Good' or Fit for Bathing'

Above suggested criteria is intended only for categorization of the river monitoring locations. However, if any State/UT desires to identify any other water body such as lakes, tanks may also apply these criteria depending on the need and the requisite achievable goals for rejuvenation of such water bodies.

**Table 1 to Table 3** gives the mean or average BOD/Faecal Coliform values or range and the corresponding scores as well as categorization of the monitoring location

**Table 1. Observed Mean or Average BOD Value in mg/l and corresponding BOD Score**

S. No	Mean or Average BOD (Weightage-70 %)	
	Mean or Average BOD (in mg/l)	BOD Score (X)
1	> 48	100
2	24-48	80
3	12-24	60
4	6-12	40
5	≤ 6	20

**Table 2. Observed Mean or Average Faecal Coliform (in MPN/100 ml) and corresponding FC Score**

S. No	Mean or Average Faecal Coliform (Weightage -30 %)	
	Mean or Average Faecal Coliform (in MPN/100 ml)	FC Score (Y)
(1)	> 5,00,000	100
(2)	5000 to 5,00,000	80
(3)	5000 to 50,000	60
(4)	500 to 5000	40
(5)	≤500	20

**Table 3. Total Score and corresponding Category of River Monitoring Location**

S. No	Total Score* (Z')	Category Priority Class of the Monitoring location	Category of Monitoring location
(1)	81-100	Category -I	Critically Polluted
(2)	61-80	Category--II	Severely Polluted
(3)	41-60	Category -III	Moderately Polluted
(4)	21-40	Category -IV	Less Polluted
(5)	≤ 20	Category -V	Good or Fit For Bathing

**Note:**

- (i) *Above criteria must be considered only for the river locations having monitored at least for 2 years and 8 observations in each year covering at least pre-monsoon and post-monsoon period;*

- (ii) *Above criteria is a preliminary screening criteria for categorizing monitoring locations. However, comprehensive assessment needs to be done by States/UTs to arrive at the extent of contamination;*
- (iii) *Please refer to the procedure for estimation of Total Score given in S.No 3.;*

- 2.1 Criteria for Category- I – Critically Polluted:** - If the Total score is 81-100, then the monitoring location is categorized as '**Critically Polluted**'.
- 2.2 Criteria for Category- II – Severely Polluted:** - If the Total score is 61-80, then the monitoring location is categorized as '**Severely Polluted**'
- 2.3 Criteria for Category- III-Moderately Polluted:** - If the Total score is 41-60, then the monitoring location is categorized as '**Moderately Polluted**'
- 2.4 Criteria for Category-IV –Less Polluted:** - If the Total score is 21-40, then the monitoring location is categorized as '**Less Polluted**'.
- 2.5 Criteria for Category -V-Good or Fit for Bathing:-**If the Total score is  $\leq 20$ , then the monitoring location is categorized as '**Good or Fit for Bathing**'.

*For easy understanding, flow chart given in **Figure 4** and steps for calculating the total score may also be referred in the subsequent paras:-*

- 3. Steps for calculating total score and categorizing of monitoring location : -**
  - (i) *Depending on the average BOD measured value, assign the BOD score (X) as given in **Table 1**.*
  - (ii) *Similarly depending on the average FC measured value, assign the FC Score (Y) as given in **Table 2**.*
  - (iii) *Total score (**Z**) is estimated as: BOD Score (**X**) X (Weightage of BOD i.e., 70 %) + FC Score (**Y**) X (Weightage for FC i.e., 30 %). and*
  - (iv) *Now compare calculated Total Score (Z) with the **Z'** Value given in the **Table 3** and the monitoring location is categorized suitably.*

For easy understanding following examples may be referred in the subsequent paras.

**E.g. (1):** At a particular monitoring location, the average values of BOD and the FC values are observed as 6 mg/l and 9000 MPN/100 ml respectively. Then, the total score is calculated as

- X is the BOD Score corresponding to the mean BOD value of 6 mg/l as per **Table 1** = 20
- Y is the FC Score corresponding to the average FC value of 9000 MPN/100 ml as per **Table 2** = 60
- Calculated Total Score (**Z**) = X X **Weightage of BOD** + Y X **Weightage of FC** i.e.,  $20 \times 0.7 + 60 \times 0.3 = 14 + 18 = 32$ .
- Compare 39 value with the **Z'** values given in **Table 3** to decide on the *Priority* Category of the Monitoring Location. In this case, monitoring location is Category-IV i.e., 'Less Polluted',

**E.g.(2):** At a particular monitoring location, the average value of BOD and the FC values are observed as 2 mg/l and 45 MPN/100 ml respectively. Then, the total score is calculated as

- X is the BOD Score corresponding to the average BOD value of 2 mg/l as per **Table 1** = 20
- Y is the FC Score corresponding to the average FC value of 45 MPN/100 ml as per **Table 2** =20
- Calculated Total Score (**Z**) is calculated as = X X **Weightage of BOD** + Y X **Weightage of FC** i.e.,  $20 \times 0.7 + 20 \times 0.3 = 20$
- Compare 20 value with the **Z'** values given in **Table 3** to decide on the Category of the Monitoring Location. In this case, monitoring location is Category-V i.e., 'Good' or Fit for Bathing

**E.g. (3):** At a particular monitoring location, the average value of BOD and the FC values are observed as 2 mg/l and 550000 MPN/100 ml respectively. Then, the total score is calculated as

- X is the BOD Score corresponding to the average BOD value of 2 mg/l as per **Table 1** = 20

- *Y is the FC Score corresponding to the average FC value of 550000 MPN/100 ml as per **Table 2** = 100*
- *Calculated Total Score (**Z**) = **X** X **Weightage of BOD** + **Y** X **Weightage of FC** i.e.,  $20 \times 0.7 + 100 \times 0.3 = 44$ .*
- *Compare 100 value with the **Z'** values given in **Table 3** to decide on the Category of the Monitoring Location. In this case, monitoring location is Category-III i.e., 'Moderately Polluted'*

**E.g.(4):** *At a particular monitoring location, the average value of BOD and the FC values are observed as 45 mg/l and 400 MPN/100 ml respectively. Then, the total score is calculated as*

- *X is the BOD Score corresponding to the average BOD value of 45 mg/l as per **Table 1** = 80*
- *Y is the FC Score corresponding to the average FC value of 400 MPN/100 ml as per **Table 2** = 20*
- *Calculated Total Score (**Z**) = **X** X **Weightage of BOD** + **Y** X **Weightage of FC** i.e.,  $80 \times 0.7 + 20 \times 0.3 = 62$ .*
- *Compare 100 value with the **Z'** values given in **Table 3** to decide on the Category of the Monitoring Location. In this case, monitoring location is 'Category-II i.e., 'Severely Polluted'*

**E.g (5):** *At a particular monitoring location, the average values of BOD and the FC values are observed as 24 mg/l and 200000 MPN/100 ml respectively. Then, the total score is calculated as*

- *X is the BOD Score corresponding to the mean BOD value of 24 mg/l as per **Table 1** = 60*
- *Y is the FC Score corresponding to the average FC value of 200000 MPN/100 ml as per **Table 2** = 80*
- *Calculated Total Score (**Z**) = **X** X **Weightage of BOD** (70 %) + **Y** X **Weightage of FC** (30 %) i.e.,  $60 \times 0.7 + 80 \times 0.3 = 42 + 24 = 66$ .*
- *Compare 90 value with the **Z'** values given in **Table 3** to decide on the Category of the Monitoring Location. In this case, monitoring location is Category-II i.e., 'Severely Polluted',*

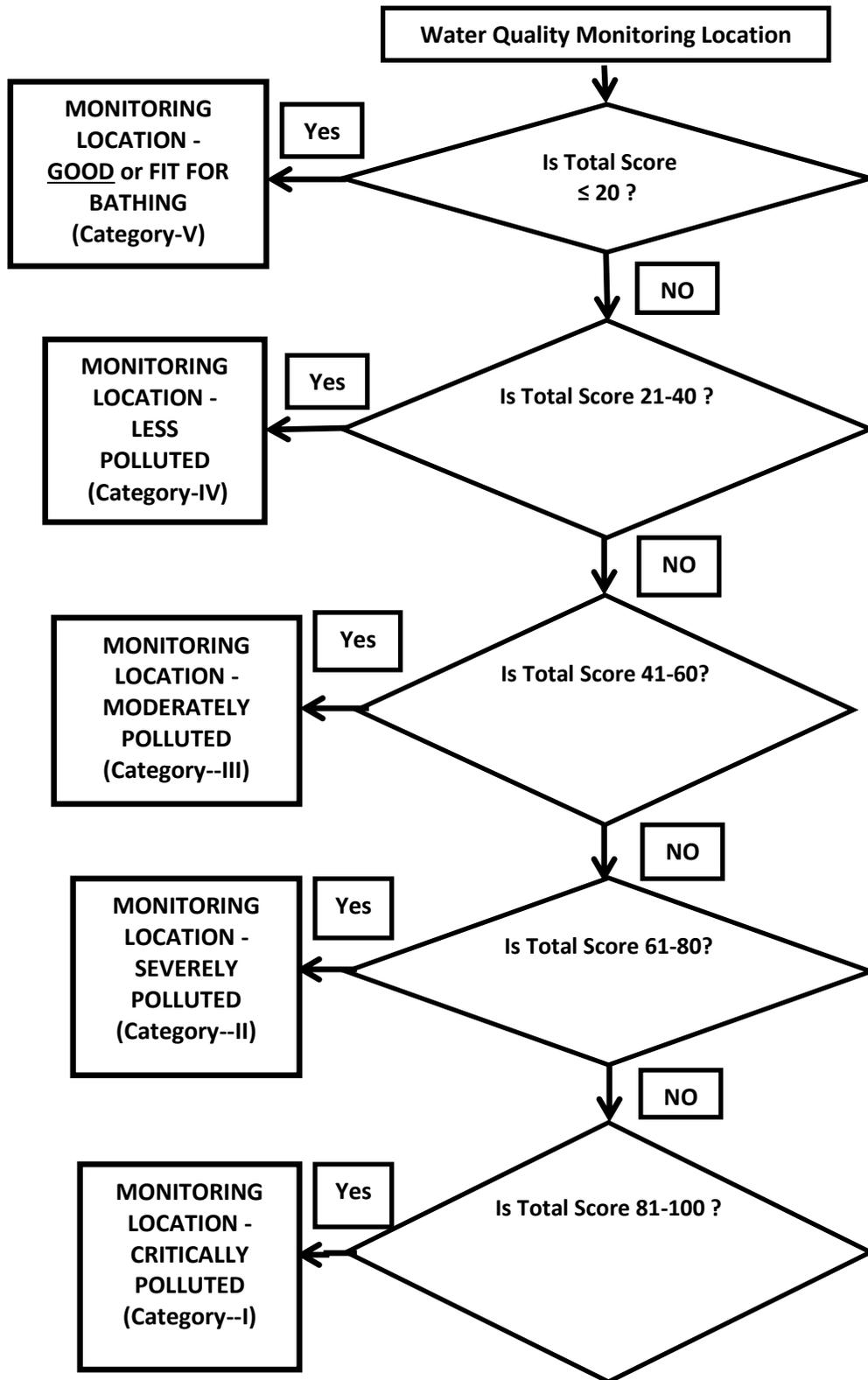


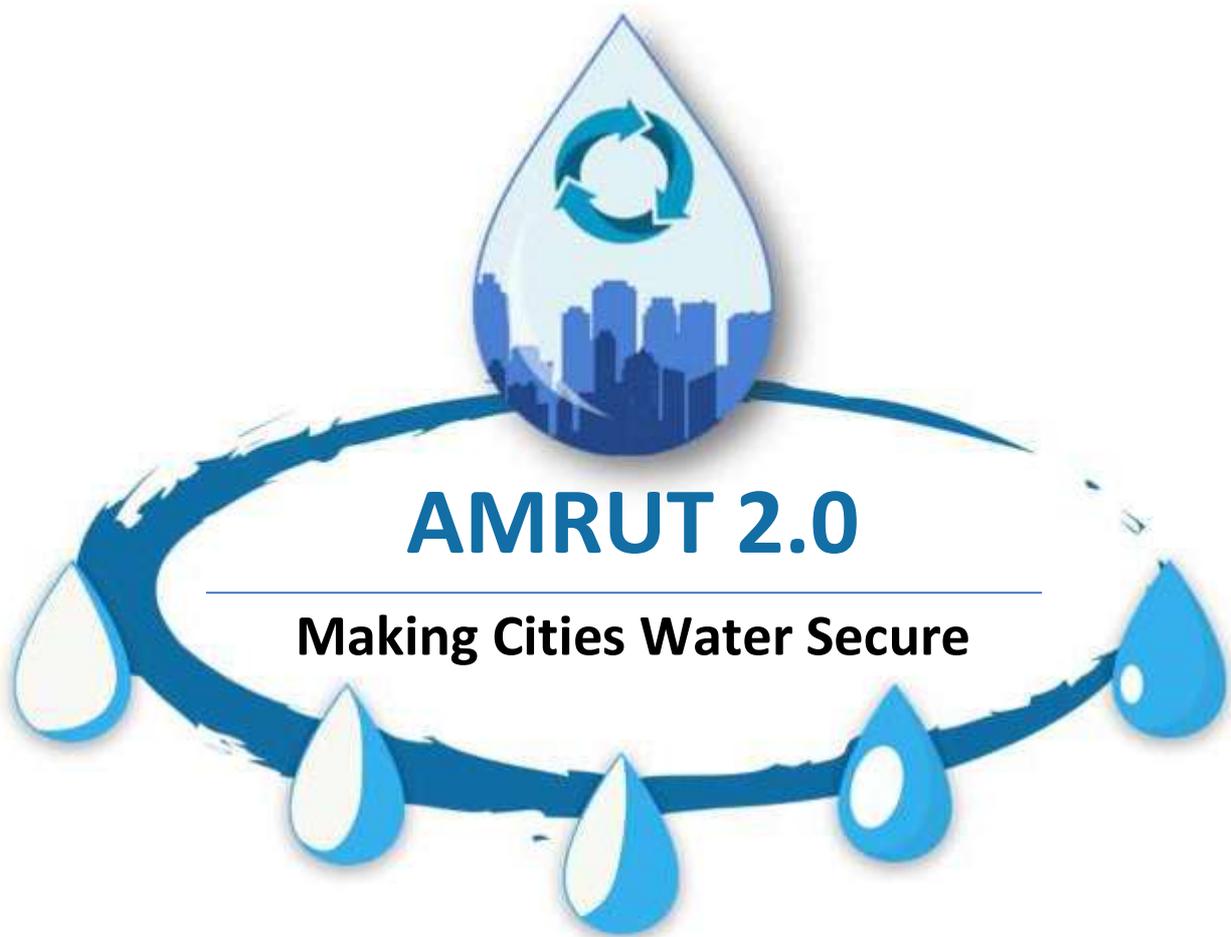
Figure 4. Flow Chart Showing Criteria for Categorization of River Monitoring Location

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**Annexure - R3<sup>71</sup>**



# Atal Mission for Rejuvenation and Urban Transformation 2.0



**Operational Guidelines**

October 2021



“...In the next stage of AMRUT, country targets to have access to clean water for all urban citizens, increase coverage of sewerage & septage management, make our cities water secure and ensure that no dirty water falls into the rivers from drains. The journey of AMRUT and Swachh Bharat Mission so far is a pride for citizens. It is not only Mission, but also denotes honour, modesty & aspiration of the nation and love for the Motherland ...”

- Hon'ble Prime Minister in his address during  
launch of AMRUT 2.0, on 1 October, 2021

हरदीप एस पुरी  
HARDEEP S PURI



सत्यमेव जयते



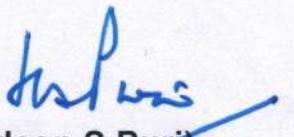
आवासन और शहरी कार्य मंत्री  
पेट्रोलियम एवं प्राकृतिक गैस मंत्री  
भारत सरकार  
Minister of  
Housing and Urban Affairs; and  
Petroleum and Natural Gas  
Government of India

### Message

Atal Mission for Rejuvenation and Urban Transformation (AMRUT) launched in 500 selected cities across the country in June 2015 by the Hon'ble Prime Minister has been successful in enhancing liveability in AMRUT cities. AMRUT made states equal partners in planning and implementation of projects, thus actualizing the spirit of cooperative federalism.

AMRUT 2.0 launched by Hon'ble Prime Minister on 1 October 2021, with a total outlay of ₹2,99,000 crores – nearly 3 times of the AMRUT - is the outcome of confidence gained during implementation of AMRUT scheme and our resolve to extend the basic services to every household. The Mission envisages providing water tap connections to households in all statutory towns through 2.68 crore new household tap connections and providing universal household coverage of sewerage/septage services in 500 AMRUT cities through 2.64 crore new sewer connections/coverage with septage management. Rejuvenation of water bodies and green spaces and parks are other components of the Mission. Outcome based funding is a major feature of AMRUT 2.0.

In this context, I am happy to see the operational guidelines for AMRUT 2.0 issued by the AMRUT Mission Directorate. I am hopeful that AMRUT 2.0 will go a long way in improving the quality of life for all urban dwellers, especially the poor and the disadvantaged and make our cities water secure.

  
(Hardeep S Puri)

New Delhi  
26 October, 2021



सत्यमेव जयते



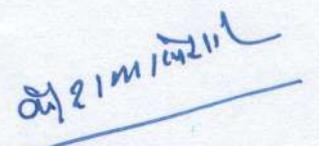
संदेश

घरों के लिए बुनियादी सेवाएं (जैसे जल आपूर्ति, सीवरेज) प्रदान करना और शहरों में सुविधाएं उपलब्ध कराना, जो सभी के जीवन की गुणवत्ता में सुधार करें, राष्ट्रीय प्राथमिकता रही है। इसी उद्देश्य से अमृत योजना को 500 शहरों में 25 जून 2015 को प्रारम्भ किया गया था। मिशन के सफलता को देखते हुए तथा इसे सभी वैधानिक शहरों में क्रियान्वित करने के उद्देश्य से माननीय प्रधानमंत्री जी ने अमृत 2.0 मिशन का शुभारम्भ 1 अक्टूबर 2021 को किया है।

अमृत 2.0 सभी वैधानिक शहरों में सभी को नल कनेक्शन प्रदान करने का लक्ष्य रखता है। साथ ही, इसमें सभी 500 अमृत शहरों में सीवरेज/सेप्टेज सेवाओं का सार्वभौमिक घरेलू कनेक्शन प्रदान करने का प्रस्ताव है। जल निकायों का नवीकरण, हरित स्थान और पार्क इस मिशन के अन्य घटक हैं। परिणाम आधारित वित्तपोषण इसकी प्रमुख विशेषता है।

इन सब को ध्यान में रखते हुए आज मैं गर्व से कहना चाहता हूँ कि अमृत 2.0 मिशन की परिचालन दिशानिर्देश, जोकि अमृत मिशन निदेशालय द्वारा जारी किया गया है, सभी वैधानिक शहरों को जल सुरक्षित बनाएगा और आत्मनिर्भर भारत के स्वप्न को साकार करने में मदद करेगा।

जय हिन्द।

  
(कौशल किशोर)

दुर्गा शंकर मिश्र

सचिव

Durga Shanker Mishra

Secretary



44700



सत्यमेव जयते

**Foreword**

भारत सरकार

आवासन और शहरी कार्य मंत्रालय

निर्माण भवन, नई दिल्ली-110011

Government of India

Ministry of Housing and Urban Affairs

Nirman Bhawan, New Delhi-110011

Hon'ble Prime Minister launched AMRUT 2.0 on 1 October, 2021. It aims to develop water secure cities in the spirit of **AatmaNirbhar Bharat**. It targets to provide reliable **2.68 crore** new water tap connections to all in about **4,800 statutory towns**. Also, it proposes to get universal household coverage of sewerage/ septage services in **500 AMRUT cities through 2.64 crore** new sewer connections. Rejuvenation of water bodies, green spaces and parks are other components of this Mission. Outcome based funding is its major feature. Total indicative outlay for AMRUT 2.0 is ₹ **2,99,000 crore** which includes allocation for projects of ongoing AMRUT Mission to the tune of ₹ **22,000 crore** for **two years** from FY 2021-22 to FY 2022-23 and the rest is for five years. Total indicative central share is ₹**86,760 crore** including ₹**10,000 crore** for AMRUT projects.

I am pleased to share AMRUT 2.0 guidelines with the stakeholders. Guidelines gives way forward for implementing the Mission. To begin with, cities are expected to prepare and submit City Water Balance Plans (CWBP) online on a robust Mission Portal of MoHUA. CWBPs will give the status of water sources, quantum of water available, water demand and supply in the city culminating in gaps in services. These gaps will lead to formulating projects with target of filling these gaps. Mission mandates implementation of 10% worth of funds allocated to million plus cities under PPP mode. Projects on 24x7 water supply in 500 AMRUT cities are encouraged. Mission management will be paperless on an online platform.

All projects proposed by State will aggregate to State Water Action Plan (SWAP) which will be submitted in three tranches for approval of Apex Committee. Mission will provide central assistance for implementing projects in three instalments. Third instalment will be released only on the basis of achieved outcomes. Notification of Property Tax and User charges by States are mandatory reforms to be implemented in first two years for continuity of central funding. Aquifer Management Plans of cities are to be submitted by States. Mission will provide funds separately for outcomes achieved through sources not funded through AMRUT and AMRUT 2.0. Central funding will be admissible for Administrative and Other Expenses (A&OE) to the States.

Pey Jal Survekshan, Information Education & Communication (IEC) and Technology sub-Mission are key components of Mission. Start-ups in water sector will also be encouraged through sub-Mission. Reform agenda of Mission has reforms on municipal governance and water security of cities. Major reforms are reducing non-revenue water to below 20%; recycle of treated used water to meet at least 20% of total city water demand and 40% for industrial water demand at State level; 24x7 water supply with 'Drink from tap' facility; GIS based master plans of the cities & efficient town planning; raising funds through issuance of municipal bonds and rejuvenation of water bodies. Successful implementation of reforms will be incentivized.

I hope these guidelines will be used extensively by the States/UTs and ULBs to implement the Mission in the field. I look forward to whole heartedly participation to achieve the Mission outcomes in a time bound manner.

Durga Shanker Mishra

New Delhi

25<sup>TH</sup> October, 2021

डी० थारा, आई.ए.एस.

संयुक्त सचिव

**D. Thara, I.A.S.**

Joint Secretary



सत्यमेव जयते



भारत सरकार  
आवासन और शहरी कार्य मंत्रालय

GOVERNMENT OF INDIA  
MINISTRY OF HOUSING AND URBAN AFFAIRS



## Preface

The AMRUT 2.0 guidelines have been formulated with the aim of assisting States/ UTs for making our cities **Aatma Nirbhar** and '**water secure**'. Several stakeholder consultations across 36 States/ UTs have been conducted as well as inputs from the key players such as development banks, private sector players, water sector consultants as well as NGOs have been taken into consideration.

MoHUA in partnership with States aims to achieve functional tap connections to all households, undertaking water source conservation/ augmentation, rejuvenation of water bodies and wells, recycle/re-use of treated used water and rainwater harvesting. Mission will extend the ease of living by upscaling universal coverage in water supply from 500 cities to about 4,800 statutory towns and universal coverage of sewerage and septage management to 500 AMRUT cities.

City Water Balance Plan will help cities to identify scope for projects focusing on the objectives of Mission stated above. Based on the projects identified in City Water Balance Plans, City Water Action Plan (CWAP) will be devised. These CWAPs will be aggregated in the form of State Water Action Plans (SWAP).

Another significant shift in the running the national Mission will be to attain data equity - AMRUT 2.0 will be a paperless mission with complete digital monitoring of projects progress and its funding. Funding to States will be predominately outcome based.

Mission has a reform agenda with focus on strengthening of urban local bodies and water security of the cities. Major reforms are reducing non-revenue water to below 20%; create a 'new tap of water' through recycle of treated used water to meet at least 20% of total city water demand and 40% for industrial water demand at State level; electric vehicle charging points; 24x7 water supply; reforms on property tax and user charges; GIS based master plans of the cities; raising funds through issuance of municipal bonds and rejuvenation of water bodies.

Further, to encourage start-ups involved in water sector, Technology Sub-Mission will be launched. Under the gig economy model, Mission will co-opt women and youth for concurrent feedbacks about its progress. Women SHGs will be involved in water demand management, water quality testing and water infrastructure operations. Pey Jal Survekshan will instill healthy competition among cities and act as a monitoring tool and Mission accelerator. Capacity building programs will be extended to various stakeholders.

We welcome this grand Mission launched by the Hon. PM and we wish to contribute to his vision of making this Mission a Jan Aandolan (people's movement).

Jai Hind.

Sd/-  
**(D. Thara)**

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## Abbreviations:

A&OE	Administrative and Other Expenses
AC	Apex Committee
ACA	Admissible Central Assistance
ADB	Asian Development Bank
AFD	Agence Française de Développement
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
AMRUT 2.0	Atal Mission for Rejuvenation and Urban Transformation 2.0
BCC	Behavioural Change Communication
C&AG	Comptroller and Auditor General of India
CA	Central Assistance
CGWB	Central Ground Water Board
CMMUs	City Mission Management Units
CPHEEO	Central Public Health and Environmental Engineering Organisation
Cr	Crore
CWAP	City Water Action Plan
CWBP	City Water Balance Plans
DLAMC	District Level Advisory and Monitoring Committee
DM	District Magistrate
DMA	District Metered Area
DPIIT	Department for Promotion of Industry and Internal Trade
DPR	Detailed Project Report
FA	Financial Advisor
FC	Finance Commission
FSSM	Faecal Sludge and Septage Management
FSSTP	Faecal sludge and Sewage treatment plant
FY	Financial Year
GIS	Geographical Information System
Gol	Government of India

HAM	Hybrid Annuity Model
HH	Household
I&D	Interception and Diversion
IEC	Information, Education and Communication
IRMA	Independent Review and Monitoring Agency
LAP	Local Area Planning
MD	Managing Director
MLD	Million Liter per Day
MoHUA	Ministry of Housing and Urban Affairs
MoU	Memorandum of Understanding
NEHU	North Eastern Hill University
NGO	Non-Governmental Organization
NIUA	National Institute of Urban Affairs
NRSC	National Remote Sensing Centre
NRW	Non revenue water
NUDM	National Urban Digital Mission
NULM	National Urban Livelihood Mission
O&M	Operation and Maintenance
PDMC	Project Development and Management Consultant
PFMS	Public Financial Management System
PHE	Public Health Engineering
PIU	Project Implementation Units
PMIS	Programme Management Information System
PMU	Project Management Unit
PPP	Public Private Partnership
RWH	Rain Water Harvesting
SBM	Swachh Bharat Mission
SCADA	Supervisory Control and Data Acquisition System
SCM	Smart City Mission
SDG	Sustainable Development Goal

SHG	Self- Help Groups
SHPSC	State High Powered Steering Committee
SLB	Service Level Benchmarks
SLTC	State Level Technical Committee
SMMU	State Mission Management Unit
SNA	Single Nodal Agency
SOI	Survey of India
SOP	Standard Operating Procedure
STP	Sewage Treatment Plant
SWAP	State Water Action Plan
TCPO	Town and Country Planning Organisation
TPS	Town Planning Scheme
UAV	Unmanned Aerial Vehicle
UC	Utilization Certificate
UD	Urban Development
ULB	Urban Local Body
UT	Union Territory
VG	Viability Gap

## 1 Introduction

1.1 Hon'ble Prime Minister, during his address to the nation on 15 August 2019 stated, "... nearly half of the households do not have water...women have to travel two to three km to fetch water...we need to work in the field of water conservation, irrigation, rainwater conservation, rejuvenation of water bodies, desalination of sea water and treatment of wastewater...". To holistically address these issues, he announced the launch of Jal Jeevan Mission.

1.2 Earlier, to facilitate ease of living to citizens, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), was launched in 500 cities on 25 June 2015, as a first focused national water Mission.

1.3 AMRUT aimed to provide universal coverage of water supply by providing 1.39 crore household tap connections. Likewise, coverage of sewer/septage connections were proposed to increase from 31% to 62% by providing 1.45 crore connections. So far, 1.12 crore tap connections and 87 lakh sewer connections have been provided. Sewage treatment plants of capacity 1,800 MLD have been created; out of this 907 MLD is being reused. This Mission has decreased disease load and improved quality of life of all, especially women in terms of time and energy saved to be put to constructive use.



1.4 Sustainable Development Goal 6.4 aims to substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity, by 2030. In order to meet (SDG 6), and to extend ease of living in water sector from 500 to all statutory towns, Atal Mission for Rejuvenation and Urban Transformation 2.0 (AMRUT 2.0) has been launched. This will also ensure 100% coverage of sewerage/ septage management in 500 AMRUT cities.

## 2 Atal Mission for Rejuvenation and Urban Transformation 2.0 (AMRUT 2.0)

2.1 AMRUT 2.0 is a step towards **AatmaNirbhar Bharat** with aim of **making the cities 'water secure'** and providing functional water tap connections to all households. This will be achieved through circular economy of water by effecting water source conservation, rejuvenation of water bodies and wells, recycle/ reuse of treated used water, and rainwater harvesting by involving **community at large**. This Mission will be run as people's program i.e. **Jan Aandolan**. Mission also targets to provide 100% sewage/ septage management in 500 AMRUT cities.

2.1.1 Mission will focus on empowering States/ UTs and cities for efficient implementation of projects in the spirit of cooperative and competitive federalism by providing flexibility to the States/ UTs to formulate, plan and implement the projects. CA released can be utilized for projects in any of the ULBs as per physical/ financial progress of the projects.

### 2.2 Ensuring community participation:

**Mission will co-opt women and youth for concurrent feedbacks about its progress.** Women SHGs will be involved in water demand management, water quality testing and water infrastructure operations. A concerted effort will be made to train women to test water quality in all the cities. This training program will be spearheaded by PHEDs or water and sewerage boards under the overall guidance of urban development department at the State level.

2.3 Mission has a reform agenda focused towards financial sustainability and water security of ULBs. Meeting 20% of water demand through recycled water, reducing non-revenue water to less than 20% and rejuvenation of water bodies are major water related reforms. Reforms on property tax, user charges, and enhancing credit worthiness of ULBs and urban planning are other important reforms.

2.4 Mission will encourage smart elements to be incorporated in every project. Mission will have a sub-Scheme on well rejuvenation.

2.5 Capacity building programs will be conducted for all stakeholders including contractors, plumbers, plant operators, students, women and citizens. Technical institutions will be roped in for assessment of Mission outcomes. Students will be engaged for survey of projects and outputs through **gig economy model**.

2.6 Technology Sub-Mission will help in identifying the proven and potential global technologies in water sector. Entrepreneurships / start-ups involved in low-cost indigenous equipment and processes will be encouraged.

2.7 **Mission will be paperless and monitored on a robust technology-based monitoring & evaluation platform.**

### 3 Components of AMRUT 2.0

#### 3.1 Projects

ULBs will submit detailed City Water Balance Plans (CWBP) and City Water Action Plans (CWAP) through online portal covering proposed projects in the thrust areas. The projects will be prioritized based on following outcomes with the focus on improving sustainability and efficiency in water sector:

- i. Universal coverage of water supply;
- ii. Sewerage, septage management and recycle/ reuse of treated used water; and
- iii. Rejuvenation of water bodies (including urban wetland) and creation of green spaces.

Detailed information on project formulation and funding is in **Article 4, 6 and 7**.

#### 3.2 Administrative & Other Expenses (A&OE)

A&OE will be fully funded by the Centre and shall be utilized to cover the cost of preparing CWBPs, Program Management Units (PMUs), Detailed Project Reports (DPRs), Project Implementation Units (PIUs), Project Development and Management Consultants (PDMCs), development of Aquifer Management Plans and Independent Review and Monitoring Agencies (IRMAs). It will also be used for capacity building.

Detailed information on A&OE funds is in **Article 7.4**

#### 3.3 Reforms

Mission has a reform agenda on ease of living of citizens through reduction of non-revenue water, recycle of treated used water, rejuvenation of water bodies, augmenting double entry accounting system, urban planning, strengthening urban finance etc. Successful implementation of reforms will be incentivised. Reforms are described in **Article 7.5 and Article 8**.

### 3.4 **Technology Sub-Mission**

Technology Sub-Mission will encourage start-up ideas and private entrepreneurship, and commissioning them into the pilot projects after screening of expert committee. Sub-Mission will also encourage innovative light house projects which will be partly funded. This component is detailed further in **Article 10**.

### 3.5 **Information, Education and Communication**

**Information Education and Communication (IEC)** including **Behavior Change Communication** under AMRUT 2.0 is envisaged as a key strategy for spreading awareness on conservation of water and enhancing water use efficiency among the masses. This component is detailed further in **Article 14**.

### 3.6 **Pey Jal Survekshan**

Pey Jal Survekshan is proposed in cities as a challenge process to assess the compliance of service level benchmarks with respect to quality, quantity, and coverage of water supply, sewerage & septage management, extent of reuse & recycle of used water, and conservation of water bodies in the city. Pey Jal Survekshan will instill healthy competition among cities and act as a monitoring tool and Mission accelerator. This component is detailed further in **Article 9**.

3.7 **Community Participation with focus on woman self help groups** to be co-opted in management of water infrastructure and quality assessment. This will be facilitated through National Urban Livelihood Mission (NULM) management unit.

3.8 **Outcome based funding is the most important defining feature of this Mission.** The cities will submit roadmap for outcomes to be achieved by them during the mission period.

3.9 **Evidence based evaluation of outcomes using online monitoring platform** combined with citizen feedback through gig economy will enable **community partnership**.

3.10 **Public Private Partnership (PPP) projects are mandatory in million plus cities** and at least a minimum of **10% of total fund allocation** at the city level shall be committed to PPP projects.

## 4 Projects

4.1 Mission will focus on achieving functional outcomes through project implementation under Amrut 2.0 as one of the means. While formulating the projects, it should be ensured that households of **informal settlements and low-income groups** are duly considered. These admissible projects/ need to be prioritized as per functional outcomes envisaged in the table below:

Sl. No.	Functional outcomes	Admissible elements of Projects
1	Providing universal piped water supply with household water tap connection	<ul style="list-style-type: none"> <li>• Water source improvement and augmentation in the city</li> <li>• Fresh Water treatment</li> <li>• Water distribution system in uncovered areas</li> <li>• Augmentation of existing water distribution system</li> <li>• Sustainability of quality and quantity of water supply</li> <li>• Reuse of treated used water</li> <li>• Provision for 24x7 water supply#</li> <li>• Smart solutions like SCADA</li> <li>• Last mile connectivity to households (Not exceeding ₹ 3,000 per HH)</li> </ul>
2	Providing universal coverage of sewerage and septage management in 500 AMRUT cities and promoting circular economy of water	<ul style="list-style-type: none"> <li>• Sewerage network</li> <li>• Interception and Diversion (I&amp;D) infrastructure</li> <li>• Sewage Treatment Plants (STPs)</li> <li>• Tertiary Treatment with end-to-end reuse plan (preferably in PPP mode)</li> <li>• Faecal sludge and Septage management (FSTP cum STP Plant &amp; collection mechanism)</li> <li>• Provision/ augmentation and rehabilitation of sewerage systems with end-to-end treatment and reuse</li> <li>• Tapping of used water for recycling</li> <li>• Identifying the bulk users of recycled used water and facilitating sale of used water to potential users (e.g. industrial clusters such as textile/ leather/ paper/ power plants/ railways, etc.)</li> <li>• Smart solutions like SCADA</li> <li>• Last mile connectivity to households (Not exceeding ₹ 3000 per HH)</li> </ul>
3	Rejuvenation of water bodies to	<ul style="list-style-type: none"> <li>• Rejuvenation of wetlands, water bodies by desilting, strengthening the embankments, and stone packing.</li> </ul>

	augment water and enhance amenity value and development of green spaces	<ul style="list-style-type: none"> <li>• Diverting the polluting drains to treatment plants</li> <li>• Harvesting the rain water through storm water drains into water body (which is not receiving sewage/ effluent)</li> <li>• Strengthening/ rejuvenation of the aquifers/ community wells</li> <li>• Creation/ strengthening of storm water drains around water body</li> <li>• Provision of STP to treat inflow into water body.</li> <li>• Development of the community green spaces linked to a clean water body</li> <li>• Funds for the projects of this sector shall not exceed 5% of total project allocation (4% for rejuvenation of water bodies and 1% for development of green spaces &amp; parks).</li> </ul>
	Outcome based funding	<ul style="list-style-type: none"> <li>• Functional outcomes in terms of functional water tap and sewer connections to households beyond baseline and not covered by AMRUT, implemented on or after 1 Nov 2021, shall be considered for funding. (Note 3)</li> </ul>

**# In AMRUT cities, projects on 24x7 water supply** with drink from tap facility may be taken up. These projects should cover at least one ward or DMA with at least 2,000 households in the contiguous manner. Projects costing up to 20% of the project fund allocation for water supply projects in AMRUT cities may be taken up for 24x7 water supply. **Additional funding for such projects will be admissible in form of reform incentive.**

Note 1: All admissible projects should have at least five-year O&M for infrastructure, which may be duly incorporated through the tender process.

Note 2: All water supply and sewerage projects will have smart elements.

Note 3: Outcome based funding is to be considered for the outcomes achieved with respect to sewer and water connections after the launch of AMRUT 2.0 by projects taken up by States/ UTs and achievement beyond baseline established for the city as on 1 November 2021.

4.2 Tentative distribution of central fund allocation among project components of Mission is as under:

#	Description	Central Share ( ₹ Cr)
1	Water supply projects	35,250
2	Rejuvenation of water bodies and developing green spaces & parks projects	3,900
3	Sewerage and septage management projects	27,600
	<b>Total</b>	<b>66,750</b>

\*The above table provides a broad picture of fund allocation. At city level, if universal water supply is achieved, then other components which are admissible can be taken up to achieve Mission objectives. The State Mission directorate shall ensure that universal water supply and sewage/ septage treatment is achieved in all cities as the first priority in that order.

## 5 Fund allocation

5.1 The total indicative outlay for AMRUT 2.0 is ₹ 2,77,000 crore including central share of ₹ 76,760 crore for five years from FY 2021-22 to FY 2025-26.

5.2 The central budgetary allocation for various Mission components will be as under:

S.no	Mission component	Central Allocation ( ₹ Cr)
1	Projects	66,750
2	Incentive for Reforms (8% of project CA allocation)	5,340
3	Administrative & Other Expenses (A&OE) for States/ UTs (3.25% of project CA allocation)	2,169
4	Administrative & Other Expenses (A&OE) for MoHUA (1.75% of project CA allocation)	1,168
5	Technology Sub-Mission (1% of project CA allocation)	667
6	IEC Activities (1% of project CA allocation)	667

5.3 Ongoing AMRUT projects will be funded with central assistance up to 31 March 2023. **No funds will be released for any AMRUT project incomplete by that date and it will become the responsibility of the State/ UT to complete them from their own resources.**

#### 5.4 Funding for projects

Funding for the projects will be shared by Centre, States/ UTs and ULBs. Central share for various classes of ULBs will be as under:

ULBs	Central share
Union Territories	100% project funds by Centre
North eastern States and Himalayan States	90% of the project funds by Centre
With less than one lakh population	50% of the project funds by Centre
With population one lakh to ten lakh (both included)	1/3 <sup>rd</sup> of the project funds by Centre
With population more than ten lakh	25% of the project funds by Centre (except for projects taken up under PPP mode)

**5.5 Public Private Partnerships (PPP): Projects amounting to at least 10% of total project allocation for all cities with population above ten lakh in a State will be mandatorily taken up in PPP mode.** Projects with focus on selling treated water to industries and other users may be the potential projects for implementing under PPP mode. Such projects can be taken up in Hybrid Annuity Model (HAM) or any other suitable model. **Viability gap funding for such projects will be provided through CA.** CA will be 50% of the **viability gap subject to maximum of 30% of the project cost.** Balance viability gap will be borne by State/ ULB. Total viability gap will not exceed 60% of project cost.

5.5.1 States/ UTs and ULBs may augment their share of funding through alternative sources like raising municipal bonds, accessing capital markets, loans/ credits, State grants and central finance commission grants etc.

5.5.2 States/ UTs may avail loan from the funds earmarked by multi-lateral/ bilateral agencies like ADB, KFW, AFD and World Bank etc.

## 6 Mission Implementation

### 6.1 Memorandum of Understanding (MoU):

States/ UTs and ULBs have accepted a tripartite Memorandum of Understanding (MoU) with MoHUA. This MoU represents collective intent of MoHUA, State/ UT, and ULBs towards making urban India 'Water-secure' by effecting water source conservation, rejuvenation of water bodies and wells, recycle/ reuse of treated used water, and rainwater harvesting by engaging the community at large. MoHUA, States/ UTs and ULBs shall align themselves to the roles and responsibilities as per the MoU.

6.2 The implementation of Mission will be **paperless**. Preparatory steps (CWBP, CWAP, SWAP, reform roadmap), project planning, reform outcome achievement reporting, functional outcome reporting, evidences reporting, progress reporting and claims will be made on a robust online technology platform. Industry, community and implementing agencies will be onboarded on a collaborative platform.

### 6.3 City Water Balance Plans (CWBP):

6.3.1 CWBPs will comprise details of water sources including water bodies, water treatment and distribution infrastructure, area-wise water coverage, status of NRW and sewerage network including STPs etc. (**Annex- 1 illustrative**). ULBs will compile baseline data on household water tap and sewer/ septage connections, and gaps in service delivery will be worked out. Based on assessed gaps, potential projects will be identified targeting functional outcomes.

6.3.2 State and ULBs will target to achieve universal coverage of water supply to all households in all ULBs and sewer/ septage connections in 500 AMRUT cities through projects proposed under AMRUT 2.0, ongoing AMRUT projects and projects/ initiatives funded by State/ ULB funds, XV FC grants, funding from external sources and PPP etc. The extent of gaps proposed to be filled through each of aforementioned sources will be clearly identified. CWBPs will be filled on the online formats provided for this purpose on the portal. CWBP should also be published on respective ULB and State websites.

#### 6.4 City Water Action Plans (CWAPs):

6.4.1 CWAP will comprise the list of projects proposed by the ULB in the priority sectors of water supply; sewerage/ septage management; rejuvenation of water bodies including green spaces & parks. It will be ensured that projects are taken up with a view to meet 20% of city water demand through recycle/ reuse of treated used water. The projects proposed under AMRUT 2.0 and ongoing/ proposed projects through sources other than AMRUT 2.0 in three sectors will be provided (**Annex-2a, Annex 2b & Annex 2c are illustrative**). CWAPs will be submitted to SHPSC by State Mission Director online on Mission portal.

6.4.2 Projects amounting to **at least 10%** of total project allocation for all cities with population above ten lakh (**million plus cities**) in a State will be mandatorily taken up in **PPP mode**. Such projects maybe identified in the CWAPs.

6.4.3 ULBs will furnish year-wise roadmap of providing household water tap connections with a view to achieve universal coverage of water supply (**Annex- 2d illustrative**). Likewise, roadmap of achieving universal coverage of household sewer/ septage connections in 500 AMRUT cities will also be furnished (**Annex-2e illustrative**).

#### 6.5 State Water Action Plans (SWAPs):

6.5.1 SWAPs will be prepared by State Mission director by aggregating CWAPs submitted by the ULBs. SWAPs will comprise entire list of projects, city-wise and sector-wise, proposed to be undertaken by States/ UTs. Cost of projects taken up will exclude cost of land acquisition. SWAP will include project wise number of proposed new household water tap connections, sewer connections and coverage of existing water tap and sewer connections to be augmented, which shall be outcomes of such projects. The projects to be implemented in PPP mode will be clearly identified. It will be ensured that projects are taken up only when land is available with clear title without any disputes. SWAPs will be submitted on portal to Apex committee in three tranches as per **Annex-3 (illustrative)**.

The first tranche will be submitted within five to nine months, second tranche within twelve to sixteen months and third tranche preferably within twenty-four months of launch of Mission. It can be submitted in advance also.

- 6.5.2 SWAPs will be approved by SHPSC before progressing to Apex Committee. State High Powered Steering Committee (SHPSC), while approving the SWAP will consider the following:
- i. SWAP is oriented towards achieving desired functional outcomes such as universal coverage of water supply and sewerage/ septage management,
  - ii. Water body rejuvenation and parks & green spaces parks have been taken in specified proportion,
  - iii. Water supply projects oriented towards 24x7 water supply in AMRUT cities have been taken,
  - iv. There is no duplication of projects with AMRUT or any other government schemes,
  - v. Low economic and informal settlements are duly included in SWAP,
  - vi. At least meeting 10% of fund allocation in PPP projects as mandated have been included for million plus cities,
  - vii. Projects facilitating Rural-Urban Synergy have been taken up wherever feasible,
  - viii. Every city should achieve universal coverage and become water secure through either AMRUT 2.0 or any other funding. State assures that all the cities are moving in this direction,
  - ix. It will also be ensure that used water (waste water) is treated and put to reuse to meet 20% of cities water demand and 40% of Industry water demand in aggregate at the state level.
  - x. Projects being proposed in SWAP will have O&M for atleast five years to be funded by way of levy of user charges or other revenue streams. Project cost will exclude O&M. ULBs shall fund O&M through an appropriate cost recovery mechanism in order to make them self-reliant and cost effective.

## 6.6 Urban Aquifer Management Plan

- 6.6.1 The Aquifer Management Plan will focus on maintaining positive groundwater balance in urban aquifer systems. The cities will strategize groundwater recharge augmentation by developing a roadmap for improving rainwater harvesting within city limits. Cities will conduct aquifer mapping with technical support from Central Groundwater Board (CGWB)/ State Groundwater Board/ other agencies to identify recharge and discharge zones and integrate aquifer management into urban planning. Cities will develop an annual groundwater balance report to ascertain the current and future availability of groundwater.
- 6.6.2 The template for aquifer mapping shall be made available to the ULBs along with a technical guidance manual on urban aquifer management following the Mission launch. Urban Aquifer Management Plan shall be submitted within 24 months from the launch of Mission by 500 AMRUT cities.

## 6.7 Implementation of projects

Projects as per approved SWAP will be planned, tendered, awarded and implemented by ULBs. Where ULBs do not have adequate capacity, specialized parastatal agencies will implement the projects. In order to ensure efficient implementation of projects, the States/ UTs, ULBs should follow an approach wherein end-to-end support for project design, development, implementation and management is provided to ULBs/ States/ UTs by external entities (PDMCs). Maintenance and upkeep of the assets created will be responsibility of the State/ UT/ ULB. Smart elements will be part of the projects.

## 6.8 **Monitoring of projects**

The achievement of mission objectives will be monitored through an online module. This module will directly be the precursor for availing funds. Therefore, the portal needs to be regularly updated by State/ UT/ ULB functionaries for flow of information and sanctioning of funds. The fields to be updated will include physical progress, financial progress, documents required for seeking central assistance, photographs, videos, third party reports, etc. The progress reported on portal will be randomly verified through citizen/ third party feedback. Implementing agencies and community stakeholders will also be facilitated to access the portal and upload the progress and feedback.

## 6.9 **Replacement of projects**

- 6.9.1 The projects approved by the Apex committee will not be replaced in normal course. However, in case some projects are required to be replaced due to unavoidable circumstances, State Mission Director will submit such proposal to SHPSC along with justification. The SHPSC will be competent to approve replacement of projects costing up to 10% of respective tranche of SWAP in admissible project components of AMRUT 2.0. Replacement of projects beyond 10% of respective tranche of SWAP, if approved by SHPSC shall be sent to the Apex committee with proper justification for consideration and approval. No expenditure shall be booked against any project proposed to be replaced.
- 6.9.2 The SHPSC, while considering replacement of projects, shall ensure that there is no duplication of projects through replacement, overall State allocation is not exceeded, new proposed projects are in line with Mission objectives.

## 7 Release of funds

### 7.1 General conditions for release of project funds

- 7.1.1 Central assistance will be processed through online claims and settlement system, which will emerge from the actual progress updated on portal through physical/ financial data, photos and videos obtained through citizen feedback and third-party assessment.
- 7.1.2 Fund flow under Mission will be as per instructions issued vide Ministry of Finance OM No. F. No. 1(13) PFMS | FCD/2020, dated 23 March 2021, which is explained in **Article 7.6**.
- 7.1.3 **Central fund allocation** to States/ UTs for projects will be worked out by distributing entire central project funds (₹ 66,750 crore) among States/ UTs giving weightage to urban population (Census 2011) and area of States/ UTs in ratio 90:10.
- 7.1.4 States shall ensure that the further allocation to cities is oriented towards achieving universal coverage of water supply in all ULBs and universal coverage of sewerage/ septage management in 500 AMRUT cities through AMRUT 2.0. If a city has already achieved universal coverage of water and sewerage, it will be clearly brought out in CWBP and further actions can be taken to make the city water secure through AMRUT 2.0. In case of a city where all indicated outcomes are planned to be achieved from other sources of funding (not through AMRUT 2.0), these may be clearly indicated in the format provided for the same purpose in CWAP.
- 7.1.5 Project funds will be released for implementation of AMRUT 2.0 projects. Functional outcomes achieved beyond baselines (as on 1 Nov 2021) through funding from sources other than AMRUT/ AMRUT 2.0 will also be funded. These other sources of funds can be XV Finance Commission grants, State Funds, ULB funds or funds from external agencies.
- 7.1.6 **Admissible Central Assistance (ACA)** will be worked out based on total amount of SWAPs submitted and applying proportion for the category of the State/ City as per Table in **Article 5.4**.
- 7.1.7 Total project fund release to a State/ UT through all instalments will not exceed the central fund allocation.

7.1.8 CA released for a particular tranche of SWAP can be utilized for implementation of approved projects of another tranche. Similarly, States/ UTs can utilize CA for projects in any of the ULBs as per physical/ financial progress of the projects.

**7.2 Release of project funds (other than PPP)**

Central assistance (CA) to the States/ UTs has been divided in two components as under:

**7.2.1 Component-1:** This component will comprise of CA for projects approved under SWAPs. This will be provided in three instalments of 20:40:40 as under.

**7.2.1.1 First instalment under component-1**

- i. This will be 20% of CA admissible against SWAP submitted by the State/ UT and approved by Apex Committee.
- ii. First instalment for component-1 shall be claimed in three (almost equal) tranches against submission and approval of each of three tranches of SWAP.

**7.2.1.2 Second Instalment under component-1**

- i. Second instalment will be 40% of the total CA for the State/UT.
- ii. AMRUT 2.0 projects for which contracts have been awarded will be eligible for consideration for release of second instalment.
- iii. Approved cost of projects will be the basis for working out instalment. Approved cost will be lower of appraised cost and contract award cost.
- iv. Following should be achieved before claiming second instalment:
  - a) Second instalment will be applicable to projects which have achieved 15% physical and financial progress. The work should have been started on site.
  - b) Submission of City Aquifer Management Plan (At least 20% AMRUT cities of the State with first tranche of SWAP, 30% AMRUT cities of the State with second tranche and remaining 50% AMRUT cities of the State with third tranche of SWAP). States having less than ten AMRUT cities may submit City Aquifer Management Plan with third tranche.
  - c) Submission of UC of A&OE grants and reform incentive.
  - d) Submission of assessment report of AMRUT 2.0 by IRMA (to be appointed by MoHUA) and ATR by the State/ UT thereon and compliance report by IRMA.

e) Citizen feedback.

### 7.2.1.3 Third instalment under component-1

- i. Third instalment will be 40% of admissible CA to the State/UT. It will be released entirely on achieving functional outcomes through AMRUT 2.0 projects. Third instalment will be worked out as per following Table:

#	Outcome	Formula for working out 3 <sup>rd</sup> instalment
1	Tap connections (both new and serviced through augmentation)	$(0.4) \times (\text{ACA for water supply projects}) \times (\text{WA/ WT})$
2	Sewer/ septage connection (both new and serviced through augmentation)	$(0.4) \times (\text{ACA for sewerage/ septage projects}) \times (\text{SA/ ST})$
3	Water body rejuvenation projects	$(0.4) \times (\text{ACA for Water body rejuvenation projects}) \times (\text{WBA/ WBT})$
4	Parks & green spaces	$(0.4) \times (\text{ACA for Parks & green spaces projects}) \times (\text{PA/ PT})$
<b>Sum of all above will be the admissible amount of third instalment. This is an illustration. Actual apportionment of third instalment for projects will be based on achievement of actual outcomes pertaining to those projects.</b>		

#### Description of terms in the Table

Outcomes	Achievement through AMRUT 2.0	Cumulative target under AMRUT 2.0
Number of new household water tap connections provided + number of tap connections serviced through augmentation + tap connections provided with 24x7 water supply as per real outcomes.	WA	WT
Number of new household sewer connections provided + sewer connections serviced through new sewerage network + households covered with septage management + households covered with tertiary treatment	SA	ST
Number of water body rejuvenation projects completed under AMRUT 2.0	WBA	WBT
Number of parks projects completed under AMRUT 2.0	PA	PT

- ii. Targets in the last column will be submitted through Tables 3(b), 3(c) and 3(d)
- iii. Third instalment can be claimed in three tranches against approved tranches of SWAPs.

**7.2.2 Component-2: Funding at the rate of ₹ 3,000 (Rupees three thousand) per new household water tap connection** provided in ULBs beyond the baseline as on 1 November 2021 will be awarded. Similarly, **funding at the rate of ₹ 3,000 (Rupees three thousand) for each new household sewer connection** provided in all 500 AMRUT ULBs beyond the baseline as on 1 November 2021 will be provided. Only those new connections, which are not funded under AMRUT and AMRUT 2.0 will be considered for the above funding. Funds against these outcomes can be claimed once every quarter in tranches from launch of Mission after baseline is firmed up. Funds will be released after due verification through citizen feedback and third-party. Funds provided under component-2 will be used by the State/ UT/ ULB on components of AMRUT 2.0 only.

### 7.3 Funds for projects implemented in PPP mode:

For the projects planned for implementation under PPP mode in cities with population above ten lakh, State/ ULB will prepare appropriate financial model and work out viability gap of such projects. Total viability gap for a project shall not exceed 60% of the project cost. 50% of the viability gap not exceeding 30% of project cost will be admissible to be funded as CA.

For such PPP projects, CA worked out as above will be released in three instalments like non-PPP projects. First instalment worth 20% of the admissible CA will be released on approval of DPR and finalization of financial model of PPP project. While claiming first instalment, details of the PPP projects will be submitted online as under:

Sl. No.	Name of PPP project	Total cost of project (₹ crore)	Total Viability Gap (VG)		Viability gap to be funded		Brief detail of financial model adopted
			Amount (₹ crore)	VG as % of project cost	By Centre(₹ crore)	By State(₹ crore)	

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Second instalment worth 40% of admissible CA for PPP project will be released on achieving 15% of physical as well as financial progress of the project. Third instalment will be released on achievement of functional outcomes as described in **Article 7.2**. Payment of annuity over the agreed period of time as per financial model will be done by the State/ ULB. To bring in confidence for PPP projects, States may facilitate ULBs to operate Escrow accounts for ensuring seamless fund flow.

#### 7.4 **Administrative and Other Expenses (A&OE) for States & MoHUA:**

- 7.4.1 3.25% of annual budget allocation will be earmarked for States/ UTs. State A&OE funds will be allocated among all States/ UTs/ ULBs depending on their urban population and area in the ratio 90:10.
- 7.4.2 A&OE funds will be released to the State in the beginning to kickstart the Mission. Some funds will be provided to the State for establishing State Mission Management Units like PDMC. To enable ULBs to prepare City Water Balance Plans (CWBP), ₹ 20 lakh will be provided per AMRUT City to the State, to be passed on to each AMRUT ULB based on their claim in SNA account and ₹ 10 lakh each for rest of the ULBs. This can also be used to establish dedicated unit for Mission management in ULBs. The States may initiate immediate action to onboard resources for assisting the cities/ parastatals for operationalizing Mission.
- 7.4.3 A&OE action plan will be submitted by States/ UTs along with SWAPs as per **Annex-4**. Annual A&OE allocation to a State/ ULB will be released in two instalments. First instalment for the first year will be released on receipt of A&OE action plan. Second instalment will be released on receipt of online claims and UC worth at least 75% of central assistance already released. In subsequent years, first instalment will be released on receipt of action plan and UC worth 75% of all the A&OE fund released in previous years. Eligible A&OE funds will be restricted as per proportion of actual expenditure.
- 7.4.4 State A&OE funds can be spent on following:
- i. Capacity building, preparation of CWBPs, Programme Management/ Implementation Unit (PMU/ PIU),

- ii. Project Development and Management Consultant (PDMC), State Mission Management Unit (SMMU),
  - iii. City or City cluster Mission Management Unit (CMMU),
  - iv. Preparation of Detailed Project Reports (DPRs),
  - v. Publications like e-Newsletter, guidelines, brochures etc., promotional activities for Mission,
  - vi. Display of the logo and tagline of AMRUT 2.0 prominently on all projects,
  - vii. Reform implementation.
- 7.4.5 Due to smaller size and fewer ULBs, North-Eastern and Himalayan States may need specialized handholding for efficient project implementation. On their written request MoHUA may deploy additional support/ experts/ institutions to augment capacities. Representatives from local technical institutions, colleges and universities may be employed in these PDMCs/ PMUs.
- 7.4.6 In addition to water sector experts, hydrogeologists and data analysts may be part of Mission management units at State, regional and city level. Model guidance document for procurement of these team members will be provided by MoHUA, if required.
- 7.4.7 The A&OE funds for MoHUA will be utilized at the National Mission Directorate level on following:
- i. Capacity building,
  - ii. Convening national & regional workshops,
  - iii. Conferring awards and recognition, up-scaling and replication of best practices & smart solutions,
  - iv. Commissioning of research and applied studies through Center of Excellence and other institutions,
  - v. Independent Review and Monitoring Agency (IRMA) to be positioned at State/ sub-State/ regional level,
  - vi. Feedback using gig economy model,
  - vii. International cooperation for capacity building and technology development, etc.,
  - viii. Pey Jal Survekshan components

7.4.8 Following is the indicative (not exhaustive) list of **inadmissible** components under A&OE:

- i. Purchase of land for projects or project related works,
- ii. Regular staff salaries of State Governments/ULBs,
- iii. Any other purpose not oriented towards achieving Mission objectives.

7.5 **Reform Incentive:**

7.5.1 Funds totaling ₹ 5,340 Crore has been earmarked as reform incentive. Eight percent of the annual budget allocation will be given as reform incentive to States/ UTs every year for achievement of Reforms from second year of Mission onwards. Incentive for reforms implemented in a year will be awarded in the succeeding financial year. States/ UTs will submit reform roadmap along with SWAPs. Reforms covered under AMRUT 2.0 under various categories have been brought out in **Article 8**.

7.5.2 A toolkit for marking system will be issued before commencement of financial year. Procedure of assessing reforms and working out of incentive to the States/ UTs will be described in toolkit.

7.5.3 The incentive can be used in Mission cities on admissible components of the AMRUT 2.0 as additionality for achieving the objectives of Mission as an untied fund. The State High Power Steering Committee (SHPS) will decide the use of the incentive amount.

7.5.4 UCs against incentive released shall be submitted in time as per guidelines of Ministry of Finance (MoF). Unutilized funds for reform incentives will be transferred to project fund every year.

7.6 **Fund flow**

Adoption of Public Financial Management System stipulated by Ministry of Finance will be the pre-condition to submit CWBPs. To receive funds under AMRUT 2.0, all transactions will have to be made through Single Nodal Agency (SNA) by using EAT as applicable, as per revised procedure for fund release stipulated in Department of Expenditure (GoI)'s OM No. F. No. 1(13)PFMS |FCD/2020, dated 23 March 2021, as updated from time to time.

## 8 Reforms

8.1 Mission has a reform agenda to enhance city water security, financial health of ULBs and ease of living of citizens. Reforms will be implemented in first four years of Mission. Reform milestones to be achieved, criteria for evaluation along with timelines will be released in reform toolkit. The evaluation will be done through third party, citizen feedback and interview with officials.

There will be two type of reforms:

- 1) Mandatory reforms
- 2) Incentive based reforms

### 8.2 **Mandatory reforms**

Mandatory reforms will be on property tax and user charges. The States will have to implement these reforms in first two years from launch of Mission to be eligible for central assistance from third year onwards.

8.2.1 **Property tax reform** will be focused on notifying property tax calculation containing guidance value/ circle rate along with provision for its periodic increase. The increase in property tax will be ensured through this notification and increase in coverage, & collection efficiency.

8.2.2 **Reforms on User Charges** will be focused on notification by State on user charges for water supply and sewerage, resolution of its adoption by all ULBs. User charges will offset O&M expenses substantially and a periodic increase mechanism has to be put in place.

500 AMRUT cities where water supply coverage has improved substantially shall submit road map for achieving 90% billing and collection. The status of billing and collection efficiency will be verified by IRMA or in any other manner decided by MoHUA.

8.2.3 **Effective system for grievance redressal** will be put in place in ULBs.

### 8.3 **Incentive based reforms**

Incentive based reforms will be on water conservation, urban governance and energy efficiency.

**(A) Reforms on water conservation:****8.3.1 Reduction in non-revenue water to below 20%:**

The ideal target for non revenue water of any ULB will be 20%. Cities will submit roadmap including regularization of illegal connections and minimizing leakage in distribution system due to damages of pipes. The system in place for leakage detection and grievance redressal will be evaluated based on its effectiveness. Measuring stations at source, storage and distribution as well as number of metered connections will be the criteria for evaluation. Proactive approach to train the plumbers and infrastructure managers to ensure minimal leakages will also be assessed. Development of mobile application for reporting of pipe leakages will be the criteria for evaluation for incentive to States. MoHUA may also facilitate the mobile application development. When ULBs adopt this mobile application and implement the successful leakage detection and repair system, they will be incentivized through this reform.

**8.3.2 Recycle of treated used water to meet at least 20% of total city water demand and 40% of industrial water demand at State level**

Issue of Policy Guidelines by State for Recycling and Reuse of treated used water and its resolution by ULBs will be a **State level reform**.

Mechanism of institutionalisation to check the quality, treatment capacity of STP, treated used water recycled, percentage of recycled water used by city, industrial, agriculture and other demand, whether the treated used water is released in water bodies will also be assessed.

**8.3.3 Rejuvenation of water bodies with area preferably one acre**

ULBs which take up projects for rejuvenation of water bodies will be incentivised based on the number of water bodies taken up for rejuvenation as per the city population, DPR preparation, award of contract and execution of work.

City population	Number of water bodies to be rejuvenated
above 40 lakh	5
10 lakh to 40 lakh	3

1 lakh to 10 lakh	2
less than 1 lakh	1

ULBs will be evaluated based on improvement of quality of water in water body, diversion of drain/ sewer from water body and quality public spaces around water body.

#### 8.3.4 24x7 water supply with 'Drink from tap' facility in the selected wards

24x7 water supply can be taken up in the form of projects. Successful implementation of such projects will be incentivized. 24x7 water supply with 'Drink from tap' facility will be evaluated on parameters of quality, accessibility and availability of water.

#### 8.3.5 Development of green spaces and parks

ULBs will implement projects on divyang friendly green spaces and parks. Reform evaluation will be based on progress of implementation of these projects. Each park preferably will not be below 0.5 acre area. Park projects will be taken up as under:

City population	Number of green spaces and parks to be developed/ augmented
50,000 to 1 lakh	2
less than 50,000	1

### (B) Reforms on governance:

#### 8.3.6 Ease of getting water and sewer connections

ULBs will endeavour to simplify the procedure for getting sewer/ water connections for the households. The ease in getting these connections with respect to SLB achieved in getting connections, documents required and cost incurred will be evaluated under this reform.

#### 8.3.7 Credit rating and issuance of municipal bonds

This reform will involve Credit rating of Tier-2 cities (population 50,000 to 99,999), enhancing credit worthiness of AMRUT ULBs and issuance of municipal bonds. Credit rating will be a **State level reform**.

#### 8.3.8 Online municipal services system

Online delivery of municipal services by ULBs will be evaluated for the services such as Property tax, Death and Birth certificate, Shop license, Health license and Grievance redressal. The SLB targeted and achieved for municipal services will also be evaluated. Similarly, the

online extent of ULB's grievance redressal system will be also be evaluated for water, sanitation, solid waste, street lights and drainage services. The guidelines issued under National Urban Digital Mission (NUDM) will be adopted for the same.

### 8.3.9 **Electrical Vehicle Charging Points in cities with population above 50,000**

Preparing and issuing notification and guidelines by State for providing electric vehicle charging points in specified class of buildings/ areas and resolution by ULBs for adoption of guidelines will be the evaluation criteria.

### 8.3.10 **Augmenting double entry accounting system**

Double entry account system shall be adopted for all the ULBs. Complete migration to double entry accounting system and obtaining audit certificate will be evaluated.

### 8.3.11 **PPP project in non-million plus cities**

Planning and implementation of projects in PPP mode in water sector in cities with population below ten lakh will be evaluated.

8.3.12 **Involvement of community** including women SHGs in water demand and water infrastructure management will be incentivised.

#### **(C) Reform on energy efficiency:**

### 8.3.13 **Reform on energy efficiency**

Effective O&M SOPs for water supply and sanitation infrastructure will be evaluated. Energy efficiency of pumps and cleaning procedures for filters will also be evaluated.

#### **(D) Reforms on urban planning and unlocking land value through urban planning**

Land monetization, unlocking land value and improving land use efficiency will be undertaken through sub-schemes as under:

### 8.3.14 **GIS based master plans of Class-II Towns with population of 50,000 - 99,999 - sub Scheme**

A sub Scheme is proposed to be launched for GIS based master plans of Class-II Towns with population of 50,000 - 99,999. The Sub Scheme will be in line with AMRUT GIS sub Scheme, which will comprise three major components i.e. Geo-database creation, formulation of GIS based master plans and capacity building. The Geo-database will be created as per the design & standards approved by MOHUA namely "Design & Standards for Formulation of GIS based

Master Plans for AMRUT Cities” and “Design & Standards for Application of Drone/UAV technology for Formulation of GIS based Master Plans for Small and Medium Towns”. The creation of Geo-database will be taken up in-house or through out-sourcing. The MoUs for Geo-database will be signed with National Remote Sensing Centre (NRSC) for Satellite based geo-data creation or Survey of India (SOI) for drone/ UAV based geo-data creation, based on requirement of State/UTs Governments.

The GIS based Master Plans will be formulated by State Governments in-house or through out-sourcing as per the State Town Planning Acts using the Geo-database created through above mentioned State of Art technologies.

#### 8.3.15 Sub-Scheme on Local Area Plan (LAP) and Town Planning Scheme (TPS)

The sub-Scheme will encourage implementation of LAP and TPS in select cities targeting optimum land utilisation. It will help States and cities in preparing LAP/ TPS plans through stakeholder consultation. Handholding will be provided for the same.

## 9 Pey Jal Survekshan

9.1 Pey Jal Survekshan will foster healthy competition among ULBs, wherein following parameters will be assessed:

- i. Water supply management & innovative practices,
- ii. Compliance of water supply service level benchmarks w.r.t. coverage, quality, quantity, and user charges reforms,
- iii. Reduction in Non-Revenue Water (NRW) through District Metered Areas (DMAs) and training to check leakages,
- iv. Operational efficiency of sewage and water treatment plants,
- v. Rejuvenation of water bodies and wells,
- vi. Evaluation of collection, treatment, and reuse of treated used water.

9.2 Feedback will be taken from citizens and municipal officials to assess above parameters. Water samples will be collected and their laboratory testing will be carried out.

9.3 The results of the survey will be the basis of ranking the ULBs in terms of water sector services and water security at city and household level.

## 10 Technology Sub-Mission

10.1 Technology Sub-Mission will facilitate identification of innovative, proven and potential environment friendly technologies in the fields of water & used water treatment, distribution and water body rejuvenation. Following are the major initiatives to be taken under Technology Sub- Mission:

### 10.1.1 Start- ups entrepreneurs:

- i. Start- ups will be encouraged in water/ sewerage sector. The Start-ups fulfilling the definition given by "Start-up India" initiative of DPIIT<sup>1</sup> shall be eligible to participate. Start-ups can apply to the State Mission Director by submitting a brief proposal online comprising details of the project, technology proposed, cost and intended benefits. Projects costing up to ₹ 20 lakh will be approved by a **State Water Start-Up Screening Committee** consisting of State Mission Director, representative of technical institute and/ or practitioners in water sector. Approved projects can be taken up for which necessary assistance will be provided by the concerned ULB.
- ii. Start-up projects with path breaking technologies, costing more than ₹ 20 lakh will be approved by **National Water Start-Up Screening Committee** consisting of representatives of MoHUA, CPHEEO and experts in water sector.
- iii. Funds will be released in three instalments of 50:40:10. First instalment (50%) will be released after approval of project by **State/ National Water Start-Up Screening Committee** as per cost of the project.
- iv. Second instalment (40%) will be released on receiving the claim for the same after having achieved progress of the project and reported online.
- v. Third instalment (10%) will be released after the project is completed and intended outcomes are achieved.

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<sup>1</sup> <https://www.startupindia.gov.in/content/sih/en/startupgov/startup-recognition-page.html>

- vi. The first shortlisting of start-ups projects for funding should be completed within six month of launch of mission and first instalment should be released within seven months from start of mission.

#### 10.1.2 Technology Melas:

Mission will support innovative, low-cost indigenous technologies including equipment, through technology challenge and melas at National/ State level.

#### 10.1.3 Light house projects:

National and international agencies/entrepreneurs will be encouraged to take up lighthouse projects and demonstrate the results in water sector. Interested agency can apply to the State Mission Director for such projects with clearly defined objectives and outcomes. MoHUA will approve such projects on recommendation of SMD. Initially, such projects will be funded by the concerned agency, however, on achieving the intended outcomes within Mission period, 20% of project cost, restricted to ₹ 50 Lakhs will be reimbursed to the agency by MoHUA.

## 11 Synergies for effective outcomes

### 11.1 Rural-Urban Synergy:

Water markets for reuse of treated used water shall be ascertained in rural urban continuum. Co-treatment of sewage/ septage from nearby villages in spare capacities of STPs will be explored by ULBs.

To facilitate this, National, State and ULB level committees on water/ sewerage/ river/ water body coordination shall be represented by members of rural areas also, especially for peri-urban areas.

There will be a capacity building convergence between urban and rural, wherever feasible.

### 11.2 Urban-Urban synergy:

Mission covers all ULBs across the country. Many of the ULBs are very small with population below 10,000. For such ULBs, water supply projects may be technologically sustainable, if planned for a cluster of ULBs which are adjacent to each other. For example, a common intake line may be laid from a far-away water source for a group of ULBs. State/ULBs will endeavor to plan such projects for cluster of cities where ever feasible. Viability of such projects will be analyzed specifically by the SHPSC before including in the SWAP.

### 11.3 Synergy among Missions:

Swachh Bharat Mission (SBM), Smart City Mission (SCM) and National Urban Livelihood Mission (NULM) have components common with AMRUT 2.0. Sanitation and FSSM are components of SBM and water supply with smart elements is a component of SCM. Employment generation through various components of AMRUT 2.0 like project implementation and capacity building contribute to the cause of urban livelihood, which is also the motto of NULM.

Convergence/ synergy among these Missions is essential to achieve the outcomes targeted towards enhancing ease of living. The ULBs which cannot plan projects to achieve intended outcomes due to resource crunch can plan the projects in convergence.

## 12 Capacity building

12.1 Capacity building will be taken up for elected representatives, ULB functionaries, contractors & their staff and citizens. Purpose of capacity building is to enhance the functional knowledge and improve the job-related skills of targeted groups.

12.2 Suggested targeted groups and fields of capacity building are as under:

	Targeted group for capacity building	Suggested fields of capacity building
1	Elected representatives and Municipal functionaries	a. AMRUT 2.0 and its Reform agenda b. Recycle/ Reuse of treated used water, Rejuvenation of Water bodies, Rain water harvesting. c. Project and financial management d. E-governance and soft skills

2	Contractors, managers and consultants	<ul style="list-style-type: none"> <li>a. Project and financial management</li> <li>b. Aspects of water &amp; sewerage infrastructure and recycle of treated used water</li> </ul>
3	Plant operators, Plumbers and Workmen	<ul style="list-style-type: none"> <li>a. O&amp;M of water supply &amp; sewerage networks and treatment plants</li> <li>b. Aspects of plumbing and plugging the leakages.</li> <li>c. RWH structures, NRW reduction,</li> </ul>
4	Citizens including Women and members of SHGs	<ul style="list-style-type: none"> <li>a. Water quality testing</li> <li>b. Management of water demand</li> <li>c. Feedbacks on functional outcomes</li> </ul>
5	Town planners	<ul style="list-style-type: none"> <li>a. Land monetization</li> <li>b. Form based planning, local area plans and town planning scheme</li> <li>c. GIS based master plans</li> </ul>

12.3 States/ UTs may impart capacity building in fields other than those described in the Table above as per specific requirements of the State/ ULB. Training can be of any duration as decided by State and can be imparted through class room courses as well as online classes.

12.4 International and Intra-national visits to best water managing cities will also be taken up.

12.5 Capacity building plans will be submitted along with action plan for State A&OE funds as per **Annex-5**. States/ UTs will bear the expenses on capacity building through A&OE funds allocated to them. The capacity building plan will include the list of agencies that are proposed to impart training. States/ UTs may explore the institutions in their proximity to impart capacity building. North-Eastern States may also explore North-Eastern Hill University (NEHU) to impart training. Small States/ UTs can adopt cluster approach whereby persons from different States can participate in common capacity building program.

12.6 1,00,000 persons are targeted to be trained under capacity building program.

### 13 Urban Aquifer Management Plan

13.1 AMRUT 2.0 acknowledges the importance of wells and aquifers, and the dependence of urban population on these systems. Mission intends to prioritize management of urban aquifer systems towards its pursuit of water secure cities.

13.1.1 ULBs under Mission are expected to develop sound strategies for management of groundwater resources with specific focus on the following parameters:

- i. ULB's dependence on groundwater
- ii. Key characteristics of city's aquifer systems
- iii. Available recharge potential within city limits

13.1.2 Mission will promote and encourage citizen's engagement for groundwater management in cities. Dug wells are identified as a common entry point towards citizen engagement and awareness generation on well recharge and rejuvenation for shallow aquifer systems in the city.

13.1.3 ULBs will facilitate a scientific approach towards management of groundwater aquifer systems by enhancing their technical capacities. ULBs shall monitor groundwater usage, identify aquifer potential and recharge opportunities.

13.1.4 Mission shall support the development of protocols for operating a scientific routine around data collection on groundwater resources that will assist in the development of aquifer management plan and its refinement.

13.1.5 A technical guidance manual specific to different aquifer systems in urban India shall be developed under Mission to assist the cities in developing an aquifer management plan.

13.1.6 The City Aquifer Management Plan will be a dynamic document that shall be revised every year until 2026 to assess the change in the dynamic groundwater balance over the mission period.

13.1.7 For the purpose of development of aquifer management plan, cities/ ULBs may provide baseline information in the first year of Mission to understand the relationship between the urban area and its underlying aquifer systems and work towards generating further information pertaining to the aquifer systems that shall be incorporated in the subsequent plans.

## 14 IEC Campaign

14.1 In order to ensure extensive outreach of Mission and its objectives; Information, Education and Communication (IEC) will be undertaken. IEC campaign shall target to build the capacities of local communities through information, education, and persuasion of people effecting Behavioral Change Communication (BCC). IEC will envisage to convert the campaign into a movement- *Jan Aandolan* by engaging ward committees, resident welfare associations, senior citizens, home makers, NGOs and civil society groups, students and youth, celebrities, brand ambassadors, and SHG groups.

**Ensuring community participation:** NULM Mission management will be involved in training and mobilizing SHGs in water quality testing and infrastructure management. At least one project's operation and maintenance of AMRUT/ AMRUT 2.0 in each city may be considered for deployment of well-trained SHG.

14.2 Objectives of IEC campaign areas under:

- To create awareness about practices for water conservation like rainwater harvesting, clean water bodies, ground water recharge and intensive plantation, etc.
- To make people aware about municipal services, especially new water connection.
- To effect behavioral changes about optimum usage and minimizing wastage of water.
- To inculcate sense of ownership of water supply infrastructure among citizens.
- To enhance awareness about creation of markets for treated used water in rural/ peri-urban areas.
- To encourage potential investors to invest in PPP projects in water sector through project profiles.

14.3 **Strategy for IEC:**

MoHUA will devise strategy for IEC activities at National, State, and ULB level. It will include the tools of awareness campaigns on the objectives brought out above. MoHUA may appoint external consultants/ agencies/ organizations etc. to devise the strategy.

This strategy will be designed into two folds – 1) primary creative strategy & master templates and its adaption into multiple tools of IEC campaign. 2) Optimum utilization of such tools for information dissemination.

Similarly, States shall leverage the MoHUA's creative strategy and localize the content at the State, district and ULB level and facilitate its information dissemination.

#### 14.4 IEC tools and action plan

Below is a snapshot of the tools of IEC plan to be used in AMRUT 2.0:

<b>Mass Media</b> - TV, Radio, Newspapers, Movies, AMRUT 2.0 anthem, etc.	<b>Social media campaign</b> through influencers, celebrities and Recognition of Water Warriors	<b>Targeted marketing</b> through- <b>Collaterals</b> – Pamphlets, brochures, leaflets, snippets, <b>Outdoor publicity</b> – hoardings, banners, standees, wall paintings etc.
<b>Activations</b> – competition among children, local community	<b>Community engagement</b> through train the trainer	<b>Exhibition/ Melas</b> of success stories

##### 14.4.1 Mass Media - TV, Radio, Newspapers, Movies

Broadcast of “Audio-Visual spots” through internet, television, local cable TV and social media networks. Advertisements and success stories in newspapers/ magazines and short films on objectives of Mission. An audio-visual anthem on AMRUT 2.0 may be created to effect behavioral change in people regarding water and sanitation.

**Radio** may also be used to achieve above objectives. Audio spots, anthem and jingles through local FM channels roping in influential radio jockeys may be broadcasted.

##### 14.4.2 Social media campaign and recognition of Water Warriors

**Social media campaign** can involve celebrities to spread awareness among masses about Mission; optimum usage of water; importance and avenues for recycle/ reuse of treated used water; significance of rejuvenation of water bodies, plantation and rain water harvesting etc. For this purpose, platforms such as WhatsApp, Facebook, Instagram, YouTube, LinkedIn, Twitter, etc. may be used. Mission will recognize citizens who have done outstanding work in the related fields, as ‘**Water Warriors**’. **Documentary films/ movies** on Mission objectives and success stories of water warriors may be made and shown during campaign.

#### 14.4.3 Targeted marketing through collaterals and outdoor campaign

**Pamphlets, brochures, leaflets, snippets** may be distributed to schools, RWAs, Slum Welfare Associations, Mohalla Samitis, academic institutions, health workers, key opinion leaders and beneficiaries, etc. **Outdoor campaign may be done via hoardings, banners, standees, wall paintings etc.** at ULB offices, schools, institutions, railway stations, bus stops, malls, markets, subways, inside and outside public transport buses, etc.

#### 14.4.4 Local level activations

Organizing competitions on painting and essay writing, etc. on water related topics in schools, colleges, slums, and RWAs, etc.

#### 14.4.5 Community engagement using 'Train the Trainer' workshops

Community young leaders at local level may be identified and trained in 'Train the Trainer' workshops. These leaders may further train the community and create sensitisation among community in water related aspects.

#### 14.4.6 Exhibition and Melas of success stories

Start-ups, entrepreneurs, research centers, institutions etc. may be engaged in local level exhibitions/ Melas to showcase their technologies and processes. This will help in increasing awareness of ULB functionaries, contractors, plant operators, and citizens.

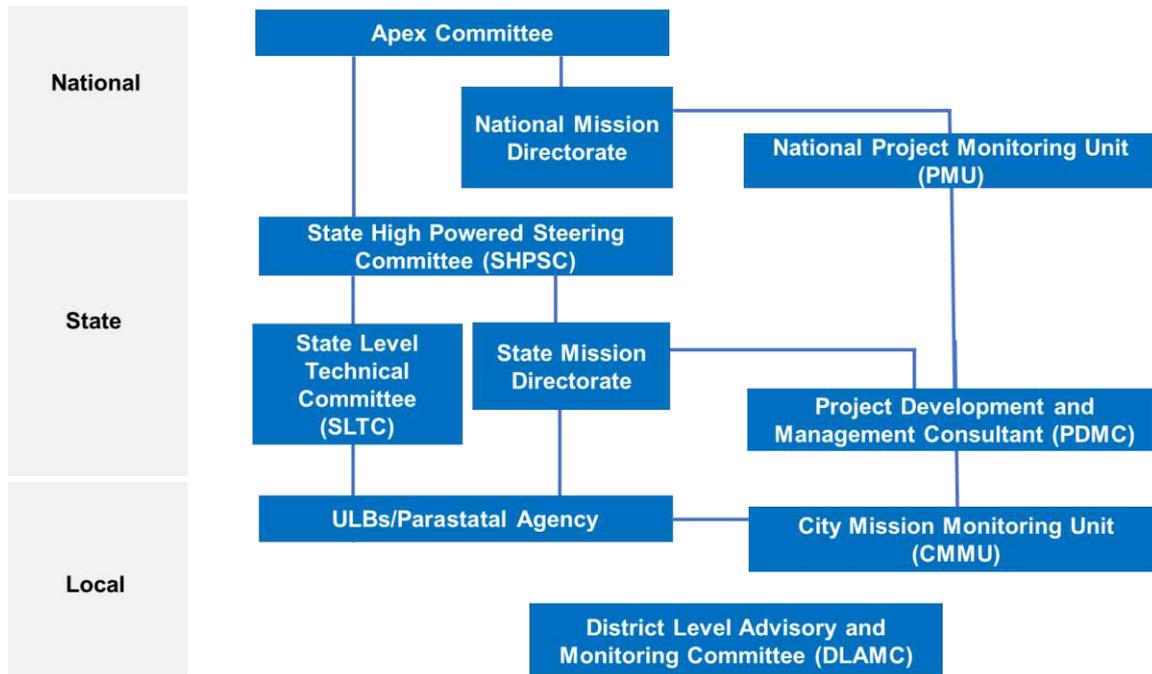
#### 14.5 Funding:

MoHUA will receive 1/3<sup>rd</sup> of annual IEC funds, and remaining funds will be disbursed to States/ UTs. State share will be worked out giving weightage to urban population and area of States in ratio of 90:10.

Annual IEC action plan will be submitted by States/ UTs along with SWAPs as per **Annex-6**. Annual IEC allocation to a State/ ULB will be released in two instalments. First instalment for the first year will be released on receipt of IEC action plan. Second instalment will be released on receipt of online claims and UC worth at least 75% of central assistance already released. In subsequent years first instalment will be released on receipt of action plan and UC worth 75% of all the IEC fund released in previous years.

## 15 Institutional Mechanism

15.1 A three-tier institutional mechanism has been devised for implementing Mission as under:



### 15.2 National Level

#### 15.2.1 Apex Committee (AC)

An Apex Committee (AC) chaired by the Secretary, MoHUA and comprising representatives of related ministries and organizations will monitor Mission. For the successful implementation of Mission, the Apex Committee (AC) will have following responsibilities:

- i. Policy guidance formulation, central assistance, and technical support to States/ UTs.
- ii. Approval of State Water Action Plans (SWAPs).
- iii. Allocate and release funds to the States/ UTs/ Mission Directorate.
- iv. Monitoring of Mission progress & fund utilization at State/UT level.
- v. Advise States/ UTs on roadmap for reform implementation and monitoring progress.
- vi. Advise the State/UT/ implementing agencies on innovative ways for resource mobilization, private financing, and land leveraging.

- vii. The Apex Committee may delegate, as it considers appropriate, some of the functions within prescribed limits to the Mission Director for ensuring speedy implementation of Mission.

Apex committee will be empowered to take any decision required for uninterrupted progress of Mission within broad framework of approved Cabinet note. Apex committee shall meet at intervals not exceeding once every quarter.

The composition of the Apex Committee will be:

1	Secretary (MoHUA)	Chairman
2	Secretary (Department of Expenditure)	Member
3	Secretary (Department of Economic Affairs)	Member
4	Secretary (Drinking Water & Sanitation)	Member
5	Secretary (Environment & Forest)	Member
6	Joint Secretary/ Advisor, NITI Ayog	Member
7	Joint Secretary & FA, MoHUA	Member
8	Adviser (CPHEEO)	Member
9	TCPO	Member
10	Director, NIUA	Member
11	Mission Director, AMRUT 2.0	Member Secretary

#### 15.2.2 National Project Management Unit (PMU)

National Project Management Unit may be employed to support National Mission Directorate. It will monitor the physical and financial progress of the overall Mission, visit States/ cities as required, liaise with PDMC/ CMMU to keep the portal updated and undertake any other duties as directed by Mission director.

#### 15.2.3 Independent Review and Monitoring Agency (IRMA)

IRMAs shall be selected for a State/ UT or cluster of States/ UTs by MoHUA through bidding process. Payments to IRMAs will be made by MoHUA. States/ UTs will facilitate IRMAs in undertaking reviews and feedbacks etc. Periodic reports and other documents will be submitted by IRMA to MoHUA with copy to States/ UTs. Brief description of activities to be performed by IRMAs is as under:

- I. Review of projects and reforms undertaken by the States/ UTs. Ascertaining if the projects are taken up in accordance with the approved SWAPs.
- II. Verification of Action Taken Report furnished by States/ UTs against IRMA observations and confirmation to MoHUA.
- III. Verification of outcomes submitted/ uploaded on portal by the States/ UTs.
- IV. Collecting user feedback in form of recorded video interviews and testimonials etc.
- V. Assisting States/ UTs in updating the portal on regular basis.

### 15.3 State level

#### 15.3.1 State High Powered Steering Committee (SHPSC)

State High Powered Steering Committee (SHPSC) chaired by Chief Secretary of State will steer the Mission program at State level. The responsibilities of SHPSC will be as under:

- I. Approve State Water Action Plan (SWAP) and accord administrative approval of Detailed Project Reports (DPRs).
- II. Monitor Mission including progress of projects, capacity building, IEC campaign and reform implementation, etc.
- III. Recommend proposals for release of instalment of funds for projects to the Centre.
- IV. Finalize State and ULB share of funds for project implementation.
- V. Allocate and release of Central and State share of funds to ULBs in time.
- VI. Encourage and facilitate start-ups and private entrepreneurs to participate in Mission through technology sub-Mission.
- VII. Approve plans for capacity building, issue notifications, etc. for speedy implementation of reforms.
- VIII. Advise State Mission Director on Operations & Maintenance of plants erected under Mission.

The indicative composition of the SHPSC will be:

1	Chief Secretary	Chairman
2	Pr. Secretary (Finance)	Member
3	Pr. Secretary (Housing)	Member
4	Pr. Secretary (Environment & Forest)	Member

5	Representative of MoHUA	Member
6	State Mission Director	Member
7	Representative of PHE Department	Member
8	Pr. Secretary (UD)	Member Secretary
9	Pr. Secretary/ Secretary Rural Development	Member

SHPSC may co-opt members from other State government departments / organizations and may invite experts in the field to participate in its deliberations.

Mission at State level will be led by State Mission Director, who will be an officer not below the rank of Secretary, nominated by the State Government. The State Mission Directorate will be responsible for developing DPRs and bid documents with the help of ULBs & PDMCs and forwarding them to the SLTC for technical approval. State Mission director may seek guidance from SHPSC to ensure speedy implementation of AMRUT 2.0.

### 15.3.2 State Level Technical Committee (SLTC)

States/ UTs shall appoint SLTC which will be primarily responsible for technical appraisal of DPRs and tender documents. Before giving approval, SLTC will ensure availability of undisputed land for projects, inclusion of O&M for at least five years and last stretch of tap/ sewerage connectivity to households.

The indicative composition of the SLTC is given below.

1	Pr. Secretary (UD)/ Secretary (UD)	Chairman
2	Water Resources/Ground Water Department	Member
3	Public health department	Member
4	Electricity Department	Member
5	Finance Department	Member
6	State Mission Director	Member
7	Technical Head (e.g. Engineer-in-Chief) Urban Water Supply & Sewerage Board	Member Secretary
8	M.D. of Parastatal	Member

### 15.3.3 Project Development and Management Consultant (PDMC)

The PDMCs may be procured by the States/ UTs through a contract, model Request for Proposal (RfP) which is available in Mission toolkit. Each PDMC will have one State office at State capital comprising management and design professionals and multiple field offices comprising project implementation professionals. PDMC in place for AMRUT Mission can continue to work for AMRUT 2.0 at the discretion of State Mission Director.

The scope of PDMCs will broadly cover planning, design, supervision and management of projects. They will prepare CWBPs, CWAPs and SWAPs and carry out investigation, design, procurement, and implementation using PMIS / latest IT tools and techniques. They will help in monitoring physical & financial progress of projects and updating Mission portal. They will also help States/ UTs in conducting capacity building activities.

The PDMCs will examine convergence with other similar schemes in terms of coverage, fund flow, impact and outcomes. The scheduling of projects for next five years will be done in consultation with citizens. During the process of developing the SWAP, the PDMCs shall explore the possibility of Public Private Partnerships (PPP) in project implementation. PDMCs will prepare Detailed Project Reports (DPRs), which shall include financial plan and O&M strategy for complete life cycle of projects. Based on approved DPRs, PDMCs will provide bid documents and support States/ULBs in procurement of contracting firms. They will subsequently provide extensive support to ULBs/State parastatal for project implementation.

### 15.4 ULB level

At the city level, the ULB represented by Municipal Commissioner/ administrative head of ULB, etc. will be responsible for implementation for Mission. The responsibilities of ULB will be as under:

- i. Submit City Water Balance Plans in time.
- ii. Help State Mission Director/ PDMC in preparation of DPRs.
- iii. Act for tendering and award of contracts as per financial rules & regulations and ensure timely completion of work under contract.
- iv. Participate actively and provide necessary support for Pey Jal Survekshan.
- v. Ensure that the reforms are achieved within timeline.

### 15.5 City Mission Management Units (CMMUs)

The States/ UTs may decide to appoint CMMUs comprising sector experts to support a city or a cluster of cities within the State.

### 15.6 District level

The Ministry of Housing & Urban Affairs has issued Guideline regarding District Level Advisory and Monitoring Committee (DLAMC) to be formed under District Magistrate (DM) to review and monitor several programs in urban sector including AMRUT 2.0. Elected representatives and representatives from ULBs and Gram Panchayats in the district will be the part of this committee. The Committee will monitor and review the implementation of AMRUT 2.0 projects in accordance with the applicable guidelines.

### 15.7 Audit and litigation matters

State Mission Directorate shall be responsible for all matters connected with C&AG Audit and litigation including cases before Courts/Tribunals and Arbitrators. State Mission Directorate shall be responsible for defending the Central Government interests on behalf of the National Mission Directorate, MoHUA.

### 15.8 Ongoing projects of AMRUT

Ongoing AMRUT projects will continue to be funded as per AMRUT guidelines.

### 16 Indicative Annexures

The annexures give indicative formats. The final formats will be made available through online portal developed by MoHUA.

### Annexure 1

### City Water Balance Plan

The screenshot displays the 'CITY WATER BALANCE PLAN' form within the AMRUT 2.0 Monitoring System. The interface includes a navigation bar with tabs for Basic Details, Water Supply, WB Rejuvenation & RWH, Used Water, and Summary. The form is divided into several sections:

- Basic Information:** Includes dropdowns for City (New Delhi), District, and State. It also has checkboxes for 'Whether covered in 500 AMRUT cities' and 'Any parastatal agency engaged?'. Below this is a table for contact details of various officials.
- City profile as per FY 2020-21:** Contains input fields for population and household data for 2011 and 2020, along with area, density, and slum-related metrics.
- Future projections:** Features input fields for population and households in 2025 and 2030.
- Agency/organisation/Experts/Engg college/ community based organisation working in water sector in city:** A table for listing external organizations.
- Geographical assessment:** Includes instructions and file upload buttons for administrative boundaries and maps showing water and sanitation coverage.

At the bottom right of the form, there are 'Save' and 'Next' buttons.

Ministry of Housing & Urban Affairs  
Government of India

AMRUT 2.0 Monitoring System

Welcome South Delhi !
CITY WATER BALANCE PLAN

Basic Details

Water Supply

WB Rejuvenation & RWH

Used Water

Summary

Major water sources in use

Water sources in use	Name/ Location	Number of Water tapping points	Quantity of water tapped (MLD)	Is it located outside the City?
Surface water source 1 (River/ Dam/ Lake/ Pond/ Canal)	<input type="text"/>	<input type="text"/>	<input type="text"/>	Yes <input type="radio"/> No <input type="radio"/>
Surface water source 2 (River/ Dam/ Lake/ Pond/ Canal)	<input type="text"/>	<input type="text"/>	<input type="text"/>	Yes <input type="radio"/> No <input type="radio"/>
Surface water source 3 (River/ Dam/ Lake/ Pond/ Canal)	<input type="text"/>	<input type="text"/>	<input type="text"/>	Yes <input type="radio"/> No <input type="radio"/>
Groundwater source 1 (Wells/ Tube-wells/ Borewells/ handpumps)	<input type="text"/>	<input type="text"/>	<input type="text"/>	Yes <input type="radio"/> No <input type="radio"/>
Treated used water	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Total</b>				

Please add more entries for more water sources.

Water Treatment Plants (WTP)

#	Name/ Location of WTP	Designed capacity (MLD)	Operational capacity (MLD)	Technology used for automatic monitoring
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	Select <input type="text"/>

Please add more entries for more water treatment plants.

Water connections

#	Number of tap connections provided	No. of households / establishments having water tap connections (Add all HH covered by bulk connections)	Water supplied (MLD)
	Residential/ Households including slums	<input type="text"/>	<input type="text"/>
	Commercial establishments	<input type="text"/>	<input type="text"/>
	Industries	<input type="text"/>	<input type="text"/>
	Institutional establishments	<input type="text"/>	<input type="text"/>
	Slums	<input type="text"/>	<input type="text"/>
<b>Total</b>			

Present water supply to consumers (after losses)

Future demand

Total — 222,434

Previous
Save
Next

AMRUT 2.0 Monitoring System

Welcome South Delhi ! CITY WATER BALANCE PLAN

Basic Details Water Supply WB Rejuvenation & RWH Used Water Summary

**Rain water harvesting**

Is rainwater harvesting included in bylaws? (Y/N)  Yes  No

Number of water tanks at religious places in your city

**Details of water bodies in city**

Water sources In use	Water Body 1 (name)	Water Body 2 (name)	Water Body 3 (name)
Approx. area of the water body (in Acre)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Attach a geotagged photo	<input type="text"/> <input type="button" value="Upload Image"/>	<input type="text"/> <input type="button" value="Upload Image"/>	<input type="text"/> <input type="button" value="Upload Image"/>
Whether water body is rejuvenated in last 10 years (Y/N)	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No
General assessment of Water quality (Good/ Bad)	<input type="radio"/> Good <input type="radio"/> Bad	<input type="radio"/> Good <input type="radio"/> Bad	<input type="radio"/> Good <input type="radio"/> Bad

AMRUT 2.0 Monitoring System

Welcome South Delhi ! CITY WATER BALANCE PLAN

Basic Details Water Supply WB Rejuvenation & RWH Used Water Summary

**Sewerage coverage (Only to be filled by AMRUT cities)**

#	No. of households covered	sewage generated (MLD)	Sewage treated through STP (MLD)
HH with sewer connections and connected to STP	<input type="text"/>	<input type="text"/>	<input type="text"/>
HH with sewer connections and not connected to STP	<input type="text"/>	<input type="text"/>	<input type="text"/>

**Septage coverage**

#	No. of households covered	sewage generated (MLD)	Sludge treated through FSSM (KLD)	Grey water recycled (MLD)
HH with septic tanks	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**Sewage Treatment Plants (Only to be filled by AMRUT cities)**

#	STP 1	STP 2	STP 3	Total
Name/ Location of sewage Treatment Plant	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Designed capacity of STP (MLD)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="200"/>
Capacity at which STP is working (MLD)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="320"/>
If reused, working Reuse capacity (MLD)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="420"/>
Reuse purpose (agriculture/ arboriculture/industry/ others)	<input type="text" value="Select"/>	<input type="text" value="Select"/>	<input type="text" value="Select"/>	<input type="text"/>
Revenue generation from reused water/ sludge disposal (per year)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="320"/>
Whether automatic monitoring is exercised in STP	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No	<input type="text"/>

AMRUT 2.0 Monitoring System

Welcome South Delhi ! CITY WATER BALANCE PLAN

Basic Details Water Supply WB Rejuvenation & RWH Used Water Summary

Gap Identification

Current Infrastructure assets / Supply FY21-22 (A)	Projected consumption/ Demand FY25-26 (B)	Estimated Gap FY25-26 (C)= (B)-(A)
Water supplied (Surface+ ground+ recycled)	Water demand	Gap in water supply 540
Water treatment capacity	Water to be treated	Gap in water treatment 50
Tap connections provided in slums	Tap connections provided in slums	Gap in household tap connections in slums 54
Households covered with Tap connections (City)	Total households incl slums	Gap in households tap connections including slums 210
Used water being treated	Used water generation	gap in used water treatment 210.22
Used water being recycled	Used water to be recycled (20%)	Gap in used water recycling 24
Sewer connections provided (including coverage with septage management)	Total households	gap in household sewer connections/ coverage with septage management) 02

Previous Submit

## Annexure 2

## City Water Action Plan (CWAP)

## 2(a) CWAP for Water supply projects

Name of city: _____					
Sl. No.	Name of water supply project	Number of household water tap connections proposed under project (New, augmented, 24x7 water supply connections)	Ward number and name of locality covered under project	Estimated cost of the project (₹ Crore)	Other source of funding for projects under AMRUT 2.0 in addition (if any)
Proposed under AMRUT 2.0					
					NA
					NA
Ongoing/ planned projects, other than AMRUT, funded through sources like State/ ULB owned funds, XV FC grants, external funding, PPP, etc.					

**2(b) CWAP for Sewerage/ septage management projects (for AMRUT cities only)**

Name of city: _____							
Sl. No.	Name of sewerage/ septage management project	Number of household sewer/ septage connections proposed under project	Ward number and name of locality covered under project	Proposed recycle/ reuse of treated used water and buyer/ receiver		Estimated cost of the project (₹ Crore)	Other source of funding for projects under AMRUT 2.0 in addition (if any)
				Proposed recycle/ reuse (MLD)	Name of buyer/ receiver		
Proposed under AMRUT 2.0							
							NA
							NA
Ongoing/ planned projects, other than AMRUT, funded through sources like State/ ULB owned funds, XV FC grants, external funding, PPP, etc.							

**2(c) CWAP for projects on Rejuvenation of water bodies and development of parks & green spaces**

Name of city: _____						
Sl. No.	Name of project on rejuvenation of water bodies/ parks	Identification of water body / park (Name and latitude -longitude)	Area of		Estimated cost of the project (₹ Crore)	Other source of funding for projects under AMRUT 2.0 in addition (if any)
			water body (acre)	Park (acre)		
Proposed under AMRUT 2.0						
						NA
						NA
Ongoing/ planned projects, other than AMRUT, funded through sources like State/ ULB owned funds, XV FC grants, external funding, PPP, etc.						

**2(d) Roadmap for water tap connections**

Name of the City: _____															
Number of households in the city	Number of households having functional water tap connections as on 1 Nov 2021 (Baseline)	Number of households to be covered through AMRUT (Post 1 Nov 2021)	Gap in household water tap connections (a) - (b) - (c)	Year wise Connections proposed (FY)											Total of (e) to (n)
				2021-22		2022-23		2023-24		2024-25		2025-26			
				AMRUT 2.0	Other than AMRUT 2.0	AMRUT 2.0	Other than AMRUT 2.0	AMRUT 2.0	Other than AMRUT 2.0	AMRUT 2.0	Other than AMRUT 2.0	AMRUT 2.0	Other than AMRUT 2.0		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)		

**2(e) Roadmap for sewer/ septage connections (AMRUT cities only)**

Name of the City: _____														
Number of households in the city	Number of households having functional sewer / septage connections till 1 Nov 2021	Number of households to be covered through AMRUT (Post 1 Nov 2021)	Gap in household sewer / septage connections (a) - (b) - (c)	Year wise Connections proposed (FY)										Total of (e) to (n)
				2021-22		2022-23		2023-24		2024-25		2025-26		
				AMRUT 2.0	Other than AMRUT 2.0	AMRUT 2.0	Other than AMRUT 2.0	AMRUT 2.0	Other than AMRUT 2.0	AMRUT 2.0	Other than AMRUT 2.0	AMRUT 2.0	Other than AMRUT 2.0	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	

## Annexure 3

## 3(a) State Water Action Plan (SWAP)

Name of State: \_\_\_\_\_

Sl. No.	Name of the City	Name of the project including Ward number and locality	Name of the sector	Number of new household connections, rehabilitated connections, connections provided with 24x7 water supply, as applicable proposed as applicable (To be left blank for water body rejuvenation and park projects)		Estimated cost of the project (₹ Crore)
				Tap connections	Sewer/ septage connections	

**3(b) State Roadmap for achieving universal coverage of household water tap connections**

Name of the State: _____															
Total Number of household s in the State	Total Number of households having functional water tap connections as on 1 Nov 2021	Number of households to be covered through AMRUT (Post 1 Nov 2021)	Total Gap in household water tap connections (a) - (b) - (c)	Year wise Connections proposed by State (FY)											Total of (e) to (n)
				2021-22		2022-23		2023-24		2024-25		2025-26			
				AMRU T 2.0	Other than AMRUT 2.0/ AMRUT	AMRU T 2.0	Other than AMRU T 2.0/ AMRU T	AMRUT 2.0	Other than AMRUT 2.0/ AMRUT	AMRU T 2.0	Other than AMRU T 2.0/ AMRU T	AMRUT 2.0	Other than AMRU T 2.0/ AMRU T		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	

**3(c) State Roadmap for achieving universal coverage of household sewer/septage connections**

Name of the State: _____															
Total Number of households in the State	Total Number of households having functional sewer connections as on 1 Nov 2021	Number of households to be covered through AMRUT (Post 1 Nov 2021)	Total Gap in household water tap connections (a) - (b) - (c)	Year wise Connections proposed by State (FY)											Total of (e) to (n)
				2021-22		2022-23		2023-24		2024-25		2025-26			
				AMRUT 2.0	Other than AMRUT 2.0/AMRUT	AMRUT 2.0	Other than AMRUT 2.0/AMRUT	AMRUT 2.0	Other than AMRUT 2.0/AMRUT	AMRUT 2.0	Other than AMRUT 2.0/AMRUT	AMRUT 2.0	Other than AMRUT 2.0/AMRUT		
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	

**3(d) State Roadmap for rejuvenation of water bodies and development of parks & green spaces**

Name of city	Water bodies proposed for rejuvenation		Number of water bodies proposed to be rejuvenated under AMRUT 2.0							
			FY 2023-24		FY 2024-25		FY 2025-26		Total	
	Number of water bodies	Total area (Acre)	Number	Total area (Acre)	Number	Total area (Acre)	Number	Total area (Acre)	Number	Total area (Acre)

Name of city	Parks & green spaces proposed to be developed		Number of parks & green spaces to be developed							
			FY 2023-24		FY 2024-25		FY 2025-26		Total	
	Number of parks	Total area (Acre)	Number	Total area (Acre)	Number	Total area (Acre)	Number	Total area (Acre)	Number	Total area (Acre)

Annexure 4

A&OE action plan of State

Name of State : _____								
Sr. No.	Items proposed	Proposed spending						
		FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25	FY 2025-26	Total	
1.	Procurement of PDMC / SMMU/ CMMU for preparation of CWBPs, CWAPs, Aquifer management plans, DPRs, Bid documents							
2.	Capacity Building							
3.	Reform implementation							
4.	Publications (e-Newsletter, guidelines, brochures, etc.)							
5.	Others							

## Annexure 5

## Capacity Building plan of State ( To be submitted with State A&amp;OE plan of Action)

Name of State:													
	Targeted group for capacity building	Suggested fields of capacity building	Year 1		Year 2		Year 3		Year 4		Year 5		Total (₹ crore)
			No. of trainees	Cost (₹ crore)									
1	Elected representatives and Municipal functionaries	a. AMRUT 2.0 and its Reform agenda b. Recycle/ Reuse of treated used water, Rejuvenation of Water bodies, Rainwater harvesting. c. Project and financial management d. egovernance and soft skills											

2	Contractors and managers	<p>a. Project and financial management</p> <p>b. Aspects of water &amp; sewerage infrastructure and recycle of treated used water</p>											
3	Plant operators, Plumbers and Workmen	<p>a. O&amp;M of water supply &amp; sewerage networks and treatment plants</p> <p>b. Aspects of plumbing and plugging the leakages.</p> <p>c. RWH structures, NRW reduction,</p>											
4	Citizens including Women	<p>a. Management of Water Demand</p>											

		b. Feedbacks on functional outcomes											
5	Town planners	a. Land monetization b. Form based planning, Local area plans and town planning scheme c. GIS based master plans											

## Annexure 6

## IEC action plan

Name of State : _____								
Sr. No.	Elements proposed	Proposed spending						Remarks (If Any)
		FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25	FY 2025-26	Total	
1.	<b>Mass Media</b> - TV, Radio, Newspapers, Movies, AMRUT 2.0 anthem, etc.							
2.	<b>Social media campaign</b> through-influencers, celebrities and recognition of Water Warriors							
3.	<b>Targeted marketing</b> through- <b>Collaterals</b> – Pamphlets, brochures, leaflets, snippets, <b>Outdoor publicity</b> – hoardings, banners, standees, wall paintings etc.							
4.	<b>Activations</b> – competition in institutions, local community							
5.	<b>Community engagement</b> through train the trainer							
6.	<b>Exhibition/ Melas</b> of success stories							





A Guide to Decisionmaking

# Technology Options for Urban Sanitation in India



A Guide to Decisionmaking

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# Technology Options for Urban Sanitation in India



September 2008

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New Delhi-110011, Dated the December 4, 2007

## Foreword

As India moves ahead in the urban sector with major reform initiatives, like JNNURM and UIDSSMT, there is a need to address key capacity issues related to provision of basic services, in order to fulfill the underlying goals of these reforms. This is particularly true of the urban sanitation sector. Traditionally public policy on basic urban services in India has focused on water supply, which has enjoyed primacy in investments as well, while sanitation has lagged behind. Even today, almost one fourth of the urban populations in India do not have access to safe and adequate sanitation facilities. Inadequate access to sanitation especially in high density urban slum settlements is one of the key impediments to improving the quality of life and productivity of urban centers. In the absence of quick and effective remedial measures, we also run the risk of rapidly increasing vulnerability to disease caused by such conditions.

While urban India has invested significantly in sanitation infrastructure, this has essentially been focused on traditional sewerage networks, with some efforts directed towards individual and community toilets for economically weaker sections of society. These efforts have failed to deliver a safe sanitary environment in urban India as they typically lacked the comprehensiveness to address the full dimension of the sanitation challenge existing in the country. In particular, these efforts have failed in terms of targeting the sanitation needs of all sections of urban society, working towards triggering behavior change to ensure usage of the facilities created or their proper operation and maintenance.

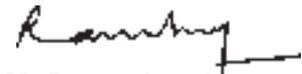
Given the experience in the sector thus far, it is imperative that future efforts consider a range of technical options ranging from on-site to traditional centralized sewerage and treatment systems, on techno-economic considerations, so as to draw up plans that are comprehensive and inclusive enough to cover all geographical locations and all sections of society. Total sanitation, in its fullest sense, must be the underlying objective of these plans. Capacity building in this regard through documentation of appropriate sanitation technology options and their techno-economic implications, is a key need of the hour.

**Towards enabling Sustainable Cities...**

In this context, these guidance notes titled '**A Guide to Decisionmaking—Sanitation Technology Options for Urban India**', which have been developed by the Ministry of Urban Development (MoUD) with support from the Water and Sanitation Program-South Asia, are extremely timely. The documentation focuses on various technology options for provision of access, O&M and disposal arrangements related to sanitation services. While it has primarily been prepared to provide municipal agencies with the required sound technical advice on the planning of new investments and the delivery of sanitation services, it is also aimed at sensitizing state governments and urban local bodies in this regard. The documentation also provides guidance on implementation and financial issues, in addition to technical details.

The guidance note should be considered as an evolving document and a “work in progress” to enable it to grow on the basis of the actual experience of cities across the country. It is applicable to small interventions in specific locations and also to larger programs that aim to improve sanitation citywide. They are not aimed at being a set of rigid, exhaustive prescriptions, and should be adapted to the cities' specific circumstances in their application.

The Ministry of Urban Development wishes to thank WSP-SA and the various state and city authorities for their assistance in the preparation of these guidance notes.



**M. Ramachandran**  
*Secretary*

***Ministry of Urban Development***



सत्यमेव जयते

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## Message

South Asia contains more people without safe sanitation than any other region in the world. It is estimated that 17 percent of the urban population in India currently has no access to any sanitary facilities, while 50-80 percent of wastewater is disposed of untreated.

It is recognized that urban sanitation is dependant on a combination of sewerage and other on-site options and a great majority of urban residents are and will remain dependent on on-site sanitation facilities such as pour flush toilets discharging to leach pits or septic tanks. However, there is need to inform the people and the utilities on appropriate disposal of the waste and maintenance of the facilities.

In addition, municipal planners need to recognize that the worst sanitary conditions usually exist in areas inhabited by the poor and the sanitation needs of these areas need to be addressed on priority. Construction of a toilet is generally regarded as the householder's responsibility but for poor households, investments in sanitation are often constrained by various issues including affordability and uncertainty over land tenure.

Special measures may therefore be needed to support service improvements for the poorest sections of the community. This does not mean subsidies and awareness campaigns only but also technology options along with a proper operations and maintenance plan, which suits the local context of these communities.

These guidance notes have been drafted to aid decisionmakers and practitioners, fully understanding the roles of each stakeholder to ensure a pragmatic and holistic sanitation plan which will focus on achieving sustainable outcomes. These guidance notes are designed to provide state governments and urban local bodies with additional information on the available technologies on sanitation and to aid them with how best and when to install them. I am confident that the guidance notes will contribute to triggering initiatives that could potentially lead to significant improvements in urban sanitation provision.

It was a privilege for me to be associated with the development of this document and I hope that the stakeholders will find them useful. I am sure that the guidance notes shall help them in realizing the vision of total sanitation. I extend my sincere thanks to the authors and peer reviewers, Water and Sanitation Program-South Asia (WSP-SA), and the various state and city authorities for their support and help in the drafting and preparation of these guidance notes.



**A.K. Mehta**  
**Joint Secretary**  
**Ministry of Urban Development**

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## Introduction

### What this Guide is about

Poor sanitation is endemic in towns and cities across India and exacts a heavy toll on public health. In response, the Government of India has made increased funding available for the qualifying cities for sanitation infrastructure via the Jawaharlal Nehru National Urban Renewal Mission.

These resources are sorely needed, but money alone cannot solve the problem; municipal agencies need sound technical advice on the planning of new investments and the delivery of sanitation services.

This guide aims to meet some of those needs by providing advice on the selection of technology options for urban sanitation, whether for new infrastructure or the upgrading of existing services. It is applicable both to small interventions in specific locations and larger programs that aim to improve sanitation citywide.

### Who is it for?

The guide has been written for both technical and nontechnical professionals responsible for urban sanitation. It is primarily intended for city managers, who may need to make decisions on sanitation investments but may not have an engineering background. The guide should help managers to make appropriate choices with simple steps and engage effectively with technical specialists.

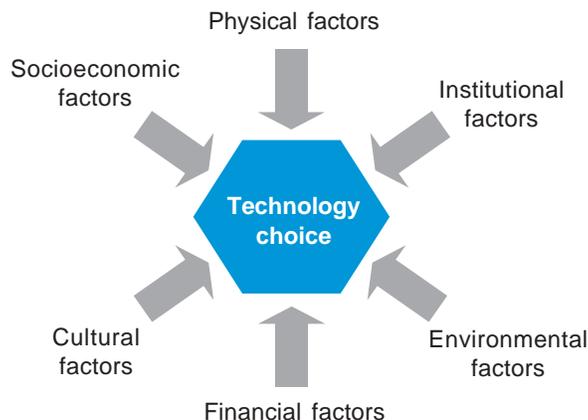
### Structure of the Guide

The guide comprises four parts:

- **Part A** sets technology selection in the context of the range of issues and challenges that urban sanitation programs need to address.
- **Part B** provides an introduction to sanitation technology for nontechnical specialists.
- **Part C**—the heart of the guide—sets out a logical process for technology selection, both for new services and upgrading.
- **Part D** is a 'toolkit' comprising information sheets on sanitation technologies; management options for service delivery and maintenance; and various communication tools to facilitate community consultation and participation in decisionmaking.

## Scope of the Guide

The guide focuses on technology but takes into account the full range of factors that affect the outcome of sanitation investments.



In many situations, on-site facilities may provide a more appropriate, cost-effective technology and, in some cases, an inexpensive option. The guide therefore pays particular attention to on-site options, including the removal and treatment of fecal sludge and septage.

## Related Documents

The guide is concerned with technology choice but is not an engineering manual; neither does it address the strategic planning of sanitation services at city level.

For further information in these important areas, please refer to the following Government of India documents:

1. *The Manual on Sewerage and Sewage Treatment*. 1993. Prepared by the Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development. The manual is available for download from the CPHEEO website at <http://cpheeo.nic.in>
2. *Urban Sanitation in India—Planning for a Better Future*. Urban Sanitation Planning Guidance Notes. Ministry of Urban Development.
3. *Guide to City Sanitation Planning*. Ministry of Urban Development.

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## Acronyms and Abbreviations

### Institutional abbreviations

CDP	City Development Plan
CPHEEO	Central Public Health and Environmental Engineering Organization
GoI	Government of India
ILCS	Integrated Low Cost Sanitation
MoUD	Ministry of Urban Development
NURM	National Urban Renewal Mission
WSP-SA	Water and Sanitation Program-South Asia

### Technical abbreviations

BOD	Biochemical oxygen demand
IHL	Individual household latrine
NH <sub>3</sub>	Ammonia
SPPF	Single-pit pour flush latrine
SS	Suspended solids
TKN	Total Kjehldahl Nitrogen
TPPF	Twin-pit pour flush latrine
UASB	Upflow Anaerobic Sludge Blanket
VIP	Ventilated Improved Pit
WWTP	Wastewater treatment plant

Part A

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# Setting the Scene





Before considering any technology choice, it is useful to first define sanitation, and then consider the urban sanitation problems faced across India and the sort of interventions needed to resolve them.

## Defining Sanitation

For the purposes of this guide, ‘sanitation’ refers to *the safe management and disposal of human excreta*. It is important to understand that this involves service delivery, not just the installation of infrastructure; both service providers and users need to act in defined ways. This means that the success of sanitation investments cannot be measured only in terms of physical outputs such as the number of toilets built or kilometers of sewer laid. Instead, the focus of attention should be on *outcomes*, primarily the use and maintenance of those facilities.

Dealing effectively with human waste may also require action in related areas such as water supply, drainage, and solid waste management. Good coordination between the agencies responsible for these services is, therefore, important.

## Urban Sanitation: What are the Challenges?

Broadly speaking, the challenges fall into four categories:

- Low infrastructure;
- Service coverage;
- Low service usage; and
- Weak institutional arrangements.

### Low Infrastructure Coverage

South Asia contains more people without safe sanitation than any other region in the world. While infrastructure coverage is gradually improving, it has so far failed to keep pace with the rate of urban growth. In India it is estimated that 17 percent of the urban population currently has no access to any sanitary facilities at all, while 50–80 percent of wastewater is disposed of without any treatment (Draft National Urban Sanitation Policy, 2007).

It may take several decades for sewerage and other sanitation services to become available to all of urban India. In the meantime, the great majority of urban residents will remain dependent on on-site sanitation facilities such as pour flush toilets discharging to leach pits or septic tanks. Municipal sanitation plans should therefore include measures to improve on-site sanitation—otherwise they will meet the needs of just a small portion of the city.

Municipal planners should also recognize that the worst sanitary conditions tend to be found in poor areas. Construction of a toilet is generally regarded as the householder's responsibility but, for poor households, investments in sanitation are often constrained by issues relating to:

- Affordability, including the cost of connecting to sewer networks;
- Uncertainty over land tenure (fear of eviction);
- Space constraints; and
- The low priority given to sanitation (people may not appreciate its importance).

Special measures may therefore be needed to support service improvements for the poorest sections of the community. This does not just mean subsidies and awareness campaigns; technology options are also needed that suit the physical conditions in poor communities.

### Limited Access to Services

Official coverage figures do not, on their own, give the full picture regarding access to sanitation services. Existing arrangements can in fact be deficient in a number of ways:

- There may be a *complete lack of facilities*. For example, there may be settlements with no toilets at all, while facilities for the safe emptying of septic tanks, and the treatment of septage, may be lacking across the entire town.
- Sanitation facilities may be available but could be *inconvenient, unpleasant or unhygienic*. This may be the result of inappropriate design or construction, or inadequate management arrangements. Poor management is often a problem with community toilet blocks.
- Sanitation facilities may be available, but some people have *limited access* to them. For example, people may not be able to afford to connect to an existing public sewer.
- Sanitation facilities may be in place but are *not operated or maintained properly*. Poor operation and maintenance of a facility shortens its useful life and could, at worst, result in rapid total failure.
- There may be *no provision for the treatment of wastewater or excreta*. Local drains and sewers may simply relocate waste to another part of town where it causes local pollution. Households are primarily concerned about the cleanliness of their immediate surroundings and much less worried about the wider impact on the environment.

### Low Service Usage

Even where toilets are available, some are not used or are underused, with family members defecating outside most of the time. This might be because the facilities are unacceptable in some way (for example, people may not be willing to share toilets), or because there is a long-held preference for open defecation. Alternatively, people may underuse their toilet because of misunderstandings about its functioning and maintenance. In the case of twin-pit pour flush toilets, for example, some people fear that the pits will fill rapidly if the toilet is used too often; and they may not know that the contents of a full pit can safely be removed manually once they have been given time to degrade.

Such problems indicate the need for effective communication in sanitation programs, so that community awareness, preferences and behavior are properly understood and then addressed through information, advice, and hygiene promotion.

### Weak Institutional Arrangements

State agencies and municipalities sometimes make very large investments in sanitation infrastructure, but these do not always deliver their intended benefits. There can be several reasons for this, for example:

- The investments are made on an ad hoc basis when funds become available, without reference to an overarching strategy or plan.
- Within the state government and municipalities, sanitation has no ‘institutional home’, meaning that no single department or agency is accountable for it. Responsibilities for different aspects of sanitation are often assigned to a number of agencies, and coordination between them is not always good. There have been cases, for example, where a state agency has developed a sewage treatment plant even when there are no sewers in the town, then handed it over to a municipality that does not have the technical capacity or financial resources to operate and maintain it.
- Large capital investments are rarely matched with detailed arrangements—both practical and financial—for future operation and maintenance.
- Improvements are often implemented on a norms basis, meaning that technologies are selected without reference to local conditions or to the preferences of users. Therefore, the new facilities may not function properly, or may not be used as intended (see Box 1).
- Especially in smaller towns, municipal and line agency staff tend to have limited technical expertise or awareness of the range of nontechnical factors that affect the outcome of sanitation investments.

### Box 1: The Limitations of a Norms-Based Approach

There is a strong tendency for municipal agencies to opt for conventional water-borne sewerage without first assessing the demand for it, or its technical feasibility and long term affordability.

Many sewerage systems malfunction or fail altogether, common problems being insufficient water to flush solids through the sewer pipes and high pumping costs.

Apart from the technical shortcomings, a common occurrence is that households fail to connect to new sewers after installation, especially when they already have septic tanks. Unless there is strong demand for connections, installing sewers can be a wasted investment.

There may, in fact, be other options that would suit local circumstances better. For example, in Ramagundam, Andhra Pradesh, the municipality worked closely with the community and developed a simplified, low-cost sewerage system serving 300 low-income households. The network uses shallow sewers leading into a communal septic tank.

## Implications for Technology Choice

This guide does not attempt to address all of the challenges outlined above, but it is important to take them into consideration when considering technology options. Technology choice needs to be approached carefully, with proper reference to local conditions, the human and financial resources available, and the needs and preferences of service users. This includes ensuring that, for any technology selected, viable arrangements for operation and maintenance can be established and sustained.

## Technology and Program Design

In order to maximize the benefits of sanitation investments, technology choice needs to be part of a planning process that addresses a range of factors affecting service delivery and use. This section highlights some key aspects of program design that have a bearing on technology choice.

### Responding to Demand

Earlier in the text, it was suggested that government schemes tend to deliver infrastructure on the basis of norms and untested assumptions about what people need. As a result, schemes may be implemented where there is no demand—something that may only

become apparent when the new facilities are left unused or are misused so that they quickly fall into disrepair and are abandoned. Public toilet blocks that have been built without adequate public consultation often suffer this fate.

Today there is greater understanding of the need to respond to demand, which means providing services that people both want and are willing to pay for. This is not entirely straightforward, however, for several reasons:

- Though sanitary conditions may be poor, the demand for new facilities may be quite low.
- People tend to ask for what they know; there may be technically appropriate, low-cost options available but people are unaware of them.
- People tend to consider their personal needs without concern for the impact of their choices on the environment. For example, people may be quite happy to discharge their toilet into an open drain that empties in another nearby community.
- Municipal agencies may not have the human or financial resources to meet local demand; it may also be impractical to satisfy a range of preferences within the same street or neighborhood. For example, if a sewer has been installed it needs a lot of toilets to discharge into it, in order to work effectively; it is impractical to provide sewers for a minority of households while the remainder use leach pits or septic tanks.

For these reasons, simply responding to current demand may not be the best approach. Instead, it is often necessary first to *generate demand*, and then advise residents of potential options and their benefits or limitations so that people can make suitable choices—in other words, to *inform demand*. After that, the task is to develop the means of meeting the demand. The development of sanitation services, then, involves a mixture of technical and nontechnical tasks and this has implications for the range of actors that should be involved in sanitation programs.

## Communication

Generating and informing demand requires good communication with the people for whom new services are being developed. Furthermore, once the facilities have been installed, households need advice and motivation on operation and maintenance. This is especially true in the case of septic tanks and twin-pit pour flush toilets installed under the Government of India's Integrated Low-Cost Sanitation Scheme. There is widespread misunderstanding over the functioning of this technology, not only on the part of users, but also among masons and even engineers. Many people use both pits at the same time, while others fear that the pits will fill up too fast and so use the toilet only occasionally. Clear practical advice is essential if the toilets are to be used and maintained properly.

An important question is who should take on the communication role. There is no single 'correct' answer here; what matters is to recognize the need for communication and make

arrangements for it. Some municipalities may be able to communicate effectively with residents via their own staff or ward councilors. There has been a good example of this in Alandur, Tamil Nadu (see Box 2).

Usually, however, municipalities do not have the right people for this job and it is necessary to appoint a third party, for example a nongovernmental organization to facilitate communication, promotion, and subsequent follow-up at the community level.

Some useful communication tools and techniques applicable to sanitation projects are provided in Part D.

#### Box 2: Alandur Sewerage Project: Successful Innovation and Partnership

Alandur is a small municipality adjacent to Chennai Metropolitan Development Area with a population of 146,000. Slums and squatter settlements constitute about a quarter of the total population. Before the project, almost 95 percent households had household toilets with individual septic tanks which discharged into open drains where much of it stagnated due to low flows, causing odor and offering sites for mosquito breeding. While a septage removal service was provided by the municipality, there was no treatment facility and waste was disposed of in low-lying areas beyond the municipal limits. Local residents were concerned about improving sanitation in the town and the mayor took up the challenge. A public awareness campaign—launched via meetings with elected councilors, resident welfare associations, and the public—succeeded in motivating the public to participate in an improvement project.

The project used conventional sewerage but developed an innovative approach to implementation based on a public-private partnership. The municipal leadership was highly proactive and ensured a high degree of transparency in all project transactions.

The funding agency insisted on a ‘willingness to pay’ study before proceeding with a loan, and this indicated that 97 percent of residents wanted a sewerage system and were willing to pay up to Rs 2,000 (US\$49)<sup>1</sup> per connection. The project cost of Rs 34 crore (US\$8 million) (excluding the treatment plant which was implemented with private investment under ‘build, own, operate, and transfer’ arrangement) was financed through a 59 percent loan component; 12 percent grant component (from the lending institution as well as the state government); and 23 percent public contribution, with the 6 percent balance funded from interest on deposits. Tamil Nadu Urban Infrastructure Financial Services Limited was nominated to coordinate project implementation and provided the necessary financial discipline.

<sup>1</sup> US\$1 = INR 41 (approximately, as of October 2007). Conversion rates are from <https://www.cia.gov/library/publications/the-world-factbook/fields/2076.html>; all conversions in the text are approximations.

## Promoting Demand

People are more likely to support sanitation projects that are given a high public profile; public interest generates momentum and active community engagement. This is especially important where there is a need to eradicate open defecation, a problem that is best tackled as a communitywide issue. The objective should be to make the practice socially unacceptable.

One way of catalyzing community action might be to hold inter ward competitions and offer financial rewards to wards that achieve a complete end to open defecation. This is already producing impressive results in rural Maharashtra, where the Community-Led Total Sanitation approach has been introduced with great success (see Box 3).

Community-Led Total Sanitation is based on the principle that the public health benefits of sanitation can only be realized in full when all households in a community dispose of excreta safely; even if 90 percent use sanitary toilets, the remaining 10 percent that practice open defecation or discharge human waste into the street pose a risk to the entire community. This could cancel out the benefits of the investments made by the rest of the community.

While Community-Led Total Sanitation can be very effective in promoting toilet use, it should be remembered that this is only one part of the sanitation challenge in urban areas. There are other important issues that can only be addressed by the municipality itself, not least the treatment and final disposal of wastewater.

## Institutional Arrangements for Sanitation Service Delivery

A critical step in technology choice is assessing whether effective operation and maintenance arrangements could be put in place for each option, given the human and financial resources available locally. Generally speaking, the more complicated the technology, the greater the need for specialist personnel and equipment. Simpler technologies, such as flush toilets with soak pits or septic tanks, offer better prospects for management at the household or neighborhood level. This suggests that it will be best to use simple technology options where these are viable.

### Box 3: The Community-Led Total Sanitation Approach in Maharashtra

Since 2002 the state government of Maharashtra has implemented a strategy for promoting rural sanitation that focuses on ending open defecation rather than building toilets. The strategy—Community-Led Total Sanitation—emphasizes both collective action and individual commitment. It aims to create demand for sanitation at the community rather than at the individual level, facilitated by the local government, and provides cash rewards to *Gram Panchayats* [a unit of local government at the village level] for the achievement of open defecation-free status (the outcome) instead of relying on subsidies to accelerate latrine construction (inputs). Till 2007, a population in excess of 4.5 million has achieved open defecation-free status—a remarkable achievement.

Whether at a local or city level, it is important that roles and responsibilities for operation and maintenance are clearly established and accepted by the relevant parties. There are a variety of potential options for doing this and the municipality does not have to be the sole player; nongovernmental or community-based organizations and private contractors could all have a role to play and might offer manpower and expertise that is unavailable within government agencies. To make the best use of these organizations, it is important that contracts (or Memoranda of Understanding) for their involvement offer incentives for good standards of service delivery and impose sanctions where these standards are not met.

Box 4 provides two examples of the successful involvement of nongovernmental and community-based organizations in service delivery.

Table 1 provides broad guidance on the possibilities for management by the public sector, community organizations, and the private sector at different levels in the service hierarchy. It suggests that individual households will normally be responsible for managing on-plot and in-house facilities while community management is usually difficult or impossible beyond the neighborhood level.

#### Box 4: NGO and CBO Roles in Service Delivery

##### *Community sanitation blocks in Mumbai*

The Slum Sanitation Project was launched in 1995 under the umbrella of the World Bank-funded Mumbai Sewage Disposal Project. Its objective is to develop community-managed toilet blocks in the Mumbai slums, with a target population of 1 million. Innovative toilet block designs are used that include a small residential block for the caretaker and their family, enabling them to live on-site. Each caretaker is employed by a local community-based organization that is responsible for maintaining cleanliness and collecting user charges. The facilities are operated under Memoranda of Understanding with the Municipal Corporation, which provides power, water, and sewerage connections (where viable).

##### *Community-managed waste stabilization ponds and aquaculture in Kolkata*

Waste stabilization ponds were constructed around the city of Kolkata in the early 1990s under the Ganga Action Plan. Capital costs were funded by the Government of India while operation and maintenance were the responsibility of the state government. Due to low strength sewage flows, the ponds offered significant aquaculture potential, and as a result an innovative arrangement was developed for leasing out their operation to cooperatives of fishermen. Under the lease agreement, the cooperatives were made responsible for maintenance of the ponds, but could also carry out aquaculture in the facultative and maturation ponds.

Initially, short-term leases were granted to the cooperatives but, following positive experience, the period was extended to seven years. Each cooperative pays an annual royalty to the implementing agency (Rs 200,000, or US\$4,000, during first two years, Rs 300,000, or US\$7,000, for the next two, and Rs 450,000, or US\$10,000, for the final three years) but this still allows the cooperatives to generate a viable income.

Table 1: Possible Management Options for Urban Sanitation

Management option	Household <sup>a</sup>	Neighborhood <sup>b</sup>	Settlement <sup>c</sup>	District <sup>d</sup> / zone	Town/ citywide
<b>Public</b>	Monitoring required	Monitoring on behalf of the public	Possible	Possible (current norm)	Possible (current norm)
<b>Community</b>	Monitoring usage required	Service provider	Possible	No	No
<b>Private</b>	Yes (individual households)	Possible as service provider	Possible (if there is an incentive)	Possible (but rare at present)	Possible (but rare at present)

*Notes:*

- Household: A single nuclear family or an extended family living in the same building or on the same plot.
- Neighborhood: An area containing anything between around 10 and 200 households.
- Settlement: A more or less homogenous area, containing perhaps 200 to 1,000 households.
- District: A part of a town or city, often an administrative area or political division, but it could be a drainage basin.

Further information on management options is provided in Part D (Appendix C).

## Legislation and Standards for Urban Sanitation

While there are no specific legal provisions relating to urban sanitation, there are a number of provisions relating to sanitation services.

### 74th Constitutional Amendment Act, 1992

Responsibility for the planning and delivery of urban services, including sanitation, lies with urban local bodies under local municipal laws and the 74th Constitutional Amendment Act, 1992. The 12th Schedule of the Act sets out a list of critical issues for the urban local bodies including, amongst other things:

- Urban planning;
- Regulation of land-use and construction of buildings;
- Water supply for domestic, industrial, and commercial purposes;
- Public health, sanitation, conservancy, and solid waste management;
- Protection of the environment and promotion of ecological aspects; and
- Slum improvement and upgrading.

### Municipal Bylaws

These enable local bodies to discharge their functions and typically include, for example, a requirement for property owners to discharge wastewater without causing nuisance; and an obligation to discharge wastewater into sewers where available. There are, however, no specific provisions for the safe removal, cartage, and disposal of septage in urban areas.

## The Environment (Protection) Act, 1986

This Act applies in principle to every establishment, agency, or individual discharging any pollutant into the environment. 'Pollutant' includes treated or untreated sewage. In principle, municipalities are required to comply with discharge norms for effluent released from sewage treatment plants and to pay water cess under the Water Cess Act, 1977.

## Technical Norms for Best Practice in On-Site Sanitation and Wastewater Management

The *Manual on Sewerage and Sewage Treatment* of the Central Public Health and Environmental Engineering Organization, Ministry of Urban Development (MoUD), sets out technical norms for best practice in on-site sanitation and wastewater management. The manual covers planning, design, and construction aspects for a wide range of technical options; it also includes operation and maintenance aspects and safeguards to prevent water pollution under different soil and groundwater conditions.

The norms set out in the manual are not mandatory but provide guidance for engineers. The manual also makes reference to relevant Indian Standards and Codes of Practice notified by the Bureau of Indian Standards.

The most relevant include the following:

- **IS 1172:1993** – Basic requirements for water supply, drainage, and sanitation.
- **IS 12314:1987** – Code of Practice for sanitation with leach pits for rural communities.
- **IS 2470 (Part 1):1985** – Code of Practice for installation of septic tank: design criteria and construction.
- **IS 2470 (Part 2):1985** – Code of Practice for installation of septic tank: secondary treatment and disposal of septic tank effluent.
- **IS 9872:1981** – Precast concrete septic tanks.
- **IS 5611:1987** – Code of Practice for waste stabilization ponds (facultative type).
- **IS 10261:1982** – Requirements for settling tanks (clarifier equipment) for wastewater treatment.
- **IS 13496:1992** – General requirements for suction machines for cleaning sewers, manholes and so on.

In addition, the MoUD prepared a document entitled 'Technical Guidelines on Twin-Pit Pour-Flush Latrines' in 1992, which broadly follows the lines of IS 12314:1987 on leach pit construction in rural areas.

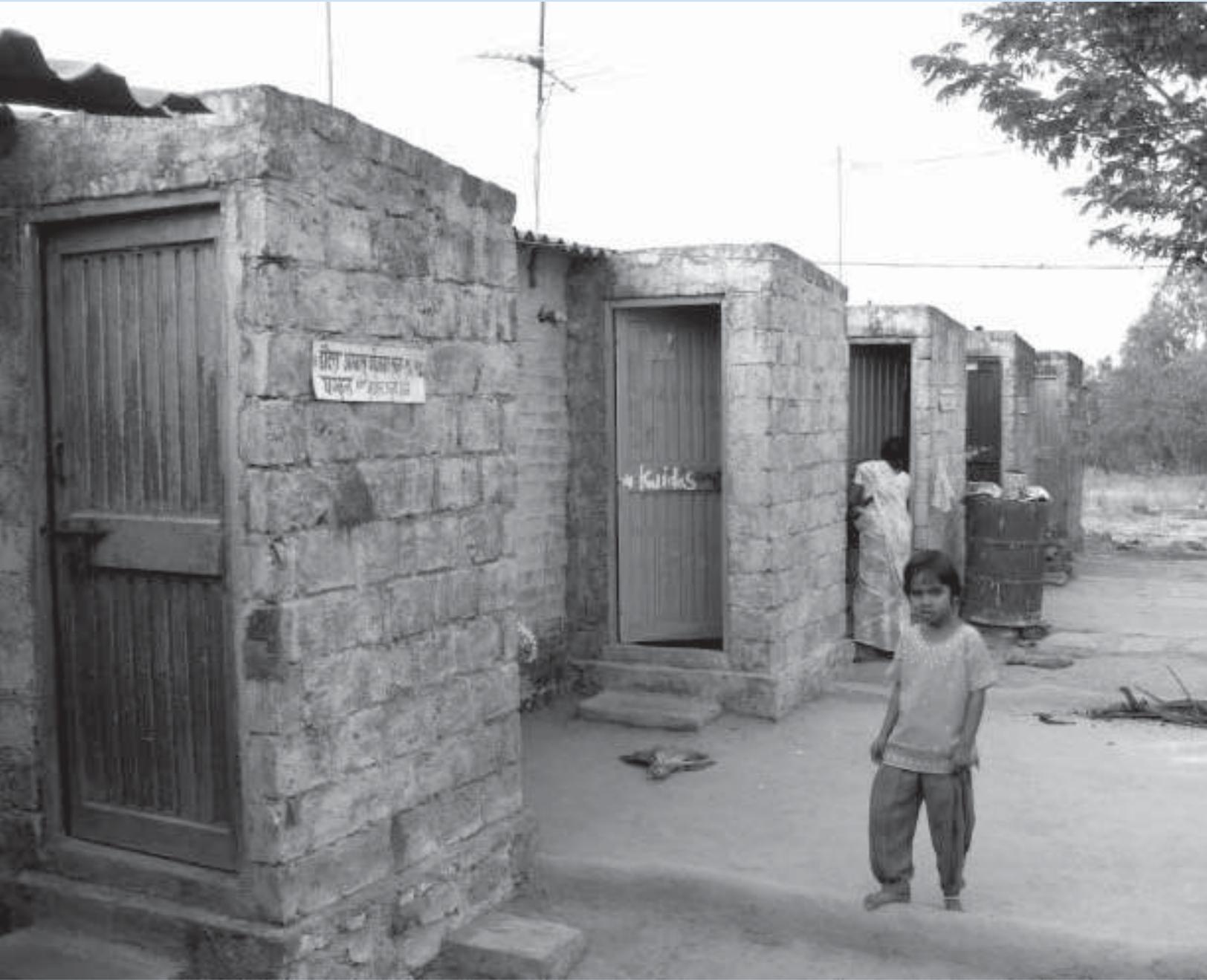
All Indian Standards' codes represent a standard of good practice and therefore take the form of recommendations. They are not mandatory unless made so under contract conditions and some are routinely ignored, for example the recommendation for the construction of soakaways, dispersion trenches, and biological filters to deal with the outflow from septic tanks; and for the regular desludging of septic tanks using specified equipment.

Part B

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# Introduction to Sanitation Technologies





The protection of public health should always be the primary concern for those involved in the installation and operation of sanitation systems. It is also important to consider the environmental impact of poor sanitation and, as far as possible, to minimize pollution. In addition, there may be scope for the productive reuse of wastewater.

This section provides an overview of the technologies that may be employed to achieve these objectives.

## Understanding Sanitation Technologies

### Wet and Dry Sanitation

All sanitation technologies can be described as being either 'wet' or 'dry':

Wet technologies require water to flush feces. Most urban sanitation in India is 'wet', involving some form of flush toilet connected to a leach pit, septic tank or sewer.

Dry technologies<sup>2</sup> do not use water for flushing. They include a range of different types of traditional pit latrines, ventilated improved pits, as well as contemporary designs that promote the safe reuse of excreta.

Pit latrines are rarely used in India, though in recent years some small-scale initiatives have promoted ecological sanitation (known as *ecosan*), a form of dry sanitation that involves the separation of feces and urine at source and the reuse of treated excreta. In principle, *ecosan* has some important advantages including (a) reduced water demand for flushing; (b) reduced wastewater management problems (no blackwater production); and (c) improved nutrient recycling, particularly the nutrients in urine.

However, the traditional practice of using water for anal cleansing, and the availability of water to the majority of households in Indian cities, mean that flush toilets are likely to remain the preferred option for most households.

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<sup>2</sup> 'Dry technology' is not widely used in urban India except in high altitude areas.

## On-Site and Off-Site Systems

Sanitation systems may be:

- On-site, retaining wastes in the vicinity of the toilet in a pit, tank or vault.
- Off-site, removing wastes from the vicinity of the toilet for disposal elsewhere.
- Hybrid, retaining solids close to the latrine but removing liquids for off-site disposal elsewhere.

In urban areas, even nominally on-site systems will normally require periodic removal of the fecal sludge and septage from pits, tanks, and vaults. As a result, no urban sanitation system is completely self-contained. To achieve total sanitation in a town, consideration must be given to the way in which household services are linked with higher level transport and disposal facilities.

## System Components

Every sanitation system includes some form of *toilet*. Most toilets in India consist of a water-sealed pan but a hole in a pit latrine cover is also a basic form of toilet.

The toilet type is important because it will determine whether the sanitation system is wet or dry. This in turn will influence choices relating to other components of the sanitation system.

On-site and hybrid systems require *storage* in the form of a pit, tank or vault to retain fecal material pending desludging. Provision has to be made for the removal and *transportation of fecal sludge* to a disposal point.

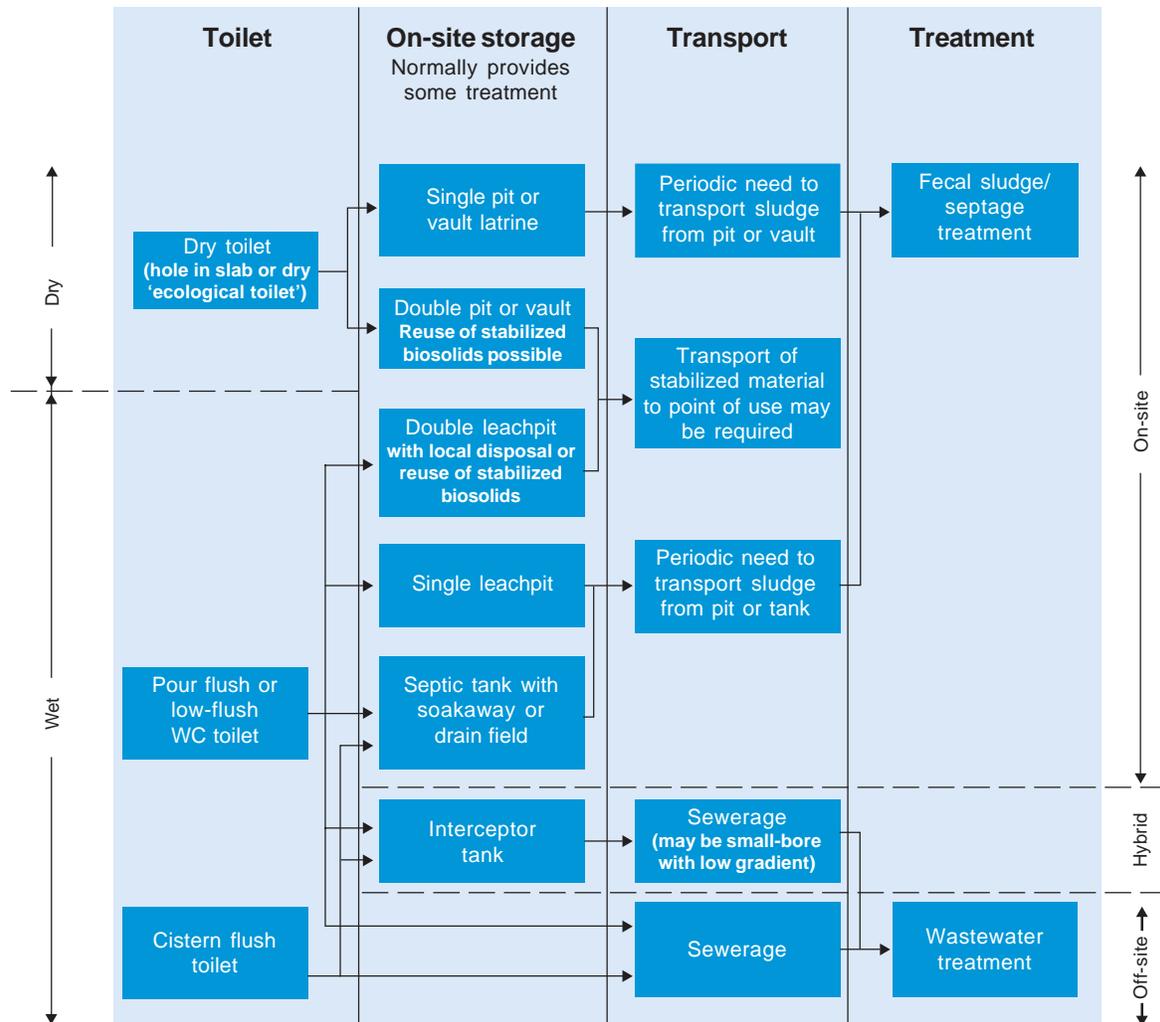
Wastewater and fecal sludge require *treatment* before they are used either as an input to agriculture or returned to the environment. Waste collection and treatment systems may serve anything from a residential area of a few hundred houses to large urban areas.

Hybrid and off-site systems require provision for *transporting wastewater* from the toilet via a system of sewers to the treatment facility.

## Possible Configurations of Components

Figure 1 shows the ways in which the components introduced previously can be brought together to create complete sanitation systems, distinguishing between wet and dry systems, as well as on-site, hybrid, and off-site systems.

Figure 1: Basic Sanitation Options



Note the following key points, not all of which can be deduced from Figure 1:

- The choice between wet and dry toilets will affect subsequent choices. Dry systems are always on-site, cistern flush toilets will require wastewater to be transported off-site unless there is sufficient land to provide a fairly extensive drain field, which will not normally be the case in urban areas. Both on-site and off-site options are normally viable for pour flush toilets.
- In all dry systems the pit or vault is located directly below the 'toilet', which may be nothing more than a hole in a slab. In effect, the toilet and storage are combined. The range of options for dealing with the wastewater produced by a water-flushed toilet is much wider.
- Choices will be influenced by what already exists. So, for instance, if most households already have a pour flush or cistern flush toilet, the choice will normally be between different wastewater disposal options.

- If a component is lacking, the sanitation system will be incomplete and will not offer the full intended benefits in terms of environmental health. Inadequate provision for the collection, transportation, and treatment of sludge from on-site systems is a widespread problem in India.
- Most on-site and hybrid systems require special arrangements for the removal and treatment of fecal sludge. The only exceptions are double pit and double vault systems which, if properly operated, remove the need to handle fresh feces.
- All off-site and hybrid systems require provision for wastewater treatment.

## On-Site Systems

As indicated in Figure 1, on-site systems may be either wet or dry. If properly designed and managed, both wet and dry on-site systems can provide a service that is as hygienic and convenient as sewerage. Indeed, if water use is low, on-site sanitation may provide a better service than a poorly functioning sewerage system.

All on-site systems that are feasible in Indian conditions—whether wet or dry—require a pit, vault or tank to hold fecal sludge. All wet on-site systems are dependent on percolation of wastewater into the ground. Where water use is more than about 30 liters per capita per day, separate provision will normally be needed for sullage and storm water run-off. Where water use is low, the subsoil is sandy and sufficient space is available, it may be possible to dispose of sullage water by percolation into the ground. Normally, however, a separate drainage system for sullage will be required.

Further information on dry and wet on-site systems is given below.

### Dry (Ecosan) Systems

As already indicated, all the dry or ecological toilets (ecosan) systems that are likely to be feasible in Indian conditions will also be on-site. In theory a single or double pit latrine could be used although these are not widely used or popular in Indian cities.

Some NGOs have installed ecosan toilets on a pilot basis in urban and periurban areas. Most of these use a double vault design with excreta stored in the first vault while the second is filling up and vice versa. The advantage of this system is that fecal material is stored for a period of about 12 months before it is removed, giving time for natural processes to break down the material and destroy pathogens and parasites. Urine is separated and should ideally be stored and used as a fertilizer. Anal cleansing is carried out away from the latrine hole to ensure that the vault contents remain dry. In order to prevent smells and nuisance caused by flies, fine ash is kept in a container in the latrine superstructure and sprinkled over the contents of the vault every time the latrine is used.

Ecosan has yet to be implemented on anything other than a pilot scale in India. It is too early to say whether it will prove to be acceptable to users and technically viable, though

compost toilets are prevalent in the mountainous regions of India. However, two observations can be made:

- Ecosan demands more from users (in terms of behavior) than other forms of on-site sanitation.
- There are many things that can go wrong, especially in separating feces and urine.

Therefore, before deciding to use ecosan, it would be important to ensure that the intended users understood and accepted what was expected of them; also that potential problems had been identified and systems put into place to deal with them.

### Wet Systems

Wet on-site systems incorporate some form of water-flushed toilet from which feces and flush water are discharged into a pit or tank. The toilet is normally a pour flush pan. In some designs, the pit or tank is located directly under the toilet, but the normal arrangement is to provide a short length of pipe to connect the toilet to one or more offset pits or tanks. Having the pit(s) or tank offset makes it easier to desludge them. Figure 1 identifies three basic categories of wet on-site system:

1. Pour flush toilet to single leach pit.
2. Pour flush toilet via division chamber to twin leach pits [the model used in integrated low cost sanitation (ILCS)].
3. Pour flush or cistern flush toilet to septic tank.

Of these, the single leach pit option requires the least space, but the contents—including fresh feces—must be removed at intervals, creating the need for a hygienic pit emptying system. Similar systems will be required for septic tanks. The twin-pit system is designed so that (as with double vault dry systems) the pit contents are stored for a minimum period before they are removed, during which time the waste decomposes and pathogens die off. This means that treated wastes can be disposed of or reused without the health risks associated with handling undigested excreta. The main drawback with this system is that it will not work properly if users do not understand, or are not interested in, the way in which the system should function.

Septic tanks consist of a chamber or series of chambers into which wastewater is discharged and contained. Sediment and solids settle to the bottom of the tank and organic wastes are decomposed by the action of bacteria. The effluent from septic tanks may contain pathogens and should be discharged into a soakaway (or drain field). In practice, many septic tanks in India discharge effluent to the nearest open drain. Where drain fields do exist, they may not function effectively due to poor design and lack of maintenance.

Where ground conditions do not permit infiltration of treated wastewater, additional treatment in the form of a constructed wetland or anaerobic filter could be provided prior to discharge into a drain or watercourse. This option should only be considered if management systems for the treatment facilities can be guaranteed, a condition that very often cannot be met.

## Sludge Collection and Transportation

On-site sanitation technologies are dependent on the periodic removal of fecal sludge from vaults, pits, and tanks. The most common practice is for households to pay sweepers to empty pits manually, though this carries health risks and is banned by the Constitution of India.

Sanitary pit emptying options exist, all incorporating some form of vacuum desludging equipment; examples are given in Table 2. These have a variety of tank sizes and pumping capacities, each appropriate for a different type of on-site service or settlement type. While some municipalities and private service providers offer a vacuum service, it is more expensive than manual pit-emptying and this tends to restrict its use to institutions and more affluent households. Shortcomings in emptying, removal, and disposal services lead to the widespread dumping of untreated wastes into open drains, fields and watercourses. This causes pollution and is a serious public health concern.

It is important to understand that simply collecting fecal sludge is insufficient; the sludge must also be treated. Fecal sludge treatment options will be discussed under 'Treatment of Wastewater and Fecal Sludge' (page 22).

**Table 2: Sanitary Pit Emptying Options**

Type of Vehicle	
<p><b>Conventional septic tank: Truck</b></p> <p>These are used in many cities in India but are expensive and have difficulties in accessing densely populated areas.</p>	 <p>Photo: Jonathan Parkinson</p>
<p><b>Narrow-wheel base truck</b></p> <p>Essentially the same as the above but with a smaller wheel capacity and wheel axle, enabling them to enter narrower lanes.</p>	 <p>Photo: Martin Strauss (SANDEC)</p>
<p><b>Trailer mounted desludger attached to a separate vehicle</b></p> <p>In South Asia, this system has been developed and promoted by the nongovernmental organization Dushtha Shasthya Kendra in Bangladesh (with the support of WaterAid) specifically to serve low-income communities in Dhaka.</p>	 <p>Photo: Peter Edwards</p>
<p><b>UN-HABITAT Vacutug</b></p> <p>The Vacutug is designed to provide a simple and inexpensive method for emptying pit latrines in areas where access by other forms of desludging equipment is not possible. The nongovernmental organization, Sulabh International, has been piloting the Vacutug in India.</p>	 <p>Photo: Iole Issaias (UN-HABITAT)</p>

## Off-Site and Hybrid Systems

All off-site and hybrid systems incorporate cistern or pour flush toilets connected to sewers. In the case of hybrid systems the toilets are connected via interceptor tanks. Blackwater and sullage are normally combined on-plot and discharged to the sewer through a single household connection. In nearly all cases, sewage treatment is required before it can be safely discharged to the environment or used for irrigation or aquaculture.

### Sewerage

Sewerage, the collective name for a system of sewers, consists of a network of buried pipes that convey wastewater from a house to the point of disposal. Sewerage relies upon a sufficient quantity of wastewater flow to convey solids along the pipe to a discharge point.

Sewers remove both excreta and sullage from the household and thereby negate the need for on-site servicing facilities. This makes sewerage convenient for users. Off-site wastewater disposal via sewers is most likely to be appropriate in higher density urban areas where water consumption is relatively high and soil permeability is low. However, sewerage is not a panacea. Silt and other extraneous material may block sewers and require periodic sewer cleaning, while blockages and overloading can cause sewage to overflow from manholes onto roads and pavements. Problems of solid accumulation are likely to be particularly acute where the available fall (slope) is limited; solid waste collection is poor; and there is lack of hard surfaces. Another requirement for sewer installation is an associated investment in off-site wastewater treatment prior to effluent discharge or reuse.

Conventional sewerage is expensive and various lower-cost options have been developed to improve affordability. These work on the same principle as conventional sewerage but incorporate modifications that take into account recent theoretical research and the possibility of matching standards to local conditions, as briefly described below.

1. **Reduced pipe diameters.** Condominial sewers in Latin America are laid with a minimum diameter of 100 mm rather than the 150 mm or 225 mm minimum standard that is common in South Asia. In theory, hydraulic efficiency increases as sewer diameter decreases. Reducing the pipe diameter reduces cost and increases structural strength. Blockages are likely to be detected quicker than in larger diameter pipes and this may mean that it is easier to clear them.
2. **Reduced minimum depth.** In residential areas where streets are narrow, traffic loadings are often much lower than those in more congested urban areas and house connections are relatively short. These factors allow the adoption of a lower minimum depth standard than that required by conventional standards. This can result in considerable savings.
3. **Access chambers.** Manholes are not required if sewers are laid at shallow depths. Access chambers are much cheaper and enable pipes to be cleaned without the need for a person to enter the chamber.

4. **Solids interceptor tanks.** These remove solids and so allow the use of small diameter sewers laid to lower gradients, reducing sewer depths throughout the system.

## Treatment of Wastewater and Fecal Sludge

Treatment of wastewater and fecal sludge is required prior to discharge into the environment. This is especially important in situations where sources of drinking water are at risk from contamination or where local residents use rivers or drainage channels for bathing or washing and where the wastewater is reused for irrigating vegetables or horticultural crops.

The purpose of treatment is to reduce the concentration of potentially harmful materials to levels that will not cause harm to either the environment or the people that might come into contact with wastewater. The treatment required to achieve this objective will be influenced by the concentrations of pollutants and pathogens contained in the waste (see Table 3).

**Table 3: Types and Sources of Domestic Wastewater and Fecal Sludge**

Type	Source	
<b>Fecal sludge</b>	Pit latrines and leach pits	Decreasing concentration of pollutants and pathogens ↓
<b>Septage</b>	Septic tanks	
<b>Blackwater</b>	Water closets	
<b>Domestic sewage</b>	Sullage and blackwater mixed together	
<b>Sullage (greywater)</b>	Personal washing, laundry, cooking, and cleaning	

While some degradation of waste material may occur on-site in vaults, leachpits and septic tanks, there will almost always be a need for further treatment of fecal sludges, septage, and wastewater. While it is possible to provide this additional treatment on-site, the more common arrangement is to provide it *off-site or 'end-of-pipe'* (at the end of a sewerage system) or where fecal sludge cartage vehicles discharge wastes.

Because of their high concentration of pollutants and pathogens and relatively low volume, fecal sludge and septage should normally be dealt with separately from wastewater. For this reason, treatment processes for fecal sludge and septage are considered separately from those for wastewater below. Sullage is less polluting and less potentially harmful than sewage and blackwater, and will normally require a much lower level of treatment.

## Treatment Standards

Treatment requirements depend largely on the proposed use of the effluent, but may also be governed by discharge consents if the waste is to be discharged into a natural watercourse. The purpose of discharge consents is to prevent unacceptable levels of pollution and risks to public health. In most towns little, if any, sewage is actually treated and standards set out in discharge consents are rarely met, even in cases where a treatment plant has been installed. The implication for regulatory bodies is that standards should be set at realistic levels in the light of local circumstances and tightened incrementally as local capacity for wastewater management increases.

## Wastewater Treatment

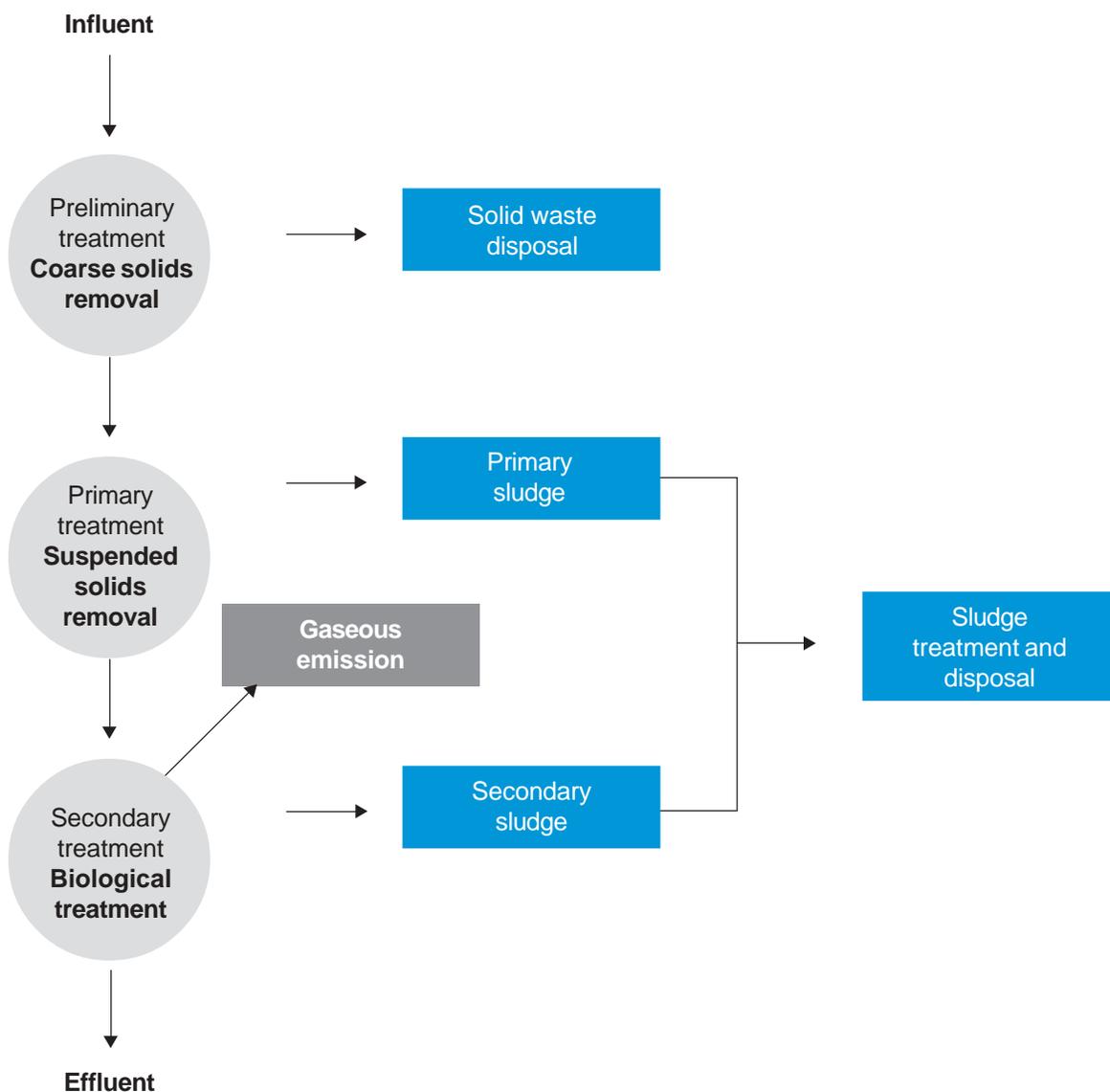
Most wastewater treatment technologies use a combination of physical and microbiological processes to remove or degrade pollutants (see Table 4).

Table 4: Types of Treatment Processes

	Process	Mode of operation	Residual end products
<b>Physical</b>	Screening	Removal of large particles by coarse screening	Sludge
	Sedimentation	Force of gravity causes particles to settle	Sludge
<b>Biochemical</b>	Aerobic degradation	Breakdown of dissolved organic matter by bacterial activity in the presence of oxygen	Carbon dioxide, water and sludge (microbial biomass)
	Anaerobic digestion	As above but bacterial action in the absence of oxygen	Methane, carbon dioxide and sludge (microbial biomass)

Conventional aerobic treatment combines these processes in a series of stages as shown in Figure 2.

Figure 2: Stages in Conventional Wastewater Treatment



Preliminary treatment normally includes coarse screening and grit removal while primary treatment is provided in settlement tanks. In both cases, the predominant mechanism is physical. Secondary treatment processes, whether in trickling filters or by activated sludge, are predominantly biological. Table 5 provides information on the typical pollutant removal efficiencies for primary and secondary processes.

Where there is a need for further reduction in pathogens or nutrients, a tertiary treatment stage may be added to conventional aerobic processes. Most tertiary treatment processes are designed to remove nitrogen, phosphorus, and industrial pollutants such as heavy metals.

There are two broad alternatives to conventional treatment: extended treatment processes based on natural processes; and anaerobic treatment. The term ‘natural’ is used here to denote processes that represent managed versions of processes that can occur in more or less the same form in nature. The main treatment options in this category are waste stabilization ponds and constructed wetlands, which are also referred to as reed beds.

Anaerobic treatment processes include upward flow anaerobic sludge blanket (UASB) systems, baffled reactors and upward flow anaerobic filters.

Conventional treatment processes produce sludges that contain high concentrations of pollutants and excreted pathogens. Providing for the safe management of these sludges is an integral component of wastewater treatment but is often overlooked.

### Fecal Sludge and Septage Treatment

It is normally advisable to treat fecal sludge and wastewater separately, though they can be combined in a wastewater treatment plant if the sludge loads are relatively small.

Options for separate sludge treatment include:

- Solids-liquid separation in batch-operated settling-thickening tanks;
- Primary sedimentation/anaerobic stabilization ponds;
- Sludge drying beds (unplanted; planted);
- Combined composting with organic solid waste (cocomposting); and
- Anaerobic digestion (potentially with biogas utilization).

Treatment results in two components: a solids and a liquid fraction. The solids fraction (biosolids) is of variable consistency—additional drying or treatment might be required for landfilling reuse in agriculture as a soil-conditioner and fertilizer.

Polishing treatment might be necessary for the liquid fraction too, to satisfy criteria for discharge into surface waters or to avoid long-term impacts on groundwater quality, where effluents will be allowed to infiltrate.

### Reuse of Treated Wastewater and Sludge

Wastewater is used for irrigation in many parts of India, nearly always without pretreatment. Similarly, untreated fecal sludges are often used on fields or in fishponds.

These practices bring financial benefits to farmers but can harm the health of both farm workers and consumers of products produced using the waste. While this may be difficult to stop in the short term, pretreatment should be introduced in the longer term, possibly as part of the resource recovery process.

In the case of reuse, health risks from enteric pathogens must be reduced as much as possible. This is especially important where wastewater is used to irrigate parks and other public places, or food crops that may be eaten raw. Long retention in a waste stabilization pond system is recommended.

Where it is not possible to provide the required level of treatment (due, for example, to a shortage of land) then other strategies are needed to reduce health risks. These could include restricting the types of crops that can be irrigated with wastewater; using drip irrigation rather than spray irrigation; and providing farm workers with boots and gloves.

Stabilized biosolids make a good soil conditioner as they contain valuable nutrients and minerals. Wastewater is not usually suitable, however, due to a high concentration of dissolved salts.

Nutrients can also be reused as fertilizer for aquaculture, that is, for the cultivation of fish or aquatic plants such as duckweed.

## Summary of Common Technology Options

Variations in housing type, density and settlement layout; poverty status; and access to networked services (especially water supply) mean that different solutions may be needed in different parts of the city or even within the same neighborhood. Rarely is a single option (for example, sewerage) viable for an entire town. For guidance purposes, Table 5 provides an idea of common upgrading options that may be appropriate for different settlements.

Table 5: Sanitation Options for Different Residential Settlement Types

	Settlement characteristics	Typical existing sanitation services	Key issues	Options for upgrading	
				On-site	Off-site
<b>High-income residential</b>	Low-density development with large plots and ample open space.	Most properties have septic tanks with or without a soakaway.  In some cases there are sewer connections.	Septic tanks are often poorly maintained, and partially treated wastewater is discharged into open drains, creating a public health risk.  Demand for water for irrigation of gardens.	Promote or enforce improved septic tank maintenance, including periodic emptying of pits.  Addition of tertiary treatment at household level (anaerobic filter or reed bed).	Off-site treatment and disposal of septage.  Sewerage combined with off-site wastewater.
<b>Medium-income residential</b>	Medium-sized plots with some space around houses.	Cistern flush and pour flush toilets connected to septic tanks or leach pits.  Sewers are laid in some areas but system is only partial.	As above: on-site sanitation is often poorly operated and maintained. Partially treated wastewater is discharged into open drains, creating a public health risk.	Promote or enforce improved operation and maintenance, including periodic emptying of pits.  Connect household toilets to small bore sewers which discharge into municipal sewers or to a decentralized wastewater treatment system.	Septage collection and off-site treatment.  Sewerage combined with off-site wastewater treatment.

	Settlement characteristics	Typical existing sanitation services	Key issues	Options for upgrading	
				On-site	Off-site
<b>Low-income residential (formal development)</b>	Medium-density housing with small plots developed according to planning norms (road width, plot sizes, and so on).	Pour flush toilets connected to leach pits or septic tanks, the latter discharging into open drains or sometimes sewers.	As above.	As above.	As above.
<b>Multistorey residential apartments</b>	High-density, medium-low income.	Either connected to sewerage or have shared septic tanks.	Malfunction of septic tanks and soak pits.	Shared septic tank followed by: a) anaerobic filter and reed bed prior to discharge into surface water; or b) discharge to small bore sewerage system.	Septage transportation and off-site treatment.  Sewerage combined with off-site wastewater
<b>Low-income informal settlements</b>	Unplanned development with medium- to high-density housing and small plots.  Many plots subdivided and/or houses converted to multistorey.  Residents may lack tenure.	Some households have no private facility.  Existing leach pits and septic tanks discharging directly into street drains.  Community or public toilets may be available.  Inadequate drainage and water supply.	Septic tanks and leach pits are poorly maintained.  Community toilets are often poorly maintained and unhygienic.  Ponding of wastewater on surfaces.	Promote or enforce improved operation and maintenance, including periodic emptying of pits.  Improved operation and management of community toilet blocks with septic tank or sewer connection.	Fecal sludge/ septage transportation and off-site treatment.  Connect household toilets to small-bore sewers discharging to municipal sewers or decentralized wastewater treatment system.

	Settlement characteristics	Typical existing sanitation services	Key issues	Options for upgrading	
				On-site	Off-site
<b>Illegal squatter slum settlements (jhughi-jhopri clusters)</b>	<p>High-density, very low-income population, lack of tenure, precarious housing.</p> <p>Narrow access lanes with poor services.</p> <p>Quality of construction and servicing of facilities is very poor.</p>	<p>Some households have their own toilet.</p> <p>Many use shared or communal toilets, or practice open defecation.</p>	<p>Need to eradicate open defecation.</p> <p>May be insufficient space to build household toilets for all.</p> <p>Lack of land tenure may constrain spending on improvements.</p> <p>Existing toilets may discharge into street drains (<i>nalas</i>), creating a public health risk.</p>	<p>Pour flush toilets with leach pits or shared septic tanks where space permits; or</p> <p>Simplified sewerage connecting existing and new toilets to municipal sewerage network.</p> <p>Community toilet blocks with septic tank or sewer connection.</p>	<p>Fecal sludge/septage transportation and off-site treatment.</p> <p>Sewerage and off-site treatment of wastewater.</p>
<b>Resettlement colony</b>	<p>Medium-high population density.</p> <p>Basic infrastructure and some level of access to municipal services.</p>	<p>In some cases, development is planned and houses are constructed with toilets and leach pits.</p> <p>In others, many houses lack a toilet.</p> <p>Community toilets with septic tanks may be available.</p>	<p>Poor maintenance, inadequate services for fecal sludge collection and treatment.</p> <p>Open defecation may be common.</p> <p>Poor maintenance of community toilets.</p>	<p>Promote or enforce improved maintenance including emptying of leach pits.</p> <p>Provide communal toilet block(s) with:</p> <p>a) constructed wetland or anaerobic filter taking discharge from septic tanks; or</p> <p>b) sewer connection.</p> <p>Simplified sewerage connecting existing and new toilets to municipal sewerage network.</p>	<p>Fecal sludge transportation and off-site treatment.</p>

	Settlement characteristics	Typical existing sanitation services	Key issues	Options for upgrading	
				On-site	Off-site
<b>Urban village, former rural village overtaken by urban spread</b>	Medium-high density, mixed income.	Coverage variable; existing toilets mostly have septic tanks or leach pits discharging into open drains or <i>nalas</i> .	<p>Poor maintenance of toilets, inadequate services for fecal sludge collection and treatment.</p> <p>Open defecation may be common.</p> <p>Possible demand for wastewater from farmers.</p>	<p>Promote/enforce improved operation and maintenance, including periodic emptying of pits.</p> <p>Simplified sewerage in denser areas, with on-site treatment.</p> <p>Integrated wastewater treatment and resource recovery through aquaculture.</p>	<p>Septage transportation and treatment.</p> <p>Reuse of wastewater or sale of fish or animal feed.</p>
<b>Institutional buildings (academic campuses, army cantonment, hospitals) and hotels</b>	Large areas of open space surrounding large buildings.	Large septic tanks with soakaways.	<p>Poor maintenance.</p> <p>Unregulated septage removal and inadequate treatment.</p>	<p>Extended septic tanks (with baffles).</p> <p>Additional treatment (anaerobic filter or reed bed).</p> <p>Separate greywater treatment.</p> <p>On-site wastewater reuse.</p>	<p>Septage transportation and off-site treatment.</p>

Part C

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# Framework for Decisionmaking





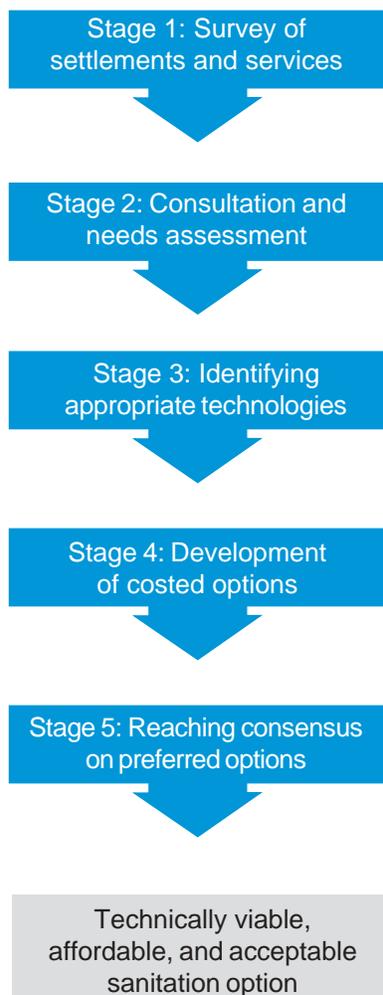
## Overview of the Decisionmaking Process

Part C sets out a step-by-step process for selecting technology and service delivery options that are appropriate under local conditions and best meet the needs and preferences of the community.

The decisionmaking process has been broken down into five key stages, as illustrated in Figure 3. Although the stages are presented as a sequence, in practice it may be necessary to revisit some steps as the process unfolds.

While working through the process, reference should be made to the Tools section of the guide (Part D). This includes information on sanitation and wastewater treatment technologies; management options; and tools for community consultation and planning.

**Figure 3: Five Key Stages in the Decisionmaking Process**



## Stage 1: Outline Survey of Settlements and Services

The objective of the first stage is to gather information about the coverage and quality of existing services to clarify the key problems to be addressed and priority locations for improvement. This investigation might be done citywide or within areas of the town that have already been earmarked for attention. The information can be obtained from (a) maps and other secondary sources; (b) from a rapid physical inspection on the ground; and (c) from informal discussion with residents.

This preparatory work does not involve systematic user consultation, which follows in Stage 2. The output includes one or more maps that show the existing sanitation infrastructure and services, and highlights areas where sanitation problems are most acute.

### Key Questions

- What sanitation infrastructure and services are in place, and how effective are they?
- Where are sanitation problems most acute?
- Where is there is a need for new infrastructure or services, and where is there a need for upgrading?
- Which areas should be prioritized for improvement?

### Map Existing Land Use and Settlement Types

Existing city maps can provide a considerable amount of relevant information, but they rapidly become out-of-date as cities expand and new settlements spring up. A common problem is that unplanned informal settlements—often inhabited by poor communities and urgently needing improved sanitation—are literally off the map. It may therefore be necessary to prepare some simple but accurate up-to-date maps to ensure that these areas are not neglected in the planning of service improvements.

Table 6 sets out some key characteristics of residential settlements and shows how these can affect technology choice. While noting the current situation, it is also important to consider how a neighborhood may change in future. For example, increasing populations and housing density result in larger quantities of waste and place additional demands on sanitation infrastructure. The increased volume of excreta and wastewater produced per unit area may overload existing sanitation systems, and there may be insufficient space to install new household toilets.

**Table 6: Settlement Characteristics and their Influence on Sanitation Technologies**

Housing layout	Availability of private and public open space determines the scope for installing new facilities. Access for servicing vehicles may also be a constraint.
Housing type	Multistorey buildings usually need flush systems.
Land ownership	Affects entitlement to public services and householders' willingness to invest in sanitation improvements.
Socioeconomic status	Poorer communities may need assistance with the costs of household facilities or sewer connections.

An estimate of population density can be used to indicate the amount of available space for latrine construction and installation of treatment systems, but may be misleading if the area contains multistorey apartment buildings. A visit to the settlement would enable a more accurate assessment of the space available for toilets and on-site storage facilities.

Even where space for a toilet compartment can be found, there can be other constraints. For example:

1. *Insufficient storage space.* This is more likely to be a problem for vaults, which are normally raised above floor level, than for pits and tanks, which can be located below ground level, allowing that space to be used for other activities.
2. *Inadequate access for desludging of on-site sanitation systems.* In very dense informal settlements narrow roads may be a constraint for access by conventional pit desludging equipment. Alternative equipment, as described in Part B, may be needed.
3. *Insufficient space for wastewater absorption into the ground.* This will mainly be a problem for cistern flush toilets discharging to septic tanks followed either by soakaways or drain fields.

### Gather Information about Existing Sanitation Infrastructure and Services

In most settlements, investments in sanitation will already have been made, whether by government agencies, households or others. The condition and functionality of these facilities will have a strong influence on the options for improvement. For example, household latrines may have been installed but without any provision for the collection, treatment, and disposal of wastewater. In other areas, periurban residents may be reusing wastewater for irrigation but without any form of treatment, which poses significant health risks.

Table 7 summarizes the information needed at this stage. Key questions to address include:

1. Is the existing infrastructure appropriate to local circumstances? Could it accommodate waste from additional sanitation facilities?
2. How effectively are existing facilities being maintained?
3. Is there an existing collector sewer or major drain in the vicinity of the area into which wastewater could discharge?

This assessment can be led by municipal or Public Health Engineering Department engineers but it may also be necessary to draw on the expertise of other agencies or private consultants for some issues (for example, problems with pumping stations or treatment works). Local residents can also provide valuable information and insights on

**Table 7: Relevant Information about Existing Services**

<b>Latrines and on-site treatment</b>	
Water availability	Information on existing water supply services (including daily consumption per household) can be used to estimate daily wastewater production.
Sanitation facilities	Current levels of service (household and shared facilities), including approximate household coverage and number and location of communal or public toilets.
On-site treatment	Types of on-site sanitation system serving households, for example, leach pit or septic tanks.
<b>Waste collection and conveyance</b>	
Existing sewerage infrastructure	Coverage of sewerage and proportion of households with household connections.
Fecal sludge and septage collection services	Coverage and frequency of servicing.
<b>Off-site wastewater treatment and reuse</b>	
Wastewater treatment	Location and types of wastewater treatment infrastructure (if any exists).
Discharge or reuse	Locations where wastewater and fecal sludge is disposed or reused.

the adequacy of existing infrastructure and services. Transect walks and informal interviews provide two options for obtaining this information rapidly (see Table 8).

**Table 8: Participatory Tools to Assist in Initial Investigations**

	Description of activity	Purpose
Transect walk	Transect walks involve a walk through the settlement accompanied by a small number of key informants from the community.	Provides an introduction to existing sanitation services and an initial understanding of the condition from the perspective of local residents.
Informal interviews	Informal interviews with community members to discuss aspects of sanitation service provision in their locality.	Help to understand the existing situation and analyze causes of problems that may not be immediately obvious to the outsider.

While municipal and other government agencies are the principal service providers, small-scale private enterprises may also have a role, for example, by emptying septic tanks. In addition, there may be nongovernmental organizations supporting sanitation improvements in some areas. Personnel from these organizations may have valuable knowledge and insights on the adequacy of current services and priorities for improvement.

### Outcome from Stage 1

The outcome from this stage should be a clear understanding of the problems to be addressed, both in terms of location and type, at the household, neighborhood and city levels. It should also be clear which locations require new infrastructure or services and which are suitable for upgrading. While some of the challenges will relate to household facilities in specific locations, the survey may also reveal a need for improvements to secondary infrastructure, calling for an area-based approach, or to primary facilities such as sewage treatment plants and trunk sewers. Some problems may also point to a need for citywide improvements in the way that services are managed and delivered.

This information will provide the basis for a more detailed, participatory investigation in Stage 2.

## Stage 2: Needs Assessment and Consultation

### Key Questions

- What is the nature and extent of current sanitation problems from the users' point of view?
- What type of improvements would users prefer?

Stage 2 entails a more detailed analysis of the current situation to reveal what types of improvements are needed and where they will have the most beneficial impact. It involves further technical investigations in priority areas identified from Stage 1, plus an assessment of existing services from the users' point of view. This should provide a fuller understanding of why existing services have failed or are otherwise inadequate.

This is also an opportunity to find out what type of improvements users want and would be willing to pay for, or at least contribute towards.

### Community Consultation

While residents may not fully understand the causes of sanitation problems from a technical perspective, they may be well aware of deficiencies in service delivery, for example the inadequate cleaning of drains, sewers, and poor maintenance of community toilets. Generally, it is important to draw on local knowledge as service users may have valuable experience and insights that are different than those of municipal staff. The consultation process can also be used to generate community interest in the proposed improvements, thereby improving the chances that any new facilities will be used and properly maintained.

Establishing the level of demand for improvements is critical, since people are unlikely to support (financially or through their behavior) services that they do not want. Where facilities are installed without consultation, on the assumption that people 'need' them, the result is often wasted investments: facilities that are left unused soon fall into disrepair and become unhygienic.

### Organizing the Consultation

There is no single correct way to organize a community consultation exercise; much depends on circumstances including the type of community and the issues being investigated. It is, however, important that the process is participatory. With this in mind a range of operational tools is provided in Appendix A.

In practical terms, it is useful to hold not only public meetings with local stakeholders, but also household interviews and discussions with small groups to get detailed insights into people’s perceptions both of current problems and the possible solutions. Within this framework, a number of tools and techniques from the toolkit can be used; some commonly used ones are outlined in Table 9.

It is also advisable to consult local leaders and community representatives such as ward councilors and members of relevant community-based or nongovernmental organizations. Amongst other things, they should have a good understanding of how improvements could be managed at a community level.

**Table 9: Participatory Tools Useful for Needs Assessment**

Focus group discussions and semistructured interviews	Focus group discussions and structured interviews can be used to explore specific issues arising from surveys and participatory mapping in more detail.
Timelines	These can help to generate a clear understanding about what has happened in the past, what is happening now and what could happen in the future.
Community mapping	A representative group of residents is invited to make a map of the colony, showing key features relevant to sanitation (for example, open defecation areas, houses with or without toilets, location of sewers, and so on). This generates important baseline information and provides the basis for a discussion on the causes of current problems and possible solutions.
Questionnaire surveys	Questionnaires may be used to help focus and guide semistructured interviews of local residents, to learn more about their perceptions of sanitation and the problems related to fecal sludge and wastewater management.
Sanitation ladder	A set of pictures, each showing a sanitation technology option, is given to a group. They rank the options from best to worst; select one picture that best illustrates the current position in that colony and another representing the level of improvement they would like to reach.

It may not be advisable to hold consultations with all stakeholder groups at the same time as the presence of some, such as local politicians, may discourage the others from airing their views. Likewise, it may be advisable to hold some separate consultations with women only.

There are risks associated with the consultation because a poorly managed process can produce unreliable information or proposals that are unrealistic or do not represent the view of the majority of the community. It is therefore recommended that external specialists are contracted to facilitate the consultation process. An additional benefit of doing this is that residents may be more willing to speak openly to a third party than to a representative of the municipality.

At the end of the consultation exercise, stakeholders should have an opportunity to comment on the findings, including the priorities for action, and to correct any misunderstandings. The output from the various activities should therefore be recorded accurately, be it on paper or using photographs or audio tapes.

## Outcome from Stage 2

The consultation should provide answers to both the key questions for this stage. This should include an indication of:

- ***Willingness to pay for improvements***

The extent to which residents are willing to pay for, or at least contribute towards, improved services indicates how strongly they want them. In Stage 4, specific costs and proposed community contributions for one or more technology options will be presented and discussed in detail. At this stage, a broad indication of willingness to pay should be sought and taken into consideration when compiling a shortlist of technology options.

- ***The level of service to be provided***

'Level of service' (see Table 10) refers to the location and convenience of sanitation facilities. There are three potential levels of service for toilets: household, shared or communal (public). Determining which level to provide is a critical step in the technology selection process.

Doubtless all residents would prefer to have a household latrine but this is not always possible, for a variety of reasons including affordability, land tenure restrictions or a lack of space. Where household toilets cannot be provided, alternative options will have to be explored and locations identified for any new facilities. (As a general rule, toilets shared by a small, self-selected group of households tend to be more heavily used, and better maintained, than communal blocks.)

Table 10: Level of Sanitation Service Provision

Household	The immediate access, convenience, and privacy offered by household sanitation will mean that this option will be the preferred option for residents. The main problems relate to the affordability for construction and the need to have a reliable servicing—notably for on-site sanitation systems—and the cost of installing a network of sewerage and off-site treatment if wastewater production is high.
Shared	In areas where there is not enough space for individual household latrines, the sharing of latrines between several families may provide a useful solution. The ownership of the latrines generally belongs to one of the houses, the owner of all the houses, or else ownership is shared between the households. Costs of pit emptying and other repairs can be included in the rent, but this can cause problems if the owner does not live there. Alternatively, residents can collaborate to clean the latrine and collect money to get it emptied when necessary.
Communal	Communal (or community) toilets are usually constructed in low-income residential areas and slums to cater to the local community who would otherwise have no access to sanitation. Provided these are managed well and maintained, this system can be effective in meeting the needs of the local community and promoting improved public health.
Public	Public latrines are provided for use for the general public in places such as bus stands, markets, and other facilities, which have a large throughput of people. One of the success stories of sanitation in India has been the public latrines developed by the organization Sulabh International.

Residents are generally more concerned about the cleanliness of their immediate surroundings than the wider impact on the environment caused by the discharge of untreated fecal sludge and wastewater. However, there may be an underlying public awareness for the need to improve the quality of the urban environment and to reduce pollution of natural watercourses.

- ***Specific concerns related to wastewater disposal or reuse***

In some communities, especially on the outskirts of smaller towns, there may be an established practice of reusing wastewater as fertilizer, though this may be unregulated and could pose a potential public health risk. If there is ongoing demand for this, the technical feasibility of doing this safely should be assessed in Stage 3. If there is no demand, then treatment and disposal will be needed.

### Stage 3: Identifying Appropriate Technologies

#### Overview

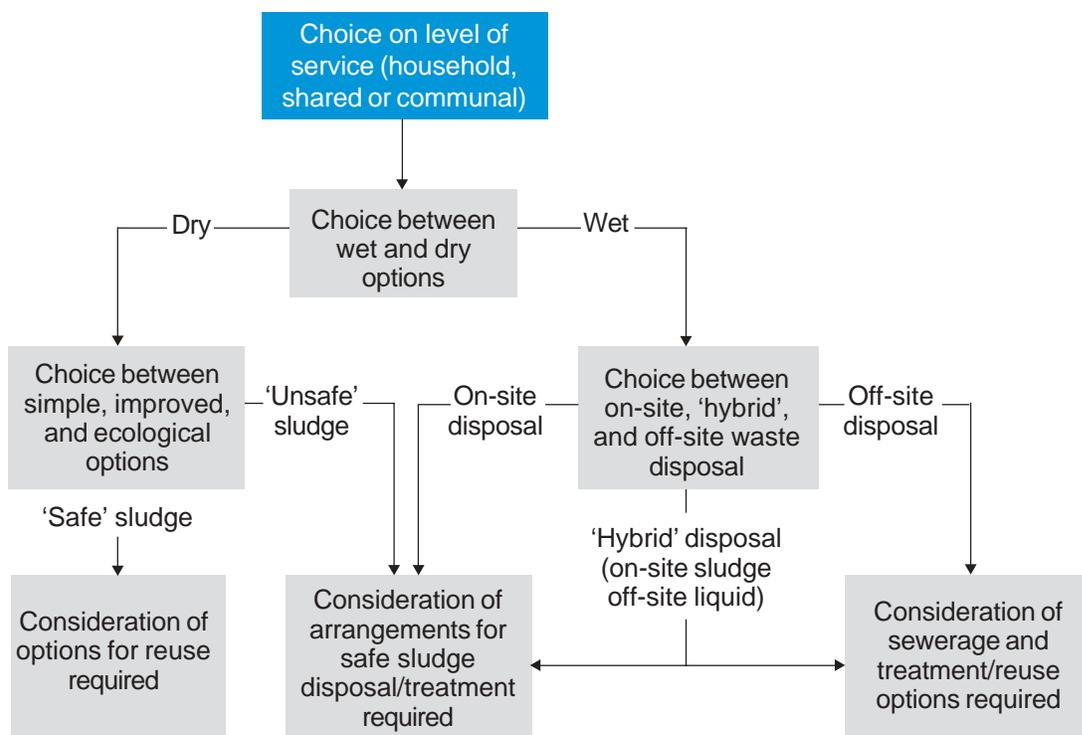
The objective of this stage is to eliminate technologies that are unlikely to be viable from a technical perspective and thus narrow the field of options. The key question for each option at this stage is: ‘Could it work?’ A variety of additional factors (some of them financial and managerial) affect whether an option *would* in fact be viable and these are considered in Stage 4.

#### Key Questions

- Can wastewater be disposed of on-site?
- When and where is sewerage required and viable?
- What arrangements are required for the management of wastewater or fecal sludge?
- How does the demand for reuse influence the choice of technology?

Figure 4 sets out a logical sequence for assessing all the potential technology options. In practice, dry sanitation is not considered an acceptable option in India and it is not, therefore, investigated further in this chapter.

Figure 4: Key Sanitation Choices and their Implications



### On-Site or Off-Site Disposal?

All forms of wet sanitation produce blackwater which has a high oxygen demand and may also contain high concentrations of pathogens. As illustrated in Figure 1, the options for dealing with this blackwater are:

- On-site disposal to a leach pit or drain field.
- On-site disposal to a septic tank with soakaway or drain field.
- On-site retention of solids in an interceptor tank combined with off-site disposal of settled wastewater (hybrid system).
- Off-site disposal of blackwater via sewerage.

The first and second options may require separate provision for disposal of sullage water while the third and fourth options work best if blackwater and sullage water are combined and dealt with together as sewage. The choice made between these options will depend on a number of factors including:

- The quantity of wastewater produced;
- Soil type, groundwater depth and topography;
- Housing density and available space;
- The source of water; and
- The presence of sewers and drainage channels into which local sewers might discharge.

These factors are considered below.

### Quantity of Wastewater Produced

The total quantity of wastewater produced will depend on water consumption, which in turn will depend on the location of the water source and the length of time for which water is available each day (see Table 11).

**Table 11: Approximate Water Consumption Figures for Different Levels of Water Supply Service**

Type of supply	Water consumption (lpcd)		
	Minimum	Average	Maximum
Standpost	15	20	30
Yard tap, hand-operated well or in-house connection with intermittent supply	25	50	70
In-house connection or well with electrically powered pump	90	120	180

When per capita consumption is relatively low (less than 30 lpcd) then, depending on ground conditions and population density, it should be possible to deal with all of the wastewater on-site. When per capita consumption is higher, on-site disposal of blackwater is still possible, but sullage water will need to be disposed of off-site. Off-site disposal of all wastewater will be required if blackwater and sullage water flows are combined on-site to produce sewage (see Table 12).

**Table 12: Relationship between Water Use and Disposal Option**

	Level of water use		
	Low <30 lpcd	Medium 30–80 lpcd	High >80 lpcd
<b>Blackwater</b>	Discharge wastewater to leach pit on or close to plot	Leach pit disposal possible if kept separate from sullage. Otherwise, sewerage and treatment required	Leach pit disposal possible if kept separate from sullage. Otherwise, sewerage and treatment required
<b>Sullage (Greywater)</b>	Discharge to soakaway or use for garden watering.	Soakaway disposal may be possible in permeable soils but off-plot disposal via a drain or sewer will normally be required.	Off-plot disposal—sewerage or drainage required.

The quantity of wastewater and, in particular, the quantity of blackwater produced is also influenced by the type of toilet used. Table 13 summarizes types of toilet and provides estimates of wastewater production based upon standard flush volumes and an estimate on the number of uses per day.

**Table 13: Types of Toilet and Estimates of Water Consumption/Wastewater Production**

Type	Description	Typical flush volume (liters)	Estimated wastewater per day l cap <sup>-1</sup> day <sup>-1</sup>
Pour flush toilets	Use considerably less water than water closet toilets but have less appeal for more affluent households.	2.5	10–25
Dual flush toilets	Use less water than a full flush system (especially when used for flushing urine).	3/6	20–40
Full flush toilets	Use large volumes of water for flushing.	6–9	30–60

The key points to note are:

1. Full flush toilets use a significant amount of water and can only be used when a reliable water supply is provided via in-house connections.
2. Full flush toilets may create more blackwater than can be absorbed from an on-plot leach pit or soakaway, thus precluding on-site wastewater disposal.

### Soil Type

The soil type will affect the operation of soakaways due to the infiltration capacity of the soil. Table 14 provides guidance on the maximum volume of wastewater that can be infiltrated on-site for different soil types. The last column calculates the maximum theoretical infiltration capacity for a 1 m<sup>3</sup> (wetted area of 5 m<sup>2</sup>) assuming that there is no constraint due to clogging or waterlogging.

Table 14 shows the considerable difference in infiltration rate between clay and sandy soils. In areas with heavy clay soils, infiltration from leach pits and soakaways may not be feasible, whereas in sandy soils it may be possible to deal with flows from cistern flush toilets and even moderate amounts of sullage water on-site. Some caution is needed, since infiltration capacity will tend to reduce over time due to clogging with fecal solids from these theoretical values. Nevertheless, the figures given provide an indication for the potential for infiltration of treated wastewater.

**Table 14: Theoretical Infiltration Capacity for Different Soil Types\***

Soil type	Infiltration rate		
	mm hr <sup>-1</sup>	l m <sup>-2</sup> day <sup>-1</sup>	Maximum capacity for a 1 m <sup>3</sup> pit (liters day <sup>-1</sup> )
Silty clay	0–1	0–24	0–120
Sandy clay	1–4	24–96	120–400
Silt	4–8	96–192	400–1,000
Sand	8–12	192–288	>1,000

\* Assuming that the soil is free draining and not clogged.

In areas where the ground is rocky, it will be difficult and expensive to install pit latrines, septic tanks and sewers. In such situations, dry sanitation systems with chambers constructed partially or fully above ground level may provide a feasible sanitation technology.

In some parts of India, notably in the hilly areas in the north, the ground may become impenetrable during the winter months due to frozen soil conditions. In addition, latrines that use water for flushing excreta (such as pour flush latrines and water closets) may freeze and therefore dry latrines may provide an appropriate option in these situations.

### **Groundwater Level and Topography**

In normal sandy and silty soils, the base of leach pits should be at least 1.5 m above the wet season water table. Where the groundwater level is near the surface, the scope for infiltration of treated wastewater into the soil will be reduced. Two possible options for overcoming these problems are:

- a) Install dry latrines with vaults partially or totally above ground level (as in the case for rocky soils described above); and
- b) Use drain fields instead of soakaways. These take up more space but promote infiltration into topsoil.

If neither of these options is possible, hybrid and off-site options should be considered. However, conventional sewerage will also be problematic where the topography is flat and there is a high water table, since the need to provide self-cleansing velocities will mean that many sewers have to be laid below the water table. This will lead to construction problems and potentially high rates of infiltration into sewers. The use of hybrid systems incorporating interceptor tanks can reduce this problem as solids-free sewers can be laid to much flatter gradients than conventional sewers.

Even where the groundwater table is low, conventional sewers can be problematic in flat areas. Laying sewers to self-cleansing gradients will result in high pumping costs. Experience shows that operators often attempt to reduce pumping costs by allowing the incoming sewer to surcharge. Surcharged sewers will silt quickly and thus need high levels of maintenance. In practice, there will often be a need for compromise between laying to self-cleansing gradients and keeping the depth of the sewer down in order to reduce pumping costs. One possibility in such situations will be to provide a hybrid system with interceptor tanks on house connections followed by solids-free sewers laid to flat gradients.

### **Housing Density and Availability of Space**

As housing and population density increase, the volume of excreta and wastewater produced per unit area also increases, while space available decreases and may preclude the installation of household toilets. Even where space for a toilet compartment can be found, there may be other constraints, for example:

- *Insufficient space to store fecal waste.* This is more likely to be a problem for vaults, which are normally raised above floor level, than for pits and tanks, which can be located below a floor, allowing that space to be used for other activities.
- *Insufficient space to allow absorption of wastewater into the ground.* This will mainly be a problem for cistern flush toilets discharging to *septic tanks followed by either soakaways or drain fields*. Another factor to be taken into account is that seepage from leach pits and soakaways sited close to buildings can cause damp problems in buildings and result in structural damage. Damp problems can be countered by providing an effective damp-proof course.

Population density provides an indicator of the amount of open space available for the construction of latrines and treatment systems. Calculating the population density for a particular area will require field surveys during which other factors can be assessed. In particular, a quick qualitative assessment of typical plot layouts will provide information on the space available for toilets and on-site storage facilities.

In very dense informal settlements, narrow roads may be a constraint for pit desludging equipment. However, as described under 'Options for Removal and Transport of Fecal Sludge and Septage' (on page 49), alternative equipment is available which can be used in this situation.

### **The Source of Water**

Where people rely on household wells and tubewells for their drinking water, the possibility of groundwater contamination must be considered. This is a potential problem mainly for on-site technologies. A minimum distance of 10 m should be allowed between a leach pit and a shallow well but this standard will be almost impossible to achieve in most urban areas. Where the groundwater table is more than 1.5 m below the bottom of the pit, the most likely contamination route will be along the side of the well or tubewell itself. This suggests that, if off-site technologies are not feasible, the focus should be on blocking the potential contamination route along the side of the well or tubewell, for instance by introducing a puddled clay layer.

### **Existing Facilities**

The cost of off-site wastewater disposal will be reduced considerably if new sewers can be connected by gravity to an existing collector sewer or drain that has the requisite capacity.

### **Choice between On-Site and Off-Site Options: Conclusions**

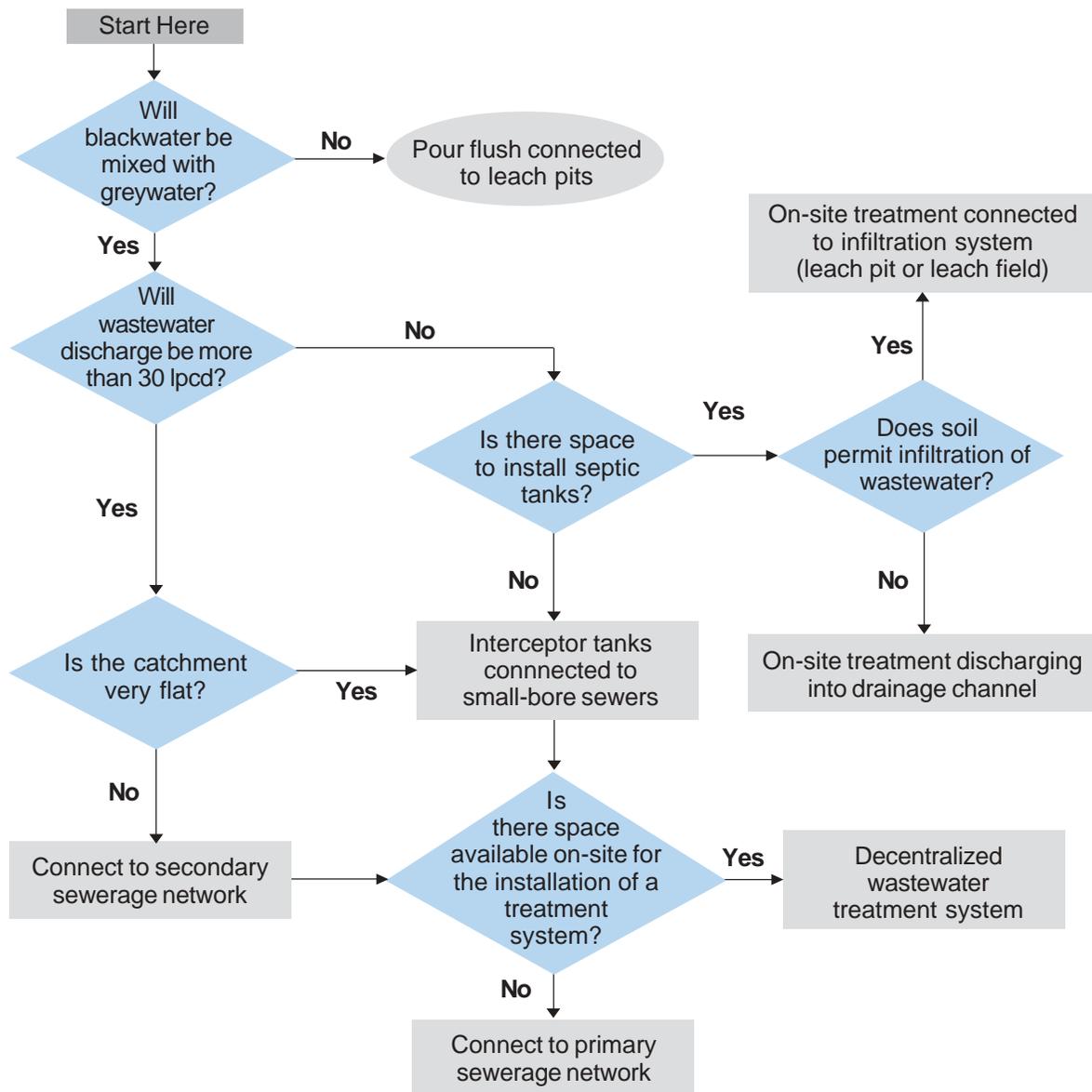
As a general rule:

- On-site options will be most appropriate in areas of low-density housing (typically less than 40 housing units per hectare), relatively low water consumption, and ground conditions that allow the absorption of wastewater without harm to an aquifer.

- Off-site options will be most appropriate where housing density is high (>40 houses per hectare), there is a reliable water supply on or close to the plot and sufficient fall is available to transport solids through the sewer without pumping.
- On-site disposal of blackwater via leach pits or soakaways, with off-site disposal of sullage water may be possible, even for relatively high density areas and relatively high water consumption, provided that ground conditions allow that and there is no problem of contaminating water supplies.
- Hybrid systems may be appropriate in medium- to high-density areas with a flat topography, particularly where the water table is high.

Further guidance on choices is given in Figure 5.

Figure 5: Options for Collection and Drainage of Wastewater



## Options for Removal and Transport of Fecal Sludge and Septage

The long-term viability of on-site sanitation depends upon the availability of a service to remove fecal sludge and septage from pits or tanks, and then transport it to a suitable disposal facility. In most towns in India, only crude and unhygienic sludge removal services are available and so any proposal to introduce or improve on-site sanitation facilities should include consideration of sanitary options for the collection, transport, treatment, and disposal or reuse of fecal sludge and septage. This section deals with options for removing and transporting sludge while ‘Treatment Options’ (on page 51) deals with treatment options. Table 15 summarizes the different types of sludge, their characteristics and the implications for sludge collection and transport systems. Manual removal of untreated waste poses a significant health risk and should be avoided. As a result some form of motorized pumping equipment is recommended (see Part B).

**Table 15: Types of Fecal Sludge and Implications on Cartage**

Source	Characteristics	Emptying and cartage implications
Dry pits/vaults	Highly concentrated quasi-solids with high pathogen content (depending upon residence time in latrine).	Vacuum desludging systems are required for cleaning of single pit latrines.
Leach pits	As above, but higher moisture content.	Twin pits can be emptied manually without the need for specialized equipment.
Septic tanks	Varies enormously depending on the number of people utilizing the septic tank, water consumption, tank size, and pumping frequency.	Septage vacuum trucks are widely utilized for cleaning of septic tanks.

If it is not possible to guarantee hygienic collection, transport and treatment systems, the option of installing twin-pit systems, from which pit contents can be safely removed manually without the need for special disposal arrangements, should be considered. Note, however, that:

- This system only works if the pit that is not in use has been left undisturbed without water logging for a period of 18 months; and
- Users must be educated to use the pits alternately as required by the design.

Informal discussions with the users of twin pit ILCS latrines suggest that the second requirement is not always met at present.

Another question to be asked is who will be responsible for emptying twin pits. It is often assumed that the householder will do it but it is more likely that householders will employ sweepers. Again, user education is important to ensure that both users and those who empty pits are aware of the health risks associated with handling fresh feces.

### Sewerage Options

All off-site and hybrid sanitation options require sewerage to transport wastewater to the point of disposal. The options for sewage disposal relate to the type of sewerage adopted and the extent of the system.

Sewerage constructed in accordance with conventional standards tends to be expensive to install and to maintain—especially where pumping is involved. Maintenance costs are likely to be high in areas with inadequate solid waste management or large unpaved and ungrassed areas, which are likely to generate high silt loads. Construction costs can be reduced by adopting standards that are appropriate to local conditions while pumping and maintenance costs may be reduced by installing interceptor tanks on household connections. Possible options for reducing the cost of sewerage are given in Table 16.

Shallow sewers are, in essence, conventional sewers constructed to relaxed standards. In particular, the shallow depth made possible by low traffic loads and short connection lengths allows the use of inspection chambers rather than manholes. Since these are not designed for entry of persons, they can be much smaller and cheaper than manholes, thus considerably reducing the cost of sewerage.

A type of shallow sewerage known as ‘condominial’ sewerage was developed in Brazil. As with shallow sewerage, sewers are laid at a shallow depth. Where possible, sewers are laid in private land, at the front or back of plots, or in sidewalks. The original assumption was that householders would take direct responsibility for sewers in private land although it seems that this practice is not as widespread as originally envisaged in Brazil. The condominium option may be feasible in some relatively low-density periurban settlements in India but is less likely to be applicable in high-density areas where houses commonly extend to both the front and back of plots, and there is no sidewalk. In such areas, it would be more appropriate to consider the use of shallow ‘lane’ sewers.

Another consideration is whether to design on the assumption that wastewater and storm water are disposed of separately. The accepted view is that separate systems should be the norm but there are likely to be situations in which it is very hard to separate flows on-plot, in which case the possibility of a combined system should not be discounted.

Table 16: Alternative Sewerage Options for Residential Areas

Terminology	Description	Benefits	Where it could be applied	Limitations
<b>Shallow sewers</b>	Sewers are laid to shallow depths and manholes are replaced with access chambers for cleaning.	Reduced cost and ease of maintenance.	In residential areas where traffic loads are low.	Protection, in the form of concrete surround or cover slab, required at road crossings.
<b>Small-bore sewerage</b> (also known as solids-free sewerage or SITS—sewered interceptor tank systems)	Interceptor tanks on household connections and small pipes of 100 mm diameter.	Removal of settleable solids in interceptor tanks reduces sedimentation in sewers and allows them to be laid to much shallower gradients.	Where ground slope is low or the water table is high.	Regular removal of solids from interceptor tanks required.  Vulnerable to illegal connections by householders.

### Treatment Options

All disposal and reuse strategies require waste treatment in order to mitigate environmental pollution and health risks. The focus for on-site systems will normally be on the treatment of fecal sludges and septage. That for off-site systems will normally be on wastewater treatment, although there will also be a need to consider options for treating the sewage sludge produced during treatment.

The choice of treatment process will be influenced by:

- The effluent quality to be achieved, which in turn will depend on what is done with the effluent.
- Wastewater characteristics, in particular its strength and likely variations in flow.
- Location and availability of land.
- Operational requirements in relation to available skills and management systems.

Each of these is discussed below.

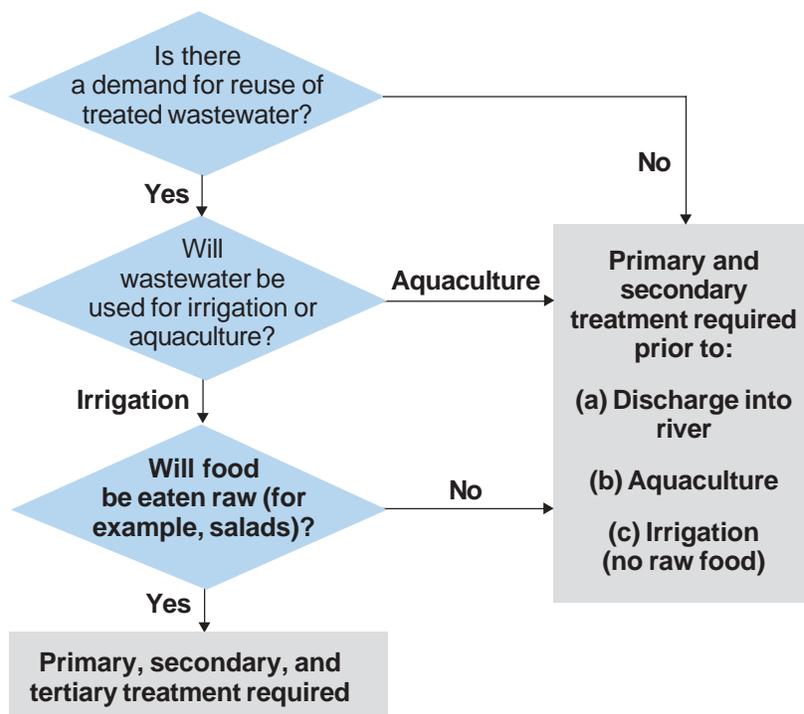
### Required Effluent Quality

Most 'conventional' sewage treatment systems are designed to remove visually offensive solids, organic material, and suspended solids, all of which are likely to affect the quality of the receiving watercourse. The demand for wastewater reuse will have been identified in Stage 2 ('Needs Assessment and Consultation', on page 38). Suspended solids may also block drip

irrigation systems. However, the most important consideration when using wastewater for irrigation is the need to reduce pathogen levels. In general, the longer the retention time in the treatment facility, the greater the pathogen removal. WHO guidelines suggest that extensive waste stabilization pond treatment is required to achieve the microbiological standards required if wastewater is to be used for either unrestricted or restricted irrigation.

Figure 6 indicates the level of treatment that is required if the effluent is to be reused or discharged into a water recipient.

**Figure 6: Level of Treatment Required for Wastewater Reuse**



### Wastewater Characteristics

The ways in which wastewater characteristics might influence the choice of treatment process are summarized in Table 17.

### Location and Availability of Land

All wastewater treatment processes require land but the amount of land required varies considerably depending on the treatment process. As a general rule, less complex wastewater treatment technologies require more land than more sophisticated technologies. Anaerobic treatment technologies are fairly compact and decentralized systems can often be located on small parcels of public land. However, additional land will be required for additional treatment to achieve normal consent conditions. Natural aerobic wastewater treatment systems such as waste stabilization ponds and constructed wetlands require a large land area. For initial planning purposes, assume that activated

Table 17: Impact of Wastewater Characteristics on the Choice of Wastewater Treatment Process

Parameter	Notes	Technology choice
Flow rate	The average dry weather flow is proportional to the contributing population. Variations in dry weather flow occur during the day with peak factors decreasing as the contributing population increases. Storm flows can lead to large variations in flow even in nominally separate systems.	Some types of treatment systems—notably those which use a ‘sludge blanket’ or ‘attached biofilm’—are sensitive to variations in changes in influent flow due to possible washout of active bacteria. The shorter the retention period, the more sensitive they are to variations in flow.
Concentration	Concentration of wastewater varies considerably according to the source, the type of sanitation, the mix between blackwater, sullage and storm water, and time of day.	In general, anaerobic treatment systems are more appropriate for more concentrated wastewaters.
Presence of toxins	Wastewater in municipal systems that receive discharges from commercial and industrial sources may contain a wider variety of pollutants than domestic wastewater and therefore be more difficult to treat.	A more complex treatment system consisting of an increased number of unit processes and more advanced treatment is required to treat municipal wastewaters. Aerobic treatment systems are more suitable for combined municipal wastewater.

sludge treatment requires about 0.06 m<sup>2</sup> per person. Trickling filters and extended aeration will require rather more, perhaps up to 0.1 m<sup>2</sup> per person. More land will be required if high effluent standards are to be achieved. Waste stabilization ponds and constructed wetlands require much more land, typically 3–5 m<sup>2</sup> per person, depending on ambient temperatures. The advantage of these technologies is that their long retention period makes them more effective than other treatment methods in removing pathogens.

Where land is in short supply or expensive, the following options should be explored:

- Extend the wastewater collection system and site the treatment facility further from the town, where relatively inexpensive land is available.
- Use a more intensive treatment technology, even though this may be more expensive to construct and operate.

- Combine relatively local primary anaerobic treatment, perhaps in the form of baffled reactors or upward flow anaerobic filters, with extensive secondary treatment located at a distance from the town.

The second option will not be possible where there is a need to achieve high rates of pathogen removal, for instance when wastewater is to be used for unrestricted irrigation.

Anaerobic waste stabilization ponds should be located some distance from housing, ideally 1 km but at least 500 meters from the nearest dwelling.

Table 18 summarizes potential options for treatment of wastewater from different sizes of catchments from household up to the city level.

### Operational Requirements and Performance Reliability

High-rate aerobic treatment systems are often highly mechanized and require sophisticated operation and maintenance. This needs large amounts of power for pumping and aeration. They are therefore at risk from power supply failures and cost of operation is prone to large fluctuations (normally increases) according to the cost of oil. This is a very important point since power outages are fairly common in India.

Discharge consents can be met by designing the treatment plant according to the appropriate hydraulic and organic pollutant loading parameters for each technology. Thus, to treat the wastewater to a higher level, it is generally possible to increase the size of the plant. But, this subsequently has implications on the amount of land that is required for plant installation.

**Table 18: Options for Wastewater Treatment According to the Level of Centralization**

Scale	Options
Household-level treatment	Septic tank with anaerobic filter connected to surface water drainage channel.
Small communal wastewater system	Baffled septic tank or septic tank followed by anaerobic filter or constructed wetlands.
Off-site (local) small-scale treatment systems	Waste stabilization ponds (if land is available). Reed beds (constructed wetlands).
Off-site (remote) large scale treatment systems	Waste stabilization ponds. Activated sludge process. Aerated lagoons.

Performance stability under variations in influent loadings will be an issue to consider as some treatment systems (for example, UASBs) are sensitive to such hydraulic or pollutant load variations. It is important to consider what might happen if treatment systems become overloaded. In many cases this will lead to the generation of septic conditions resulting in bad odors, which creates a nuisance for people living close to the treatment plant and adversely affects treatment efficiency and contaminant removal.

### Other Factors

**Sludge production and management:** Smaller quantities of sludge are produced if anaerobic treatment is used compared with aerobic treatment. Large quantities of sludge to aerobic digestion processes can create a sludge disposal problem. Both aerobic and anaerobic wastewater treatment processes produce a highly concentrated sludge, which is generally treated on the same site as the wastewater treatment plant.

**Emission of odorous and corrosive gases:** Anaerobic digestion of wastewater and organic waste produces odorous and corrosive (methane and hydrogen sulphide) gases. Therefore, similar problems arise from septic tanks and sedimentation tanks (primary treatment), and anaerobic waste stabilization ponds should be located some distance from houses.

**Biogas production:** Anaerobic treatment becomes more favorable when treating high concentration wastewater and sludge, but the methane produced is malodorous and also contributes towards greenhouse gas emissions. Reuse of methane 'biogas' is more attractive as it can be used on-site for cooking, heating water or electricity generation. Although biogas production in itself does not provide a justification for adopting anaerobic treatment, it can provide an additional incentive for ensuring that the treatment system is well managed.

### Output from Stage 3

Based on the considerations above, it should be possible to produce a shortlist of technology options for different areas.

Although there may initially appear to be a wide range of technological possibilities, the number of options that are practically feasible will probably be quite limited in the light of local circumstances, including the nature of the services already in place.

In Stage 4, the financial and operational viability of the shortlisted options will be tested to produce a final list of options.

## Stage 4: Developing Costed Options

Stage 3 identified technology options that are viable from a technical perspective. In order that technology choices can be made, this stage estimates the capital and operating costs associated with each option over its anticipated lifetime, and considers how the new services could be operated and maintained. This should confirm whether the technologies are viable in terms of the human and financial resources available locally. For those that are viable, costed packages can be presented to the community in Stage 5 and agreement reached on the final choice.

### Assessing the Costs

Detailed costings will not be needed until a technology option has been selected and works are to go ahead. At this stage, a reasonable estimate of the cost per household should be sufficient to indicate the relative affordability of each option.

In comparing the options it is important to consider the *full life cycle costs* of each. This means taking into account not only the capital and recurrent costs over the anticipated lifespan of new facilities, but also the need eventually to replace some components. Full life cycle costing might show that the option that is cheapest to install in the short term may not be the most cost-effective in the long term. Further information on life cycle costing is provided in Appendix B.

It should also be borne in mind that existing infrastructure represents 'sunk costs', meaning that the capital investment has already been made and will be lost if an alternative system is introduced. This may be an important consideration where households have already invested in facilities, such as septic tanks, that will become obsolete if sewers are installed.

### Capital Cost

This should include all the components of a sanitation system: not only household facilities, but associated secondary and tertiary infrastructure if it is not already in place.

Caution is needed when determining the unit cost of technology options. Standard cost estimates used in government sanitation schemes may be out-of-date and quite unrealistic bearing in mind the current price of raw materials and labor. Wherever possible, new estimates should be made against standard designs, using current market prices for labor, components, and construction materials.

Capital costs should also include other project implementation costs such as:

- Training and other capacity building for municipal staff or service users;
- Communication costs, especially where a new technology or service delivery model is proposed;

- Community mobilization;
- Sanitation and hygiene promotion;
- Demand generation; and
- Strengthening the local supply of materials and skilled labor.

### **Operation and Maintenance Costs**

Broadly speaking, operation means the running of a service on a daily basis, whereas maintenance refers to less frequent activities that are necessary to keep a technology in proper working condition.

Operation and maintenance costs are often underestimated or, at worst, overlooked altogether. Infrequent operations are the ones that are *most likely to be ignored and it is often these that are costly*. While costs can vary greatly according to local conditions, they are normally substantial for sewerage, especially in flat areas where poor solid waste management results in sewers being choked with garbage.

The allocation of responsibilities for paying capital and operation and maintenance costs also needs to be considered. Costs at household level are normally the responsibility of the users, in which case there is no direct burden on the local authority, but there may be indirect costs associated with monitoring and regulation. Where on-site sanitation is installed, costs at household level arise not only from the routine cleaning and care of household toilets, but also from the need for periodic emptying of pits.

Appendix B provides guidance on calculating capital and operation and maintenance costs for both on-site and networked services.

### **Sources of Funding**

The affordability of technology options depends not only on their life cycle costs but also on the availability of dedicated funds from third parties. Where the bulk of capital costs are covered by a grant from the state or central government, or a donor, then the size of the initial outlay may not be of much concern to the municipality; operation and maintenance costs may pose a much greater challenge.

### **Revenue Potential**

A realistic estimate of the revenue potential of new or improved services should be factored into the cost of providing the service. Unlike water supply, sanitation services suffer the problems of uncertain demand, significant capital costs and limited scope for revenue generation. Some municipalities seek to recover some sanitation costs via property tax or as a percentage of the water bill, but both are problematic and tend to generate only nominal sums. Where sewerage is proposed there can be a dual problem of high operational costs and the risk that only a few people will connect to the service. Where households use on-site facilities there is often no scope for revenue generation, though the costs to the municipality may in any case be minimal.

Pay-and-use toilets are the obvious exception here; where they are well managed, users are often willing to pay and this can generate sufficient revenue to cover operation and maintenance costs.

### Revenue Potential from Wastewater Reuse

There may be scope to generate revenue from the sale of treated wastewater or sludge to farmers. In Rajasthan, for example, wastewater has traditionally been sold to farmers for much of the year. Other possibilities include combined wastewater treatment-reuse systems such as waste stabilization ponds combined with duckweed or water hyacinth aquaculture or fish production (pisciculture). The data sheet in Appendix A provides more information about treatment using duckweed. The revenues from such operations are unlikely to cover the full operation and maintenance cost of sanitation services but may subsidize them to some extent. However, a lot of land is required and, in some cases, the acquisition costs might cancel out any financial gains.

### The Role of Subsidies

The risks associated with the use of subsidies were discussed in Part A. There may nevertheless be a case for some level of carefully targeted subsidy to stimulate household investment, provided a genuine demand for the new service has been identified. It may also be necessary to subsidize the transaction costs of project implementation. The availability of any subsidies, whether at household or municipal level, should be factored into the cost estimates.

### Service Delivery and Maintenance Options

No sanitation technology, however simple, is entirely maintenance-free. Identifying how each of the potential technologies could be operated and sustained is an integral part of the decisionmaking process. There is no special methodology for doing this; this matter needs proper attention since operation and maintenance will not take care of itself. Any technology is only as good as the operational framework within which it is used.

Typical operation and maintenance tasks at household, neighborhood and city level are outlined in Table 19.

**Table 19: Operation and Maintenance Tasks**

Level	Typical tasks
Household level	Cleaning of toilets; emptying of leach pits and septic tanks; unblocking of household connections.
Lane and neighborhood level services	Management of communal septic tanks and toilet blocks; cleaning of lane sewers.
City level	Operation of sewage treatment plants, pumping stations and septage/sludge treatment facilities.

### **Contracting out**

It is often difficult for local authorities to service and meet all maintenance needs. There is considerable potential for harnessing the resources of other parties—not least the users of the service themselves, who may know how best to provide services effectively at the local level, and can mobilize their own resources to supplement what the government provides. It may also be beneficial to contract out some aspects of service delivery or maintenance, particularly where skilled personnel or equipment are required that are not available in-house.

Key considerations in the assignment of operation and maintenance responsibilities at each level are outlined below.

### **Household and Shared Facilities**

In most cases, users should be responsible for the operation, maintenance, and eventual replacement of household facilities and toilets shared by small, self-selected groups. There are nevertheless roles for the municipality in terms of:

#### *Enabling*

- Providing technical information and advice on the use and maintenance of the facilities; and
- Ensuring that local services are available for the safe emptying of pits and septic tanks and treatment and disposal of wastes.

#### *Monitoring and Regulation*

- Ensuring that households dispose of waste material safely; and
- Resolving operational problems as they arise, which may include enforcement action in cases of unsafe practices (such as the discharge of excreta directly into the street).

### **Lane and Neighborhood Level Services**

Tasks at this level are listed in Table 19. In this case there are a range of possible institutional arrangements that might involve only the municipality (or a line department) but could include roles for community-based and nongovernmental organizations, individuals or private contractors.

### **City Level Services**

Activities at this level include the operation of sewage treatment plants, pumping stations, and sludge treatment and disposal facilities. As with neighborhood services, there may be scope for the municipality or line department operating the service directly, but there may be potential gains from contracting out some services.

Appendix C provides further information on the various stakeholders in sanitation services, their potential roles and possible contractual arrangements. In practice, much will depend on the capacity of the municipality and, where this falls short, the availability of relevant expertise within the local private and nongovernmental organization sectors. Where tasks are assigned to a third party, the quality of service delivery will depend largely on the design and management of contractual arrangements. The challenge is to create incentives for good performance and to penalize poor performance. Where the private sector is involved, there must be scope for making a reasonable profit, otherwise there will be a strong incentive to cut corners and reduce the quality of work. Effective budgeting is, therefore, essential.

### Output from Stage 4

At the end of Stage 4, options that would be unaffordable to the municipality, or for which the operation and maintenance prospects look poor, can be eliminated. For those options that remain (which may be only one or two in many cases) outline life cycle costs and potential management arrangements can be presented to the community in Stage 5 to reach a consensus on the final choice (see Tables 20 and 21).

Table 20: Comparative Life Cycle Costs of Technology Options

Option (examples)	Capital cost per household		Net annual operation and maintenance cost per household	
	User	Municipality	User	Municipality
1. Pour flush toilet with twin pits				
2. Pour flush toilet with septic tank				
3. Pour flush toilet with sewer connection				
and so on...				

Table 21: Management Options

	Proposed operation and maintenance arrangements		
	Household	Neighborhood	City
1. Pour flush toilet with twin pits			
2. Pour flush toilet with septic tank			
3. Pour flush toilet with sewer connection			
and so on...			

## Stage 5: Reaching Consensus on Preferred Options

In the final stage, the options developed in Stage 4 can be presented back to the community. For each package, the technical, managerial and financial implications—including proposed operation and maintenance arrangements—need to be explained clearly. This should enable residents to engage in an informed discussion with municipal representatives resulting, hopefully, in consensus on the way forward.

### Facilitating the Process

Stage 5 is, in effect, a continuation of the process begun in Stage 2, and again requires good facilitation skills. It is therefore appropriate that the agency that carried out the consultation in Stage 2 also facilitates the final activity, which could take the form of one or more public meetings; possibly also focus group discussions to ensure that the views of all stakeholders are heard. On this occasion, however, municipal representatives should also be present since negotiations and formal decisionmaking are involved.

Where on-plot sanitation is concerned, it may be possible to accommodate more than one design within the same street or neighborhood, but more commonly a single choice will need to be selected, especially where there will be sewers. This may require some degree of negotiation and compromise on the part of both users and the municipality, though this needs to be handled carefully, especially in relation to user contributions.

Detailed explanations of the design, function and maintenance requirements associated with each option should be provided, especially where a technology is unfamiliar to the community. It is best to visualize the presentation: scale models could be used but, for household facilities at least, a better idea might be to build one or more demonstration toilets, or take a group of residents to see the technology in operation elsewhere.

Some options may be unfamiliar both to local masons and to the community, so that training or technical advice would be needed if those options were selected. Further practical advice and motivation may be needed to promote good operation and maintenance postinstallation if an unfamiliar technology is adopted. This might focus, for example, on the emptying of leach pits or the need to avoid the clogging of sewers and drains with solid waste.

Even when local behavioral and cultural factors have been taken into account, some options may meet with a negative response due to residents' concerns over issues such as the level of service, cost sharing arrangements or operation and maintenance requirements.

Alternatively, the community may display only moderate interest in the options at first. This might not indicate that the options are inappropriate; rather it could indicate the need for a

promotional campaign to generate real demand before going ahead with any works. This might occur where the community's preferred option has proved to be nonviable, or where users do not perceive the importance of a proposed investment. There may, for example, be limited initial interest in making house connections to a proposed sewer if people have already invested in septic tanks which they perceive to be perfectly adequate.

Proposals for centralized facilities such as wastewater treatment plants might not generate much interest among residents since they have no direct impact at community level. This could make technology choice a simple matter for the municipality, unless there was a proposal to introduce or increase user charges for the service; people unconcerned about the safe disposal of effluent are unlikely to spend money on it. For the same reason, people might be indifferent to the proposed introduction of pit emptying and treatment services. Some level of hygiene promotion and awareness-building may be needed and, where current pollution problems are severe, the municipality may even need to consider a program of enforcement action.

If all of the proposed options are found to be unacceptable, then it may be necessary to revert to previous stages of the decisionmaking process and consider other technologies or service delivery and financing arrangements.

### Outcome from Stage 5

The outcome of Stage 5 should be clarity and consensus on the preferred option(s) in technical, financial, and managerial terms. The feedback from this consultation should also enable the municipality to design an appropriate implementation process that encompasses not only physical works but addresses communication needs (not least for demand generation and hygiene promotion).

Part D

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# Toolkit



**Appendix A:** Participatory Communication Tools

**Appendix B:** Costing Technology Options

**Appendix C:** Institutional Options for Operation and Maintenance

**Appendix D:** Technology Data Sheets



## Appendix A

# Participatory Communication Tools

## Community Mapping

### Purpose

Community social maps represent a popular planning, evaluation, and monitoring tool because they reveal a lot that is never possible to know from written records. They help to visually represent and analyze the community situation regarding all water and sanitation facilities, including informal facilities as well as government services and those provided by specific projects. The mapping procedure helps to understand the access of different socioeconomic groups to these services. It also helps to assess which households pay for services (and how much) in relation to service access obtained.

To do social mapping well requires a considerable amount of time and excellent facilitation. The venue chosen for mapping should be a well lit central place, where a large group can gather for an extended period of time, protected from the weather, and accessible to all classes and both genders.

### Preparation

A day before, facilitators discuss this activity with community representatives (both women and men) and agree on the area to be mapped. For project planning purposes, the entire population to be covered by a project intervention would have to be included.

For large settlements, it is often too cumbersome to map the whole neighborhood down to the household level. Instead, a general layout of the area is drawn showing relevant infrastructure and services, as well as the rich, poor, and intermediate sections.

### Process

The facilitator explains the purpose of the exercise, and helps start a discussion to develop a list of features that need to be indicated on the map. Women and men make the map, either together or in separate groups, as gender relations allow.

The map is then drawn on a larger sheet of paper, or on the ground using locally available materials such as pebbles, colored powder, coins, twigs, leaves, and so on, to represent key features such as houses, temples, roads, and so forth.

The team uses the map to gather information and generate discussion on existing sanitary conditions and the type of improvements people would prefer. This would

include information on the number, type, and location of sanitation facilities, both public and private; and about households that do not have easy access to a sanitary toilet. The adequacy, reliability, and coverage of water supply services are also investigated since this affects the range of choice of sanitation technologies that could work effectively.

## Pocket Voting

### Purpose

This tool is particularly useful for eliciting information on sensitive subjects about which people feel inhibited to state their views publicly. In essence, a range of options or scenarios is presented, and then individuals make a secret 'vote' for one of them in answer to a question posed by the facilitator. People might, for example, use their 'vote' to confirm that they currently practice open defecation. The voting is done in the focus groups of men or women, rich or poor.

### Process

The facilitator poses a question, and a set of pictures of sites representing possible answers is presented, typically by attaching them to a large cloth which is hung before the group. Under each picture is a small pocket sewn into the cloth. The cloth is then hung in a concealed place (for example, in a small room) and group members approach one by one to cast their secret vote by placing a small stone or token in the appropriate pocket.

After each voting session, the group lays out the votes for an analysis of the findings. The facilitator draws the group's attention to voting patterns to analyze similarities, differences, and changes. This provides the basis for further discussion on current practices or services and the need for change.

Pictures can be used to investigate many aspects of the current situation and also to find out what sort of improvements people would prefer. Useful information emerging from the use of this tool might include:

- Existing water sources and the purposes for which they are used. (For example: Are shallow wells used for drinking?)
- Defecation practices including the level of use of existing facilities by men, women, and children from richer and poorer households.
- Differences in behavior and preferences for improvement between women and men, rich and poor.
- The priority attached to sanitation as compared with other possible improvements in infrastructure and services.

## Stakeholders' Meeting

### Purpose

A stakeholders' meeting uses a variety of activities to stimulate and nurture open discussion on the issues under investigation, which in this case could be sanitary conditions in the community and priorities for improvement. Participants include representatives of public and (where relevant) private sector providers of water supply and sanitation services.

### Process

In small- and medium-size towns, stakeholders' meetings are best organized at the ward or zonal level. A neutral place with adequate space, as opposed to the offices of the public service provider, is appropriate for the meeting.

To the extent possible, participants should include representatives of:

- Service delivery agencies, including managers, engineers, and social development staff (if any).
- Relevant social intermediaries (nongovernmental organizations, community-based organizations), if any.
- Other relevant institutions, for example, schools where improvements to school sanitation are envisaged.
- Other specialist workers in water and sanitation-related functions, such as masons or community health workers involved in hygiene promotion.

### Activities

A typical meeting might proceed as follows.

1. **Formal opening**, including self-introduction by the participants.
2. **Introductory icebreaker exercise**. An icebreaker serves to break down hierarchical barriers to interaction and create an informal, relaxed climate conducive to sharing and learning together.
3. **Facilitated discussion** on the key topics on the agenda. It is important that everybody's views are heard and the views of different stakeholder groups recorded.

The stakeholders' meeting is, by virtue of the range of participants, a significant challenge for the facilitator. All efforts must be made to ensure that the hierarchy of institutions is not reflected in the proceedings, that is, the poorer or female participants are not relegated to the background while the community elite and project staff take centre stage. Special care must be taken to ensure equal participation by all. It is advisable to use the services of

professional facilitators adept in the local language. A team of one facilitator and one or two cofacilitators or recorders is preferable.

It is important that the facilitator and recorders are very alert—they should be able to capture the special features of the group dynamics between the different categories of participants and make notes when views differ consistently.

## Transect Walk

### Purpose

A transect walk can be used to gain an overview of existing water- and sanitation-related facilities in a community from the perspective of the local residents.

### Process

During the transect walk, a representative user group of women and men from the local community, together with the facilitators (one of whom should be an engineer), walk from one end of the community to the other. Interactions with residents during the walk yield information about the use, functionality, and adequacy of existing services, as well as financial and institutional arrangements for their operation and maintenance.

The walk should provide an opportunity for observations regarding:

- Water supply sources, in relation to their use for sanitation (flushing, anal cleansing, and personal hygiene).
- Toilet-owning households from different socioeconomic groups.
- Shared and public sanitation facilities.
- Drainage and sewerage systems.
- Locations where wastewater is discharged into drainage channels or natural water courses.
- Areas where wastewater is reused (in this case, further discussion with the users of the wastewater will be beneficial).

It can also be used to cross-check some of the information derived from the community mapping exercise. Key information obtained during the walk should be recorded and should provide an overview of the key needs and challenges in that community.

## Appendix B

### Costing Technology Options

A preliminary assessment of the cost of a technological option involves an estimation of capital and operation and maintenance costs, and a consideration of the options available for project financing, cost sharing, and revenue generation. The latter is important if operation and maintenance is to be sustained.

At this stage, the costs do not need to be accurate, but it is important to recognize what all the potential costs are, including hidden operational costs associated with staffing and other overheads.

All components of a sanitation system should be considered in the costing, including those relating to off-site sewers and wastewater treatment where applicable. When comparing the costs of different options, it is important to bear in mind that existing facilities represent 'sunk costs', meaning expenditure that has already been made and would be lost if an alternative system was adopted. Two broad approaches can be used to estimate capital and recurrent costs: one for on-site facilities, the other for networked systems.

The cost of on-plot facilities such as household toilets and drains can be calculated using typical house layouts. Normally these costs, and the cost of a sewer connection, are borne by the users unless subsidies are available under a special project or scheme. As such they do not form part of the municipality's costs but have important implications for users in terms of affordability and willingness to pay. For networked systems such as sewerage and drainage, the normal practice is to calculate the capital and recurrent costs of a scheme, and then divide these by the number of households to be served to arrive at an average cost per household for the public or shared components.

### Capital Costs of On-Plot Facilities

The costs for individual items may be estimated from either:

1. **Lump sum costs based upon market rates for complete items** (including the cost of labor and the contractors' profit). The simplest approach to estimating the cost of a standard unit (for instance, a pit latrine to be produced to a standard design) is to refer to prices quoted by contractors for previous schemes. This does not, however, provide information on the costs of specific components, hence it can be difficult to adjust the price to allow for price increases or design modifications.
2. **Bill of quantities.** In this case the price is derived based on the combined costs of components, materials, and labor, using local standard rates can be obtained for each unit. This will enable a fuller understanding of the true costs of each technology under consideration and can be used as a benchmark to compare with market prices.

## Estimating the Cost of a Networked System

The first step in estimating the cost for a networked system is to establish a hierarchy of components for primary, secondary, and tertiary facilities. The costs of the different components at each level can then be estimated as follows.

### Primary and Secondary Facilities

For main drains and collector sewers, the cost can be calculated based on unit costs for pipes of different sizes and the length required for each. Professional assistance is needed for this area of costing.

Costs can be summarized in a table giving the length of each sewer or drain, its size, cost per unit length, and any additional costs required (for example, road reinstatement). For some items—for instance, pumping stations—it will be necessary to make separate allowances for these items. The total cost can then be calculated using these data.

### Tertiary Facilities

The cost per hectare of tertiary level facilities (local sewers and drains) can be calculated as follows:

1. Choose areas with housing types and densities typical of the locality.
2. Determine the number of households contained (or potentially contained) within each area.
3. Design a tertiary sewerage and/or drainage system to serve that area, assuming that the system will connect to a secondary facility at the edge of the area.
4. Prepare a bill of quantities using estimates of the cost of materials and labor that would be required for this tertiary system. The cost estimate should exclude house connections, which should be included in household-level estimates.
5. Divide the total calculated cost by the area to provide the average cost per hectare, and by the number of households to give the average cost per household.

This exercise should be carried out for a number of typical areas and the results averaged. The results can be used to estimate the cost of tertiary facilities for all areas with similar characteristics.

## Estimation of Recurrent Costs

Recurrent costs are those incurred for the operation and maintenance of facilities, including management overheads. They will vary greatly according to local conditions; for instance, the cost of operating and maintaining a sewer is likely to be much higher in flat areas with poor solid waste management than in an area with good gradients and adequate waste collection services.

Operational, maintenance, and rehabilitation costs should take into account:

- Routine cleaning of drains and waste disposal;
- Purchase of equipment and materials;
- Maintenance of facilities, for instance, public toilets, and so on; and
- Spare parts and replacement costs.

There is often little useful information available on recurrent costs. It may, therefore, be necessary to pilot operation and maintenance procedures in a range of representative areas and to record the costs. The stages in doing this would be to:

1. Select suitable areas large enough to enable meaningful estimates to be made (for example, a whole ward or housing development).
2. Agree on the operation and maintenance procedures to be followed.
3. Implement those procedures over a period of weeks, monitoring the costs, the quality of service provided, and any problems that are encountered.
4. If necessary, make adjustments to operation and maintenance procedures and repeat the exercise to obtain a better idea of the relationship between inputs and the outputs achieved.
5. Extrapolate the results of the exercise to the town as a whole.

## Life Cycle Costing

Life cycle costing takes into account capital and recurrent costs and the need to replace infrastructure at the end of its life cycle. A spreadsheet can be developed showing the relevant costs and revenues for each technology over a given time period, and used to help identify the most cost-effective option.

## Accounting for Inflation

As financial analysis involves an estimation of the actual amount of money paid and received by the project over a period of time, it is necessary to make adjustments to take into account the impact of inflation on each component where considered to be significant. Differing inflation rates may apply to different components and it should be applied to both expenditures and revenues (but not for capital and interest payments).

Systems that expose the user to high and uncertain levels of operation and maintenance expenditure are risky in an inflationary environment. In general, technologies that have more predictable construction costs or depend less on imports, are less 'risky' with respect to inflation, which may be an important factor in the choice of a system.

## Appendix C

# Institutional Options for Operation and Maintenance

Table 22 (on page 75) summarizes a range of options for the operation and maintenance of urban sanitation services.

The main areas to consider are:

- Management of household and neighborhood facilities.
- Management of zonal and city-level (primary) infrastructure.
- Managing communication and community liaison.

Operation and maintenance at household level is generally regarded as a household responsibility; municipal involvement is usually confined to the installation of toilets under government programs such as the Integrated Low Cost Sanitation Scheme. However, there may be some services that need external support, not least the desludging of leach pits and septic tanks and disposal of the effluent. It may be necessary both to promote pit emptying and to ensure that an emptying service is available. The municipality, a line department, nongovernmental organizations or private operators could all potentially provide this service.

Some programs have formalized the roles of the community and municipal agencies, based on the level of infrastructure concerned. Typically, households—perhaps via lane or neighborhood committees—are made responsible for ‘internal’ infrastructure and services, meaning local level drains, sewers, waste collection points, water distribution networks, and so on; government agencies retain responsibility for ‘external’ infrastructure and services such as secondary and trunk drains and sewers, bulk water supply lines, and so forth. Maintaining good operational links between municipal and community-managed activities is important.

Where more than one management option appears possible, it is important to consider the capacity of the different sectors. So, for instance, if municipal agencies are short of skills or resources for community liaison, but there are strong community organizations, then community management may be the preferred option at the neighborhood level.

It is also important to consider what *incentives* for good performance would operate under the various management options. There are some areas of service delivery that have been traditionally managed by municipalities or Public Health Engineering Departments, but with very disappointing outcomes—public toilets are a prime example. Contracting out operation and maintenance to informal or private sector operators can result in better quality of service delivery, so long as the service is commercially viable and the contract provides incentives for good performance and imposes penalties where specified standards are not met.

Some additional comments on the various institutional options are provided below.

## Municipal Service Delivery

Most municipalities have a large and mostly unskilled sanitation workforce, making it ideal for unskilled and semiskilled labor-intensive tasks such as the maintenance and cleaning of drains and sewers. Some also offer a pit or septic tank emptying service for a fee.

There is often quite limited capacity to provide more complex services such as the operation of treatment plants, especially in smaller municipalities that do not have specialist equipment or staff, though this may be the responsibility of a state agency, typically the Public Health Engineering Departments.

Whatever organizations are involved, the municipality has a central role that it cannot give up: to monitor and enforce standards of service delivery, whether the services are delivered in-house or contracted out. Where monitoring is lacking, service providers can easily avoid their responsibilities and let standards slide.

## Nongovernmental Organizations' Involvement

Very often, the added value that such organizations bring to a sanitation program is their ability to work closely with the community: in the initial planning and needs assessment; in capacity building; during the installation of new household facilities; and in operation and maintenance. Managing communication between the municipality and local residents may be central to this role. It is, therefore, important for the municipality to treat nongovernmental organizations not just as private contractors but as partners, especially where community support is central to the success of the new investment. In some cases, it may be better to work with such organizations under a Memorandum of Understanding rather than a contract, so that the organization's independence is not compromised in the eyes of the community.

Where a potential role for nongovernmental organizations has been identified, it should not be assumed that any local organization could fulfil the task or legitimately represent the community. It is important to check whether an organization has the right range of skills for the task, proven experience and the capacity to operate at the scale required. Some nongovernmental organizations are very effective on a small scale but cannot meet the managerial demands of a service once it expands.

It is also important to recognize that, while such organizations have humanitarian objectives, they need to cover their operating costs. They should, therefore, be compensated adequately for any work assigned to them. Continuity is also important; it can be difficult for nongovernmental organizations to continue funding their staff if there are long periods of inactivity between municipal assignments.

## Community Management

Community management implies long term community responsibility for a facility or service and in some cases it includes legal ownership of the infrastructure or service. This is usually done through neighborhood groups or other community-based organizations. Community members may carry out the work themselves or play a managerial role and pay a third party, such as a contractor or a community-based organization, to do it for them.

While some initiatives in community management have been successful, rarely can community groups manage services effectively without some level of support from, and coordination with, existing city level management structures. Furthermore, the assumption that poor people have the time and motivation to carry out important tasks on a purely voluntary basis is very misguided, especially in urban settlements that lack the close-knit community structure found in villages. As with private contractors, it is important to consider the financial viability of the service and the incentives for doing the work to a high standard.

## Private Sector Participation

Table 22 includes a wide array of options for private sector participation in operation and maintenance, from the provision of specialized, time-bound services to fully independent service provision whereby the private agency develops and delivers a service using its own resources. Generally speaking, the need to harness private sector capacity increases with the complexity of the technology adopted. This is especially true in the case of smaller municipalities without specialist engineering staff. Having said this, the availability of affordable specialist contractors is often limited in smaller towns, reinforcing the case for adopting simple technology as far as possible.

Getting the best out of private sector participation depends on the selection of appropriate contractors and on the effective design and supervision of contracts. Standards of service delivery need to be spelled out clearly and enforced by the municipality.

## Multistakeholder Involvement

There can be much to gain from establishing partnerships whereby the municipality, civil society organizations, and private contractors work together towards a common purpose under the umbrella of a partnership agreement. For example, a decentralized wastewater treatment plant might be established on the initiative of the municipality, with government funding, with a nongovernmental organization facilitating community involvement and a private contractor appointed for specialist maintenance tasks.

At their best, partnerships draw on the different strengths of the institutions involved to achieve a comprehensive service delivery package that addresses the full range of service delivery needs: technical, institutional, communication, and so on. The careful assignment of roles and responsibilities within partnerships is important, so that roles match each partner's strengths. A willingness to share not only information but decisionmaking within the partnership is also vital if the partnership is to maximize its potential.

**Table 22: Institutional Options for the Construction, Delivery, and Maintenance of Urban Sanitation Services**

Title	Description	Applicability	Examples
Municipal service delivery	Direct service provision by municipality's own workforce.	Labor-intensive unskilled and semiskilled tasks, especially, operation and maintenance of secondary and primary infrastructure. However, both capacity and incentives to do a good job may be limited.	Sewer maintenance. Operation of treatment plants. Desludging of septic tanks.
<b>Community or community-based organization involvement</b>			
Community contracting	The community is given responsibility (usually via a community-based organization) for specified construction works and/or maintenance tasks. Community members may execute the work directly or hire others.	Labor-intensive works that do not require very specialized skills. Can be used as a form of capacity-building and income-generating support; also to enhance community ownership of new or improved facilities.	Construction of household toilets. Excavation and laying of shallow sewers.
Community management	Community ownership and control of local facilities (usually via a community-based organization). The community may manage the facilities directly or appoint a third party.	Household and neighborhood facilities that do not require expensive or highly specialized skills for their maintenance.	Operation of public toilet blocks. Emptying of septic tanks?

Title	Description	Applicability	Examples
<b>Nongovernmental organization involvement</b>			
Support to community contracting or management	Nongovernmental organization builds capacity or facilitates community management or contracting; and liaises with the municipal agencies on the community's behalf.	Willingness of municipality to recognize and coordinate with community-managed service.	Construction of on-site facilities. Management of public toilet blocks.
Nongovernmental organization management	Nongovernmental organization manages construction, service delivery and/or maintenance of facilities at local level, possibly within a partnership (see below).	Scope of the nongovernmental organization's role depends on its technical and managerial capacity and skills in community-based approaches.	Construction of on-site facilities. Management of public toilet blocks.
<b>Private sector involvement</b>			
Specialist support to in-house services	Government agency operates sanitation services directly but brings in the private sector, usually for a short period, to fill specific expertise gaps.	Time-bound activities requiring skills and/or equipment that are unavailable within the municipality or line departments.	Use of specialists in no-dig sewer construction.
Service contracts	Government agency is the main service provider but contracts out specific aspects of service delivery (typically two or three years).	Applicable where the municipality lacks the human or financial resources to provide the service directly.	Emptying septic tanks and treatment or disposal of the contents. Provision of IEC, communications.

Title	Description	Applicability	Examples
Management contract—without construction	Experienced operator appointed to take over management of all, or part of, a sanitation service (typically five or seven years).	Municipality has acquired new infrastructure or services but lacks the capacity to manage them in-house; also where local private sector capacity offers added value (such as specialist skills or equipment).	Operation of treatment plant(s). Operation of public toilet blocks.
Management contract—with construction	As above, but includes capital works funded by the public sector (typically five or seven years).	Applicable where construction by management contractor would be more cost-effective than by a municipal agency.	Construction and operation of decentralized wastewater treatment plants, public toilet blocks.
Leasing	Private operator takes complete control of all aspects of a service and controls the revenue stream. Operator pays an annual fee, assets remain in public ownership (usually 12+ years).	There must be scope for significant revenue generation, to incentivize maintenance.	Operation of decentralized sewerage systems, public toilet blocks.
Independent service provision	Local services developed and delivered directly by the informal or private sector using their own resources.	There must be significant local demand for the service.	Construction and operation of private toilet blocks. [Promotion and] construction of household toilets. Emptying of septic tanks and/or transportation and disposal of sludge.

Title	Description	Applicability	Examples
<b>Multistakeholder involvement</b>			
Bi- and tri-sector partnerships	Public, private and/or civil society organizations work within a shared operational framework established by a contract or memorandum of understanding. May include establishment of a service company jointly operated and staffed.	Stakeholders have valuable skills and resources and are willing to work together.	Development of on-site sanitation facilities in low-income communities where community mobilization skills are needed alongside the technical capacity of the private sector.

## Appendix D

# Technology Data Sheets

## On-Site Sanitation

- Pour flush toilet with single leach pit
- Pour flush toilet with double leach pit
- Septic tank
- Communal toilet block

## Waste Transportation

- Desludging trucks (Vacutug)
- Conventional sewerage
- Shallow sewerage
- Conventional sewerage

## Wastewater and Fecal Sludge Treatment

- Oxidation ditch
- Rotating biological contactors
- Anaerobic baffled reactor
- Reed beds
- Waste stabilization ponds
- Activated sludge process
- Biological trickling filter
- Fluidized aerated bed reactor
- Upflow Anaerobic Sludge Blanket (UASB)
- Upflow anaerobic filter
- Duckweed ponds

Note: For all technologies, the exact capital and operation cost is dependent on type and availability of material, labor, and location. The figure stated is a broad estimate as of 2007.

## On-Site Sanitation: Pour Flush Toilet with Single Leach Pit

### What is it?

- A technology for on-site disposal of blackwater and storage of excreta for long periods for partial digestion, prior to removal and further treatment. Excreta is flushed into a pit by pouring one or three liters of water. Pour flush toilets have a water seal to reduce odor and insect problems.
- Fecal matter is accumulated in an underground pit normally lined with open-jointed brickwork to enable water to percolate into the ground.
- The pit may be located directly under the latrine superstructure or can be offset so as to enable access for desludging.

### Where is it applicable?

- Single leach pits are a simple and relatively inexpensive form of on-site sanitation that have widespread application in urban areas but are dependent upon the provision of an affordable and hygienic fecal sludge collection and treatment service.
- Leach pits are appropriate when water use is at least 25 liters per capita per day. However, they may be used to deal with all household wastewater when per capita water use does not exceed about 50 liters per day, depending upon soil characteristics and groundwater level. If wastewater production is higher, leach pits may still be used for disposal of blackwater with off-site disposal of grey water via a drainage or sewerage system.
- Impermeable soils such as clay or rock preclude the use of leach pits. A high water table may also reduce the capacity of the soil to infiltrate wastewater. In these situations, the pits and latrine superstructure should be raised and a layer of sand provided around the pits to promote infiltration of wastewater.
- Care should be taken when using leach pits in situations where groundwater is used for water supply. A minimum distance of 10 meters should be allowed between a leach pit and a shallow well.

### Operation and maintenance requirements

- Once the pit is full, it must be desludged. The methods used should prevent operators or cleaners from coming into contact with fecal material. The undigested and unstabilized sludge must be treated and disposed of safely.

### Additional infrastructure or treatment requirements

- Periodically, sludge must be collected and treated prior to reuse or disposal. Collection methods need to be hygienic, preventing contact between workers and feces.

### Limitations and risks

- The widespread practice of manual desludging of excreta and its indiscriminate disposal presents a major health risk.
- Pollution of groundwater is likely if the bottom of the pit is less than 2 meters above the groundwater table and people collect drinking water from shallow wells located close to pits. Deeper groundwater may also become contaminated if the underlying ground is fissured rock.
- There are many instances where pits work well initially but problems arise later when water use increases. In this situation, residents often connect their toilets to the surface water drainage system.
- Leach pits are not normally designed to cater for sullage water, nevertheless it is sometimes discharged to pits and can result in overflowing, causing nuisance and a potential health hazard close to houses.

### Management arrangements

- Responsibility for maintenance rests primarily with the householder, who will need to pay a private or public service provider to remove the pit contents and transport off-site for treatment and disposal.

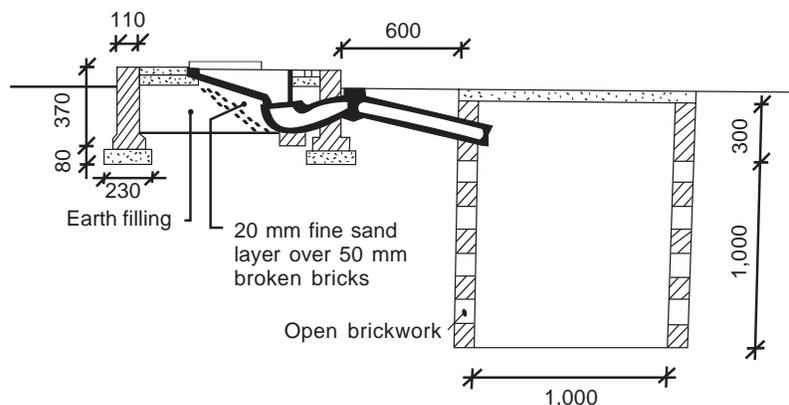
### How much does it cost?

- *Capital costs:* Varies considerably from Rs 3,500 (US\$85)<sup>3</sup> upwards, depending on superstructure construction and ground conditions. Raising the latrine above ground level will increase the construction cost.
- *Operating costs:* Approximately Rs 200–300 (US\$5–7) per year.

### Links to other technologies

- Pit emptying and fecal sludge treatment.

Figure 7: Pour Flush Latrine with Offset Single Pit



Source: Cairncross, Sandy, and Richard Feachem. Environmental Health Engineering in the Tropics: An Introductory Text.

<sup>3</sup> US\$1 = INR 41 (approximately, as of October 2007). Conversion rates are from <https://www.cia.gov/library/publications/the-world-factbook/fields/2076.html>; all conversions in the text are approximations.

## On-Site Sanitation: Pour Flush Toilet with Double Leach Pit

### What is it?

- A technology for on-site disposal of blackwater while storing fecal material for a period long enough for digestion to render it harmless. Digested sludge can be used as a fertilizer or soil conditioner without further treatment.
- Two underground chambers are provided to hold fecal matter. These are normally offset from the toilet and should be at least 1 meter apart. A single pipe leads from the toilet to a small diversion chamber, from which separate pipes lead to the two underground chambers. The pits should be lined with open-jointed brickwork, similar to the single pit design. Each pit should be designed to hold at least 12 months' accumulation of fecal sludge.
- Blackwater is discharged to one chamber until it is full of fecal sludge. Discharge is then switched to the second chamber. Just before the second chamber is full of fecal sludge, the contents of the first pit are dug out. During the time of storage, digestion should ensure that it is odorless and free of pathogens.

### Where is it applicable?

- In low- to medium-density areas, particularly periurban areas, where there is space on or immediately outside the plot to install the pits and where the digested sludge can be applied to local fields and/or gardens as a fertilizer and soil conditioner. This technology has been widely used in the Government of India's Integrated Low Cost Sanitation Scheme (ILCS).
- Where water use is in the range 30–50 liters per capita per day depending upon the characteristics of the soil or groundwater level.
- Where the depth to the water table is 3 meters or more, allowing a clear 2-meter vertical distance between the bottom of the pit and the water table.
- Constraints for single leach pits relating to impermeable soils and the proximity of wells and tubewells also apply to double leach pits.

### Operation and maintenance requirements

- The pits must be used alternately and the diversion chamber must be accessible so that flow can be diverted between chambers.
- Wastewater should never be diverted back to the first chamber before digested sludge has been removed from it.

### Additional infrastructure or treatment requirements

- If digested material cannot be used in local fields and gardens, provision will have to be made for transportation to areas outside the city for reuse on agricultural land.

### Limitations and risks

- Householders may not understand the system and as a result may not use the pits alternately, or may omit to rest the filled pit at least for one year so that the contents degrade and become harmless. Explanation of the operation and maintenance requirements is therefore essential at the time of installation.
- Water may percolate through the soil surrounding the pit and pollute groundwater, which is a potential problem if water is used for drinking.

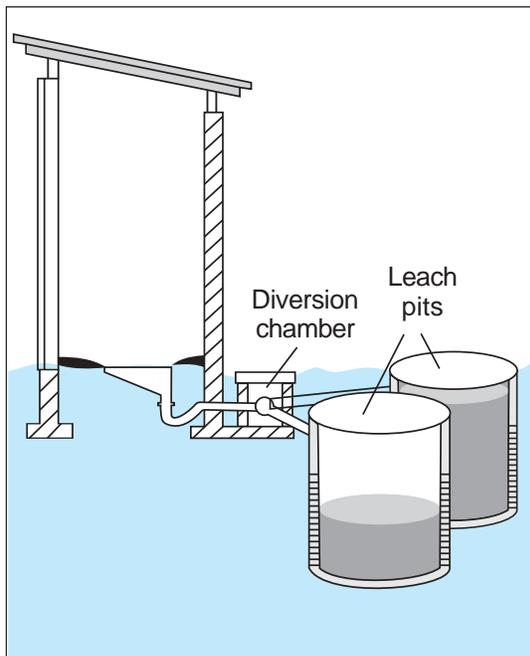
### Management arrangements

Responsibility for operation and maintenance rests primarily with the householder, who needs to ensure that the pits are used in the correct sequence and are emptied at the appropriate time.

### How much does it cost?

- *Capital costs:* Varies, depending on superstructure construction details and the ease of digging, but the minimum cost of the standard Integrated Low Cost Sanitation Scheme design is Rs 5,000 (US\$120).
- *Operating costs:* Roughly, Rs 200–300 (US\$5–7) per year.

Figure 8: Pour Flush Latrine with Offset Twin Pit



Source: WHO 2003. Reproduced with permission from the World Health Organization, Geneva.

## On-Site Sanitation: Septic Tank

### What is it?

- A septic tank is a buried chamber that collects and stores domestic wastewater (usually both blackwater and sullage) and treats organic waste under anaerobic conditions.
- Effluent from septic tanks should be discharged to an on-site infiltration system (soakaway or drain field) or a small-bore sewerage system, or be treated on-site before discharge into surface water. In practice, many septic tanks discharge pathogenic effluent directly into open drains, posing a public health risk.
- The standard septic tank design incorporates two chambers. Some septic tank designs adopted in India have three chambers. Most of the treatment takes place in the first chamber.
- A well-managed septic tank will remove about 50–60 percent of the biological load in the wastewater.

### Where is it applicable?

- Septic tanks are widely used to provide partial treatment of wastewater from individual homes, clusters of houses or institutional buildings where there is no sewerage network.
- Appropriate in periurban settlements or less dense urban areas due to the fact that they do not require any centralized infrastructure.
- Normally associated with *pucca* [permanent] houses for middle and higher income households.
- For soakaways to function, soil conditions must be suitable for infiltration of effluent from septic tanks. A microwetland can help through increased evapo-transpiration losses and moisture uptake. Sullage must not be discharged into a septic tank.

### Mode of operation

- Solids settle in the tank and digest anaerobically. This reduces sludge volume and enables wastewater to infiltrate into the ground without clogging the leaching system.
- Sludge settles in the tank and digests anaerobically over time, releasing methane and other gases.

### Operation and maintenance requirements

- Septage must be removed from septic tanks and transported off-site for treatment prior to disposal.

### Additional infrastructure

- Septic tank desludging.
- Septage treatment.

### Limitations and risks

- The biggest disadvantages of septic tanks are the cost and space requirements for the soakaway or drain field. The leaching system is often not constructed and common practice is to discharge effluent directly into an open drain.
- Septic tanks often receive too much wastewater. As a result, the retention time in the septic tank is insufficient and the soakaway becomes hydraulically overloaded. This means that the septic tanks needs to be desludged regularly, but more commonly the householder bypasses the soakaway and connects the overflow directly to a surface water drain.
- Shock loadings and disturbance of settling zones caused by large inflows (typically from sullage discharges) can affect the efficiency of the septic tank and cause excess solids to flow into the soakaway.
- Performance monitoring of septic tanks is rarely undertaken and regulation to control private desludging operators is problematic.

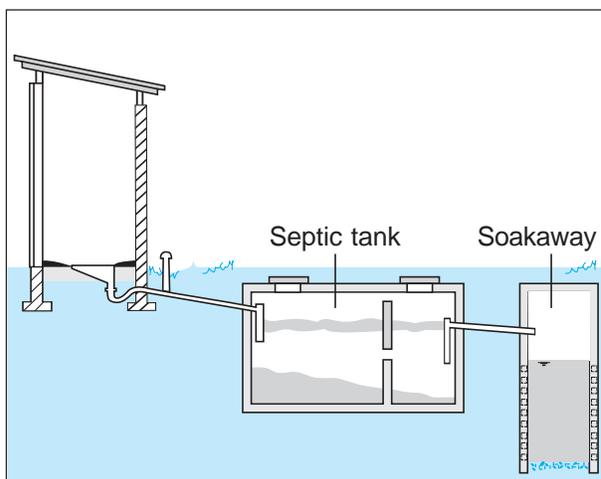
### Management arrangements

- Responsibility for operation and maintenance lies with the owner of the property.
- Municipal utility or private contractors are required for desludging of septic tanks and to ensure safe disposal of septage at a treatment plant.

### How much does it cost?

- *Capital costs:* A conventional septic tank constructed from brick or concrete is a considerable household investment, but cheaper options are available, made from prefabricated plastic or concrete rings. Costs range from Rs 6,000–15,000 (US\$140–360).
- *Operating costs:* Varies from Rs 500–1,500 (US\$12–37) once every few years depending on the frequency of emptying, size of tank and distance to treatment plant.

Figure 9: Pour Flush Latrine with Septic Tank and Soakaway



Source: WHO 2003. Reproduced with permission from the World Health Organization, Geneva.

## On-Site Sanitation: Communal Toilet Block

### What is it?

- A communal toilet block is a shared facility provided for a group of residents or an entire settlement. Pour flush technology is generally used though dry ‘ecological sanitation’ (ecosan) toilet blocks have been piloted in a few locations. Washing facilities are sometimes included in the block.

### Where is it applicable?

There are two situations where a communal toilet block is appropriate:

- Communal toilet blocks are used primarily in low-income informal and illegal settlements where house connections are too expensive or nonviable due to a lack of space and/or land tenure problems.
- Public toilet blocks are provided for occasional use by the general public in places such as markets, train stations or other public areas where there is a considerable number of people passing by.

### Operation and maintenance requirements

- Operation and maintenance requirements depend upon the technology adopted: (a) If the facility discharges into a sewer, then the operation and maintenance requirements will primarily concern keeping the toilet block clean; and (b) If the toilet block has on-site wastewater collection and treatment then the operation and maintenance burden (including desludging) will be higher.

### Additional infrastructure or treatment requirements

- Toilets blocks either discharge to a sewer or into a septic tank—potentially with additional on-site treatment depending on the discharge or reuse requirements.

### Limitations and risks

- The main risk is that the municipality (or contracted operator) does not maintain the block adequately so that it becomes unsanitary and falls into disuse.
- People may be deterred by the user charge and the facility is underused.
- Reliable water and electricity supplies are essential, but not always available.
- Women and children may not use the facility if they consider it unsafe to go there.

### Management arrangements

- A range of management options are possible depending upon whether the toilet block is communal or public. Communal blocks are commonly managed by the municipality, a nongovernment organization (NGO) or a community-based organization with NGO support.

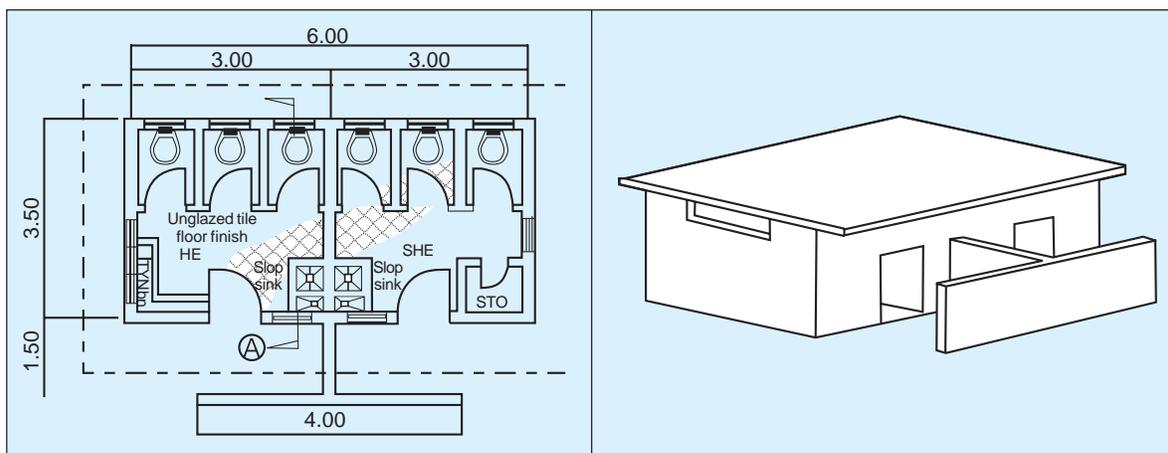
### How much does it cost?

- *Capital costs:* Depends on many factors such as location, waste disposal arrangement, contract duration, and so on. The initial investment cost can be in the range of Rs 800,000 (US\$19,500).
- *Operating costs:* Also varies depending on size, location, and so on, but can be more than Rs 200,000 (US\$4,000) per annum.

### Examples

- Sulabh International pioneered the nongovernment organization-managed toilet block in India and operates facilities in many cities.
- CBOs and NGOs such as SPARC and Shelter Associates have promoted community management of toilet blocks in Mumbai and Pune. The approach adopted by SPARC was incorporated into a World Bank-funded project in Mumbai. Under this program the typical per seat cost was Rs 80,000 (US\$2,000) and the toilet block included water supply, overhead tank, electricity, septic tank, and a caretaker's room.
- BORDA and its nongovernment organization partners (including FEDINA, EXNORA) have promoted community managed toilet blocks in Bangalore and other cities. These are successfully managed by community-based organizations but require ongoing support to help with technical issues, especially where there is on-site treatment.
- In New Delhi, the municipal bodies have piloted the involvement of private entrepreneurs via Build, Operate, and Transfer contracts. A novel feature of the contracts is that the operators are allowed to use the road-facing walls of the premises as advertising space. This enables them to generate substantial revenues.

Figure 10: Community Toilet Block



Source: Philippines Sanitation Sourcebook and Decision Aid, WSP-EAP.

## Waste Transportation: Desludging Vehicle (Vacutug)

### What is it?

- The Vacutug is a device for emptying pit latrines and leach pits with a vacuum pump discharging into a 500-liter tank fitted onto a wheelbase with a small engine for driving it around.
- A modified system (known as Vacutug Mark II) developed in Dhaka, Bangladesh, has a larger capacity tank on a trailer which is pulled by a vehicle.

### Where is it applicable?

- Can be used in high-density informal settlements with narrow lanes where conventional vacuum trucks are unavailable or vehicular access is difficult.
- Used for cartage of fecal sludge over a short distance (maximum 1 km for Mark I and 5 km for Mark II) from the point of collection to a treatment facility, municipal sewer or an intermediate collection point, from which waste can be collected using larger conventional sludge trucks.

### Mode of operation

- A small diameter hose is inserted into the pit and used for evacuating the excreta under vacuum pressure, which is generated by a motor located on the chassis of the Vacutug.
- Pits frequently require the addition of water to loosen compacted solids that have consolidated over time.
- After motoring to the discharge point, the Vacutug tank is emptied by gravity or under pressure if the waste needs to be lifted up to an elevated storage tank.

### Operation and maintenance requirements

- Two trained operators can operate the Vacutug under supervision and can be responsible for cleaning and maintaining the machine, emptying the pits, driving the machine to the disposal point, and carrying out minor repairs.
- The operators should be warned about the hazardous nature of latrine wastes and should be provided with rubber boots, rubber gloves, overalls, and disinfectant soap.
- The Vacutug is designed to be operated and maintained with a minimum of servicing and spare parts, but some preventative servicing will ensure its optimum life and operational performance. Maintenance requires one part-time mechanic for a weekly check-up and when it breaks down.

### Additional infrastructure or treatment requirements

- Collected sludge needs to be discharged into a treatment facility or sewerage system. Alternatively, the waste can be stored temporarily prior to transportation to a larger sludge processing facility.

### Limitations and risks

- Regulation of operators is important to prevent dumping of fecal sludge into local drainage channels.
- The suction pump may not be powerful enough to raise hardened sludge from a deep (>2 m) latrine.
- Solid waste in the pits can block and tear the suction pipe.
- The system is only financially viable if users are prepared to pay emptying charges, which may be higher than those of informal contractors using unsanitary methods.

### Management arrangements

- Small-scale desludging operations using the Vacutug can be managed by nongovernmental organizations or small private entrepreneurs working in low-income settlements.

### How much does it cost?

- *Capital costs:* Varies considerably depending on the use of imported or locally-manufactured equipment.
- *Operating costs:* Varies depending on the need to import spare parts.

### Links to other technologies

- Fecal sludge treatment.

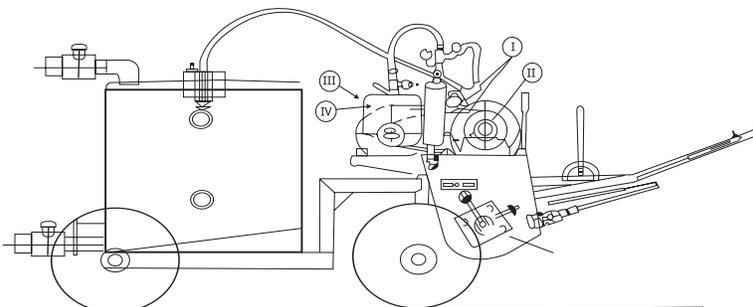
### Examples of application

- Sulabh International Social Service Organisation, India.

### Sources of further information

- UN-HABITAT Operating and Maintenance Manual for Mark II Vacutug Latrine Emptying Vehicle. UN-HABITAT/United Nations Human Settlement Program, Nairobi.
- Alabaster, G., and I. Issaias. 2003. 'Removing Human Waste: The Vacutug Solution. Habitat Debate, Case Studies'. September 2003, Vol 9 (No 3). UN-HABITAT, Nairobi.

Figure 11: A Vacutug



Source: Reproduced with permission from UN-HABITAT, Nairobi.

## Wastewater Transportation: Conventional Sewerage

### What is it?

- Conventional sewerage consists of a closed system of pipes, manholes, and pumping stations (in flat areas), which takes wastewater from domestic and other properties to disposal or treatment facilities.

### Where is it applicable?

- Conventional sewerage is used extensively in urban areas to dispose of wastewater from residential, commercial, and industrial areas.

### Operation and maintenance requirements

- Sewers and manhole chambers will occasionally require structural repair or replacement, and broken and missing manhole covers should be replaced immediately.
- In gravity sewers, wastewater and solids are flushed along the sewer line to a treatment plant. If sewers are laid to self-cleansing velocities, they should require little routine maintenance. However, silting can be a problem where falls are limited and/or storm run-off carrying silt enters sewers. In such situations, periodic rodding, flushing or jetting will be required to remove blockages.
- Where pumping is required, considerably more attention will be required to operate and maintain pumps and other associated electro-mechanical equipment.

### Additional infrastructure or treatment requirements

- Requires off-site wastewater treatment.

### Limitations and risks

- Operation and maintenance costs can be high, especially where pumping is required or silt and other solids cannot effectively be excluded from the sewer. As a result, many service providers rely upon subsidies to keep the system functional.
- Sewers often become heavily silted and lose hydraulic capacity or become completely blocked.
- Illegal storm water collections may lead to hydraulic overload of the sewerage system during heavy rainfall events. This may result in the flow of runoff contaminated with excreta flowing in streets and sometimes houses.
- In order to save electricity costs, pumping station operators often maintain wastewater levels in the wet well above the invert level of the incoming sewer. This reduces flow velocities in the incoming sewer and leads to rapid siltation.
- In many cases a sewerage system is built in isolation from the sewage treatment plant and the two do not connect.
- Households may not connect their facilities to the sewer network due to high connection charges and low willingness to pay.

## Wastewater Transportation: Shallow Sewerage

### What is it?

- Developed for use in residential areas, these sewers can be laid at relatively shallow depths due to the absence of heavy traffic.
- A simplified design and layout is used with inspection chambers instead of manholes. This reduces construction costs, facilitates cleaning, and makes it easier and cheaper to connect households to the system.

### Where is it applicable?

- Particularly appropriate for dense informal settlements where laying sewer lines is often problematic due to the unplanned, irregular layout of buildings and streets.
- Can also be used in higher income residential areas to reduce installation costs.
- Can be supported by a decentralized sewage treatment facility.

### Operation and maintenance requirements

- Shallow sewerage may require occasional flushing to remove blockages, but no more so than conventional sewers unless they are laid to flatter gradients.
- Sewers and inspection chambers will occasionally require structural repair or replacement.

### Additional infrastructure or treatment requirements

- Requires off-site wastewater treatment.

### Limitations and risks

- Can be problematic to install through private properties requiring considerable efforts to work with local communities. Residents need to be motivated to connect to the system and to maintain the private component.
- Communities often need support from the public agency to deal with blockages. Such problems can be aggravated in communities with a changing population, since new residents may be unaware or unwilling to take on their operation and maintenance responsibilities.

### Management arrangements

- The network may be managed by a centralized service or, alternatively, can be divided into private (house connections and lane sewers) and public (collector and main sewers) components. Users can be made responsible for maintaining lane sewers, while the public service provider remains responsible for the main sewers. The users may employ the services of a private operator or form a cooperative.

### How much does it cost?

- The technology is cheaper than conventional sewerage. Cost reductions stem mainly from:
  - Lower excavation volumes.
  - Use of simplified inspection chambers instead of costly manholes.
  - Reduced pipe diameters and layout length.
- *Capital costs*: Approximately Rs 50,000/m<sup>3</sup>/day flow (US\$1,200). Low to medium investment costs if population density is high, number of connections is large, and three to four households share one connection.
- *Operating costs*: Rs 215/m<sup>3</sup> (US\$5) or Rs 1,800/m (US\$40) of pipeline based on regular cleaning of the system, sewer line and inspection.

### Examples of practical experience

- The Ramagundam municipality in Andhra Pradesh has also adopted this technology for slum sanitation to good effect.
- Shallow sewerage (also known as 'condominial' sewerage) has been used extensively in Brazil since the 1980s in both high- and low-income residential areas. More recently, the technology has been piloted in Bolivia, Peru, and South Africa.

### Sources of further information

- CPHEEO. 1993. *Manual on Sewerage and Sewage Treatment of the Central Public Health and Environmental Engineering Organization*. Ministry of Urban Development.
- Water and Sanitation Program. 2005. *The Experience of Condominial Water and Sewerage Systems in Brazil*. Washington D. C.

## Wastewater Transportation: Small-Bore Sewerage

*Otherwise known as Septic Tank Effluent Disposal Scheme (STEDS) or Sewered Inceptor Tank Systems (SITS)*

### What is it?

- A hybrid system comprising interceptor tanks connected to small-diameter sewers for drainage of domestic wastewater. Removal of solids in the interceptor tanks means that sewers carry only liquid and so can be of smaller diameter, and laid to flatter gradients, than conventional sewerage.

### Where is it applicable?

- Appropriate where wastewater production is at least 25 lpcd.
- Lower gradients result in reduced excavation depths where topography is flat. So, small-bore sewerage may be a good option in flat areas, particularly where the water table is near the surface.
- Can provide a cost-effective way to upgrade septic tanks to a level of service comparable with conventional sewers.
- Can be used where effluent from pour flush toilets and household sullage cannot be disposed of on-site due to soil and/or groundwater conditions, but there is insufficient water to allow for operation of conventional sewerage.

### Mode of operation

- Solids settle in the bottom of the tanks and partial anaerobic degradation of wastewater occurs. The supernatant liquid is discharged into the sewer, together with finely divided digested solids.

### Operation and maintenance requirements

- Interceptor tanks need periodical desludging and disposal of solids.

### Additional infrastructure or treatment requirements

- The effluent from interceptor tanks transported through small-bore sewerage can be discharged into conventional sewerage or treated locally in a decentralized wastewater treatment plant.

### Limitations and risks

- Small-bore sewerage systems may have the same operational and maintenance problems associated with both septic tanks combined with the need for maintenance of the sewers. This situation is exacerbated where the ownership and roles and responsibilities for operation and maintenance are not well defined or not accepted.

## Management arrangements

- Individual households are normally responsible for maintenance of each interceptor tank (as with septic tanks) while the sewer network requires a communal management arrangement. This may involve a central service provider or small private operator employed to maintain the system and clean the tanks regularly.

## How much does it cost?

- Capital costs:** Considerably lower than for conventional systems. Approximately Rs 28,100 (US\$685) for the unit illustrated. Desludging costs roughly Rs 2,500 (US\$60) every five years.
- Operating costs:** Depends on topography. Reduced pumping costs due to reduced depth must be balanced against cost of periodic removal of sludge from tanks.

## Links to other technologies

- Desludging of fecal sludge.

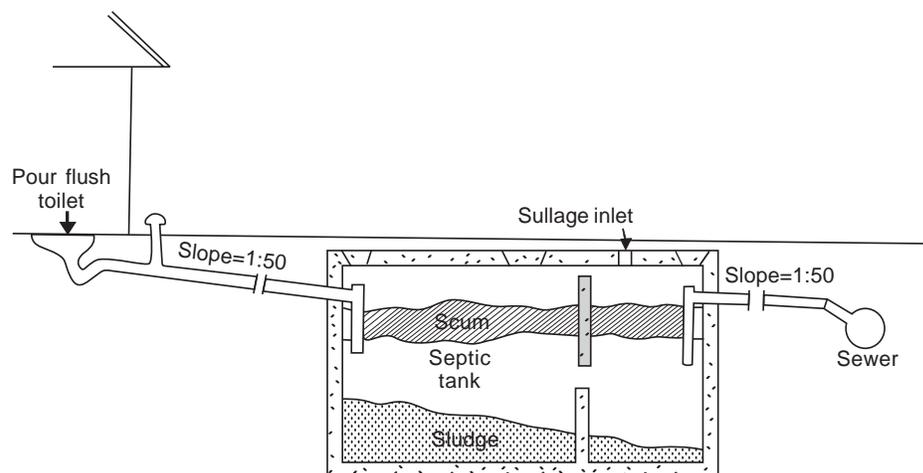
## Examples of practical experience

- Sewered Interceptor Tank Systems (SITS) have been used successfully in Australia; there are also examples in Pakistan, South Africa, and the Maldives.

## Sources of further information

- Otis, R. J., and D. D. Mara. 1985. *Design of Small Bore Sewerage Systems*. Series TAG Technical Note #14. The World Bank, Washington D. C. Sanicon website at [www.sanicon.net/titles/topicintro.php3?topicId=8](http://www.sanicon.net/titles/topicintro.php3?topicId=8). Website [www-wds.worldbank.org](http://www-wds.worldbank.org)

Figure 12: Small Bore Sewerage



Source: After Kalbermatten et al. 1982.

## Wastewater Treatment: Oxidation Ditch

### What is it?

- An activated sludge treatment process with a long solids retention time to improve the efficiency of pollutant removal.
- Typically consists of a single or multichannel configuration within a ring-, oval- or horseshoe-shaped basin.
- Horizontally or vertically mounted aerators ensure that the wastewater is oxygenated and promote a circular flow of wastewater through the channel.

### Where is it applicable?

- Most appropriate for treatment of intermittent flows from small communities and isolated institutions where there is sufficient land for installation.

### Mode of operation

- Long hydraulic retention time and complete mixing reduces the impact of shock loads or hydraulic surges.
- Produces less sludge than other aerobic treatment processes due to long solids retention times and extended biological activity.

### Operation and maintenance requirements

- Needs a skilled wastewater engineer and electro-mechanic technician to keep the treatment plant working efficiently.
- Sludge tends to have high water content but is relatively easy to dewater and smaller in volume than sludge from conventional activated sludge plants.
- Total power costs are higher than for conventional activated sludge due to the extended retention time.

### Additional infrastructure or treatment requirements

- May be preceded by a primary sedimentation tank but many systems omit primary sedimentation.
- Excess biomass is removed in a clarifier and some is returned to the oxidation ditch to maintain sufficient concentration of active biomass in the reactor. The excess sludge collected by the clarifier must be dewatered and treated before disposal.

### Limitations and risks

- Effluent suspended solids' concentrations are relatively high compared to other modifications of the activated sludge process.
- Power requirement is higher than for conventional activated sludge processes-leading to high power costs and the need for a reliable power supply.

### Management arrangements

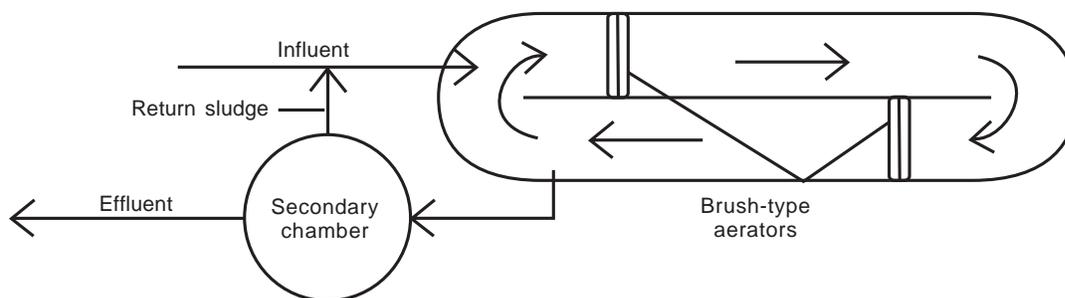
- Oxidation ditches are simpler to operate than activated sludge plants but are considerably more complex than waste stabilization ponds.

### How much does it cost?

Plant capacity (m <sup>3</sup> /day)	Capital costs (in US\$)*	Annual O&M costs (in US\$)
200	419,400	4,900
600	777,200	6,900
2,000	1,470,500	10,300

\*US\$1 = INR 41 (approximately, as of October 2007). Conversion rates are from <https://www.cia.gov/library/publications/the-world-factbook/fields/2076.html>; all conversions in the text are approximations.

Figure 13: Oxidation Ditch



Source: Photo is from Philippines Sanitation Sourcebook and Decision Aid, WSP-EAP.

## Wastewater Treatment: Rotating Biological Contactor

### What is it?

- A rotating biological contactor consists of a series of discs which are partially immersed in the wastewater and rotate slowly to allow active bacteria to digest dissolved organic wastes.

### Where is it applicable?

- This technology is most effective for small communities and isolated institutions where there is enough land for installation. However, due to operational and maintenance problems (see below), it is not generally recommended for use in India.
- Domestic sewage, effluents, and process wastewater from dairies, bakeries, food processors, pulp and paper mills, and other biodegradable industrial discharges can be treated by the process.

### Mode of operation

- As the discs rotate, a film of biomass grows on their surface, comes into contact with the wastewater and treats biodegradable organic matter. Atmospheric oxygen is supplied to the bacteria in the biofilm when the discs are out of the wastewater.
- Excess biomass sloughs off the discs by the shearing forces exerted as the discs rotate combined with the force of gravity.
- Advantages of rotating biological contactor technology include:
  - A higher level of treatment than conventional high-rate trickling filters due to a longer contact time (8 to 10 times greater); and
  - Reduced susceptibility to changes in hydraulic or organic loading than the conventional activated sludge process.
- The rotating biological contactor process can be designed to remove 80–90 percent of the biochemical oxygen demand (BOD) but full nitrification can only be achieved when the organic loading rate is less than 5 g BOD/m<sup>2</sup>/day.

### Operation and maintenance

On a daily basis, there is little need for operation and maintenance, but there can be problems with breakage of the shaft and the mechanism that turns the discs.

### Additional treatment requirements

- Raw municipal wastewater should not be applied to a rotating biological contactor. Primary settling tanks are required for removal of grit, debris, and excessive oil or grease prior to the rotating biological contactor process. In some cases, fine screens (0.03–0.06 inches) may be installed.
- Excess biomass is removed in a clarifier that follows the rotating biological contactor. It then requires sludge treatment.

### Limitations and risks

- As the motor is dependent upon electricity, the rotating biological contactor is prone to failure as a result of power cuts.
- The shaft, discs, and motor all require maintenance.

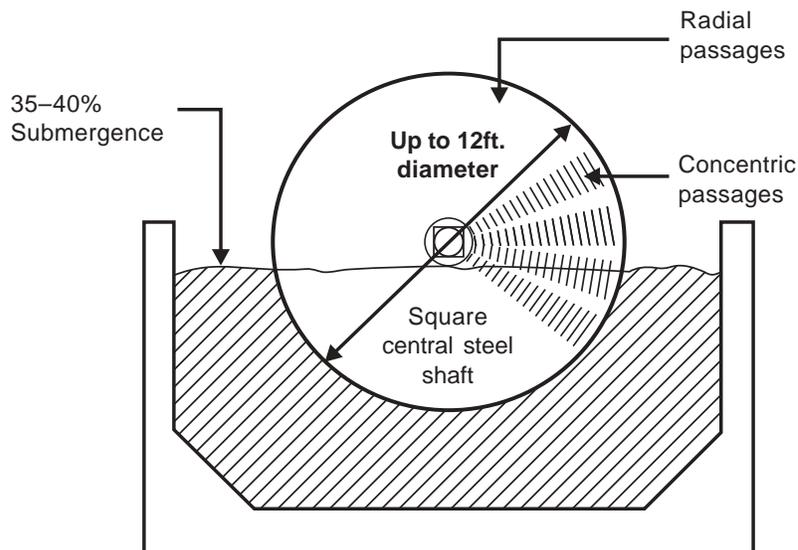
### Management arrangements

- A self-enclosed system with few day-to-day management arrangements. However, the system's reliance on mechanical parts means that skilled personnel are required for maintenance and repair.

### How much does it cost?

- *Capital costs:* Rs 3.36 million (US\$81,000) per MLD capacity.
- *Operating costs:* High operating costs, in the region of Rs 14,000 (US\$340) per month.

Figure 14: Rotating Biological Contactor



Source: Philippines Sanitation Sourcebook and Decision Aid, WSP-EAP.

## Wastewater Treatment: Anaerobic Baffled Reactor

*Otherwise known as Baffled Septic Tanks.*

### What is it?

- An anaerobic baffled reactor consists of a settling compartment with the same dimensions as the first compartment of a conventional septic tank, followed by a number of smaller compartments arranged in series.
- After passing through the first compartment, sewage passes from bottom to top through the remaining compartments in turn. Intensive contact between resident sludge and incoming liquid increases treatment efficiency.

### Where is it applicable?

- The baffled reactor tank is suitable for all kind of wastewaters (including domestic) but its efficiency increases with higher organic loadings and is therefore most appropriate for the treatment of blackwater.
- Suitable for small community schemes and housing developments with no access to municipal sewerage.

### Mode of operation

- Baffled reactors involve a combination of physical treatment and anaerobic digestion as the incoming wastewater passes through a blanket of suspended flocculations of active bacterial sludge in each compartment.
- Wastewater flows from bottom to top with the effect that sludge particles settle against the upstream flow of liquid. Digestion of substances that are difficult to degrade takes place in the upward flow baffled reactors after more easily degradable material has been digested in the front chamber.
- Treatment performance depends on the availability of active bacterial mass but is normally 65 percent COD (70 percent BOD) removal.

### Operation and maintenance

- Adequate arrangements must be made for periodic removal of sludge from the first compartment. Sludge accumulation in the baffled compartments should be much less.
- Although desludging at regular intervals is necessary, it is important that some active sludge is left in each of the compartments to maintain a stable treatment process.

### Additional treatment requirements

- The last chamber may consist of an anaerobic filter to improve treatment performance.
- A reed bed or maturation pond for posttreatment is necessary to eliminate septicity and increase dissolved oxygen level before releasing into surface water or using for irrigation.

### Limitations and risks

- Operation and maintenance is easily ignored, leading to deterioration in performance.

### Management arrangements

- The system is fairly robust and relatively easy to operate but nevertheless requires organized technical management.

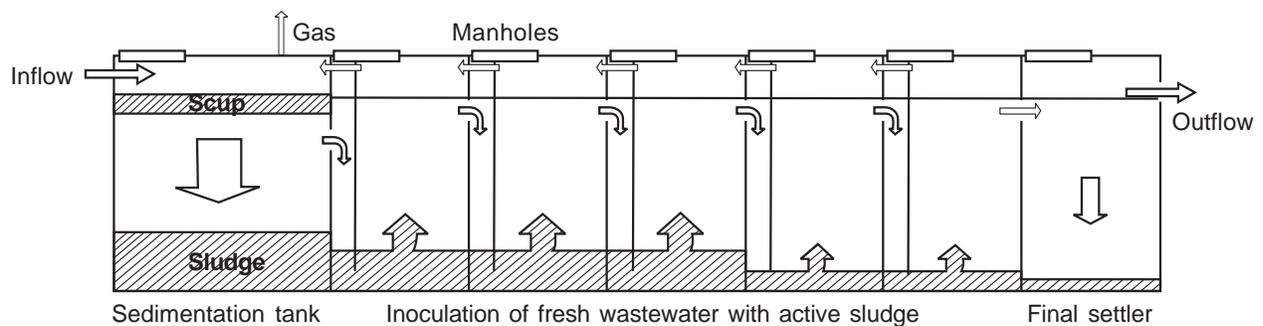
### How much does it cost?

- *Capital costs:* Rs 750,000 (US\$18,200) for a 14,000 liter/day plant.
- *Operating costs:* Rs 12,000 (US\$300) per annum for a 14,000 liter/day plant, equivalent to Rs 0.86/liter/day (US\$0.02/liter/day)

### Sources of further information

Sasse, L. 1998. *DEWATS: Decentralized Wastewater Treatment Systems in Developing Countries*. Bremen Overseas Research and Development Association, (BORDA), Bremen, Germany.

Figure 15: Anaerobic Baffled Reactor



Source: Philippines Sanitation Sourcebook and Decision Aid, WSP-EAP.

## Wastewater Treatment: Reed Beds

Also known as constructed wetlands, planted horizontal gravel filters, subsurface flow wetlands or root zone treatment.

### What are they?

- Reed beds are engineered natural treatment systems that use fast growing plant species to assimilate dissolved organic impurities. A combination of physical settlement, photosynthesis, uptake by plants, degradation by bacteria in the root-zone, and filtration bring about improvement in wastewater quality.
- There are various types of reed beds for different treatment applications. Horizontal sub-surface flow systems are most appropriate for domestic wastewater treatment whereas vertical flow is used for dewatering of sludge and treatment of septage.
- Reeds are planted in the media. Commonly used plants are cattails, bulrushes and reeds, with *Phragmites australis* being ideal due to its extensive root system.

### Where are they applicable?

- Reed beds provide secondary and tertiary treatment and can treat a wide range of wastewaters, septage, and fecal sludges of varying strengths and composition.
- They are suitable for pretreated (presettled) domestic or industrial wastewater with a COD content less than 150–200 mg/l (BOD 70–90 mg/l) and are generally good at handling intermittent and variable flows.
- The most common use is to provide additional or advanced treatment of wastewater from homes, businesses, and small communities. The technology is also well-suited for hotels, campsites, resorts, and recreational areas.

### Mode of operation

- Reed beds mimic the treatment that occurs in natural wetlands by relying on plants and a combination of naturally occurring biological, chemical, and physical processes to remove pollutants from the water.
- Treatment is mostly anaerobic as the layers of media and soil remain saturated and unexposed to the atmosphere.
- The main role of the plants is to transport oxygen via their roots into the filter media though the roots also reduce clogging of the filter.

### Operation and maintenance requirements

- Operation and maintenance requirements are simple but essential to ensure system performance. They include removal of excess weed, occasional scraping of the top layer of filter media, and removal of the floating scum layer, plastic and other debris.
- Insect and odor problems should not be a problem as long as the wastewater remains under the gravel and sand. Otherwise, insecticide spray should be used to control mosquitoes and other insects.
- Inlet and outlet structures should be cleaned periodically. The filter media will eventually become clogged and should be changed every 8 to 15 years.
- Plants need to be harvested.

### Additional treatment requirements

- To prevent clogging of the media, wastewater must be pretreated to reduce suspended solids. For this reason, reed beds are best used for secondary treatment following primary treatment in a sedimentation tank, septic tank, baffled reactor or other form of anaerobic treatment.
- Sludge production is relatively low as solids are retained in or on the reed bed.

### Limitations and risks

- Careful design is required to ensure that the filter media is of appropriate grain size and quality.
- Reed beds require a large amount of space, up to 5 m<sup>2</sup> per person, depending on conditions, and are therefore not always appropriate in urban areas.
- Odor caused by ponding on the surface, blockages in inlet pipe work and problems with drainage at the outlet can result in the development of septic conditions in the reed bed.
- A blocked or overloaded reed bed can cause the wastewater to rise above the surface, which may result in problems with mosquitoes or other insects.

### Management arrangements

- Although the process is natural, constructed wetlands are complex systems that require specialist knowledge and technical expertise to ensure sustained performance.

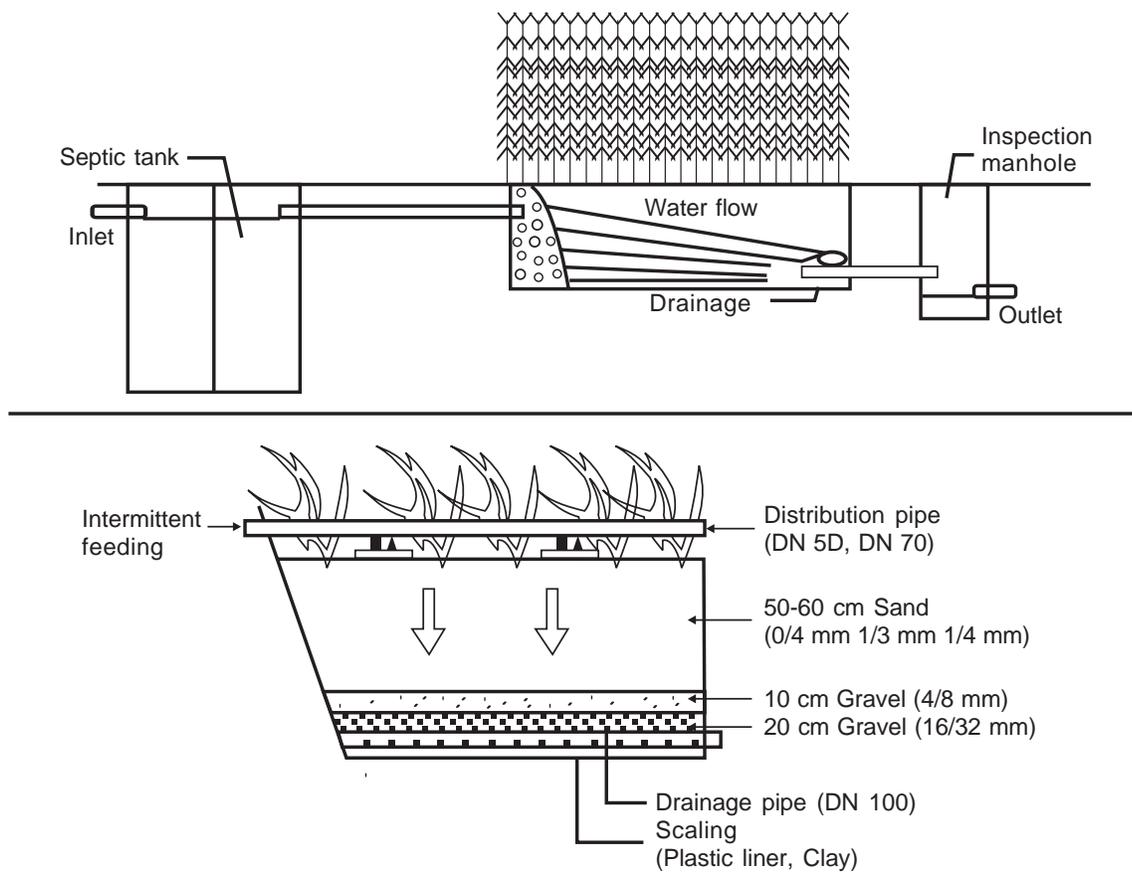
### How much do they cost?

- *Capital costs:* Estimated cost at Rs 1,300/m<sup>2</sup> (US\$30/m<sup>2</sup>) for horizontal flow beds and Rs 2,100/m<sup>2</sup> (US\$50/m<sup>2</sup>) for vertical flow beds, excluding land cost.
- *Operating costs:* Consists mainly of labor costs for reed cutting at intervals of three or four years.

### Sources of further information

- Sasse, L. 1998. *DEWATS: Decentralized Wastewater Treatment Systems in Developing Countries*. Bremen Overseas Research and Development Association (BORDA), Bremen, Germany.
- US-EPA. 2000. *Manual Constructed Wetlands Treatment of Municipal Wastewaters*. Report EPA/625/R-99/010. United States Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio 45268.

Figure 16: Wastewater Treatment Process



Source: Philippines Sanitation Sourcebook and Decision Aid, WSP-EAP.

## Wastewater and Fecal Sludge Treatment: Waste Stabilization Ponds

### What are they?

There are three basic types of waste stabilization ponds and these are normally connected in series to provide a two- or three-stage treatment process. They are:

- **Anaerobic ponds:** Comparatively small and deep (3–4 m) as there is no need for aeration. They receive raw sewage which is treated by anaerobic bacteria, while sludge that builds up in the bottom of the pond is digested by anaerobic micro-organisms.
- **Facultative ponds:** Shallower (1.5–2 m) with a larger surface area than anaerobic ponds. They consist of an aerobic zone close to the surface and a deeper, anaerobic zone.
- **Maturation ponds:** Shallow (1–1.2 m) with a large surface area to enable light penetration. They receive treated effluent from the facultative pond and provide tertiary treatment to remove turbidity, pathogens, and nutrients.

### Where are they applicable?

- Waste stabilization ponds are appropriate for medium- to low-density settlements with sufficient free space, but should not be located very close to houses due to possible odor.
- They offer a robust treatment process that can deal with a wide variety of wastewaters of varying types and concentrations.
- Ponds are particularly appropriate where pathogen removal is an important objective of treatment.
- Waste stabilization ponds may be combined with aquaculture systems (duckweed, water hyacinth or fish production).

### Mode of operation

- Treatment efficiency of high-loaded ponds with long retention times ranges from 70–95 percent BOD removal (COD removal: 65 percent to 90 percent) depending on biodegradability of the wastewater.
- Treatment efficiency increases with retention time but the number of ponds is not of major significance (splitting one pond into two ponds may increase performance by approximately 10 percent).
- Pond systems continue to operate well when overloaded beyond their theoretical design loads, but they will invariably fail if they are not maintained.
- Treatment in anaerobic and facultative ponds is based on microbial activity and settlement of suspended solids and sludge, while in maturation ponds it is achieved by solar radiation, predation by zooplankton, and the acidity created by photosynthesis.

### Operation and maintenance requirements

- The commissioning of facultative ponds involves the development of algal culture and a heavily loaded anaerobic pond may release a bad odor until a layer of scum seals the surface.
- Routine operation and maintenance is easy but arrangements must be made for sludge removal. This is often done by emptying ponds and manually digging out the sludge. Alternatively, sludge can be removed under hydrostatic pressure using pumps mounted on rafts.
- Spraying to prevent fly breeding may be required at various times of the year.

### Additional treatment requirements

- The three-stage process is a complete treatment system. The only additional requirement is for sludge treatment after its removal from ponds.

### Limitations and risks

- Ponds require a lot of land, at least 5 m<sup>2</sup> per person.
- Underdesign, hydraulic short-circuiting, and poor operation and maintenance can all reduce performance.
- Possible problems related to odor and insects if the ponds are not managed properly, or are overloaded.

### Management arrangements

- Performance and operation and maintenance practices need supervision and monitoring.

### How much do they cost?

- *Capital costs:* Rs 1.5 million/MLD capacity (US\$36,500/MLD).

### Sources of further information

- Mara, D. D. 1997. *Design Manual for Waste Stabilization Ponds in India*. Lagoon Technology International, Leeds, United Kingdom ([www.leeds.ac.uk/civil/ceri/water/tphe/publicat/pdm/india.html](http://www.leeds.ac.uk/civil/ceri/water/tphe/publicat/pdm/india.html)).
- Arthur, J. P. 1983. 'Notes on the Design and Operation of Waste Stabilization Ponds in Warm Climates of Developing Countries'. Technical Paper, n. 7, Washington, D. C.
- Pescod, M. B. 1992. *Wastewater Treatment and Use in Agriculture*. Food and Agriculture Organization (FAO) Irrigation and Drainage Paper 47. United Nations ([www.fao.org/docrep/T0551E/t0551e05.htm](http://www.fao.org/docrep/T0551E/t0551e05.htm)).
- [www.irc.nl/page/14622](http://www.irc.nl/page/14622) IRC. 2004. 'Waste Stabilization Ponds'.

## Wastewater and Fecal Sludge Treatment: Activated Sludge Process

### What is it?

- This process involves rapid mixing and aeration of the wastewater, either by mechanical surface aerators or a submerged compressed air system, to create optimal conditions for treatment.
- The aeration basin is followed by a secondary clarifier (settling tank) designed to remove suspended micro-organisms (flocs) prior to discharge. Active biomass is returned to the aeration tank.

### Where is it applicable?

- Widely used for the treatment of municipal wastewater from medium to large towns where land is scarce and power is reliable.

### Mode of operation

- Vigorous aeration elevates dissolved oxygen to create optimum conditions for aerobic bacterial growth. The bacterial population is maintained in suspension and grows rapidly, consuming large quantities of organic matter.
- A fraction of the settled microbial sludge is pumped back from the secondary clarifier to maintain an active population of micro-organisms and an adequate supply of biological solids for the adsorption of organic material.
- Provided the reactor is well operated, a very good removal of BOD and suspended solids can be achieved, though pathogen removal is low.
- Performance is critically dependent on the performance of secondary clarifier and the sludge settling characteristics.
- Sludge production depends on the sludge retention time in the reactor (an extended aeration process can reduce the quantity of sludge produced). Excess sludge is removed from the secondary clarifier and pumped to a separate sludge-handling process.

### Operation and maintenance requirements

- A continuous supply of oxygen and sludge is essential; hence maintenance of the aeration equipment and sludge pump is important.
- Careful monitoring and control of concentrations of suspended sludge solids and dissolved oxygen levels in the aeration tank is required.

### Additional treatment requirements

- *Pretreatment:* There is usually a need for primary sedimentation, but in many cases it is omitted, with only preliminary screening provided.

- *Posttreatment.* The treated effluent from the secondary clarifier may require additional treatment depending on the discharge requirements.
- *Sludge production and treatment.* Provision must be made to digest, dewater, and dispose of excess sludge.

### Limitations and risks

- High energy consumption results in high recurring costs.
- Performance is adversely affected due to interruptions in power supply, even for short periods of time, due to impacts on aeration process and sludge recirculation.
- Foaming, particularly in the winter, may adversely affect the oxygen transfer, and hence performance.
- Mixing of industrial effluent with domestic wastewater can lead to toxicity and major malfunctioning.

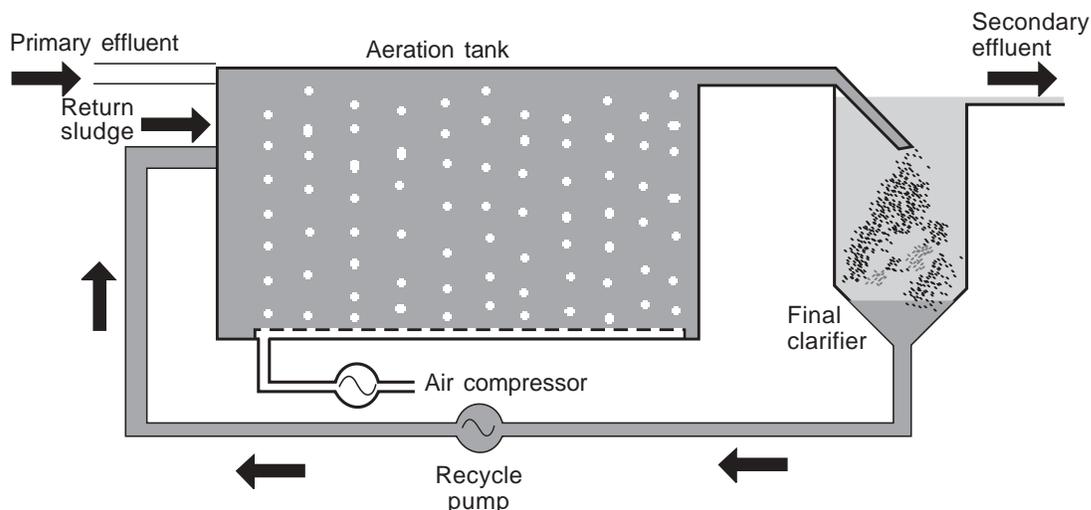
### Management arrangements

- The activated sludge process is technically complex and requires a highly competent and trained supervisor and workforce to be able to operate the system effectively.

### How much does it cost?

- Smaller capacity plants tend to incur relatively high costs per volume of treated wastewater.
- *Capital costs:* In the range of Rs 4.2–4.8 million/MLD (US\$0.10–0.12 million/MLD). Approximately 55 percent cost is for civil works and remaining 45 percent is for electrical and mechanical works.
- *Operating costs:* In the range of Rs 0.43–0.52 million/year/MLD (US\$10,500–12,600/year/MLD).

Figure 17: Activated Sludge Process



## Wastewater Treatment: Biological Trickling Filter

### What is it?

- An 'attached-growth' system comprising a circular tank filled with a bed of crushed aggregate, cylindrical plastic or foam blocks. Wastewater trickles vertically through the filter and the biomass growing on the media removes organic matter under aerobic conditions.

### Where is it applicable?

- Can be used as a standalone treatment or a preliminary treatment for high strength wastewater in combination with activated sludge process or as a posttreatment operation for UASB effluent.
- Land requirement: Between 0.28 to 0.65 hectare/MLD.

### Mode of operation

- A rotating arm distributes wastewater across the surface of the filter bed. Effluent is drained at the bottom.
- Micro-organisms growing on the media break down organic material to produce a consistent effluent quality and sludge with good settling characteristics.
- Bacteria use oxygen to convert ammonia in the effluent to nitrate and the BOD is reduced by 65–85 percent, nitrogen by 10–20 percent, and coliform bacteria by 60–90 percent.
- Recirculation of effluent may be required to avoid low flow conditions and reduce odor and flies.

### Operation and maintenance requirements

- Relatively straightforward though hydraulic loading needs to be controlled to prevent the loss of biofilm. Clogging of screens must also be controlled.
- Maintenance of the turntable is required, as well as cleaning of stone filter media once in five or seven years or more.

### Additional treatment requirements

- *Pretreatment:* Primary sedimentation is compulsory to avoid clogging of filter bed.
- *Posttreatment:* Effluent requires secondary clarification.
- *Sludge treatment:* Excess sludge production = 0.8 kg/kg of BOD removed. Thickening, digestion, and drying are required.

### Limitations and risks

- Mechanical breakdown of the distribution arm is common; ponding resulting from blockages due to excess biofilm growth can also be a problem.
- High organic loadings can create anaerobic conditions on the filter, causing an odor problem.
- Filter flies (*Psychoda*) may proliferate due to inadequate filter media moisture.

### Management arrangements

- Low-skilled manpower requirements under technical supervision.

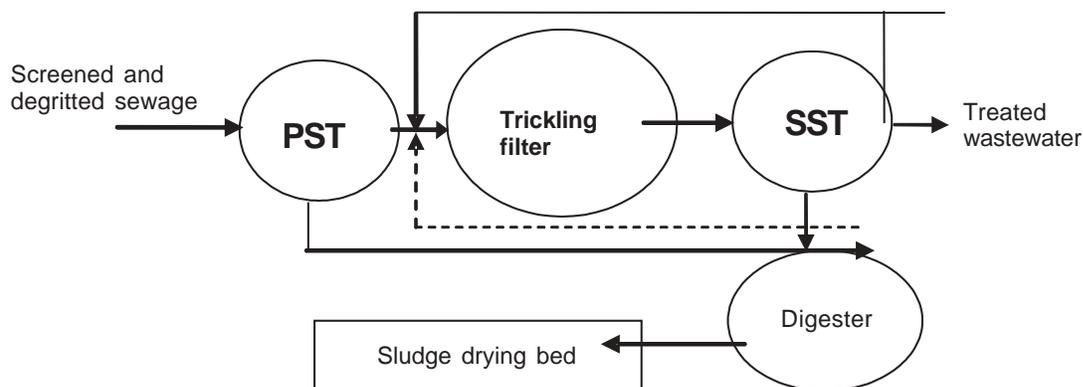
### How much does it cost?

- *Capital costs*: Rs 13.2 million (US\$0.32 million) per MLD capacity

### Sources of further information

- Arceivala, Soli J. 1998. *Wastewater Treatment for Pollution Control, 2nd ed.* Tata McGraw-Hill Publishing Company Ltd.

Figure 18: Biological Trickling Filter



## Wastewater Treatment: Fluidized Aerated Bed (FAB) Reactor

### What is it?

- An aerobic process in which wastewater flows vertically upwards through a filter bed of lightweight inert media at a sufficient velocity to 'fluidize' the bed. A bacterial biofilm develops on the media particles and treats the wastewater as it passes through.

### Where is it applicable?

- Good for treatment of small to medium flows in congested locations. Being a closed reactor, it is suitable for sensitive locations.

### Mode of operation

- High BOD removal with effluent concentration under 10 mg/l and high suspended solids removal with effluent concentration under 20 mg/l.
- Fecal coliforms removal for a two-stage FAB.
- Electrical energy requirement rather low (between 99 to 170 kWh/MLD).

### Additional treatment requirements

- Secondary settling, sludge removal, thickening, and drying. Digestion is not required as the sludge is stabilized.

### Management arrangements

- Straightforward operation but requires a skilled workforce.

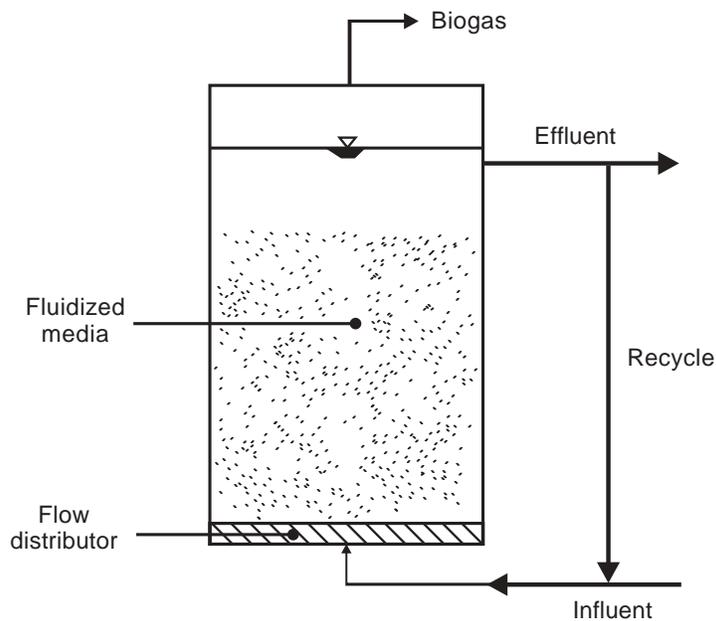
### Limitations and risks

- Reliance on patented filter media.
- Choking of reactor by floating plastic matter and of outlet by fluidized media. Excess biomass growth or low hydraulic loads can result in blockages.
- Long shutdowns may lead to septic conditions, and restart may involve a long stabilization period.
- Uncertain durability of media under varying climatic conditions.

### How much does it cost?

- *Capital costs:* Rs 5–200 million/MLD (US\$0.12–4 million/MLD) for plants of 0.5–40 MLD capacity. Filter media accounts for roughly one-third of the cost.
- *Operating costs:* Rs 0.6–0.75 million/MLD/annum (US\$14,000–18,000/MLD/annum).

Figure 19: Fluidized Aerated Bed (FAB) Reactor



## Wastewater Treatment: Upflow Anaerobic Sludge Blanket (UASB)

### What is it?

- Wastewater flows upwards through a blanket of flocculated biomass in a vertical reactor containing anaerobic bacteria which break down carbonaceous organic matter.

### Where is it applicable?

- Best suited to higher strength wastewaters: blackwater and industrial wastewater, but can also treat lower strength domestic wastewater.
- Appropriate for medium-size wastewater treatment plants.
- UASBs need less land than aerobic systems but require follow-up treatment to achieve comparable performance in terms of COD/BOD removal.

### Mode of operation

- The upward motion of gas bubbles produced during anaerobic digestion causes turbulence that enables mixing without mechanical assistance. Baffles at the top of the reactor allow gases to escape but prevent outflow of the sludge blanket.
- No external energy requirements in the reactor, thereby the process is not vulnerable to power cuts.
- Can bring down BOD of domestic wastewater to 70–100 mg/l and suspended solids as low as 50–100 mg/l, but removal of nitrogen and bacteria is poor.

### Additional treatment requirements

- *Pretreatment:* Screening and degritting but no other form of primary treatment is required.
- *Posttreatment:* Like other anaerobic treatment technologies, UASBs only provide partial treatment and rarely meet discharge standards unless appropriate post-treatment is provided. As yet, only a waste stabilization pond system has been found to be an appropriate post treatment option.
- *Sludge production and treatment:* Relatively low sludge production with good dewatering characteristics. Requires thickening, drying, and safe disposal.

### Operation and maintenance requirements

- Careful monitoring and control of the reactor sludge levels and sludge withdrawal.
- Frequent cleaning or desludging of distribution or division boxes and influent pipes.
- Removal of scum and floating material from the settling zone.
- Control of the flow rate is difficult for small units.
- Prevent mixing of industrial effluents with toxic elements and sulfates or sulfides.

### Management arrangements

- Skilled supervision during start-up and for control of biomass levels in the reactor.

### Limitations and risks

- Long start-up and high initial oxygen demand of effluent during this period may cause oxygen depletion in receiving water bodies.
- Sensitive to seasonal temperature variations and low removal efficiency in winter.
- Release of corrosive and odorous hydrogen sulfide and ammonia in the air.
- Sludge washout from the reactor can result in instability leading to deteriorations in treatment performance and very high BOD and total suspended solids in the effluent.

### How much does it cost?

- *Capital costs:* Rs 2.4–3.5 million/MLD (US\$58,500–85,000/MLD) depending on the capacity of the plant. Approximately 65 percent cost is of civil works and remaining 35 percent is for electrical and mechanical works.
- *Operating costs:* Rs 0.07–0.15 million/MLD/annum (US\$1,700–3,600/MLD/annum) depending on plant capacity.

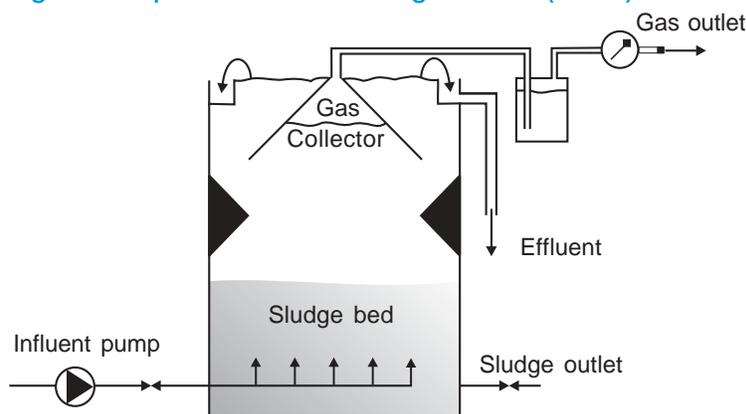
### Practical experiences

- 14 MLD domestic wastewater treatment plant in Mirzapur.
- 36 MLD tannery wastewater treatment plant in Kanpur.
- In India, see: Tare, Vinod, and Asit Nema. April 2006. *Sewage Treatment through UASB Technology—Expectations and Reality*. 22<sup>nd</sup> National Convention on Environmental Engineering, Institution of Public Health Engineering and IT-BHU, Varanasi, India.
- Elsewhere: There has been considerable interest in the UASB as an appropriate form of wastewater treatment in other developing countries, notably Brazil.

### References and sources of further information

- Bal, A. S., and N. N. Dhagat. April 2001. 'Upflow Anaerobic Sludge Blanket Reactor: A Review'. *Indian J Environ Health*,. 43(2):1–82. National Environment Engineering Research Institute (NEERI).

Figure 20: Upflow Anaerobic Sludge Blanket (UASB)



Source: Integrated Approach and Replicability. March 1994. Indo-Dutch Environmental and Sanitary Engineering Project, Kanpur-Mirzapur.

## Wastewater Treatment: Upflow Anaerobic Filter

*Also known as fixed bed or fixed film reactor.*

### What is it?

- Anaerobic filters provide additional treatment by bringing wastewater into contact with active bacteria attached to media as the wastewater flows upwards through the filter. Filter material, such as gravel, rocks, cinder or specially formed plastic pieces provide additional surface area for bacteria to form a slime.

### Where is it applicable?

- Appropriate for treating effluent from septic tanks (individual or shared/communal) in areas where infiltration is not possible due to low soil permeability, high water table and/or lack of space.

### Mode of operation

- There is no physical straining of particulates; nonsettleable and dissolved solids are removed through close contact with a surplus of active bacterial mass.
- May be operated as downflow or upflow systems. Upflow is generally preferred as there is less risk of washing out active bacteria, but cleaning of the filter is easier with the downflow system.
- Treatment quality (when combined with pretreatment) can be as high as 80 percent BOD removal.

### Operation and maintenance

- Active sludge (for example, from septic tanks) should be added to the filter before starting continuous operation.
- The bacterial film gradually thickens and must eventually be removed. This is usually done by back-washing with wastewater.

### Additional treatment requirements

- The filter should be preceded by a septic tank.

### Limitations and risks

- Lack of attention to maintenance results in blockage of the filter. In addition, the perforations of the distribution pipe at the bottom of the filter get clogged easily.
- On average, 25–30 percent of the total filter mass may be inactive due to clogging. While a cinder or rock filter may not block completely, reduced treatment efficiency is indicative of clogging in some parts.

- A sand or gravel filter may block completely due to smaller pore size resulting in backup of wastewater into the septic tank.

### Management arrangements

- Responsibility will normally lie with the manager of the property served.

### How much does it cost?

- No data available.

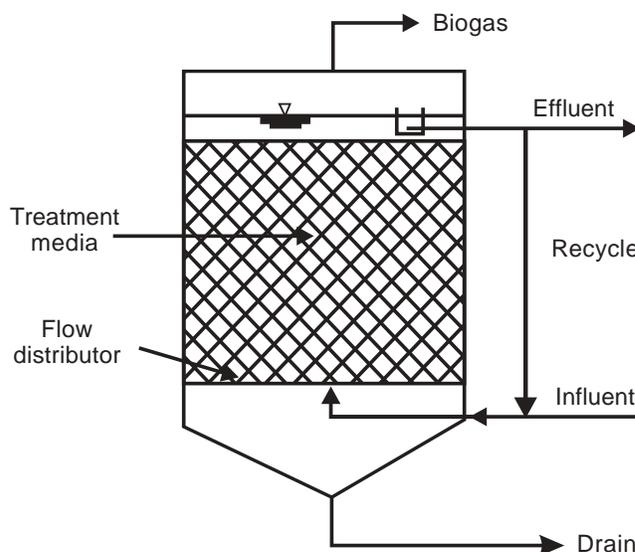
### Practical experience

- Research in Thailand found that operational problems with household septic tanks and upflow anaerobic filters resulted from the perforations in the distribution pipe clogging easily.

### References and sources of further information

- IRC. 1997. *Operational and Maintenance Problems of Septic Tank with Anaerobic Upflow Filter*. Chiang Mai, Thailand.
- Sagar, G. 1983. 'A Dwarf Septic Tank Developed in India'. *Waterlines*, Vol 2 (1). July 1983.

Figure 21: Upflow Anaerobic Filter



## Wastewater Treatment: Duckweed Ponds

### What is it?

- Duckweed (*Lemnaceae*) is a small, floating, and fast growing aquatic plant that grows vigorously in pretreated wastewater to produce a protein-rich biomass.
- Duckweed-based pond systems take nutrients from wastewater and produce a highly nutritious feed for fish, poultry or livestock. Fish yields may be two to three times higher than in conventional ponds.

### Where is it applicable?

- Appropriate for treating low strength domestic wastewater or as a polishing treatment after primary sedimentation.
- Requires a considerable amount of land (5–10 m<sup>2</sup> per person for 7- or 20-day retention period).
- Best suited for rural and semiurban settlements.

### Mode of operation

- Duckweed-based systems are a modification of conventional lagoon technology with the pond functioning as a facultative lagoon. Deeper layers are anaerobic.
- Duckweed grows rapidly and is harvested for use as a mulch or natural soil enricher. Harvesting promotes growth and removal of nutrients and dissolved carbon from the wastewater.
- Algal growth is suppressed by duckweed due to competition for sunlight and nutrients and possibly secretion of organic substances.
- Duckweed suppresses mosquito breeding by forming a mat over the water surface.

### Operation and maintenance requirements

- Relatively simple maintenance: Frequent duckweed harvesting from the surface to ensure productivity, prevention of other vegetative growth, and control of wave action using bamboo or similar vegetation.
- The pond needs desludging every two or three years.

### Additional infrastructure or treatment requirements

- Pretreatment required if used as part of a wastewater treatment process. This often takes the form of a waste stabilization pond but other forms of treatment can be used.

### Limitations and risks

- Low pathogen removal due to reduced light penetration.
- Duckweed dies in cold weather.

- If flows are not adequately controlled, duckweed can flow out with the effluent. Treatment capacity may be lost during floods.

### Management arrangements

- Technical and commercial skills are needed for the production, marketing, and sale of dried duckweed for animal or fish feed if this is to succeed as a microenterprise.

### How much does it cost?

- *Capital costs:* Of the same order as waste stabilization ponds with the additional cost of floating cell material (to control flows). Estimated at Rs 1.9 million/MLD (US\$46,000/MLD) capacity.
- *Operating costs:* Rs 0.18 million/MLD/year (US\$4,000/MLD/year).

### Links to other technologies

- Waste stabilization ponds.

### Examples of application

- Duckweed ponds have been piloted on a limited scale in Delhi, Haryana, West Bengal, and Orissa in both rural and urban locations. They have also been used in Bangladesh.

### References and sources of further information

- Gijzen, H. J., and M. Ikramullah. 1999. *Pre-Feasibility Study of Duckweed-Based Wastewater Treatment and Resource Recovery in Bangladesh*. World Bank.
- Iqbal, S. 1999. *Duckweed Aquaculture Potentials, Possibilities and Limitations for Combined Wastewater Treatment and Animal Feed Production in Developing Countries*. SANDEC Report No. 6/99. EAWAG, Switzerland.

## Glossary

**Activated sludge:** An aerobic treatment process in which oxygen and micro-organism concentrations in wastewater are artificially elevated to facilitate rapid digestion of biodegradable organic matter.

**Aerated pond or lagoon:** A natural or artificial wastewater treatment pond in which mechanical or diffused air aeration is used to supplement the natural reoxygenation processes.

**Aerobic treatment:** Treatment of wastewater with the help of micro-organisms that rely on oxygen.

**Anaerobic digestion:** Decomposition of organic material by anaerobic bacteria in the absence of air.

**Anaerobic lagoon:** A system for treatment of high-strength wastewater and sludge that involves retention under anaerobic conditions.

**Biochemical oxygen demand:** A measure of the organic pollutant strength of wastewater.

**Biosolids:** See **Sewage sludge**.

**Blackwater:** Wastewater discharge from toilets.

**Bucket latrine:** A traditional but unhygienic form of sanitation in which feces is deposited into a bucket which is collected regularly (usually at night) and taken away (usually by 'sweepers').

**Composting latrine:** A latrine designed to receive both feces and waste vegetable matter with the aim of reducing moisture content and achieving a carbon-to-nitrogen ratio that promotes rapid decomposition.

**Dry latrines:** All forms of latrines that do not require water for flushing.

**Desludging:** Removal of sludge or settled solid matter from treatment tanks such as septic/Imhoff tank, interceptor tank or sedimentation tanks.

**Disposal:** Discharge, deposition or dumping of any liquid or solid waste onto land or water so that it may enter the environment.

**Domestic sewage:** All forms of wastewater derived from residential properties, as well as blackwater and greywater from commercial and institutions buildings.

**Dry sanitation:** Disposal of human excreta without the use of water for flushing or anal cleansing.

**Ecological sanitation (ecosan):** A form of dry sanitation that involves separation of feces and urine in order to facilitate recycling of nutrients in local agricultural systems.

**Effluent:** Any form of wastewater or liquid waste that flows from an operation or activity.

**Excreta:** Feces and urine.

**Fecal sludge:** The undigested sludge that is collected from pit latrines and leach pits.

**Greywater (also known as sullage):** Wastewater produced by washing and bathing activities.

**Lagoon:** See technology data sheet on 'Wastewater and Fecal Sludge Treatment: Waste Stabilization Ponds' (page 104).

**Leachfield:** A trench filled with sand, soil, gravel and brickbats for disposal of septic tank overflow into the surrounding soil.

**Leach pit (sometimes known as a cesspit):** An underground tank that is used where there is no sewer and household wastewaters are drained into them to permit leaching of the liquid into the surrounding soil.

**Night soil:** Human excreta, with or without anal cleansing material, which are deposited into a bucket or other receptacle for manual removal.

**On-plot sanitation:** A sanitation system that is wholly contained within the plot occupied by a private dwelling and its immediate surroundings. Commonly, on-plot sanitation is equivalent to 'household latrine', but may also include facilities shared by several households living together on the same plot.

**On-plot facilities:** The components of a sanitation system located within a householder's plot.

**Off-site sanitation:** A system of sanitation that involves collection and transportation of waste (wastewater either by sewerage or septage/fecal sludge by vacuum truck) to a location away from the immediate locality.

**Pathogens:** Micro-organisms such as bacteria, viruses and protozoa that cause disease.

**Percolation rate:** The rate at which liquids move through soil.

**Pit latrine:** A form of on-plot sanitation with a pit for accumulation and decomposition of excreta from which liquid infiltrates into the surrounding soil.

**Pour flush toilet:** A type of latrine where a water seal trap is used to prevent smells and to reduce insects.

**Sanitation:** Interventions (usually construction of facilities such as latrines) that improve the management of excreta and promote sanitary (healthy) conditions.

**Septage:** Mixture of wastewater and sludge removed from a septic tank during cleaning operations.

**Septic tank:** A form of on-plot sanitation for the anaerobic treatment of sewage/blackwater.

**Sewage:** A mixture of wastewater from all urban activities from residential, commercial properties. It may also contain a component of industrial wastewater.

**Sewer:** A conduit, usually a pipe, which is used to collect and convey wastewater away from its point of production to its point of disposal.

**Sewage sludge (sometimes referred to as biosolids):** A semisolid residue generated during the treatment of domestic sewage including both solids removed by sedimentation and biological sludge produced by biological treatment.

**Sewerage:** A network of interconnected sewers in an area, district or town.

**Soak pit/Soakaway:** A pit, typically after a septic tank from where wastewater slowly seeps into the ground through perforated sides and bottom.

**Sullage (also known as greywater):** Wastewater from bathing, laundry, preparation of food, cooking, and other personal and domestic activities.

**Superstructure:** Screen or building enclosing a latrine to provide privacy and protection for users.

**Suction truck:** A vehicle used for mechanized sludge removal from septic tanks and lined latrine pits.

**Ventilated improved pit latrine (VIP):** A dry latrine system, with a dark interior and a screened vent pipe to reduce odor and fly problems.

**Vent pipe:** A pipe that facilitates the escape of gases and odors from a latrine or septic tank.

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**Wastewater:** Liquid wastes from households or commercial or industrial operations, along with any surface water/storm water.

**Wastewater treatment:** A combination of physical, chemical, and biological processes to remove suspended solids, dissolved pollutants, and pathogens and render the water harmless to the environment.

**Water closet:** A pan, incorporating a water seal, in which excreta are deposited before being flushed away using water.

**Water seal:** Water held in a U-shaped pipe or hemispherical bowl connecting a pan to a pipe, channel or pit to prevent the escape of gases and insects from the sewer or pit.

## References and Sources of Additional Information

- ADB (Asian Development Bank). 2006. *Model Terms of Reference: Planning Urban Sanitation and Wastewater Management Improvements*. [www.adb.org/Water/tools/pdf/Planning-Urban-Sanitation-TOR.pdf](http://www.adb.org/Water/tools/pdf/Planning-Urban-Sanitation-TOR.pdf)
- Alaerts, G. J., S. Veenstra, M. Bentvelsen, L. A. van Duijl, *et al.* 1991. 'Feasibility of Anaerobic Sewage Treatment in Sanitation Strategies in Developing Countries'. *IHE Report Series 20*, International Institute for Hydraulic and Environmental Engineering, Delft.
- Cotton, A. P., and D. L. Saywell. 1998. *On-Plot Sanitation in Low-Income Urban Communities: Guidelines for Selection*. WEDC. Loughborough University, Loughborough.
- Department for International Development. 1999. *DfID Guidance Manual on Water Supply and Sanitation Programmes*. WELL Resource Centre, Loughborough University, UK.
- Feachem, R. G., J. B. David, G. Hemda, and D. D. Mara. 1983. *Sanitation and Disease: Health Aspects of Excreta and Wastewater Management*. World Bank, Washington, D. C.
- Franceys, R. 1997. 'Private Sector Participation in the Water and Sanitation Sector'. *Water Resources Occasional Papers No 3*. DfID WELL Task paper. WEDC, Loughborough University and IHE, Delft.
- Franceys, R., J. Pickford, and R. Reed. 1992. *Guide to the Development of On-Site Sanitation*. World Health Organization.
- Heinss, U., S. A. Larmie, and M. Strauss. 1997. *Solids Separation and Pond Systems for the Treatment of Faecal Sludges in the Tropics*. SANDEC Report No. 5/97. Dübendorf, Switzerland.
- IETC (International Environmental Technology Centre). 2002. *International Source Book on Environmentally Sound Technologies for Wastewater and Stormwater Management*.
- Iqbal, S. 1999. *Duckweed Aquaculture Potentials, Possibilities and Limitations for Combined Wastewater Treatment and Animal Feed Production in Developing Countries*. SANDEC Report No. 6/99. EAWAG, Switzerland.

- IRC. 1997. *Operation and Maintenance of Sanitation Systems in Urban Low-Income Areas in India and Thailand*. Report on a joint research programme, 1989-1993. Project and Programme Papers 6-E, International Research Centre (IRC), Netherlands.
- Khouri, N., J. M. Kalbermatten, and C. Bartone. 1994. *The Reuse of Wastewater in Agriculture: A Guide for Planners*. UNDP–World Bank Water and Sanitation Program. World Bank, Washington, D. C.
- Ludwig, H. F., H. Fennerty, K. L. Sow, and K. Mohit. 2005. *Textbook of Appropriate Sewerage Technology for Developing Countries*. New Delhi: South Asian Publishers Pvt Ltd.
- Mara, D., and S. Cairncross. 1989. *Guidelines for the Safe Use of Wastewater and Excreta in Agriculture and Aquaculture*. Geneva: United Nations Environmental Programme/World Health Organization.
- Mara, D. D. 1985. *The Design of Pour-Flush Latrines*. TAG Technical Note No. 15. Washington, D. C.: World Bank.
- Mara, D. D. 1996. *Low-Cost Urban Sanitation*. England, Chichester: John Wiley and Sons.
- Mara, D. D. 1997. *Design Manual for Waste Stabilization Ponds in India*. National River Conservation Directorate, Ministry of Environment and Forest, Government of India, and Department for International Development, UK.
- Mara, D. D. 1998. *Low-Cost Sewerage*. England, Chichester: John Wiley and Sons.
- Mara, D. D., A. Sleight, and K. Tayler. 2000. *PC-Based Simplified Sewer Design*. Leeds: University of Leeds (School of Civil Engineering).
- Ministry of Urban Development. 1995. *Manual on Sewerage and Sewage Treatment, 2nd edition*. New Delhi: Government of India Press.  
[http://urbanindia.nic.in/moud/publicinfo/manual\\_sewage.htm](http://urbanindia.nic.in/moud/publicinfo/manual_sewage.htm)
- Morel, A., and S. Diener. 2006. *Greywater Management in Low and Middle-Income Countries—A Review of Different Treatment Systems for Households or Neighbourhoods*. SANDEC, Switzerland.
- Otis, R.J., and D. D. Mara. (1985). *The Design of Small Bore Sewer Systems*. TAG Technical Note No. 14. Washington, D. C.: World Bank.

- Roy, A. K., et al. 1984. *Manual on the Design, Construction and Maintenance of Low-Cost Pour-Flush Waterseal Latrines in India*. TAG Technical Note No. 10. Washington, D. C.: World Bank.
- Sansom, K., R. Franceys, Cyrus Njiru, and J. Morales-Reyes. 2003. *Contracting out Water and Sanitation Services: Volume 1. Guidance Notes for Service and Management Contracts in Developing Countries*. WEDC, Loughborough University, UK.
- Sasse, L. 1998. *DEWATS Decentralised Wastewater Treatment in Developing Countries*. BORDA (Bremen Overseas Research and Development Association), Bremen.
- Sinnatamby, G. S. 1986. *The Design of Shallow Sewer Systems*. Nairobi: United Nations Centre for Human Settlements.
- Taylor, K., J. Parkinson, and J. Colin. 2003. *Urban Sanitation: A Guide to Strategic Planning*. UK: Practical Action Publications.
- UNEP (United Nations Environment Programme). 2004. *Guidelines on Municipal Wastewater Management*. Version 3. UNEP; WHO; UN-HABITAT and WSSCC (2004). The Hague, The Netherlands, UNEP GPA.
- US-EPA (United States–Environmental Protection Agency). 2002. *Onsite Wastewater Treatment Systems Manual*. EPA/625/R-00/008 February 2002. [www.epa.gov/nrmrl/pubs/625r00008/html/625R00008.htm](http://www.epa.gov/nrmrl/pubs/625r00008/html/625R00008.htm)

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***Annexure - R5***<sup>279</sup>

**National Mission for Clean Ganga**

**Ministry of Jal Shakti**

**Department of Water Resources, River Development &**

**Ganga Rejuvenation, Government of India**

**Environmental and Social Management Framework  
(ESMF)**

**Prepared by**

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## List of Abbreviations

AF	Affected Family
BPL	Below Poverty Line
CPRs	Common Property Resources
EA	Executing Agency
EMP	Environmental Management Plan
EP	Entitled Person
ESA	Environmental and Social Assessment
ESMF	Environmental and Social Management Framework
GAP	Ganga Action Plan
GEMP	Generic Environmental Management Plan
GoI	Government of India
GSMP	Generic Safeguard Management Plan
ha	Hectare
LAA	Land Acquisition Act
MoJS, DoWR, RD&GR	Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation
MoEF &CC	Ministry of Environment, Forests & Climate Change
NGO	Non-Government Organization
NGP	Namami Gange Program
NMCG	National Mission for Clean Ganga
NLCP	National Lake Conservation Plan
NRCD	National River Conservation Directorate
PAP	Project Affected Person
RFCTLARR 2013	Right to fair compensation and transparency in land acquisition, rehabilitation and Resettlement Act, 2013
R & R	Resettlement and Rehabilitation
RAP	Resettlement Action Plan
ROW	Right of Way
SC	Scheduled Caste
SMCG	State Mission for Clean Ganga
SRCA	State River Conservation Authorities
SECs	State Executive Committees
u/s	Under Section
ULB	Urban Local Body

## Glossary of Terms

Bigha	1/5 of an acre
Development Block	A number of villages grouped together form a Development Block.
District Collector/ Magistrate	Administrative head of a District.
Divisional Commissioner	Administrative head of a division comprising of a number of Districts.
Grievance Redress Cell	A cell set up for grievance redress by the competent authority at various levels
Hectare	A unit for measuring land area. (10,000 m <sup>2</sup> ).
Kachha	Structures with stone/ mud wall/ thatch roof
Non-titleholders	Drawing economic benefits from a piece of land, but not the owner of the land
Panchayat	Elected local self-governing body at village level.
Panchayat Samiti	Local Self-governing body at Block level
Pucca	Cement, bricks or concrete build structure
Sarpanch	Elected Head/chief of a village level body.
Semi Pucca	Structures with tiles/ thatch roof/ brick cement wall
Tehsil/ Subdivision	A group of Blocks

## EXECUTIVE SUMMARY

### Background

1. River Ganga has significant economic, environmental and cultural value in India. Rising in the Himalayas and flowing into the Bay of Bengal, the river traverses a course of more than 2,500 km through the plains of north and eastern India. The Ganga basin – which also extends into parts of Nepal, China and Bangladesh – accounts for 26 per cent of India's landmass, 30 per cent of its water resources and more than 40 per cent of its population. The Ganga also serves as one of India's holiest rivers whose cultural and spiritual significance transcends the boundaries of the basin.

2. Despite its importance, extreme pollution pressures pose a great threat to the biodiversity and environmental sustainability of the Ganga, with detrimental effects on both the quantity and quality of its flows. Increasing population in the basin and haphazard urbanization and industrial growth has significantly impacted the water quality of River Ganga, particularly during the dry season.

3. The previous attempt to clean the river, such as Ganga Action Plan (GAP) launched in 1985 have provided some gains in arresting rate of water quality degradation, but lot more needs to be done. The lessons drawn from this prior experience indicate that improving water quality in the Ganga three-pronged approach has been adopted as mentioned below:

- (i). Establishing a basin-level, multi-sectoral framework for addressing pollution in the river (including national/state policies and river basin management institutions);
- (ii). Making relevant institutions operational and effective (e.g. with the capacity to plan, implement and manage investments and enforce regulations); and,
- (iii). Implementing a phased program of prioritized infrastructure investments (with emphasis on sustainable operations and mobilization of community support)

4. As a major first step in this direction, the Government of India (GoI) has established the National Ganga River Basin Authority (NGRBA) in 2009 and National Council for River Ganga (Rejuvenation, Protection and Management) in 2016, as an Authority has been created for comprehensive management of the river. The NGRBA was established through Gazette notification of the Government of India S.O. No. 521 (Extraordinary) dated 20 February 2009 under section 3 of the Environment Protection Act, 1986, as an empowered planning, financing, monitoring and coordinating authority for the Ganga River.

5. The Namami Gange Programme launched in 2015 has adopted a river-basin approach and has been given a multi- sectoral mandate to address both water quantity and quality aspects. Under Namami Gange Programme, diverse set of interventions for cleaning and rejuvenation of river Ganga have been taken up. These include pollution abatement activities including sewage, industrial effluent, Solid Waste etc., River Front Management, Aviral Dhara, Rural Sanitation, Afforestation, Biodiversity Conservation, Public Participation etc. The programme covers short term, medium term and long term activities.

6. The pace of these projects has gathered momentum and all efforts are being made to complete these projects well within the respective timelines.

7. National Ganga River Basin Project (NGRBP) started in 2011 and funded by World Bank has now been included as a part of Namami Gange Programme.

### National Mission for Clean Ganga (NMCG)

8. The National Mission for Clean Ganga was established in the form of a national level Program Management Group (PMG) in 2011, for seeking \$1bn assistance from World Bank. Cabinet Committee on Economic Affairs (CCEA) accorded approval on 28.04.2011 for the World bank assisted National Ganga River Basin Project (NGRBP) at an estimated cost of Rs. 7000 crore to be implemented by NMCG as a registered Society under the Societies Registration Act 1860, to act as an implementation arm of NGRBA (External Funding).

9. With change in Allocation of Business Rules, 1961 vide Gazette Notification dated 31.07.2014, the work related to Ganga and its tributaries was transferred to Ministry of Water Resources, River Development and Ganga Rejuvenation (Now Ministry of Jal Shakti) from the Ministry of Environment & Forests. The next major development in the evolution of NMCG was launch of Namami Gange Programme on 13<sup>th</sup> May 2015 with the approval of Cabinet as a Central Sector Scheme (100% central assistance), with components including all objectives of NGRBA. The non-lapsable fund of Rs 20,000 crore was earmarked for five-year period, 2015-2020.

10. The Namami Gange Program with a definite timeline of five year required a truly empowered implementing body. This realization led to reconstitution of NMCG as an Authority on 7<sup>th</sup> October 2016. With simultaneous dissolution of NGRBA, the present form of NMCG as an Authority is the designated body to take all necessary decisions and actions for pollution abatement and rejuvenation of River Ganga.

Later in 2019, **Ministry of Jal Shakti** was formed by merging Ministry of Water Resources, River Development & Ganga Rejuvenation and Ministry of Drinking Water and Sanitation. Now, NMCG falls under the Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti.

### Brief Project Description

11. The earlier NGRBP programme usually has 70% central share and 30% state share at the sub-projects levels and support for 5 years of Operation and Maintenance. After launching of Namami Gange programme almost all the new projects sanctioned under Namami Gange Programme would have 100% funding from the Central Government for the entire life cycle cost of the assets created, which includes 15-year Operation & Maintenance cost as well. Namami Gange Programme has been segregated into three different components:

- ▶ **Component 1: Institutional Development:** This component will support to the national, state and municipal governments to strengthen implementation and financing arrangements and develop a framework to improve Ganga river basin management.
- ▶ **Component 2: Infrastructure Development:** Pertains to the initiatives to be undertaken under National Ganga Plan in 5 major sectors i.e. Infrastructure Development (Sewage Treatment, River Front Development, and Industrial Wastewater Treatment & Solid Waste Management), Ecological Sustainability and Research & Development and Communication & Public Outreach.
- ▶ **Component 3: Program communication and management:** NMCG conducts a range of vibrant communication activities ranging from ground-level community engagement exercises, social and traditional media outreach, public debates and lectures, to a flagship mass media campaign.

12. The Ganga-2 project is basically a continuation of Ganga-1 project with a portfolio of investment of US\$400 million under Ganga-2. The portfolio of river pollution mitigation projects to be implemented under the Namami Gange and its components areas under.

**Portfolio of Projects: NGRBP**

13. The portfolio of river pollution mitigation projects to be implemented under the Namami Gange and its components areas under.

S.No.	Portfolio of Projects	Components
(i)	Sewerage and Sanitation Schemes	<ul style="list-style-type: none"> <li>▪ Provision for an entirely new sewerage network including individual house connections and gravity based interception and diversion arrangements to drains carrying sanitary sullage/dry weather flow</li> <li>▪ Extensions to existing sewerage networks in some parts of cities/towns to include areas which are un-sewered hitherto or to newly developed areas in the recent years</li> </ul>
(ii)	Sewage Treatment Plants/Facility	<ul style="list-style-type: none"> <li>▪ Entirely new sewage treatment plant/facility</li> <li>▪ Augmentation of capacities in existing sewage treatment plant/facility</li> <li>▪ Remodeling/Renovation of existing sewage treatment facilities, resulting in better effluent quality and augmented treatment capacity</li> </ul>
(iii)	Solid Waste Treatment Facilities	<ul style="list-style-type: none"> <li>▪ Engineered landfills with leachate collection and treatment systems</li> <li>▪ Waste segregation and composting facilities</li> </ul>
(iv)	Industrial Pollution Control Facilities	<ul style="list-style-type: none"> <li>▪ Common Industrial Effluent Treatment Plants(CETP's)</li> <li>▪ Hazardous Waste Treatment, Storage and Disposal Facility(TSDF's)</li> <li>▪ Other Industrial Effluent Treatment and disposal facility</li> </ul>
(v)	River Front Development Schemes	<ul style="list-style-type: none"> <li>▪ River Front Development and beautification schemes of river banks</li> <li>▪ Construction of Bathing Ghats</li> <li>▪ Redevelopment of Cremation grounds, situated on river banks</li> <li>▪ Development of electric and or gas-based crematoriums situated on river banks</li> </ul>

14. The implementation of these projects is spread across several cities and/or towns within the Ganga basin states/UT of Uttarakhand, Uttar Pradesh, Haryana, Himachal Pradesh, Delhi, Bihar, Jharkhand, Rajasthan, Madhya Pradesh, Chhattisgarh and West Bengal.

**Key Achievements under Namami Gange Programme**

15. Under Namami Gange programme, till December 2019, a total of 310 projects have been sanctioned at an estimated cost of Rs.28909.59 Crore, out of which 114 projects have been completed and made operational; rest of the projects are at various stages of implementation. These projects are related to: Sewerage Infrastructure, Ghat Entry Level activities, Institutional development, project Implementation support/ research & study projects/ public relations and Public Outreach, Biodiversity education, Construction of IHHL across Gram Panchayats near Ganga River, Composite Ecological Task Force & Ganga Mitra, Bioremediation and Afforestation etc.

16. Under Ganga-1 (funded by World Bank), 35 sewerage and STP schemes are expected to be completed by December 2021 with installed STP capacity of 620 MLD and laying of 3035 km. of sewerage network. In these installed STP capacity by December 2021, nearly 424 MLD of sewage is expected to be treated and with this 25,032 Metric tonnes of BOD is expected to stop in getting discharged to river Ganga annually. Further, with completion of Patna River Front project (90% work is completed and opened to public) a good public place has been created to the people of Patna and has become a showcase for spreading awareness for river rejuvenation and proactive measures for disposal of solid waste in the river bank areas. The crematoria developed under Patna river front has enormously helped in reducing the burden of waste disposal associated with the cremation activities.

17. Additionally, the Ganga-1 has helped to developed the institutional mechanism in Namami Gange

projects to spread the programme to the district level by formation of NMCG, SMCGs (in UK, UP, Bihar, Jharkhand and West Bengal), State Ganga Committee and District Ganga Committee for suitable implementation and monitoring of projects. All these projects are generally supported with 15 years of Operation and Maintenance which is a paradigm shift in project formation as compared with previous Ganga cleaning programme. Further people's participation has been increased manifold for the success of the programme by organizing various state and national level programmes like "Swachhata Pakhwara" (15 days long programme to clean the banks along river between 15-30<sup>th</sup> March every year), Swachta Hi Sewa, Vraksharopan, Ganga Utsav, Rafting Expedition, Ganga Yatra etc.

18. For the 1<sup>st</sup> time, projects are packages in the forms of Hybrid annuity and PPP mode in the sewerage sector projects in India under the Ganga-1 (under Namami Gange) which ensures performance-based payment plan to enhance the performance of the STPs to meet the desired effluent criteria.

19. Since the roll-out of the HAM in 2016, 7 HAM projects have been awarded and 10 more are at different stages of preparation and bidding. A market study was carried out as part of the Ganga 2 preparation to capture the emerging lessons from the HAM contracting mode.

20. Till date out of the 35 sewerage projects sanctioned under Ganga-1 (world Bank funded), 11 projects are already completed, and another 15 projects are expected to be completed by December 2020.

#### **Identified Thrust Areas and Action Points under Namami Gange**

21. There are 7 identified thrust areas and 21 action points for the rejuvenation of Ganga and its tributaries, as below, the details are given in the main report.

- ▶ *Thrust Area 1-Aviral Dhara*
- ▶ *Thrust Area 2-Nirmal Dhara*
- ▶ *Thrust Area 3-Protection and Beautification of riverfront and development of Public amenities*
- ▶ *Thrust Area 4-Inter-ministerial Coordination, State's participation and Capacity building*
- ▶ *Thrust Area 5-Research and Monitoring*
- ▶ *Thrust Area 6-Conservation of plants and aquatic species*
- ▶ *Thrust Area 7-People's participation and Creating Awareness*

22. The Ganga 1 projects were mostly on the main-stem of river Ganga which covered the 5 basin States i.e. Bihar, Jharkhand, Uttar Pradesh, West Bengal and Uttarakhand. The Ganga 2 projects are in continuation to the Ganga 1 projects and sub-project which are similar in nature. The focus of NMCG has also included from Ganga main-stem to the polluted stretches of the tributaries of river Ganga. Thus, the need was felt for updating the ESMF to showcase the inclusion of the tributaries, projects and sub-projects with respect to Ganga 1 and Ganga 2.

23. Accordingly, the ESMF document has been updated to provide an overview of the Ganga basin profile including major tributaries like Ramganga, Kali, Yamuna (downstream of Delhi), Hindon, Gomti, Betwa, Chambal, Parbati, Shipra, Sind, Tons, Son, Damodar, Ajay, Burhi Gandak, Kiul, Kosi, Mahananda, Ken and Ghagra. The Ganga basin covers 11 States i.e. Uttarakhand, Uttar Pradesh, Haryana, Himachal Pradesh, Delhi, Bihar, Jharkhand, Rajasthan, Madhya Pradesh, Chhattisgarh and West Bengal.

#### **Environmental and Social Analysis (ESA) and Management Framework (ESMF)**

24. All potential projects and sub-projects planned under the NGRBP/Namami Gange programme may have environmental and social impacts. Therefore, the purpose of developing the Environmental and Social

Management Framework (ESMF) was to facilitate the management of environmental and social issues of all investment projects proposed by the NGRBA/Namami Gange at the very beginning of project planning and implementation. The ESMF currently addresses the broader portfolio of projects<sup>1</sup> to be implemented under the Namami Gange along with its implementation methods like Hybrid Annuity Mode (HAM), DBOT etc. As specific project identification will operate as a demand-driven process and also depends on many other factors like polluted river stretch etc., a single ESMF common to the NMCG, SMCG and all other project implementing agencies is required so that project specific ESIA and ESMP or ESDDRs are prepared based upon a common guideline. In this line the ESMF was updated depicting all the various process of project implementation and revised land acquisition details in August 2017. This version of the ESMF is now being updated considering the inclusion of tributaries; a basic profile of such tributaries is already presented in **Annex-I**.

#### **Objectives of ESMF:**

25. The ESMF for Namami Gange project<sup>2</sup> has following objectives:

- ▶ Determine key social and environmental issues associated with River Ganga and possible activities that could be initiated by NGRBA, both at national as well as state level;
- ▶ Conduct an environmental and social impact assessment of the investments proposed to be supported by the project, identify potential environmental and social impacts associated with such investments and recommend measures to mitigate impacts;
- ▶ Carry out an analysis of various stakeholders associated with the project, identify their concerns with regard to environmental and social aspects, and recommend measures to mainstream these aspects into the project;
- ▶ Develop an Environmental and Social Management Plan (ESMP) for the project, to ensure that environmental and social issues are effectively addressed in project design and implementation.

#### **Laws and Regulatory Framework**

##### *Relevant National key Legislations*

- *Environment Protection Act, 1986*
- *Environmental Impact Assessment (EIA) Notification 14<sup>th</sup> Sep' 2006*
- *Air (Prevention and Control of Pollution) Act, 1981*
- *Water Prevention and Control of Pollution Act, 1974*
- *The Noise Pollution (Regulation and Control) Rules, 2000*
- *The Wildlife (Protection) Act, 1972 and Its Amendments*
- *The Forest (Conservation) Act, 1980*
- *Solid Waste Management Rules, 2016*
- *Construction and Demolition Waste Management Rules, 2016*
- *Coastal Regulation Zone (CRZ) Notification 2011 & amendments after*
- *The Ancient Monuments and Archaeological Sites and Remains Act, 1958*
- *Disaster Management Act, 2005*
- *The National Green Tribunal Act, 2010*
- *Public Liability and Insurance Act, 1991*
- *Explosive Act, 1984*
- *Minor Mineral and concession Rules*
- *The Motor Vehicles (Amendment) Act, 2019*

<sup>1</sup>Portfolio of projects are discussed in detail in Chapter V

<sup>2</sup> 'Project' comprises all the sub-projects sanctioned under Namami Gange

- *National Forest Policy, 1988*
- *The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996*
- *Hazardous Wastes (Management and Handling) Rules, 1989 (the Rules govern handling, movement and disposal of hazardous waste);*
- *Manufacture, Storage and Import of Hazardous Chemicals Rules 1989, amended 1994 and 2000 (the Rules provide indicative criteria for hazardous chemicals and require occupiers to identify major accident hazards and prepare on-site and off-site emergency plans).*
- *Right to fair compensation and transparency in land acquisition, rehabilitation and Resettlement Act 2013*

#### **Applicable World Bank Policies**

- *Environmental Assessment (OP 4.01)- Umbrella Policy applicable for all infrastructural projects- Applicable in all Investment*
- *Natural Habitats (OP 4.04)- to protect natural habitat including forest & wildlife areas- Applicable where Forest and Wild Life are impacted due to project*
- *Forestry (OP 4.36) – to protect the health and quality of forest, welfare and right of people dependent on forest resource and utilization of natural forests or plantations. - Applicable where Forest land are impacted due to project*
- *Involuntary Resettlement (4.12)- to avoid minimize involuntary resettlement where feasible- Applicable in case of Private land Acquisition*
- *International Waterways (OP 7.50) - Since Ganga River and its tributaries are considered international waterways. Therefore, the policy has been triggered.*
- *Physical Cultural Resources (OP 4.11) - Considering the presence of number of historic and heritage structure in the project area and cultural significance of the Ganga River, this policy has been triggered.*

#### **Environmental and Social Baseline**

26. The Ganga basin encompasses an area of more than a million square kilometers (1,086,000 sq.km.) spread over four countries: India, Nepal, Bangladesh and China. With 861,404 sq.km. within India itself, the Ganga basin is the largest river basin in India and covers approximately 26.3 per cent of India's total geographical area. The Ganga flows through the states of Uttarakhand, Uttar Pradesh, Bihar, Delhi, Haryana, Himachal Pradesh, Madhya Pradesh, Jharkhand and West Bengal. The Ganga rises in the Garhwal Himalaya (30° 55'N, 79°7'E) as the Bhagirathi. Throughout the course of the Ganga, from its source at Gaumukh to its mouth at Sagar Island in Bay of Bengal, it is a common practice for Indians to take daily dip in the holy waters of the Ganga, especially at places of pilgrimage like Rishikesh, Haridwar, Garhmukteshwar, Kannauj, Prayagraj (formerly known as Allahabad), Mirzapur and Varanasi.

27. Based on stream characteristics, the entire 2,525 km course of the Ganga can be divided into the following major five sections: (i) mountainous, (ii) upper plain, (iii) middle plain, (iv) deltaic non-tidal and (v) deltaic tidal plain. In term of physiography, the Ganga basin falls entirely in three major i.e. 1) Northern Mountains, (2) Great Plains (3) Central Highlands regions of India. Major soil type of the Ganga Basin is alluvial soil 52% followed by red soil (11%). Climatically, the tropical and subtropical temperature zones are most predominant in the entire Ganga basin. May is the hottest month in most part of the basin, while January is coldest. The weather in the Ganga basin is characterized by a distinct wet season during the period of south west monsoon (June to September). The Ganga basin, by virtue of its alluvial makeup, is endowed with vast resources of ground water. The mean annual replenishable groundwater in India as a whole has been assessed at 446.87 billion cumec per year, of which about 219.09 billion cumec per year (49%) lies in the states of the Ganga basin. Land use of the Ganga basin is extensively cultivated, constituting approximately more than 45 per cent of the total area of the India. With respect to forest cover, Ganga basin

has 17.53% of forest cover to its total geographical region; this is comparatively lesser than country level (21%). This may be due to having major area occupied under Agriculture.

28. The detailed baseline profile of other tributaries is presented in **Annex-I**. Increasing population, urbanization, industrialization, and the use of agricultural chemicals continue to pose a significant threat to water quality in the Ganga basin today. The number of cities and towns in the Ganga basin has increased from 1873 in 1991 to 1949 in 2001, while the urban population has increased from 88 million in 1991 to 128 million in 2001. As per census 2011, total 324 class I and class II cities are located in Ganga Basin.

29. The Ganga basin evidently demands treatment of sewage and minimum ecological flow for its survival as a river. Since a river is a living eco-system and therefore ultimate goal should be to protect the functioning of the river eco-system.

30. The Ganga basin is one of the most densely populated and fertile river basins in the world. The basin supports about 600 million people over an area of approximately 860,000 sq. km of which some 100 million are directly dependent on the river and its tributaries.

31. For Ganga stem cities/town, projects have been taken up to create 3308 MLD sewage treatment capacity against the generation of 2953 MLD (Year 2016). The sewage treatment capacity in Ganga main stem towns have now increased from 1575 MLD (Year Dec 2016) to 1954 MLD (Sept 2019), excluding 410 MLD sewage treatment through East Kolkata Wetland.

#### Identification of potential Environmental and Social Impacts and Mitigation Measures

32. Since the Project proposed under Namami Gange Scheme are pollution abatement project of River Basin. Although few negative impact may also be encountered due to having project proposal on a fresh land, located in busy city limit and catering city' sanitation etc. Potential Impact and Mitigation measures applicable for Namami Gange project has been detailed in **Appendix I** of the ESMF Guideline. However, major impact with respect to Environment and Social is presented below:

Type of Project	Potential major Impact
Sewerage Scheme	<ul style="list-style-type: none"> <li>• surface and groundwater contamination due to leakage and/or improper joints in sewers</li> <li>• severance of utilities and requirement for relocation due to sewer laying</li> <li>• disruption due to local traffic diversion and congestion during sewer laying works</li> <li>• impact on public/private properties and other sensitive receptors along the sewer alignment during construction</li> <li>• disposal of excess excavated soil and construction debris</li> <li>• Exploitation of water sources for meeting construction water demand.</li> <li>• air and noise pollution from construction equipment's</li> <li>• Health and safety concerns of workers, while laying or rehabilitating existing sewers.</li> </ul>
Sewage Treatment Plants	<ul style="list-style-type: none"> <li>• change in land use pattern, in case of proposed sewage treatment plants at new locations</li> <li>• change in channel hydraulics, triggering erosion and siltation problems, if sewage treatment plants are proposed in flood plains</li> <li>• change in hydrology and drainage patterns due to the construction activity, particularly, if sewage treatment facility is located in flood plains</li> <li>• Health and safety issues associated with operation and maintenance of sewage</li> </ul>

Type of Project	Potential major Impact
Industrial Pollution Control Initiatives	<p>treatment facility, particularly exposure to methane and other noxious gases, sludge contaminated with heavy metals etc.</p> <ul style="list-style-type: none"> <li>● issues associated with the disposal of sludge, if sewage is likely to be contaminated with heavy metals due to mix of industrial waste with sewage</li> <li>● Emission of methane, if not utilized for power generation or any other gainful applications.</li> <li>● water logging problems due to improper/ inadequate disposal of treated effluent or effluent not conforming to stipulated discharge standards during operation</li> <li>● Sludge from a waste treatment plant may constitute a hazardous and nonhazardous waste.</li> </ul>
Solid Waste Management Investments	<ul style="list-style-type: none"> <li>● Pollution of water resources</li> <li>● Soil contamination due to the disposal of untreated / partially treated effluents and / or hazardous wastes</li> <li>● air quality, odor and fly nuisance due to the improper operation of treatment facilities</li> <li>● health impacts on the neighboring communities</li> <li>● Issues of leachate and loss of productivity to agriculture lands due to the disposal of sludge from the facilities.</li> </ul> <ul style="list-style-type: none"> <li>● surface and ground water contamination due to unmanaged leachate collection and disposal</li> <li>● change in channel hydraulics, triggering erosion and siltation problems, if solid waste management facility is proposed in flood plains</li> <li>● change in hydrology and drainage pattern, if the facility is located in flood plains</li> <li>● air quality, odor and fly nuisance due to the improper operation of waste disposal or processing facilities</li> <li>● issues pertaining to siting of facility such as change in land use pattern, proximity to settlements, cultural properties and any other sensitive receptors</li> <li>● air and noise pollution from construction equipment's</li> <li>● Health and safety issues associated with operation and maintenance of solid waste treatment facility, particularly of workers manually handling wastes.</li> </ul>
River Front Management Investments	<ul style="list-style-type: none"> <li>● change in land use, and drainage pattern</li> <li>● change in channel hydraulics, triggering erosion and siltation problems either at in situ or elsewhere along the course of river</li> <li>● impact due to inadequate solid and liquid waste disposal arrangements</li> <li>● impact due to inadequate sanitation, health and safety facilities</li> <li>● impact on river water quality due to proposed amenities</li> <li>● impact on environmental aesthetics and cultural value</li> </ul>
Major Social Impact applicable for all kind of project	<ul style="list-style-type: none"> <li>● Direct purchase of small land parcels for SPS/ Lifting station</li> <li>● Land acquisition / taking for sewerage treatment plant leading to loss of livelihood / displacement of non-titleholders / titleholders</li> <li>● Temporary land taking causing inconvenience to local community</li> <li>● Temporary loss of common grazing area</li> </ul>

33. **Mitigation Measure:** Mitigation measure applicable during planning -designing phase, construction phase and operational phase has been presented in **Appendix III A & III B** of ESMF for Sewerage scheme and STP projects. Few insights of major points are described below, which is applicable for all STP, Sewerage and River Front Development projects:

- ▶ **Regulatory Compliance:** Obtain necessary approval with respect to project as per regulatory compliance

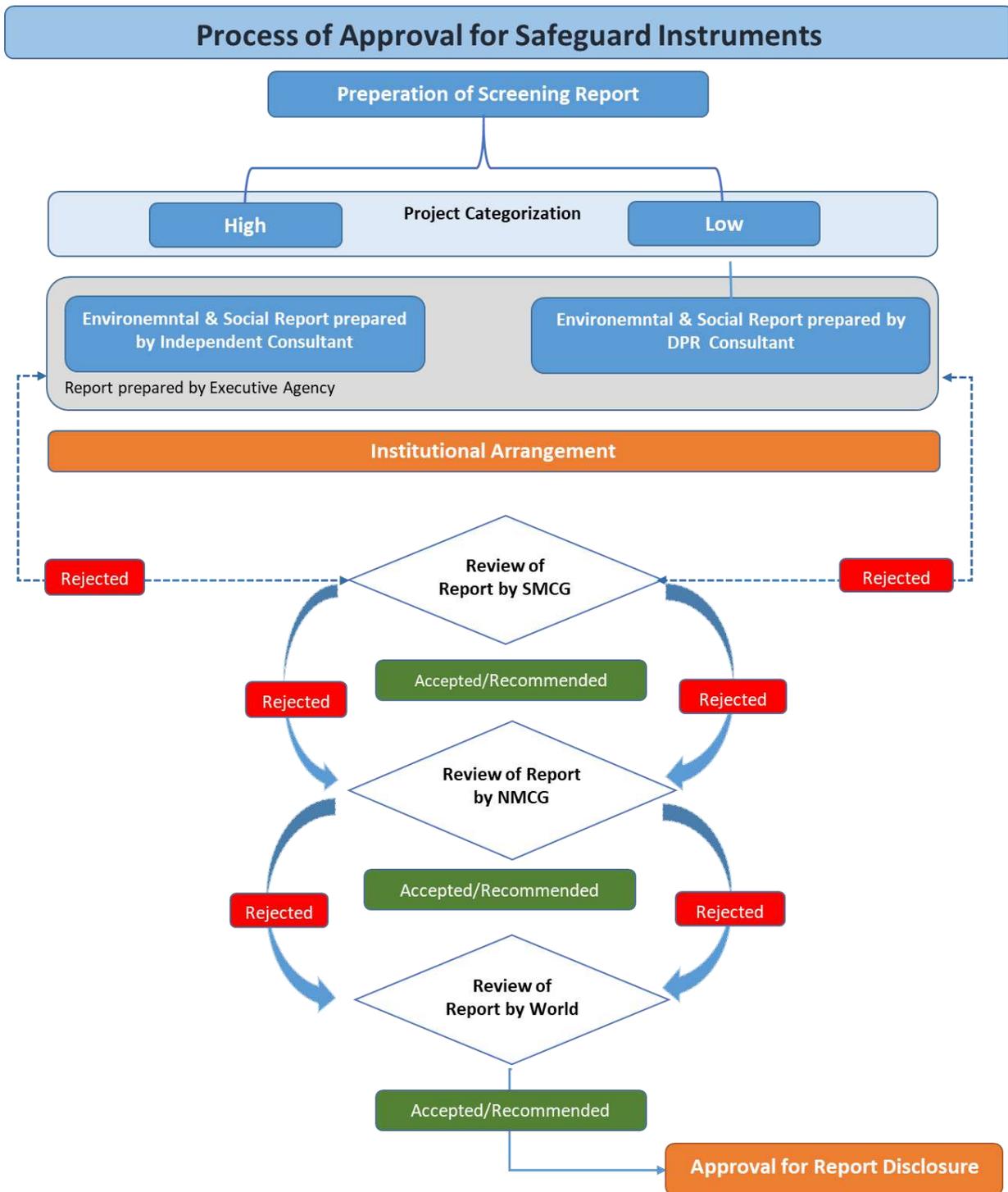
- ▶ **Flood Risk Management:** The Design Consultants should design for bypass arrangements, to discharge untreated sewage.
- ▶ **Landscape:** Undertake Landscape afforestation in nearby areas this will also to cater the issue of Odor, Noise.
- ▶ **Treated Wastewater:** The treated water quality shall comply with the standards laid down by the state pollution control board for disposal onto the land, water body or for irrigation use.
- ▶ **Sludge:** Providing adequate and safe sludge disposal facilities, Digested Sludge from a waste treatment plant may constitute a hazardous and nonhazardous waste, therefore periodic testing of Sludge to assess the content of hazardous chemical should be identified (as per CPHEEO manual 2016) before its final disposal at the identified dumping site of MC. Dumping shall be done when the authorized land fill site is not available nearby to project region.
- ▶ **Location:** Careful planning and design of STP with adequate buffer zones. Future growth of the surrounding areas shall be considered. Select appropriate location away from sensitive locations such as schools and hospitals other Air, water, Noise, Soil Pollution control measure during construction stage (presented in Sample EMP).
- ▶ **Health and Safety:** During construction stage, assurance of safe work environment and incident free execution of the project, health and safety of worker as well as overall project is significant in the Namami Gange projects. As per relevant Factory Act 1948 & The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, concessionaire has to be ensured all related measures reflected in the Site specific ESMP of the projects and will be part of Bid documents.

#### **Procedure for Environmental and Social Management**

34. The Environment and Social Management Framework (ESMF) is an integral part of the NGRBA framework document. The ESMF is aligned with the Environment and Social safeguard policies of World Bank and the concerned rules and regulations of Government of India. This would be used as an umbrella guideline by the Namami Gange program (the NMCG and SMCGs) while preparing and/ or appraising, approving and executing the investments.

#### **Environment and Social Assessment for DBOT Projects:**

35. As per ESMF guideline each project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts (Screening Checklist), based on outcome of screening analysis, proposed investment shall be categorized as High and Low category. Therefore, as per ESMF, the sub-projects are categorized into (i) High Impact and (ii) Low Impact category, in which, for High Category Project, a detailed Environment and Social Assessment and Management Plan (ESAMP) has been carried out preferably by a separate consultant apart from the DPR consultant. The procedures for implementation of ESMF in these types of projects are summarized in above flow chart. The approved ESAMP will form part of the bidding document. After the award of work the selected contractor may need to update the ESAMP based upon the detailed design of the project and shall prepare a site specific ESAMP.



**Environment and Social Assessment for the HAM based PPP Projects:**

36. The agreed action for Environment and Social assessment of projects under HAM projects include:
- ▶ ESDDR along with Environment and Social Management Action Plan (ESMAP) will be prepared at the DPR stage;
  - ▶ The ESDDR will cover the basis nature of the projects, a very brief description of the environment and present status along with screening checklist and an analysis of environmental and social issues associated with the project.
  - ▶ The ESDDR (carried out by the project) will describe the future action plan to be taken during the detailed design stage by the Concessionaire<sup>3</sup> like:

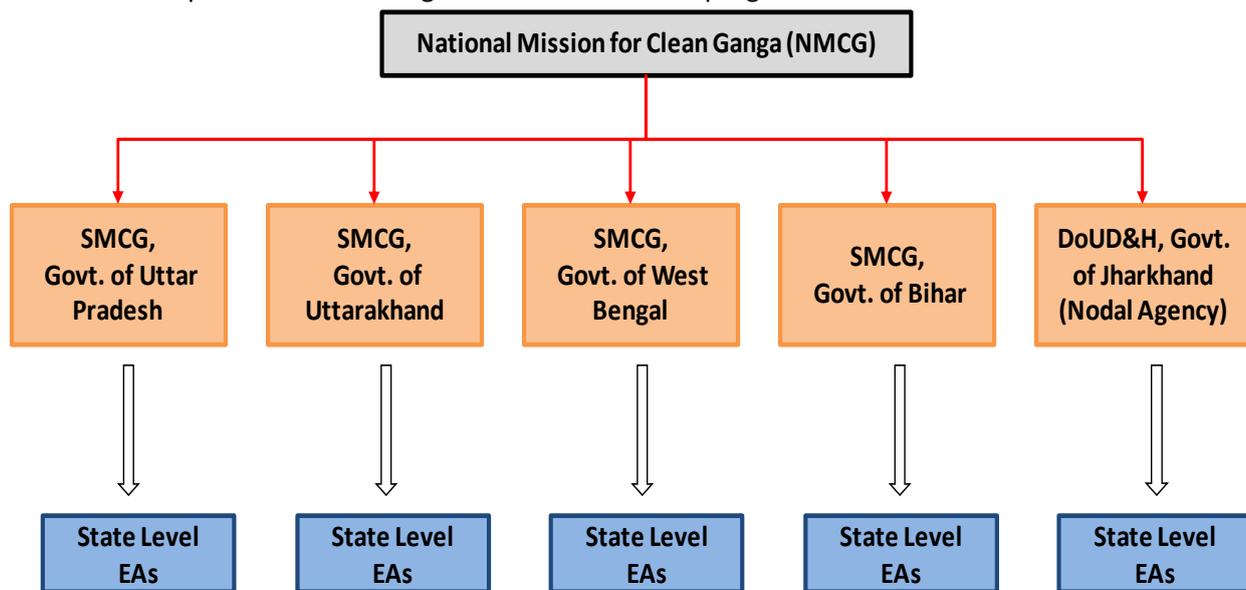
<sup>3</sup> Concessionaire is a company who signs the concession agreement with the owner (NMCG/SMCG/Executive Agency) to complete the investment under Hybrid Annuity Mode (HAM).

- Various regulatory clearances (e.g. environmental clearance, forest clearance, NOC etc. as applicable)
- Preparation of Environmental and Social Assessment (ESA)/EIA
- Resettlement Action Plan (RAP), as applicable
- other actions, and management measures to be implemented by the Concessionaire

37. ESDDR can become part of the bidding document. The public consultation and disclosure process will continue during project implementation. The draft EIA/EMP/RAP etc. for the specific sub-projects will be discussed with the affected communities and the final documents will be placed on the websites of the NMCG and the SMCGs. The copies of the EMP and RAP will also be placed at the offices of the executing agencies, district magistrate and contractor's office. The executive summary of the EIA and RAP will also be translated into local language and placed in the office of the Gram Panchayat of the affected villages.

38. **Project Monitoring and Training:** NMCG, through the respective SMCGs monitors all the approved investments under the Namami Gange program to ensure conformity to the requirements of the ESMF. The training program for SMCG, EA and various relevant stakeholders has been envisaged in ESMF, includes an orientation program on the ESMF, Project Management, Engineering and Public Health. Module has been at **Table 7-3**.

39. The implementation arrangements for the NMCG program are summarized below



40. **Institutional Arrangement** The NMCG, through the respective SMCGs will monitor all the approved investments under the Namami Gange program to ensure conformity to the requirements of the ESMF. The monitoring will cover all stages of construction, operation and maintenance. The monitoring will be carried out through the environmental and social safeguard compliance reports that form a part of Quarterly Progress Reports for all investments and regular visits by the environmental and social specialists of the NMCG and SMCGs. In addition to the above, the NMCG will undertake an annual ESMF audit and will review the status of ESMF compliance, as per the sample terms of reference provided in **Appendix VI**. World Bank also make necessary mission visits to the project sites once in six months to check the safeguard measures for ongoing projects as well as projects under operation. During the mission visits necessary compliance monitoring of the previous mission is also checked.

41. At the NMCG as well at the 5 SMCG levels, one officer for Environmental Safeguard and once officer

for Social safeguard are appointed for managing social and environmental issues. These officers assist the EAs in implementation of ESMF provisions. In the EA, an officer each are designated as social and environment officer who are responsible for the implementation of ESMF tasks at the field level with the assistance and participation of the local self-government.

42. Further in each of the sub-project levels, each of the contracting agencies also deploy their own Environment and Health and Safety officer to implement the ESAMP at site.

43. **Present Functionality of Grievance Redress Mechanism:** At NMCG GRM officers are designated to address all queries registered in the NMCG portal. The GRM officer is supported by one social expert who coordinates with all the SMCGs. At SMCG level, reporting of grievances are being monitored by environmental and social experts. The details are mentioned in the report.

# 1. BACKGROUND

## 1.1. INTRODUCTION

1. River Ganga has significant economic, environmental, and cultural value in India. Rising in the Himalayas and flowing into the Bay of Bengal, the river traverses a course of more than 2,500 km through the plains of north and eastern India. The Ganga basin (which also extends into parts of Nepal, China and Bangladesh) accounts for about 26 percent of India's landmass, 30 percent of its water resources, and more than 40 percent of its population. Ganga is India's holiest river and has a cultural and spiritual significance that far transcends the boundaries of the basin.

2. Increasing population in the basin and haphazard urbanization and industrial growth has significantly impacted the water quality of River Ganga, particularly during the dry season. The primary sources of pollution are untreated sewage and industrial wastewater. Non-point pollution sources from agriculture and livestock, religious activities at various locations along the river, as well as poor solid waste management, also contributes to pollution. In addition, substantial abstraction of water, primarily for irrigation, has led to low flows and associated poor water quality in the critical middle stretch of the river.

3. The previous attempt to clean the river, such as Ganga Action Plan (GAP) launched in 1985 have provided some gains in arresting rate of water quality degradation, but lot more needs to be done.

4. Lessons from earlier experience indicate that improving water quality in the Ganga cannot be achieved by plugging the infrastructure gap alone. Any effective initiative will have to adopt a three-pronged approach by (i) establishing a basin-level multi- sectoral strategy for addressing pollution in the river (ii) making relevant institutions operational and effective and (iii) implementing a phased program for Ganga clean-up.

5. As a major first step in this direction, the Government of India (GoI) has established the National Ganga River Basin Authority (NGRBA) in 2009 and National Council for River Ganga (Rejuvenation, Protection and Management) in 2016, as an Authority has been created for comprehensive management of the river. The Namami Gange Programme will adopt a river-basin approach and has been given a multi- sectoral mandate to address both water quantity and quality aspects. The Namami Gange Program has resolved that by year 2020 no untreated municipal sewage or industrial effluent will be discharged into River Ganga. National Ganga River Basin Project (NGRBP) started in 2011 is funded by World Bank has now been included as a part of Namami Gange Programme.

## 1.2. OBJECTIVE

6. The Namami Gange program will finance infrastructure investments to reduce pollution loads at priority locations on the river. The investments are intended to exemplify, among other attributes, the high standards of technical preparation and implementation, sustainability of operations, and public participation. Most investments in the Namami Gange program are expected to be in the wastewater sector, particularly in wastewater treatment plants and sewerage networks. Investments will also be supported in industrial pollution control and prevention (e.g. common effluent treatment plants), solid waste management (e.g. collection, transport and disposal systems), and river front management (e.g. improvement of the built

environment along river stretches, improvement of small ghats and electric crematoria, and the conservation and preservation of ecologically sensitive sites). Many investments are likely to combine elements of more than one of these sectors.

7. An investment framework has been finalized for selection of program investments. The objectives of this investment framework are to:

- a) Provide a filter for all the Namami Gange investments for ensuring that the selected investments are well-prepared and amongst the most effective in reducing the pollution loads;
- b) make transparent the decision-making process on investments selection;
- c) Ensure that the investments are implemented in a sustainable manner; and
- d) Investment projects needs to ensure compliance with National and local Environmental and Social legislation/regulation, World Bank safeguards policies as well as EHS guidelines (wherever applicable).

### 1.3. THE ESMF

8. The **Annex-I** covers River Ganga and some of the major and minor tributaries which are spread across the eleven Ganga basin States/UT of Uttarakhand, Uttar Pradesh, Haryana, Himachal Pradesh, Delhi, Bihar, Jharkhand, Rajasthan, Madhya Pradesh, Chhattisgarh and West Bengal. The tributaries of Ganga covered in ESMF are Ramganga, Kali, Yamuna (downstream of Delhi), Hindon, Gomti, Betwa, Chambal, Parbati, Kshipra, Sind, Tons, Son, Damodar, Ajay, Burhi Gandak, Kiul, Kosi, Mahananda, Ken and Ghagra.

9. The Aravalli ranges have been designated as Natural Conservation Zone in the Plan in accordance with Regional Plan-2021. For protection of Aravallis, the notification of the MoEF, Government of India dated 07.05.1992, shall be applicable. Similarly, for execution of any project, the project proponent will have to obtain environmental clearance in terms of notification dated 14.09.2006, which is mandatory in nature. Similarly, the restrictions applicable to the Eco-Sensitive Zone notified by MoEF or for protection of environment shall also be followed and implemented.

10. Few of the tributaries of Yamuna (Chambal, Sahibi) which have influence of Aravalli region in the state of Rajasthan and Haryana are Eco sensitive area. In order to protect the area falling under Aravalli Range and restrict activities which are likely to cause environmental degradation, MOEF &CC has issued a notification dated 7th May, 1992, and prohibit tree cutting, mining and new development activities like Construction of any clusters of dwelling units, farms houses, sheds, community centers, information centers, Transmission line etc. Punjab land preservation Act 1900 is applicable in these zones, so in case of involvement of any project interventions such as (establishment of STP, CETP, and Landfill site) prior approval from MOEF &CC shall be required along with preparation of EIA, EMP according to respective guideline.

11. The Ganga 1 projects were mostly on the main-stem of river Ganga which covered the 5 basin States i.e. Bihar, Jharkhand, Uttar Pradesh, West Bengal and Uttarakhand. The Ganga 2 projects are in continuation to the Ganga 1 projects and sub-project which are similar in nature. The focus of NMCG has now Included Ganga main-stem to the polluted stretches of the tributaries of river Ganga. Thus, the need was felt for updating the ESMF to showcase the inclusion of the tributaries, projects and sub-projects with respect to Ganga 1 and Ganga 2. Ganga 2 is the continuation of Ganga 1. The projects in Ganga 2 have been taken up on the tributaries of river Ganga especially the Kali, Ramganga, Hindon, and Yamuna (downstream of Delhi). Further, the updation of the ESMF has also provided an opportunity to update the report based on the latest information w.r.t. identified thrust areas and action points; key achievements; funding mechanism;

brief on Namami Gange programme, NMCG Authority and Ministry of Jal Shakti; Vision & objectives of NMCG; Policy making Apex Council, State Ganga Committees; State River Conservation Authorities; census data; water quality monitoring data; water supply; waste water and sewage generation data.

12. Under Ganga-1 (funded by World Bank), 35 sewerage and STP schemes are expected to be completed by December 2021 with installed STP capacity of 620 MLD and laying of 3035km of sewerage network. In these installed STP capacity by December 2021, nearly 424 MLD of sewage is expected to be treated and with this 25,032 Metric tonnes of BOD is expected to stop in getting discharged to river Ganga annually. Further, with completion of Patna River Front project (90% work is completed and opened to public) a good public place has been created to the people of Patna and has become a showcase for spreading awareness for river rejuvenation and proactive measures for disposal of solid waste in the river bank areas. The crematoria developed under Patna river front has enormously helped in reducing the burden of waste disposal associated with the cremation activities.

13. Additionally, the Ganga-1 has helped to developed the institutional mechanism in Namami Gange projects to spread the programme to the district level by formation of NMCG, SMCGs (in UK, UP, Bihar, Jharkhand and West Bengal), State Ganga Committee and District Ganga Committee for suitable implementation and monitoring of projects. All these projects are generally supported with 15 years of Operation and Maintenance which is a paradigm shift in project formation as compared with previous Ganga cleaning programme. Further people's participation has been increased manifold for the success of the programme by organizing various state and national level programmes like "Swachhata Pakhwara" (15 days long programme to clean the banks along river between 15-30<sup>th</sup> March every year), Swachta Hi Sewa, Vraksharopan , Ganga Utsav, Rafting Expedition , Ganga Yatra etc.

14. For the 1st time, projects are packages in the forms of Hybrid annuity and PPP mode in the sewerage sector projects in India under the Ganga-1 (under Namami Gange) which ensures performance-based payment plan to enhance the performance of the STPs to meet the desired effluent criteria.

15. With the addition of tributaries under Ganga 2, baseline section of the ESMF was updated to reflect the baseline status of expanded project boundary. The Technical Assistance programme of Ganga 1 supported a comprehensive and multidisciplinary Strategic Social and Environmental Assessment (SESA). The SESA was completed in March 2020 and recommendations given will be suitably integrated in the various activities of Ganga 2. An annual E&S Audit of the all the sub projects has been undertaken for the last two years. The Audit results shows compliance with the project ESMF.

16. Since the roll-out of the HAM in 2016, 7 HAM projects have been awarded and 10 more are at different stages of preparation and bidding. A market study was carried out as part of the Ganga 2 preparation to capture the emerging lessons from the HAM contracting mode.

17. Given the distributed nature of investments in multiple states, the investments under the program may entail environmental and social impacts. The environment and social frameworks intended to help manage the social and environmental impacts through appropriate measures during the planning, design, construction and operation phases of various investments. The framework will identify the adverse environment and social impacts and provide specific guidance on the policies and procedures to be followed for environmental and social assessment along with roles and responsibilities of the implementing agencies.

18. The projects taken up by NMCG are taken up either on DBOT or on Hybrid Annuity based PPP mode (HAM). The projects of NMCG will be developed by a private sector entity selected through PPP concept

under annuity or Hybrid annuity or any other contractual arrangement between the public entity and a private company. Under this model, Environment and Social Due Diligence Report (ESDDR) and Environment and Social Management Action Plan (ESMAP) will be prepared at the DPR stage. The ESDDR would cover the brief description of the environment, current status with screening checklist and analysis of both social and environmental project related issues and ESMAP would include the action plan to be taken during the design stage.

19. The document essentially comprises the following key sections:
- ▶ A brief summary of key probable Environmental and Social Impacts
  - ▶ Environment and Social Regulatory Framework applicable for the program
  - ▶ Environment Management Framework
  - ▶ Social Management Framework
  - ▶ Project Appraisal, Monitoring and Reporting Arrangements
  - ▶ Institutional Arrangements
  - ▶ Training and Capacity Building for ESMF

## **2. PROGRAMMES AND INSTITUTIONAL FRAMEWORK**

### **2.1. BACKGROUND**

20. In order to achieve the objective of 'Clean Ganga by 2020', NGRBA provides financial assistance for implementation of river pollution abatement/mitigation projects in Ganga basin states. The first phase of such initiative is supported by The World Bank, in the states of Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. In addition to complying with various technical and performance standards, the projects to be supported under this program shall comply with the Environmental and Social Management Framework, as detailed out in the earlier sections. The implementation, monitoring and reporting arrangements for the ESMF have been worked out within the overall institutional structure for implementation of the NGRBA program, as described in the sections below.

### **2.2. NGRBA**

21. The Government of India (GoI) constituted the National Ganga River Basin Authority (NGRBA), on 20th February 2009, for comprehensive management of the Ganga River under section 3(3) of the Environment Protection Act, 1986. Under the same Act, the eleven NGRBA program states have notified the State River Conservation Authorities (SRCAs) thereby defining the apex policy and decision-making structure at the state level. The Union Ministry of Environment and Forests (MoEF) was the nodal agency for the NGRBA program and will have the lead responsibility for project implementation and ensuring that the project development objectives are met. Similarly, at the state level, the SRCA nodal departments will have the responsibility for project implementation in the respective states. As a major first step in this direction, the Government of India (GoI) has established the National Ganga River Basin Authority (NGRBA) in 2009 and in 2016 National Council for River Ganga (Rejuvenation, Protection and Management), as an Authority has been created for comprehensive management of the river. The Namami Gange Programme will adopt a river-basin approach and has been given a multi- sectoral mandate to address both water quantity and quality aspects.

### **2.3. NAMAMI GANGE PROGRAMME**

22. Government of India launched "Namami Gange" an Integrated Conservative Mission programme on 13<sup>th</sup> July 2015. The Namami Gange programme is an umbrella programme which covers the previously sanctioned ongoing projects as well as the projects in new components with multi sector mandate to address both water quality and water quantity issues. The programme aims at integrating previous and currently ongoing initiatives by enhancing efficiency, extracting synergies and supplementing them with more comprehensive and better coordinated interventions. The programme structure attempts to bring all stakeholders on one platform to take a holistic approach towards the task of Ganga cleaning and rejuvenation. Namami Gange Programme has been segregated into two different components:

<b>Component 1</b> Institutional Development	: This component will support to the national, state and municipal governments to strengthen implementation and financing arrangements and develop a framework to improve Ganga river basin management.
<b>Component 2</b> Infrastructure Development	: Pertains to the initiatives to be undertaken in 5 major sectors i.e. Infrastructure Development (Sewage Treatment, River Front Development, and Industrial Wastewater Treatment & Solid Waste Management), Institutional Development, Ecological Sustainability, Research & Development and Communication & Public Outreach.
<b>Component 3</b> Program Communication and Management	: NMCG conducts a range of vibrant communication activities ranging from ground-level community engagement exercises, social and traditional media outreach, public debates and lectures, to a flagship mass media campaign

23. In addition to the physical resource value, the socio-cultural significance of Ganga River is also enormous. Despite this iconic status and religious heritage, the Ganga today is facing formidable pollution pressures, along with the attendant threats to its biodiversity and environmental sustainability. The absence of adequate infrastructure, along with weak environmental governance and little technical expertise to manage these extreme pollution pressures, has resulted in the rapid deterioration of the water's quality in recent decades. At the same time, the River is extremely polluted, and many studies point to its high level of environmental depletion. The World Bank recognizes that the pollution in River Ganga is primarily a result of inadequate infrastructure, the weak capacity of local water and wastewater utilities in the basin, and the poor state of environmental monitoring and regulation. It is further attributed to factors such as (i) inadequacy of municipal wastewater infrastructure and services, (ii) industrial pollution, (iii) solid waste and non-point sources, and (iv) inadequate in-stream flows.

24. The major development in the evolution of NMCG was launch of Namami Gange Programme on 13th May 2015 with the approval of Cabinet as a Central Sector Scheme (100% central assistance), with components including all objectives of NGRBA. Rs 20,000 crore non-lapsable funds were earmarked for five-year period, 2015-2020.

#### 2.4. NMCG AUTHORITY

25. NMCG has been constituted as authorities at Central, State and District levels vide Notification no. Estt-01/2016-17/111/NMCG dated 7th October 2016 under the provisions of EP Act, 1986, to take measures for prevention, control and abatement of environmental pollution in River Ganga and to ensure continuous adequate flow of water so as to rejuvenate the River Ganga to its natural and pristine condition and for matters connected therewith. As per the above notification, NMCG is to be constituted as National Council for Rejuvenation, Protection and Management of River Ganga. Accordingly, State Ganga Rejuvenation, Protection and Management Committee and District Ganga Protection Committee has been constituted in the 9 States (Uttarakhand, Uttar Pradesh, Jharkhand, Bihar, West Bengal, Chhattisgarh, Himachal Pradesh Madhya Pradesh and Rajasthan) and its districts.

#### 2.5. THE MINISTRY OF JAL SHAKTI (DEPARTMENT OF WATER RESOURCES, RIVER DEVELOPMENT AND GANGA REJUVENATION)

26. Ministry of Jal Shakti is a ministry under Government of India which was formed in May 2019

with a vision of “Optimal sustainable development, maintenance of quality and efficient use of water resources to match with the growing demands on this precious natural resource of the country”. This ministry was formed by merging of two ministries; Ministry of Water Resources, River Development & Ganga Rejuvenation and Ministry of Drinking Water and Sanitation.

27. The ministry has been incorporated with an aim to clean the river Ganges. They would also be engaged in coordination, mediation and facilitation in regard to the resolution of differences or disputes relating to Inter-State Rivers and in some instances overseeing of implementation of inter-state projects and negotiate talks with neighboring countries, with regard to river waters, water resources development projects and the operation of the Indus Water Treaty. The ministry has also launched its special campaigns on social media so that citizens of the country become aware of water conservation.

28. The Minister of Jal Shakti is the head of this ministry and is one of the cabinet ministers of the Government of India.

## 2.6. NMCG: VISION

29. The vision for Ganga Rejuvenation constitutes restoring the wholesomeness of the river defined in terms of ensuring “Aviral Dhara” (Continuous Flow), “Nirmal Dhara” (Unpolluted Flow), geologic and ecological integrity. There are 7 identified thrust areas and 21 action points for the rejuvenation of Ganga and its tributaries. These thrust areas and action points are as under:

**Table 2-1: Thrust Areas and Action Points**

Thrust Areas	Action Points
1. Aviral Dhara	1. Determine and maintain environmental flow
2. Nirmal Dhara	2. Upgrade existing Sewage Treatment Plants
	3. Creating additional treatment capacity
	4. Industrial pollution abatement
	5. Development of ‘Ganga Grams’
	6. Managing agricultural run-off
	7. Development of model dhobi ghats
	8. Creating model cremation ghats
3. River Front Development	9. River Front Development
	10. Public amenities in selected towns
	11. Ganga Task Force
4. Capacity Building	12. Support for DPR preparation
	13. Capacity Building
5. Research and Monitoring	14. GIS and Spatial Planning
	15. Research projects
	16. National Ganga Monitoring Centre
	17. Ganga knowledge centre and Ganga institute of river sciences
6. Protection of aquatic flora and fauna	18. Afforestation drive of medicinal plants and native tree species
	19. Conserving diversity of Gangetic aquatic life
7. Awareness Creation	20. Ganga vichar manch, Ganga prahari, Ganga mitra
	21. Communication and Public Outreach Activities

## 2.7. NMCG: OBJECTIVES

30. The Namami Gange program will finance infrastructure investments to reduce pollution loads at priority locations on the river. The investments are intended to exemplify, among other attributes, the high standards of technical preparation and implementation, sustainability of operations, and public participation. Most investments in the Namami Gange program are expected to be in the wastewater

sector, particularly in wastewater treatment plants and sewerage networks. Investments will also be supported in industrial pollution control and prevention (e.g. common effluent treatment plants), solid waste management (e.g. collection, transport and disposal systems), and river front management (e.g. improvement of the built environment along river stretches, improvement of small *ghats* and electric crematoria, and the conservation and preservation of ecologically sensitive sites). Many investments are likely to combine elements of more than one of these sectors.

31. An investment framework has been finalized for selection of program investments. The objectives of this investment's framework are to:

- ▶ provide a filter for all the Namami Gange investments, for ensuring that the selected investments are well-prepared and amongst the most effective in reducing the pollution loads;
- ▶ make transparent the decision-making process on investments selection; and
- ▶ Ensure that the investments are implemented in a sustainable manner.
- ▶ Investment projects needs to ensure compliance with National and local Environmental and Social legislation/regulation as well as World Bank safeguards policies (wherever applicable).

## 2.8. IMPLEMENTATION APPROACH

32. Recognizing that the investments under the previous river conservation programmes have not yielded commensurate results, a number of measures will be taken up under Namami Gange Programme to improve implementation and achieve better outcomes. These include;

- ▶ Tripartite Memorandum of Agreement between the Centre, the States and the Urban Local Bodies;
- ▶ Innovative approaches including decentralized treatment systems, in-situ treatment, etc.;
- ▶ Strong focus on technology and involvement of research institutions;
- ▶ An expanded, transparent and participatory water quality monitoring programme;
- ▶ Concurrent, third party evaluation; and
- ▶ Community mobilization;
- ▶ Citizen monitoring committees; and
- ▶ Special Purpose Vehicles for implementation, wherever feasible.

## 2.9. NAMAMI GANGE: INSTITUTIONAL STRUCTURE

33. As nodal Ministry for the Namami Gange program, the Ministry of Jal Shakti is the primary implementing agency for the project at the national level. The NMCG has a detailed implementation structure, supported by the GoI. A number of committees will provide technical and administrative support, and are as follows:

- ▶ Policy making Apex Council headed by the Prime Minister;
- ▶ Standing Committee under Finance Minister to regularly oversee implementation;
- ▶ Empowered Steering Committee to facilitate coordination with the Central and the State Government departments, and prioritize and sanction projects on a fast track basis;
- ▶ A Mission Director with a core team of professionals to be responsible for implementing the work programme of the Authority and to perform its day-to-day operations;
- ▶ State River Conservation Authorities under the Chief Ministers to coordinate and implement river conservation activities at the state level; and
- ▶ Implementation of projects through the states and urban local bodies. Special Purpose Vehicles (SPVs) will be set up wherever feasible.

**Policy making Apex Council**

Name of the Council: - National Ganga Council

Headquarter of the Council: - New Delhi

**Table 2-2: Composition of the Council**

(a)	Prime Minister	ex-officio Chairperson
(b)	Union Minister for Jal Shakti	ex-officio Vice Chairperson
(c)	Union Minister for Environment, Forests and Climate Change	ex-officio Member
(d)	Union Minister for Finance	ex-officio Member
(e)	Union Minister for Housing and Urban Affairs	ex-officio Member
(f)	Union Minister for Power	ex-officio Member
(g)	Union Minister for Science and Technology	ex-officio Member
(h)	Union Minister for Rural Development	ex-officio Member
(i)	Union Minister for Shipping	ex-officio Member
(j)	Union Minister of State for Tourism	ex-officio Member
(k)	Vice Chairman, NITI Aayog	ex-officio Member
(l)	Chief Minister, Bihar	ex-officio Member
(m)	Chief Minister, Jharkhand	ex-officio Member
(n)	Chief Minister, Uttarakhand	ex-officio Member
(o)	Chief Minister, Uttar Pradesh	ex-officio Member
(p)	Chief Minister, West Bengal	ex-officio Member
(q)	Secretary, Department of Water Resources, River Development and Ganga Rejuvenation	ex-officio Member
(r)	Secretary, Department of Drinking Water & Sanitation	ex-officio Member
(s)	Secretary, Ministry of Housing and Urban Affairs	ex-officio Member
(t)	Secretary, Department of Agriculture and Farmers' Welfare	ex-officio Member
(u)	Director General, National Mission for Clean Ganga	ex-officio Member Secretary

**Source:** River Ganga (Rejuvenation, Protection and Management) Authorities (Second Amendment) Order, 2019**2.10. IMPLEMENTATION MODALITY UNDER NAMAMI GANGE****2.10.1. National Level**

34. Based on extensive consultations with the stakeholders, an improved institutional structure was planned for effective and expeditious decision making and implementation of NMCG's mandate. At both central and state levels, dedicated entities were constituted to lead the implementation of the NMCG program on full time basis. NMCG acted as implementation arm of National Ganga River Basin Authority (NGRBA) which was constituted under the provisions of the Environment (Protection) Act (EPA), 1986. NGRBA has since been dissolved and consequent to the constitution of National Council for Rejuvenation, Protection and Management of River Ganga (referred as National Ganga Council) vide notification no. S.O. 3187(E) Dt. 7th October 2016 under EPA 1986. The states have similarly set up State Mission for Clean Ganga (SMCG) in the form of registered societies, to ensure effective implementation at state level. SMCGs have been constituted in Uttar Pradesh, Uttarakhand, Bihar and West Bengal. In Jharkhand, a dedicated Nodal Cell within the Department of Urban Development was set up. At the local level, specific Executing Agencies (EAs) are selected for implementation of various activities, including infrastructure investments under the Namami Gange program.

35. These implementing agencies are responsible for managing the World Bank-supported project and achievement of its PDOs; coordinating project activities on a full-time basis and directly executing some of the relevant project sub-components.

36. The Act envisages five tier structure at national, state and district level to take measures for prevention, control and abatement of environmental pollution in river Ganga and to ensure continuous adequate flow of water so as to rejuvenate the river Ganga as below:

- (i). National Ganga Council under chairmanship of Hon'ble Prime Minister of India.
- (ii). Empowered Task Force (ETF) on river Ganga under chairmanship of Hon'ble Union Minister of Water Resources, River Development and Ganga Rejuvenation,
- (iii). National Mission for Clean Ganga (NMCG),
- (iv). State Ganga Committees, and
- (v). District Ganga Committees in every specified district abutting river Ganga and its tributaries in the states

37. NMCG aims to accomplish the two mandates i.e., (i) to ensure effective abatement of pollution and rejuvenation of the river Ganga by adopting a river basin approach to promote inter-sectoral coordination for comprehensive planning and management and (ii) to maintain minimum ecological flows in the river Ganga with the aim of ensuring water quality and environmentally sustainable development.

38. The main functions of NMCG include the following:

- (i) Implement the work programme of Namami Gange
- (ii) Implement the World Bank supported National Ganga River Basin Project.
- (iii) Coordinate and oversee the implementation of projects sanctioned by Government of India under Namami Gange.
- (iv) Undertake any additional work or functions as may be assigned by DoWR, RD & GJ, Ministry of Jalshaktiin the area of conservation of river Ganga.
- (v) Make rules and regulations for the conduct of the affairs of the NMCG and add or amend, vary or rescind them from time to time.
- (vi) Accept or to provide any grant of money, loan securities or property of any kind and to undertake and accept the management of any endowment trust, fund or donation not inconsistent with the objectives of NMCG.
- (vii) Take all such action and to enter all such actions as may appear necessary or incidental for the achievements of the objectives of Namami Gange.

#### 2.10.2. State Ganga Committees

39. State-level committees for Clean Ganga Project were set up in the States of Uttarakhand, Uttar Pradesh, Jharkhand and Bihar in 2017. The main objective of these committees is to streamline the work and fund along with execution on ground. Each State-level Committee is headed by The Chief Secretary (State Government) who acts as the ex-officio Chairperson. The ex-officio members of the committee include Principal Secretaries of the Departments of Finance, Urban Development, Environment & Forests, Irrigation and Drinking Water of the respective state governments. Principal Chief Conservator of Forests

(State Government) and Program Director of State Mission for Clean Ganga are also ex-officio members of the Committee. In addition to the ex-officio chairperson and ex-officio members, there are 4-5 nominated members in each State Ganga Committee who are distinguished personalities from renowned organizations. The Nominated Members of these committees hold office for a term of two years from the date of publication of the order.

40. The State Ganga Committee of Uttarakhand and Jharkhand comprises of 14 members each whereas, State Ganga Committee of Uttar Pradesh comprises of 16 members and the State Ganga Committee of Bihar comprises of 15 members. Further details are represented in **Appendix IV**.

41. The implementation arrangements for the NMCG program are summarized in Figure 2-1 .

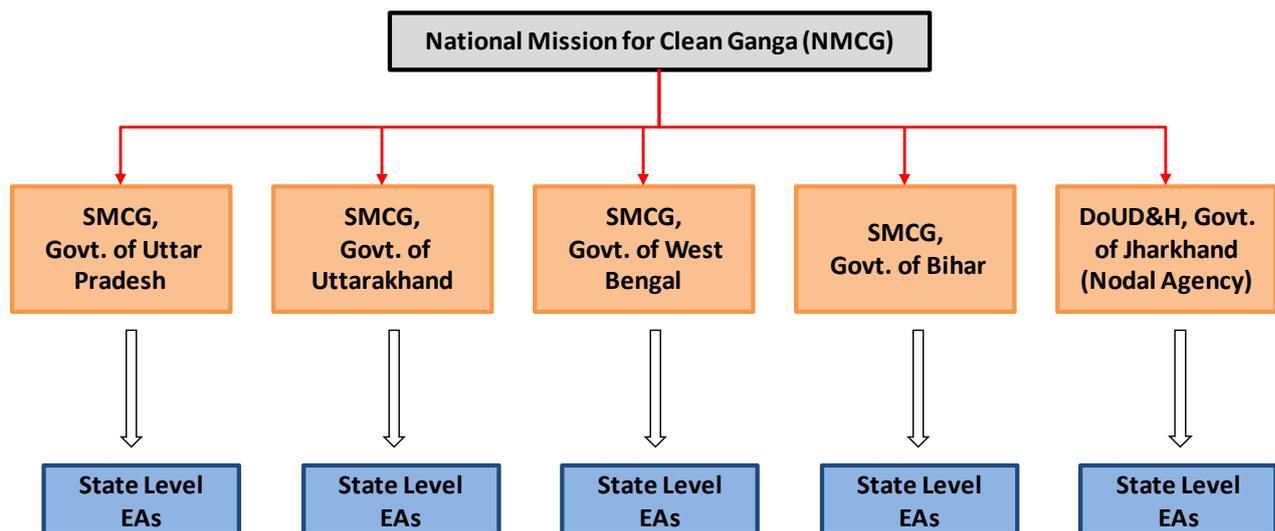


Figure 2-1: Implementation Arrangements for the National Mission for Clean Ganga

### 2.10.3. District Ganga Committees

42. River Ganga (Rejuvenation, Protection & Management) Authorities has issued an order on 7<sup>th</sup> October 2016, wherein 'Authorities under the provision of EP Act, 1986 have been constituted at the Center, State and District Level'. A notification related to the constitution of district Ganga Committee were issued 53 districts of five basin states of main stem of River Ganga. The Authority order includes in detail: (i) Constitution of District Ganga Protection Committee (Para 53); (ii) Function and power of District Ganga Committee (Para 55); (iii) Nomination of Nodal Officer (Para 56); (iv) Preparation of plans by District Ganga Committee for Protection of River Ganga and Tributaries (Para 57); and (v) Preparation of Budget and maintenance of Account of District Ganga Committee (para 58)

### 2.10.4. Implementation Process

43. NMCG and the state nodal departments have prepared and agreed detailed investment frameworks, implementation process flow (including planning, preparation, appraisal, implementation and monitoring and evaluation), Guidelines for investment preparation, Memoranda of Understanding, and Delineation of Functions and Powers of different implementing entities, which collectively define and form the basis of program implementation and performance monitoring. The main features of these are summarized in the following sections.

#### 2.10.5. Investment Frameworks

44. Investment frameworks have been developed for selecting and implementing infrastructure investments in the four key sectors of intervention under the NMCG program - municipal wastewater, industrial pollution, solid waste management and river front management.

45. The frameworks prescribe criteria and quality assurance standards covering various aspects including eligibility, prioritization, planning, technical preparation, financial and economic analyses, environmental and social management, long term O&M sustainability, community participation, and local institutional capacity. The objective is to ensure that the investments are well-prepared and amongst the most effective in reducing the pollution loads and implemented in a manner that makes them sustainable.

46. Given the long-term nature of the Namami Gange program and the fact that universe of potential investments is large, the adoption of the framework approach effectively sets the “rules of the game” and will allow infrastructure investments to be selected on a dynamic and ongoing basis.

#### 2.10.6. Implementation Process Flow

47. The step-by-step process along with roles and responsibilities of the entities involved in implementation of Namami Gange program have been agreed and documented. The implementation process covers the various aspects including annual planning, investment prioritization, a 2-stage (feasibility and detailed project report) preparation and appraisal process, execution, O&M, eventual assets transfer to local bodies, financial management, procurement, community engagement, social and environmental management, governance and monitoring and evaluation. In addition to the infrastructure investments (under Component 2 of the project), the implementation process has also been agreed for pre-identified activities related to Namami Gange Institutional Development (Component 1 of the project), innovative pilots, communications, and research and knowledge management.

#### 2.10.7. Guidelines for Infrastructure Investments Preparation

48. A two-step process has been agreed for preparation and appraisal of investments, whereby investments would be appraised at both concept and detailed project report stage. Guidelines have been prepared and disseminated for preparation of concept stage and detailed project reports, including requisite contents, methodologies, and standards to be followed.

#### 2.10.8. Model Agreements/MoUs

49. The following instruments were prepared to operationalize the agreed institutional model and implementation arrangements: (i) Tripartite MoU between NMCG, SMCG, and ULB for ensuring formal agreement on roles and responsibilities regarding expenditures (capital and O&M) and ownership of assets; (ii) MoU between SMCG, PEA and ULB for ensuring clarity on roles and responsibilities of various parties regarding execution, O&M, and eventual transfer of investments to local bodies (iii) MoA and by-laws, including functions and powers of the SMCG societies setup by the state governments, and the same for the NMCG.

#### 2.10.9. Powers of Approvals

50. Powers and procedures for technical and administrative approvals of investments, for award of contracts for works/goods and services, and for making payments have all been well defined for each implementing agency and being documented in the FM and procurement manuals. To ensure efficiency in implementation most of the powers have been delegated to the lowest appropriate levels, adopting the

principle of subsidiarity. Most of the implementation related powers are vested with NMCG, SMCG and PEAs for their respective components. The only exceptions are the award of the high cost consultancy and works/goods contracts, which have been defined in the fiduciary manuals.

51. Other important documents guiding project implementation are:

- ▶ FM Manual: providing the details of funds flow, accounting, auditing and reporting, and the related control and accountability mechanisms
- ▶ Procurement Manual: containing the procurement strategy, methods and procedures to be adopted, along with draft documents to be used for bidding of typical works and goods and procurement of consultant services, along with powers of actors to award these works and consultancies
- ▶ Environmental and Social Management Assessment and Framework
- ▶ Governance and Accountability Action Plan
- ▶ Communication strategy and action plan

#### **2.10.10. Institutional Development and Capacity Building**

52. Detail cost implementation plans are being completed for the activities comprising the Institutional Development component of the project (operationalization of NMCG institutions, setting up of Ganga Knowledge Center, upgradation of Ganga Water Quality Monitoring System, Capacity-building of environmental regulators and ULB service providers, etc.).

#### **2.10.11. Post-Implementation Management of Assets Created**

53. The frameworks and implementation arrangements require that each DPR includes a detailed plan for operation and maintenance of assets that will be created under the NMCG. These plans must identify the institutional responsibilities as well as funding and other resources that would be required for their long-term sustainable operations. The observations during the implementation period of the program will be addressed by the SMCG and Executive Agencies of the respective basin states.

#### **2.10.12. Monitoring and Reporting Arrangements for the ESMF**

54. Within the above overall implementation framework of the NMCG, environmental and social due diligence will be carried out by the relevant agencies at each stage of the project cycle in accordance with the guidance provided in the ESMF.

55. A Social Development Officer and an Environmental Officer will be appointed for managing social and environmental issues (including safeguards issues) at both central level (NMCG) as well as in each of the project states (SMCGs/Nodal Agencies). These officers will assist and advise the Mission Director and interact with the Project Executive Agency (PEA) in implementation of ESMF provisions.

56. In the PEA, an officer will be designated as social and environment officer who will be responsible for the implementation of ESMF tasks at the field level with the assistance and participation of the local self-government. These officers will also have the responsibility of implementing resettlement along with other project components, and for co-ordination among different agencies, such as the local self-government, Revenue Department etc. During implementation, meetings will be organized by the SMCGs inviting all PEAs in the state for providing information on the progress of the project work.

57. Environment and Social Audit / Compliance Monitoring Consultants shall be appointed in each of

the project states to regularly monitor the planning, design and construction and will confirm that actions taken at each stage of the sub project cycle are in compliance with agreed procedures and standards.

58. The project cycle for an investment under the N and the interface with the ESMF requirements are summarized hereunder.

#### **2.10.13. Project Screening**

59. Upon receipt of request for funding, SMCG will assess the eligibility of the sub-project in line with the agreed framework of the respective sector of the sub-project and the proposed safeguard categorization of the sub-project. Based on the above screening, the PEA would be advised on the appropriate DPR preparation toolkit that needs to be followed for the sub-project and the scope of ESA (for High Category sub-projects) to be carried out. In case of Low Category projects, the generic environmental management measures and the requirements of abbreviated resettlement plan will be agreed at the screening stage.

60. The PEA will prepare a Detailed Project Report (DPR) including GEMP tailored to the specific sub-project (for low category projects). For high category projects, the PEA will undertake preparation of ESA / EMP / RAP as relevant for high category projects in line with the requirements of ESMF. While initiating the ESA studies, the PEA shall interact with the Environmental and Social Specialists in the SMCG and seek guidance in the finalization of scope of work and the conduct of respective studies.

61. On receipt of the ESA reports, the respective specialists will evaluate the completeness of the studies and their compliance with the ESMF. Further actions, if any required, will have to be carried out by the PEA prior to the appraisal of the project.

#### **2.10.14. Project Appraisal**

62. During project Appraisal, the NMCG and SMCG will appraise the project preparation leading to the approval of the DPR. The safeguard aspects that will be appraised during the project appraisal will include the following aspects:

- ▶ Environmental and social suitability of site
- ▶ Adequacy of the ESA as per the ESMF including analysis of alternatives, if relevant
- ▶ Compliance with regulatory requirements and clearances
- ▶ Comprehensiveness of the EMP/SMP in light of the project specific environmental and social issues
- ▶ Integration of environmental and social mitigation measures in to the design, wherever relevant/required
- ▶ Arrangements for implementation of EMP/SMP/RAP, including institutional capacity and contractual provisions
- ▶ Inclusion of EMP/SMP budgets in the project cost and contract documents
- ▶ EMP/SMP monitoring and reporting arrangements
- ▶ Need for any legal covenant to address specific environmental risks including regulatory risks, if any
- ▶ Risk analysis / allocation
- ▶ environment and social enhancements (if any / applicable)

63. The Environment Management Plan (EMP) prepared for the project will form part of the bidding documents, in addition to the references to various acts relating to environment and labor, and the

implementation of the same will be monitored by NMCG and SMCG.

#### 2.10.15. Project Approval and Disbursement

64. Prior to the approval of the sub-project, all High Category - projects will be forwarded to the World Bank for clearance after the EMP and SMP has been cleared by the NMCG and SMCGs. The SMCGs will further ensure that all the comments/suggestions of the World Bank for all high category projects are adequately addressed, prior to approval of the DPR. The implementing agencies will also comply with the World Bank's policy on public disclosure.

65. After requisite approvals and concurrence are obtained, SMCG will discuss implementation of environmental and social management measures of the project with the PEA to ensure that these are suitably incorporated into the respective legal /contractual documents, for implementation by the PEA.

66. As far as resettlement issues are concerned, disbursement of entitlements shall be through the NGOs hired for the purpose of implementation of resettlement action plan (RAP). The civil works will be initiated only after the required land has been acquired and declared free from encroachments and other encumbrances and the PIU has the physical possession of the land. Before the start of civil works the compensation has to be disbursed to the landowners. During implementation, consultations with the communities shall be undertaken by the PEA / NGOs for providing information on the progress of the project work.

#### 2.10.16. Monitoring and Reporting

67. The NMCG, through the respective SMCGs will monitor all the approved projects under the NGRBP to ensure conformity to the requirements of the ESMF. The monitoring will cover all stages of construction, operation and maintenance. The monitoring will be carried out through the environmental and social safeguard compliance reports that form a part of Quarterly Progress Reports for all projects and regular visits by the environmental and social specialists of the NMCG and SMCGs. In addition to the above, the NMCG will undertake an annual ESMF audit of all sub-projects in implementation and will review the status of ESMF compliance. The audit will include all high category projects and 25% of the low category projects.

68. The NMCG will review these audit reports and identify technical, managerial, policy or regulatory issues with regards to the compliance of the ESA reports. The identified technical issues will be duly incorporated in the subsequent projects. Policy and regulatory issues will be debated internally by the NMCG's internal review committee and the need for appropriate interventions will be determined. These interventions could include appropriate revision of ESMF document or suitable analytical studies to influence policy or programs of the state, if found necessary / warranted.

69. An external evaluation of the RAP implementation prepared under NGRBP will also be undertaken twice during the implementation of the project – mid-term and at the end of the implementation. **Table 2-3** below details out the mitigation measures for each impact type, monitoring measures, responsibility and timeline.

Table 2-3: Mitigation, Monitoring, Responsibility and Timeline for RAP Implementation

S. No.	Impact	Monitoring Measures	Responsible Agency	Timeline
1	Loss of land (agriculture)	Regular internal monitoring by the SDO of PEA and SMCG; third party ESMF audit; and periodic evaluation	PEA, ESMF Auditors; Evaluation consultants	12 months from the start date. Compensation to be paid before the start of civil works.
2	Loss of structure and land (residential and commercial)	Regular internal monitoring by the SDO of PEA and SMCG; third party ESMF audit; and periodic evaluation	PEA, ESMF Auditors; Evaluation consultants	
3	Loss of land value near landfill sites and /or STPs		PEA and supervision consultants	
4	Loss of access to private and / or common property	Regular internal monitoring by the PEA; third party ESMF Audit; midterm and end term evaluation	PEA, ESMF Auditors; Evaluation consultants	12 months from the start date of the activities of the priority investment. Assistance to be paid before the start of civil works.
5	Loss of livelihood or source of livelihood	Regular internal monitoring by PEA; third party ESMF Audit; midterm and end term evaluation	PEA, ESMF Auditors; Evaluation consultants	
6	Displacement of squatters and encroachers	Regular internal monitoring by the PEA; third party ESMF auditor; midterm and end term evaluation	PEA, ESMF Auditors; Evaluation consultants	

70. The overall ESMF implementation and monitoring arrangements are summarized in

71. **Table 2-4.**

Table 2-4: ESMF Implementation and Monitoring Arrangements

Mile Stones	Objectives	Process	Responsibility	Decision/Target/Deliverable
1. Sub- Project Screening	To appraise the PEA about NMCG's policies, plan and priorities	a. Discussions with PEA to <ul style="list-style-type: none"> <li>- assess eligibility of project based on NMCG's priorities in consonance with Mission Ganga</li> <li>- identify scope of project report</li> </ul> b. Issue DPR preparation toolkit c. Appraise the PEA about ESMF requirements	NMCG <ul style="list-style-type: none"> <li>• SMCG</li> <li>• PEA</li> </ul>	<ul style="list-style-type: none"> <li>• Decision to proceed or not</li> <li>• Issue appropriate Information Package for Preparation of DPR</li> </ul>
2. Sub- Project Appraisal	Appraise ESA	a. Detailed appraisal of the ESA including site visit/investigation if necessary to assess <ul style="list-style-type: none"> <li>- suitability of site</li> <li>- environmental and social assessment and adequacy of EMP/SMPs</li> <li>- risk analysis /allocation</li> <li>- regulatory clearances for</li> </ul>	<ul style="list-style-type: none"> <li>• SMCG followed by NMCG</li> </ul>	<ul style="list-style-type: none"> <li>• Review report with decision to               <ul style="list-style-type: none"> <li>- accept ESA</li> <li>- accept with modifications</li> <li>- reject and instruct to resubmit as per requirements</li> </ul> </li> </ul>

Mile Stones	Objectives	Process	Responsibility	Decision/Target/Deliverable
		the project		
3. Approval	Approvals from authorities	a. Send ESA Report for approval	<ul style="list-style-type: none"> <li>• SMCG and NMCG</li> <li>- to WB for high category</li> <li>- Projects</li> </ul>	<ul style="list-style-type: none"> <li>• Approval of the project</li> </ul>
	Concurrence from WB	a. Obtain concurrence from WB for all high category projects	<ul style="list-style-type: none"> <li>• WB</li> <li>• SMCG</li> <li>• State Govt.</li> <li>• ULB</li> <li>• PEA</li> </ul>	<ul style="list-style-type: none"> <li>• WB's concurrence on EA / SAR reports</li> </ul>
4. Project Implementation Monitoring and Review	Ensure Implementation of agreed EMP/RAP	a. Prepare quarterly progress reports b. Schedule field visits as required	<ul style="list-style-type: none"> <li>• NMCG</li> <li>• SMCG</li> <li>• State Govt.</li> <li>• ULB</li> <li>• PEA</li> <li>• Contractors</li> <li>• Supervision Consultants</li> </ul>	<ul style="list-style-type: none"> <li>• Quarterly Progress Report</li> </ul>
	ESMF Audit project, if sampled	a. All E1 and S1 project will undergo ESMF audit b. Only 25% of the projects categorized as E2 and S2 will undergo ESMF audit	<ul style="list-style-type: none"> <li>• NMCG</li> <li>• SMCG</li> </ul>	<ul style="list-style-type: none"> <li>• Audit report for all E1 and S1 category projects and sampled E2 and S2 projects</li> </ul>

#### 2.10.17. Social Accountability and Grievance Redress Mechanism

72. The social accountability mechanism has been established for all sub projects. The key approaches adopted for ensuring social accountability consists of any or a combination of participatory processes guiding social audit, citizen score card and report card to acquire feedback on performance of the sub projects and record citizens' recommendations for improvement. The social accountability mandate will be further strengthened through a strong grievance redress mechanism.

73. The project abides the RTI Act of 2005 and under provisions of Section 4 of the Act and commit itself for proactive disclosure and sharing of information with the key stakeholders, including the communities/beneficiaries. The project has a communication strategy focusing on efficient and effective usage of print and electronic media, billboards, posters, wall writing, and adoption of any other method suiting local context, logistics, human and financial resources.

74. Presently, one GRM officer has been appointed in NMCG to address all queries registered in the NMCG portal. The GRM officer is supported by one social expert who coordinates with all the SMCGs. At SMCG level, reporting of grievances are being monitored by environmental and social experts. All Executing Agencies have a GRM mechanism at each project site. The project manager and deputy project managers are in-charge of these GRMs. To register grievances, a register has been kept at all project site offices and sometime field team received grievances over mobile phones as well as on WhatsApp messages. To resolve the grievances, project manager from EAs side, contractor's project engineer and his team, work together sorted out at the earliest. If site team is unable to resolve the issue its own, the complaint/matter is brought up to senior management of EA as well as Contractor and discussed in monthly review meetings and

escalated to the level of SMCG and NMCG. In continuation, Grievance Redress Committees (GRCs) has also been constituted in some of the basin States. The GRC discusses grievances on weekly basis at their safety meetings<sup>4</sup>.

75. A Grievance Redress Committee (GRC) should be set up at sub-project level consisting of project in-charge of the contractor, project in charge of PIU and Social Specialist of SMCG. Grievances could be submitted through various mediums, including in person, in written form to a noted address, through phone line or through direct calls to concerned officials, and online. All local contact information and options for complaint submission should be available on site on local information boards. Grievance registers and contact numbers of the GRC officers should be maintained at worksite in all the project states. The complaints received at different levels of the project (Contractor, PIU and EA) should be directed to the GRC to initiate the action and take the corrective measures as required. If the complainant is not satisfied, he/she can escalate the grievance by registering it in Centralized Public Grievances Redress and Monitoring System (CPGRAM) portal of NMCG.

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<sup>4</sup> Draft Report on GBV-GRM in National River Ganga Basin project (NGRBA), June 2019, World Bank

### 3. ENVIRONMENTAL AND SOCIAL IMPACTS

#### 3.1. GENERAL

76. The implementation of the river pollution mitigation investments may have environmental and social issues like pollution of surface and ground water bodies or other natural resources, issues related to air pollution or other environmental health and sanitation, inconvenience to public due to traffic diversions and construction activities, issues of land acquisition and rehabilitation and resettlement. The NMCG recognizes these environmental and social issues and prepares itself to address their mitigation through a set of management procedures elaborated in this Environmental and Social Management Framework (ESMF). NMCG, through state level SMCGs will ensure that policies and procedures described in the ESMF are applied to all investments.

77. To evolve its environmental and social management procedures, the NMCG has carefully examined the portfolio of investments previously executed under the river pollution mitigation investments under Ganga Action Plan (Phase I and II) along with similar other urban infrastructure investments implemented elsewhere in the country under various Government of India sponsored schemes, supplemented by detailed environmental and social analysis of Ganga Basin and field visits to existing and proposed sample investments.

#### 3.2. PORTFOLIO OF INVESTMENTS

78. The portfolio of investments to be implemented is presented in **Table 3-1**. These investments in the first phase of program is spread across several cities and/or towns within the Ganga main stem states of Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal and may be extended to entire Ganga basin comprising of 11 states in later phases.

**Table 3-1: Portfolio of Investments under Namami Gange Program**

S.No.	Portfolio of investments	Possible Portfolio Components
1	Sewerage and Sanitation Systems/ Sewage Treatment Plants (New / Upgradation)	<ul style="list-style-type: none"> <li>• Provision for an entirely new sewerage network including individual house connections</li> <li>• Extensions to existing sewerage networks in some parts of cities/towns to include areas which are un-sewered hitherto or to newly developed areas in the recent years</li> <li>• Entirely new sewage treatment plant/facility</li> <li>• Augmentation of capacities in existing sewage treatment plant/facility</li> <li>• Remodeling /Renovation of existing sewage treatment facilities, resulting in better effluent quality and augmented treatment capacity</li> </ul>
2	Solid Waste Management	<ul style="list-style-type: none"> <li>• Engineered landfills with leachate collection and treatment systems</li> <li>• Waste segregation and composting facilities</li> <li>• Waste Processing or Waste to Energy Facilities</li> </ul>

S.No.	Portfolio of investments	Possible Portfolio Components
3	Industrial Pollution Control Initiatives	<ul style="list-style-type: none"> <li>• Common Effluent Treatment Plant</li> <li>• Common Hazardous Waste Management Facilities</li> <li>• Pilot treatment facilities for various industrial sectors</li> <li>• Waste Minimization and Clean Technology Programs</li> </ul>
4	River Front Management Investments	<ul style="list-style-type: none"> <li>• River Front Management and beautification</li> <li>• Construction of Bathing Ghats</li> <li>• Development of Cremation grounds Improvement to existing crematoria situated on riverbanks</li> </ul>

79. The Investments aims at preventing discharge of untreated sewage into River Ganga and thus aiding abatement of river water pollution and improvement in water quality. Consequently, this also contributes to the improvement in the status of environment health and sanitation for the citizens of the concerned cities and towns. The Investments, to be implemented, have its own beneficial as well as adverse impacts. The significance of these impacts depends on the individual project, its size and location. The likely beneficial impacts of the investments include the following.

- ▶ Improvement in sewerage collection and treatment within the cities/towns
- ▶ Prevention of storm drains carrying sanitary sullage or dry weather flow
- ▶ Prevention of ground water and soil pollution due to infiltration of untreated liquid waste
- ▶ Prevention of discharge of untreated sewage into River Ganga
- ▶ Improvement in water quality of River
- ▶ Improvement in environmental sanitation health and reduction in associated health hazards within the cities/towns
- ▶ Improvement in quality of life, human dignity and increased productivity
- ▶ Reduced nuisance of open defecation due to low cost sanitation and reduced malarial risks and other health hazards
- ▶ Improved community participation and sense of ownership

### 3.3. ENVIRONMENTAND SOCIAL IMPACTS

80. This section identifies the environmental and social impacts of the investments with a view to facilitate early evaluation of such impacts and integrate suitable mitigation measures during planning stage itself. Based on field visits and discussion with the potential executing agencies, the typical adverse impacts associated with the investments are summarized below:

#### 3.3.1. Sewerage Schemes

81. The investments involve laying of sewers (both gravity and pressure lines), provision of sewer connections to individual houses, gravity based interception and diversion arrangements to drains carrying sanitary sullage/dry weather flow, construction of new sewage pumping stations including installation of electro- mechanical works, renovation and/or remodeling of existing sewage pumping stations among others. Most of these investments would be concentrated in one location except for laying of sewers (both gravity and pressure lines), which are linear investments and the sewers are largely buried below ground or sometimes may be laid on or above the ground depending upon the available/required slope or gradient.

82. Although there would not be any permanent negative or adverse environmental impacts, the potential environment issues associated with sewerage and sanitation investments are:

- ▶ surface and groundwater contamination due to leakage and/or improper joints in sewers

- ▶ severance of utilities and requirement for relocation due to sewer laying
- ▶ disruption due to local traffic diversion and congestion during sewer laying works
- ▶ impact on public/private properties and other sensitive receptors along the sewer alignment during construction
- ▶ disposal of excess excavated soil and construction debris
- ▶ Exploitation of water sources for meeting construction water demand.
- ▶ air and noise pollution from construction equipment's
- ▶ Health and safety concerns of workers, while laying or rehabilitating existing sewers.

### 3.3.2. Sewage Treatment Plants

83. The investments may involve construction of new sewage treatment plants, augmentation of treatment capacity in existing sewage treatment plants and renovation and/or re-modelling of existing sewage treatment plants, resulting in improved effluent quality and disposal as per prescribed standards. Most of these investments would be concentrated in one location and the requirement of land for these investments is small as compared to other infrastructure development investments.

84. Although there would not be any permanent negative environmental impacts, the potential environment issues associated with sewage treatment facility are:

- ▶ change in land use pattern, in case of proposed sewage treatment plants at new locations.
- ▶ change in channel hydraulics, triggering erosion and siltation problems, if sewage treatment plants are proposed in floodplains.
- ▶ change in hydrology and drainage patterns due to the construction activity, particularly, if sewage treatment facility is located in floodplains.
- ▶ health and safety issues associated with operation and maintenance of sewage treatment facility, particularly exposure to methane and other noxious gases, sludge contaminated with heavy metals etc.
- ▶ issues associated with the disposal of sludge, if sewage is likely to be contaminated with heavy metals due to mix of industrial waste with sewage.
- ▶ Emission of methane, if not utilized for power generation or any other gainful applications.
- ▶ water logging problems due to improper/ inadequate disposal of treated effluent or effluent not conforming to stipulated discharge standards during operation.
- ▶ Sludge from a waste treatment plant may constitute a hazardous and nonhazardous waste.

85. Most of the portfolio of infrastructure investment under Namami Gange programme belongs to sewerage infrastructure and River Front Development. A sample construction and operation stage impacts and management measures are given in **Appendix-III A** and **III B** Solid Waste Management Investments

86. These investments may involve construction of municipal waste receiving and segregation yards, composting yards, engineered landfills with leachate collection and disposal arrangements among others. Most of these works would be spread over in one location and the requirement of land for these investments is rather small as compared to other infrastructure development investments. Generally, the land for the solid waste treatment facility will be selected away from habitations.

87. Although there would not be any permanent negative environmental impacts, the **potential environment issues** associated with Solid Waste Management are:

- ▶ surface and ground water contamination due to unmanaged leachate collection and disposal

- ▶ change in channel hydraulics, triggering erosion and siltation problems, if solid waste management facility is proposed in floodplains
- ▶ change in hydrology and drainage pattern, if the facility is located in floodplains
- ▶ air quality, odor and fly nuisance due to the improper operation of waste disposal or processing facilities
- ▶ issues pertaining to siting of facility such as change in land use pattern, proximity to settlements, cultural properties and any other sensitive receptors
- ▶ air and noise pollution from construction equipment's
- ▶ Health and safety issues associated with operation and maintenance of solid waste treatment facility, particularly of workers manually handling wastes.

### 3.3.3. Industrial Pollution Control Initiatives

88. Investments under this component could involve development of common industrial effluent treatment plants or hazardous waste management plants, etc. However, implementation of these pollution control facilities may lead to certain **environmental impacts** such as the following:

- ▶ Pollution of water resources
- ▶ Soil contamination due to the disposal of untreated/partially treated effluents and/ or hazardous wastes
- ▶ air quality, odor and fly nuisance due to the improper operation of treatment facilities
- ▶ health impacts on the neighboring communities
- ▶ Issues of leachate and loss of productivity to agriculture lands due to the disposal of sludge from the facilities.

### 3.3.4. River Front Management Investments

89. These works involve river front development schemes, beautification of river banks, construction of bathing *Ghats* along rivers, lakes and water bodies' improvement, redevelopment of cremation grounds among others. These works would be included under one investment. The requirement of land for these works is moderate and much lesser than that is required for the sewage treatment or solid waste treatment facility. Although, these facilities are frequently used by the citizens, the location of these investments will not generally involve displacement of people.

90. There would not be any permanent adverse or negative impacts due to these investments, if there are no major interferences in the river flow channel hydraulics, which can trigger erosion and siltation issues either *inset* or elsewhere along the course of the river. Impacts due to such investments could be minimized or mitigated by appropriate interventions and engineering designs.

91. The **environmental issues** that may arise due to investments like river front development schemes, beautification of river banks, construction of bathing *Ghats*, and development of cremation grounds are:

- ▶ change in land use, and drainage pattern
- ▶ change in channel hydraulics, triggering erosion and siltation problems either at in situ or elsewhere along the course of river
- ▶ impact due to inadequate solid and liquid waste disposal arrangements
- ▶ impact due to inadequate sanitation, health and safety facilities
- ▶ impact on river water quality due to proposed amenities
- ▶ impact on environmental aesthetics and cultural value

92. **Health and Safety:** During construction stage, assurance of safe work environment and incident

free execution of the project, health and safety of worker is significant in the Namami Gange projects. The measures to ensure worker's Health and Safety will be detailed out in sub project specific ESMAP.

93. The bid document of Namami Gange projects directs that the selected DBOT Operator/HAM Concessionaire shall ensure implementation of health and safety measure during the construction and operation stage as mentioned in sub project specific ESMAP including applicable legislations & World Bank's EHS Guidelines, projects and will be part of Bid documents. During construction & operation stage, project will develop a protocol to report and document any incident at the project location. The incident reporting will be part of progress report to be shared with SMCG & NMCG.

94. As regards to the **Social Impacts**, the requirement of land for all these investments is rather small. However, wherever there is displacement of titleholders/non-titleholders, it may involve resettlement issues and may result in temporary loss of access to private and common properties during construction. Social issues that may arise due to these kinds of investments are:

- ▶ Direct purchase of small land parcels for SPS/ Lifting station
- ▶ Land acquisition / taking for sewerage treatment plant leading to loss of livelihood / displacement of non-titleholders /titleholders
- ▶ Temporary land taking causing economic displacement
- ▶ Temporary loss of common grazing area

95. So far, in most cases, SPS and STPs have been designed in existing government land that is free of encroachment and other encumbrances. In case of requirement of private land, EAs have preferred direct purchase based on willing buyer – willing seller. Wherever, government land has been taken, non-titleholders have been compensated for assets and assisted in relocation (e.g., Patna RFD).

96. Most of these investments would be concentrated in one location and the requirement of land for these investments is rather small as compared to other infrastructure development investments. Hence, the social impacts would be minimal but in case of displacement Resettlement Action Plan<sup>5</sup> need to be prepared.

### 3.4. EXPERIENCE IN IMPLEMENTING ESMF

97. As per part of Implementation, monitoring and reporting arrangement of ESMF, an independent Environmental and Social audit was conducted by a Third Party (independent consultant hired by NMCG) in year 2018 and being conducted in 2019. The audit was conducted as per the ESMF guidelines. The mandate for conducting the audit was as per **Appendix V** of this report. The Audit was conducted in all the five basin states to verify/ witness the corrective action taken by the SMCG/ nodal agencies in addressing the Non-compliance identified during the Environmental and Social Audit. The major findings/ outcomes of the E&S Audit are as under:

- a) Good Practices:** as part of Audit procedure, discussions with various stakeholders at Central and State levels were conducted and reviewed the relevant documents which revealed number of good practices as follows:
- (i) As per Audit findings, it is intimated that overall institutional framework to implement NMCG projects is complied with the NGRBA/Namami Gange Programme Framework, wherein

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<sup>5</sup>e.g. places where Government land is available, and no displacement is involved a Generic ESMP is prepared/to be prepared. Places where private land acquisition is involved /physical displacement or displacement of Non-title holders is required (e.g. cases like Patna RFD and Begusarai WWT), an abbreviated RAP /RAP is prepared/to be prepared.

SMCGs/Nodal Agency dedicatedly facilitated the implementation with support from Executing Agencies at respective project locations.

- (ii) As part of internal monitoring within dedicated agencies under the project, the monitoring and supervision by NMCG was found appreciative. It is stated in the Audit report that the safeguards officials of NMCG frequently visited project locations and also regularly communicated to SMCG as well as to EA insisting upon (i) appropriate implementation of various ESMP compliances including inclusion of ESMP in Bid/Contract document and EMP budget in BoQ, (ii) deployment of safeguards officials along with necessary directions for their consistent inspection of project site, (iii) formulating project specific ESMP for inclusion in future projects, and (iv) formulating robust grievance redress mechanism. In addition to this, Dynamic monitoring system was found in place for making use of freeware messaging system. The day-to-day progress, grievances and site photographs were exchanged in WhatsApp groups for constant monitoring of the projects and immediate action.
- (iii) Liaising of SMCG with local governing bodies was observed to be good. The efforts taken by the States in creating an enabling environment in close coordination with District Administration, especially sub-divisional office was found noteworthy in the E&S Audit.
- (iv) With regard to selection of feasible site, Audit finding insights that the available government land was preferably utilized for establishing various project components in all the project sites as option 1 under Namami Gange Projects. In cases, where government land was not available, the SMCG/EA in coordination with respective district administration has purchased land following mutual negotiation process.
- (v) Biometric system has been adopted for construction labourers by few of the Contractors, which is appreciative. Also, the wages for the labourers were reported bank transferred.
- (vi) Environmental and Social Due Diligence was carried out by NMCG in Prayagraj and Buxar (information based on the public-disclosed documents) which is appreciative. Similar Due Diligence exercise to be done in other project locations.
- (vii) **Health and Safety at worksite:** Site visits undertaken during E&S Audit of Implemented and under construction project envisaged that Health and Safety Officer in the Contractor's team has been mobilized in all the project sites. Based on the proposed design, the safety aspects were well taken care. Site-specific Health and Safety Plan has been developed and implemented, provided PPEs to workers, Training Provisions, Documentations etc. Markings and signboards were given near energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Safety equipment such as helmet, safety Shoves, Gloves, masks was observed on labourers. Contractors were equipped with health safety aspect during construction workers.

- b) Recommendations:** Audit observed following key environmental and social issues which has been addressed at various levels of implementation in Ganga 1 and will continue for Ganga 2:

Table 3-2: Audit observations and measures adopted

S.No.	Key E&S audit observations	Adopted Measures
1	According to E&S Audit, it was reported that, Sample EMP's included in the ESMF with respect to various components of the project, was generally used as a replica by the SMCG/EA and does not reflect sub-project-specific site features, therefore, Preparation of sub-project specific EMP has been suggested and the same need to be followed for the proposed Hybrid Annuity based Contracts and in other new Contracts.-	The screening process has been strengthened, that will help in identifying issues and prepare site specific EMP.
2	Preparation of respective Sludge management Plans should be made mandatory. Sludge Disposal Plan is not provided by the Contractor. States (Jharkhand, as of now) which have plans for Solid Waste Management, is reportedly integrating the sludge generated from respective STPs.	In the new contracts of Ganga 2, safe disposal of sludge is the responsibility of DBOT operator/ HAM concessionaire in consultation with EA & ULB.
3	Regulatory requirements should be fully complied. All the required permissions should be obtained before commencement of civil works. Permission like Ground Water Extraction, outdated fire-safety equipment placed at site; DG with inadequate emission standards use at site; Use of high-capacity DG set without obtaining permission from SPCB need to be improved at active project sites.	As mentioned in the institutional arrangement, SMCG will conduct regular monitoring to ensure safeguards compliance & provide necessary guidance to EA & DBOT Operator/HAM concessionaire.
4	It is reported in E&S audit that, Capacity building of respective E&S personnel of EA and Contractors is lacking. Safeguards Officers requires to take pro-active role in ensuring compliance to ESMF.	Section 6.5 on Training and Capacity Building has been strengthened accordingly.
5	With respect to public consultation and outreach, it is reported that, consultation at various stages of the project needs to be expedited. Deployment of safeguard officials to be consistently done. Public consultation and outreach is observed to be weak. People are concerned about the lack of prior information regarding the civil work schedule in respective localities.	Mechanism for continued participation added in section 7.3 in this report.
6	Related to land related grievance: Appropriate consultation to be carried out with aggrieved party. If found entitled, should be accordingly assisted following the provision of Resettlement Policy and Land Acquisition Framework given in ESMF.	Both GRM & consultation mechanism have been strengthened (Section 7.3 & 6.4).
7	Environmental Monitoring Formats should be included in the Bid / Contract document.	The format has been included in the Bid document.
8	The supervision of ESMP by the EA is need more attention, during audit it was observed limited to fulfilling the periodic progress reporting requirements of SMCG/NMCG.	<ul style="list-style-type: none"> <li>• The safeguard staff in SMCGs has been appointed.</li> <li>• The requisite institutional arrangement has been updated in Section 2.10, para 54, for effective monitoring and reporting at EA level.</li> </ul>

S.No.	Key E&S audit observations	Adopted Measures
9	Designated area for storing construction materials is not provided. This was observed that the Contractor is making use of the land provided by the EA/District Administration, wherever possible. However, the Contractor also stores the construction materials in private land without formal agreement with the landowner.	As mentioned in the institutional arrangement, SMCG will conduct regular monitoring to ensure safeguards compliance & provide necessary guidance to EA & DBOT Operator/HAM concessionaire.
10	Grievance redress mechanism is informal and there is no toll-free number is provided as envisaged in the ESMF.	Section 6.4 on GRM has been strengthened, toll-free number added by SMCGs as part of GRM.
11	Labour Contract was reported as widely practiced and the hired labours or their employers have inadequate awareness about the environmental and social safeguard measures. Contractors do not have any capacity building plan for the hired labourers	As part of GBV, two rounds of, intensive awareness campaign and consultations with contractors and labourers has been undertaken that apart from GBV issues also includes Health and Safety, Labour management & regular health checkups. These issues are now part of daily Tool Box Talk.

98. **Budget for implementing ESMF:** As per finding of Audit conducted in year 2018 for 30 STPS & Sewerage schemes implemented in five basin states i.e. Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, West Bengal, majorly budget for ESAMP has been considered as ranges from 0.5% to 1% of the total basic capital cost, while Communication and Public Outreach, GAAP expected as 0.1% to 1% of the basic Capital Cost of the project. Post World Bank funding till the approved O&M period, any activity under ESMF will be funded by NMCG.

Table 3-3: Budget for Implementing ESMF

S.No	Item	Unit	Unit Cost		Total Cost		Source of financing
			Rupee	US\$	Rupee	US\$	
1	Preparation of specific ESIA/ESDDR for Ganga-1	38	550000	7857	20900000	298571	World Bank
2	Preparation of ESIA and ESDDR for Ganga-2	30	617000	8814	18510000	264429	
3	Capacity Building###	5	10000000	142857	50000000	714285	
4a	Implementation of specific ESMP*/RAP	68	8000000	114286	54400000	7771428	
4b	Implementation of GRM and GBV	68	20000000	28571	13600000	1942857	
5	Annual ESMF Auditing#	10	7000000	100000	70000000	1000000	
	<b>Total</b>				839410000	11991570	
	<b>Total (Say)</b>				850 Million	12.5 Million	

\*This include cost of implementation of ESAMP/RAP including land purchase cost on an average

# Annual ESMF audit cost for 10 years starting from 2018 till 2028

### The capacity building cost is lump sum for training and other purposes for 5 basin states SMCG and NMCG

## 4. ENVIRONMENT AND SOCIAL REGULATORY FRAMEWORK

### 4.1. GENERAL

99. The national, state and local environmental and social regulatory requirements that are applicable to the investments proposed are given in this section. As the applicability of these legal requirements would depend on the nature of the specific investments, the exact applicability cannot be determined at this stage. SMCGs and the State level executing agencies (EA) would ensure compliance of these requirements by all concerned.

100. NMCG would verify whether the investments are in compliance with these regulatory requirements prior to granting approval to the investments and disbursement of funds. During implementation, NMCG would ensure that SMCGs monitor the ESMF compliance in all investments on an on-going basis.

### 4.2. APPLICABLE LAWS AND REGULATIONS -ENVIRONMENTAL

101. The following laws and regulations are applicable to the environmental and social aspects of the investments implemented under the programme:

- ▶ Policy and Regulatory Framework of Government of India (GoI)
- ▶ Environmental Policy and Regulations of the respective State Governments
- ▶ Legislations applicable to construction activities
- ▶ World Bank Safeguard Policies
- ▶ EHS Guidelines

#### 4.2.1. Legal Framework of Government of India

102. The Government of India has laid out various policy guidelines, acts and regulations pertaining to environment. The Environment (Protection) Act, 1986 is umbrella legislation for the protection of environment. As per this Act, the responsibility to administer the legislation has been jointly entrusted to the Ministry of Environment and Forests & Climate Change (MoEF&CC) and the Central Pollution Control Board (CPCB)/State Pollution Control Boards (SPCBs).

#### 4.2.2. Key Environmental Laws and other related Regulations

103. The key environmental laws and regulations as relevant to the investments under the NGRBP/Namami Gange are given in **Table 4-1**. The key environmental regulations can also be accessed at [www.MoEF&CC.nic.in/rules-and-regulations](http://www.MoEF&CC.nic.in/rules-and-regulations)

Table 4-1: Environmental Regulations and Legislations

S. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
1	Environment Protection Act, 1986	To protect and improve overall environment	Yes	As all environmental notifications, rules and schedules are issued under this act.	MoEF &CC, GoI, DoE, State Govt. CPCB, SPCBs
2	Environmental Impact Assessment Notification 14th Sep-2006	Mandatory environmental clearance to certain category of new development activities following environmental impact assessment	Yes	This notification is applicable only for Sewage Treatment Facility and Solid waste Treatment facility investments	MoEF &CC, EIAA
3	Municipal Wastes (Management and Handling) Rules, 2000	To manage collection, transportation, segregation, treatment, and disposal of municipal solid wastes	Yes	This notification is applicable only for Municipal Solid waste Treatment facility investments	MoEF &CC, EIAA, CPCB, SPCBs
4	Coastal Regulation Zone (CRZ) Notification 1991(2011)	Protection of fragile coastal belt	No	If Project location is located along coastal belt	
5	Land Acquisition Act, 1894 (As amended)	Sets out rules for acquisition of land by government	Yes	applicable in case of acquisition of land for investments	Revenue Department, State Government
6	The Forest (Conservation) Act, 1980	To check deforestation by restricting conversion of forested areas into non-forested areas	Yes	applicable if there is diversion of forest land for non-forest activities i.e. forest land required for any of the investments	Forest Department, State Government and Ministry of Environment and Forests, Government of India.
7	Wildlife (Protection) Act, 1972	To protect wildlife through National Parks and Sanctuaries	No	This act will be applicable, if there are any points of wildlife crossings in proximity to project locations	Chief Conservator Wildlife, Wildlife Wing, State Forest Department and Ministry of Environment and Forests, Government of India
8	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution by controlling emission of air pollutants as per the prescribed Standards.	Yes	This act will be applicable during construction;	SPCBs
9	Water Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Yes	This act will be applicable during construction	SPCBs
10	The Noise Pollution (Regulation and Control) Rules, 2000	The standards for noise for day and night have been promulgated by the MoEF &CC for various land uses.	Yes	This act will be applicable for all construction equipment deployed at worksite	SPCBs

S. No	Act / Rules	Purpose	Applicable Yes/ No	Reason for Applicability	Authority
11	Ancient Monuments and Archaeological Sites and Remains Act, 1958	Conservation of cultural and historical remains found in India	Yes	This act will be applicable, only if any of the investments is in proximity to any Ancient Monument, declared protected under the act.	Archaeological Dept. GoI, Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH).
12	Public Liability and Insurance Act, 1991	Protection from hazardous materials and accidents.	Yes	Contractor need to stock hazardous material like diesel, Bitumen, Emulsions etc.	SPCBs
13	Explosive Act, 1984	Safe transportation, storage and use of explosive material	Yes	For transporting and storing diesel, Oil and lubricants etc.	Chief Controller of Explosives
14	Minor Mineral and concession Rules	For opening new quarry.	Yes	Regulate use of minor minerals like stone, soil, river sand etc.	District Collector
15	Central Motor Vehicle Act, 1988	To check vehicular air and noise pollution.	Yes	This rule will be applicable to vehicles deployed for construction activities and construction Machinery.	Motor Vehicle Department
16	National Forest Policy, 1988	To maintain ecological stability through preservation and restoration of biological diversity.	No	This policy will be applicable if any eco sensitive feature exists in and around the investments	Forest Department, State Government and Ministry of Environment and Forests, Government of India
17	The Mining Act	The mining act has been notified for safe and sound mining activity.	Yes	The construction activities for investments will require aggregate. These will be procured through mining from approved quarries	Department of Mining, State Government

*Note: the applicable world bank policies are included in section 4.5.*

### 4.3. APPLICABLE LAWS AND REGULATIONS -SOCIAL

104. All strategic interventions on human development, spread across all social issues, need directives of policies and legal support to operationalize the appropriate actions. These policies and legislations help to overcome the constraints and support administrator, implementer, community and individual in delivery of justice. This section includes the National policies and Acts as detailed under:

**Table 4-2: Relevant Social Policies and Acts**

Acts/Rule/Policy	Year	Objective	Applicability to this project	Responsible Agency
<b>National Social Policies and Acts</b>				
Right to fair compensation and transparency in land acquisition, rehabilitation	2013	Fair compensation for acquisition of Immovable assets; Resettlement of displaced population due to	Yes. as some subprojects will be acquiring private land	Revenue Department of respective state governments.

Acts/Rule/Policy	Year	Objective	Applicability to this project	Responsible Agency
and Resettlement Act		LA and economic rehabilitation of all those who are affected due to land acquisition.		
Seventy Third Constitution Amendment Act,	1992	The Act enables participation of Panchayat level institutions in decision- making by broadening the village level functions, supporting implementation of development schemes. The Act provides for involvement of the PRIs especially, the Gram Sabha/Panchayat during project preparation and implementation. The Panchayats at the village level will be involved for preparation and implementation of the project.	Yes, as some sub projects may come in panchayat areas	Department of Panchayat Raj of respective state governments.
<b>State Specific laws</b>				
Bihar Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules, 2014.	2014	To assist implementation of National Act on land acquisition and R&R. Fair compensation for acquisition of immovable assets; Resettlement of displaced population due to LA and economic rehabilitation of all those who are affected due to land acquisition.	Yes, as some sub projects will be acquiring private land	Revenue department and requiring body
Bihar Rayati Land Lease Policy	2014	Allows government to take land on perpetual lease from landowners by paying four times of the minimum value registered in rural areas and two times in urban areas.	Yes, if land acquisition is not necessary and landowner agrees to give land on lease.	Revenue department and requiring body
Uttar Pradesh Land Direct Purchase Policy (through Mutual Consent)	2015	Allows government to directly purchase land from landowners through mutual consent. The policy apart from land cost also provides for R &R assistance	Yes, as private land will be required for the purpose of the project	Revenue department and requiring body

#### 4.4. OTHER LEGISLATIONS APPLICABLE TO CONSTRUCTION ACTIVITIES

105. Construction stage generally involves equity, safety and public health issues. The construction agencies therefore will be required to comply with laws of the land, which include inter alia, the following:

- ▶ Workmen's Compensation Act 1923 (the Act provides for compensation in case of injury by accident arising out of and during the course of employment);
- ▶ Payment of Gratuity Act, 1972 (gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years);
- ▶ Employees PF and Miscellaneous Provision Act 1952(the Act provides for monthly contributions by

the employer plus workers);

- ▶ Maternity Benefit Act, 1951 (the Act provides for leave and some other benefits to women employees in case of confinement or miscarriage, etc.);
- ▶ Contract Labor (Regulation and Abolition) Act, 1970 (the Act provides for certain welfare measures to be provided by the contractor to contract Labour);
- ▶ Minimum Wages Act, 1948 (the employer is supposed to pay not less than the Minimum Wages fixed by the Government as per provisions of the Act);
- ▶ Payment of Wages Act, 1936 (it lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers);
- ▶ Equal Remuneration Act, 1979 (the Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees);
- ▶ Payment of Bonus Act, 1965 (the Act provides for payments of annual bonus subject to a minimum of 83.3% of wages and maximum of 20% of wages);
- ▶ Industrial Disputes Act, 1947 (the Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment);
- ▶ Industrial Employment (Standing Orders) Act; 1946 (the Act provides for laying down rules governing the conditions of employment);
- ▶ Trade Unions Act, 1926 (the Act lays down the procedure for registration of trade unions of workers and employers. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities);
- ▶ Child Labour (Prohibition and Regulation) Act, 1986 (the Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labour is prohibited in Building and Construction Industry);
- ▶ Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 (the inter-state migrant workers, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home to the establishment and back, etc.);
- ▶ The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 (all the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act; the employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for Workers near the workplace, etc.);
- ▶ The Factories Act, 1948 (the Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours and rendering information-regarding accidents or dangerous occurrences to designated authorities);
- ▶ Hazardous Wastes (Management and Handling) Rules, 1989 (the Rules govern handling, movement and disposal of hazardous waste);
- ▶ Manufacture, Storage and Import of Hazardous Chemicals Rules 1989, amended 1994 and 2000 (the Rules provide indicative criteria for hazardous chemicals and require occupiers to identify major accident hazards and prepare on-site and off-site emergency plans).

#### 4.5. APPLICABLE WORLD BANK POLICIES

106. The Operational Policies of World Bank that are applicable in the project are as under:

**1.3-3: Safeguard Policies of World Bank**

World Bank Safe Guard Policies	Objective	Applicability	Safeguard Requirements
<b>OP/BP4.01: Environment Assessment</b>	The objective of this policy is to help in ensuring that the projects proposed for World Bank financing are environmentally sound and sustainable through Environment Assessment (EA). EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation.	Applicable for all infrastructure projects under Namami Gange programme. The scale and detailing of the EA report depends largely upon the project categorization.	EA report and ESMP (combined with social report) for projects under DBOT/EPC mode. Environment and Social Due Diligence (ESDD) for projects under PPP mode followed by a detailed EIA report during the detailed design stage. For High category projects
<b>OP 4.04: Natural Habitats</b>	The objective of this policy is to protect the natural habitats including the forest areas and wildlife in order to protect and enhance the environment which is essential for long-term sustainable development. World Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development.	Applicable on case to case basis where disturbance to forest areas/natural habitats are envisaged to be impacted from the projects.	Necessary requirement include permission from competent authorities in the state government as well preparation of documents for necessary action plan to protect the surrounding natural habitats/forest areas.
<b>OP 4.36: Forestry</b>	The OP/BP 4.36 aims management, conservation, and sustainable development of forest ecosystems and their associated resources are essential for lasting poverty reduction and sustainable development. This is also to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests.	Applicable on case to case basis where disturbance to forest areas are envisaged to be impacted from the projects.	Necessary requirement include permission from competent authorities in the state government as well preparation of documents for necessary action plan to protect the surrounding forest areas.
<b>OP/BP 4.12: Involuntary Resettlement</b>	The objective of this policy is to avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs. Furthermore, it intends to assist displaced person in improving their former living standards; community participation in	There will be need for limited land acquisition for some sub projects such as wastewater	Resettlement Action Plan in consultation with the community and project authorities.

World Bank Safe Guard Policies	Objective	Applicability	Safeguard Requirements
	planning and implementing resettlement; and to provide assistance to affected people, regardless of the legality of title of land	treatments or river front development resulting in relocation or loss of shelter for non-titleholders; loss of assets or access to assets; loss of income sources or means of livelihood.	
<b>OP 7.50: International Waterways</b>	The objective of this policy is to recognize the cooperation and goodwill of riparian for the efficient use and protection of the waterway.	This policy is triggered as River Ganga and its tributaries are considered as international waterways.	OP 7.50 attaches great importance to riparians' making appropriate agreements or arrangements for these purposes for the entire waterway or any part thereof. The Bank stands ready to assist riparians in achieving this end. In cases where differences remain unresolved between the state proposing the project (beneficiary state) and the other riparians, prior to financing the project the Bank normally urges the beneficiary state to offer to negotiate in good faith with the other riparians to reach appropriate agreements or arrangements.
<b>OP 4.11: Physical Cultural Resources</b>	The objective of this policy is to avoid or mitigate adverse impacts on physical cultural resources.	This policy is triggered due to the presence of number of historic and heritage structure in the project area, if found.	Management plan and mitigation measures will be prepared in consultation with the community and project authorities.

107. Furthermore, the World Bank's Environmental, Health, and Safety (EHS) Guidelines is also applicable for the proposed project. This guideline will provide guidance on EHS issues; principally occur during the construction, operation and maintenance phases. This can be made available as a part of bidding document.

## 5. ENVIRONMENT AND SOCIAL MANAGEMENT FRAMEWORK

### 5.1. OBJECTIVES

108. There may be adverse impacts that have to be effectively managed during the planning, design, construction and operational phases of Namami Gange investments. These impacts may have the potential to cause major and minor, and reversible and irreversible societal/community damage; as well as result in project delays, incomplete implementation, partial achievement of the project development goals and, reputation risks to various stakeholders. Proper management is therefore necessary for smooth and effective project implementation.

109. The Objective of Environment and Social Management Framework (ESMF) is to ensure environmentally sustainable development in NGP's endeavor of Mission Clean Ganga by effective management of environmental and social issues in all the investments with a special focus on the following:

- ▶ ensure that all investments adhere to the national, state and local regulatory requirements during the design, implementation and operation stages
- ▶ ensure that best environmental and social practices are mainstreamed/ integrated during design, implementation and operation of the investments
- ▶ strive to enhance environmental conditions wherever feasible
- ▶ undertake to develop communication strategy, capacity building and training initiatives for all stakeholders such as the SMCG, EAs, ULBs, NGOs and common citizens.

### 5.2. PURPOSE OF THE ESMF

110. The purpose of the ESMF is to facilitate the management of environmental and social issues of the river pollution mitigation investments. At this stage, although the portfolio of investments has been broadly identified, the specific investment projects, i.e. their size, type and location, are yet to be identified. Therefore, at this stage it is not possible to develop specific environment and social management plans for each of the specific investments. The specific project identification will be a need based/ demand-driven process, consistent with the overall objectives of 'Mission Clean Ganga'. The Environment and Social Management Framework (ESMF), therefore, would be used as an umbrella by the Namami Gange program (the NMCG and SMCGs) and all implementing agencies while preparing and/ or appraising, approving and executing the investments.

111. **Environmental impacts:** There may be adverse environmental impacts for which mitigation plans are essential. These impacts include direct, indirect, cumulative, and induced impacts in the project's area of influence. Each project needs to be scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Environmental impacts include those related to the natural environment (air, water, and land); human health and safety; and trans-boundary and global environmental aspects. Environmental guidelines – policies and requirements – seek to avoid, minimize, or mitigate adverse environmental impacts.

112. **Social impacts:** Project-related social impacts include displacement impacts and impacts to vulnerable groups. Broadly, this includes physical displacement (relocation, loss of residential land or loss of shelter) and economic displacement (loss of land, assets, access to assets, income sources or means of

livelihood). If a project directly or indirectly affects the dignity, human rights, livelihood systems, or culture of SC/ ST/ BPL groups or affects the territories or natural or cultural resources. Social management plan seeks to avoid, minimize or mitigate these adverse impacts. Related to displacement impacts, if these adverse impacts cannot be avoided, then affected people should receive assistance/compensation so that they are at least as well off as they were in the absence of the project.

113. Through the ESMF, the SMCGs and the NMCG will also be implementing international good practices for managing social and environmental issues.

### 5.3. SCREENING AND CATEGORIZATION OF INVESTMENTS (DURING THE FEASIBILITY STUDY STAGE)

114. Each project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. The extent of assessment required to identify and mitigate the impacts largely depends upon the complexities of project activities. The scrutiny and screening will be based on a detailed Environment and Social Screening exercise, summarized in the following Format:

Table 5-1: Screening Format

Environment and Social information format for screening				
	Project Title: Implementing agency: Project cost: Project components: Project location (Area/ district)			
	Screening Criteria	Yes/No	Assessment of Impact Category (High/Low)	Explanatory note for categorization
1	Is the project in an eco-sensitive area or adjoining an eco-sensitive area? (Yes/No) If Yes, which is the area? Elaborate impact accordingly.			
2	Will the project create significant/ limited/ no social impacts? <ul style="list-style-type: none"> <li>Involuntary land taking resulting in loss of income from agricultural land, plantation or other existing land-use.</li> <li>Involuntary land taking resulting in relocation of title holder or non-titleholder households.</li> <li>Any reduction of access to traditional and river dependent communities (to river and areas where they earn for their primary or substantial livelihood).</li> <li>Any specific gender issues.</li> </ul>			
3	Will the project create significant / limited / no environmental impacts during the construction stage? (Significant / limited / no impacts) <ul style="list-style-type: none"> <li>Clearance of vegetation/tree-cover</li> <li>Direct discharge of construction run-off, improper storage and disposal of excavation spoils, wastes and other construction materials adversely affecting water quality and flow regimes.</li> <li>Flooding of adjacent areas</li> <li>Improper storage and handling of substances leading to contamination of soil and water</li> <li>Elevated noise and dust emission</li> <li>Disruption to traffic movements</li> <li>Damage to existing infrastructure, public utilities, amenities</li> </ul>			

Environment and Social information format for screening				
	<ul style="list-style-type: none"> <li>• Failure to restore temporary construction sites</li> <li>• Possible conflicts with and/or disruption to local community</li> <li>• Health risks due to unhygienic conditions at workers' camps</li> <li>• Safety hazards during construction</li> </ul>			
4	Will the project create significant / limited / no environmental impacts during the operational stage? (Significant / limited / no impacts) <ul style="list-style-type: none"> <li>• Flooding of adjacent areas</li> <li>• Impacts to water quality due to effluent discharge</li> <li>• Gas emissions</li> <li>• Safety hazards</li> </ul>			
5	Do projects of this nature / type require prior environmental clearance either from the MOEF&CC or from a relevant state Government department? (MOEF&CC/ relevant State Government department/No clearance at all)			
6	Does the project involve any prior clearance from the MOEF&CC or State Forest department for either the conversion of forest land or for tree-cutting? (Yes/ No). If yes, which?			
7	Please attach photograph and location maps along with this completed Environmental Information Format For Screening.			

*\*Detailed explanation/ justification for arriving at specific category (high/ low) to be provided in the specified column*

115. Further, below table can be referred for the overall rating and assessment (high/low) of the project.

**Table 5-2: Rating Index**

Sl.no	Categorization Criteria	Applicability (Yes/No)	Remarks
1	Is the treatment plant of the project is located within Eco Sensitive Zone as per the Wildlife (Protection) Act, 1972		
2	Is the treatment plant of the project is located within Ecological Sensitive Area (ESA) as per the Environmental (Protection) Act, 1986		
3	Is treatment plant of the project is located within notified Forest Area as per the Indian Forest Act 1927		
4	Is the treatment plant of the project is located within Critically Polluted Area (CPIA) as per Environmental (Protection) Act, 1986		
5	Does the treatment plant of the project attract the 14 <sup>th</sup> September 2006 EIA Notification & further amendments		
6	Is the treatment plant of the project is located within the Notified zone Coastal Regulation Zone (CRZ) notification 2016		
7	Is the treatment plant of the project is located within the area as notified under Wetlands (Conservation and Management) Rules, 2017		
8	Is the treatment plant of the project is located within the regulatory zone of area as per The Ancient Monuments and Archaeological Sites and Remains Act 1958.		

Sl.no	Categorization Criteria	Applicability (Yes/No)	Remarks
9	Is Resettlement / displacement /permanent loss of livelihood involved? (more than 200 persons)		
	<b>Overall Rating in percentage</b>		
<i>Note: If any of these indicators is answered yes, the project will be considered as high impact sub project.</i>			

116. The level of impact category (high/ low) shall be determined through a process of environmental and social screening as described above and shall be provided as part of the Feasibility Report and has to be agreed by the SMCG.

117. The NGRBA program as per World Bank safeguard policies is categorized as A. However, sub-projects are categorized as high / low impact categories where high impact category project will correspond to Category A and low impact corresponds to Category B projects as per World Bank's safeguard operational policy 4.01.

#### 5.3.1. Addressing safeguard issues in projects for PPP Projects:

118. Under the NGRBA framework, National Mission for Clean Ganga (NMCG) under Namami Gange programme shall finance commercially viable projects under PPP model. Viable projects may also include those projects that will become viable after receiving viability gap funding under a government scheme. The necessary procedures for preparation of safeguard documents with respect to PPP mode of projects are included in the **Addendum-I**.

### 5.4. ADDRESSING ENVIRONMENTAL AND SOCIAL IMPACTS (DURING PREPARATION OF THE DPR)

#### 5.4.1. High impact categories

119. A proposed investment will be classified as High impact category, if it is likely to impact (adverse or moderate) the environmental and social aspects of the investments. The High Category investments will also include all those investments which require the mandatory environmental clearance as per the EIA notification SO1533 (E) dated Sept 2006, published by Ministry of Environment and Forests.

120. The investments categorized as 'High' would require conducting an Environmental and Social Assessment (ESA) by an independent agency (other than the agency designing the project) and the scope of the assessment will be decided based on the nature of the investment and the environmental and social sensitivity of the area. The ESA shall examine all the potential negative and positive environmental and social impacts of the investment, compare them with those of feasible alternatives (including the "without investment" situation), and recommend any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

121. The ESA may include (a) a detailed description of the environmental and social condition of the project area; (b) an assessment of the potential impacts; (c) formulation of mitigation measures; and (d) preparation of an Environment and Social Management Plan. The ESA report will contain the following chapter scheme: (1) Introduction; (2) Description of the project; (3) Description of the environment; (4) Alternatives; (5) Anticipated environmental and social impacts and mitigation measures; (6) Socio- economic assessment; (7) Environmental and Social Management Plan; (8) Public consultation and disclosure; and (9) Conclusions.

#### 5.4.2. Gender Assessment and Development

122. Gender Development plan is being designed under the project as part of ESMF which will help analyze gender issues during the preparation stage of sub project and design interventions. At the sub project level, gender analysis will be part of the social assessment and the analysis will be based on findings from gender specific queries during primary data collection process and available secondary data. The quantitative and qualitative analysis will bring out sex disaggregated data and issues related to gender disparity, needs, constraints, and priorities; as well as understanding whether there is a potential for gender based inequitable risks, benefits and opportunities. Based on the specific interventions will be designed and if required gender action plan will be prepared. The overall monitoring framework of the project will include sex disaggregated indicator and gender relevant indicator

123. The participation of beneficiaries and focus on poverty reduction are two other key determinants of the effectiveness and sustainability of any project. Any project must address the constraints on women's participation in project design, construction, operation and maintenance (O&M), training, and monitoring and evaluation (M&E). The project must also focus on the linkage between gender and poverty, by identifying, for example, households headed by females and those households' special needs. An adaptive, learning, and process-oriented approach works better than a blueprint approach; continuous dialogue between the EA and the beneficiaries is therefore important. Project beneficiaries are likely to have a stronger sense of ownership when the project gives them enough time, design flexibility, and authority to take corrective action. In this way, they find it easier to incorporate their earlier learning and negotiate with project staff and service providers. Therefore, a mechanism must be built into the project to allow such two-way interactions between the beneficiaries and the service providers.

124. Gender analysis will be an integral part of the initial social assessment at the screening stage itself. The issues identified can be scaled up during the feasibility and detailed analysis can be carried out during the DPR stage.

125. The project designs should be gender responsive based on the gender analysis, and should be included in the DPR. The findings and recommendations from the gender analysis during project planning and feedback from beneficiaries during implementation must be discussed thoroughly to determine the need for further action. Listed below are the key action points:

126. Develop a feedback mechanism in which both male and female have a voice. Identify organizations that could facilitate women's participation during implementation and M&E.

127. Document the gender-responsive design features in the DPR and include covenants in the loan agreement to ensure gender-sensitive project design mechanisms to be complied by the executing agency

#### 5.5. LABOUR MANAGEMENT PROCEDURE

128. Since sub projects involves construction work that will demand a constant supply of labourers, the influx of migrant workforce will put additional pressure on existing resources. The workforce normally consists of solitary migrant males and that can be a potential risk for the host population. However, in many cases, the migrant male member of the family might relocate his family with him. Specifically, the influx of labour force can lead to:

- ▶ Risk of conflict and social unrest due to cultural differences between the labour force and local community

- ▶ Risk of spread of communicable diseases due to interaction of the labour and the local community
- ▶ Risk of gender-based violence
- ▶ Risk of violation of child-safety measures
- ▶ Health hazard for host community due to lack of sanitation facilities and waste management
- ▶ Additional pressure on the local resources and social infrastructures

#### 5.5.1. Construction Labour Management Plan

129. Since the construction activities are mostly labour intensive by nature, therefore, it is also envisaged that many of the labourers will be employed from outside the State and hence, accommodation will be provided. These migrant labourers will be accommodated in a temporary campsite within the project area.

#### 5.5.2. Objectives

130. The influx of migrant labour will have both negative and positive impacts on the nearby community and local environment. The labour will be accommodated in a temporary campsite within the project area which can have a significant interface with the host community. The influx of migrant workers would lead to a transient increase of population in the immediate vicinity of the project area for a limited time. This would put pressure on the local resources such as roads, fuel for cooking, water, etc. Hence, a plan has been designed to demonstrate the:

- ▶ Potential impacts associated with influx on the host population and receiving environment are minimized;
- ▶ Provision of safe and healthy working conditions, and a comfortable environment for migrant labour; and
- ▶ To ensure compliance with the national labour laws.

#### 5.5.3. General Requirements

131. All migrant workers are envisaged to be accommodated in a proper temporary campsite within the project area. If migrant workers are accompanied by their families, provisions should be made accordingly. As per the National Acts, the inclusion of requirements for labour camp to be established by contractors during construction phase of the project. Contractor(s) shall ensure implementation of the following measures to minimise the potential negative impacts of worker accommodation and workers on local communities:

- ▶ Employment of child Labour is prohibited in Building and Construction Industry. No child labour<sup>6</sup> shall be utilized at any of project or subproject site (during planning, construction or O&M phases). The contractor will be sensitized on issues related to child labour. All sub project sites will display child helpline number on information board and prohibition of child labour use will be part of daily Tool Box Talk (TBT). The Bid document clearly mentions prohibition of child labour employment.
- ▶ Cleanliness: Pest extermination, vector control, and disinfection are to be carried out throughout the living facilities in compliance with local requirements and/or good practice.
- ▶ Complaints and incident reporting: A formal Complaints Procedure will be implemented to ensure

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<sup>6</sup> Child Labour (Prohibition and Regulation) Act, 1986 (the Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes.

timely and transparent response to complaints as received from labour.

- ▶ Labour education: The workforce will be sensitized to local social and cultural practices through the provision of an induction course for all employees that stipulates expected behaviour;
- ▶ Labour behaviour in the campsite provided: A Code of Behaviour governing appropriate behaviour in the accommodation facilities to be kept in place and to be strictly enforced. The contractor shall ensure implementation of the “rules of engagement” between labourers living in campsite and community and shall be implemented by construction contractors for all engaged labourers.
- ▶ Labour Compensation and Accommodation: The client shall ensure that labourers are provided with benefits such as leave, weekly rest day, etc. Accommodation to be provided for the construction labour which covers facilities (including catering facilities, dining areas, washing and laundry facilities, etc.) and supporting utilities.

#### 5.5.4. Hiring and Recruitment Procedure

132. The manpower contractor shall, wherever possible, locally recruit the available workforce and shall provide appropriate and requisite on job and EHS training as necessary. The following general measures shall be considered for the workforce during their employment tenure:

- ▶ The implementing agency in consultation with the PMU will include a code of conduct relating to the accommodation to be signed with the contract document of contractors.
- ▶ The contractor shall not employ any person below the age of 18 years nor will have any forced labour;
- ▶ The construction labourers will be provided with documented information regarding their rights under national labour and employment law such as but not limited to Factories Act, Minimum Wages Act, Trade Unions Act, and Workmen’s Compensation Act;
- ▶ First priority for employment of labour should be given those impacted by the project such as landowners who have lost land / donated land;
- ▶ No discrimination shall be done by the construction contractor with respect to recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, termination of employment or retirement, and disciplinary practices;
- ▶ The contractor to ensure that work hours are set at eight hours a day, 48 hours a week, with a weekly rest day for all engaged labour;
- ▶ Every labour is entitled to a maximum of only two hours a day as Overtime (OT) work. OT pay is twice the hourly remuneration;
- ▶ The project will ensure that equal wages for male and female workers for work of equal nature or value is maintained;
- ▶ A grievance redress mechanism for workers will be put in place by the contractor to raise workplace concerns. The workers will be informed about the grievance mechanism at the time of recruitment; and
- ▶ The Contractor will ensure that they develop and implement a procedure to review the performance of their sub-contractors.
- ▶ The procedure developed should include regular inspection of the camp sites, maintaining information pertaining to labour sourced by sub-contractors;

#### 5.5.5. Worker's Accommodation

133. The Contractor will supervise and monitor the activities performed by their contractor and accommodation facilities provided in the campsite. The following measures shall be provided:

- ▶ The labour will be provided with accommodation made of insulating material and locally available building material, etc.;
- ▶ The migrant workers with families will be provided with individual accommodation comprising bedroom, sanitary and cooking facilities;
- ▶ The units will be supported by common latrines and bathing facilities duly segregated for male and female labour;
- ▶ Adequate number of toilets will be provided in the accommodation facilities. A minimum of 1 unit to 15 males and 1 unit for 10 females shall be provided;
- ▶ The contractor shall provide a canteen facility for the construction workers and the food will be of appropriate nutritional value and will consider religious/cultural backgrounds;
- ▶ All doors and windows shall be lockable and mobile partitions/curtains shall be provided for privacy;
- ▶ Facilities for the storage of personal belongings for workers shall be provided within the campsite only;
- ▶ Dustbins shall be provided for collection of garbage and will be removed on a daily basis;
- ▶ It is also required to provide first aid box in adequate numbers; and
- ▶ Ventilation should be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time.

#### 5.5.6. Security

134. The contractors shall put in place the following security measures to ensure the safety of the workers. The following measures shall be incorporated:

- ▶ Access to the campsite shall be limited to the residing workforce;
- ▶ The contractor shall be responsible for deploying an adequate number of guards;
- ▶ Adequate, day-time night-time lighting shall be provided;
- ▶ The security personnel shall be provided with training to respect the community traditions and in dealing with, use of force, etc.; and
- ▶ The rental accommodation shall be provided with firefighting equipment and portable fire extinguishers.

#### 5.5.1 Provisions for Drinking Water

135. Access to an adequate and convenient supply of free potable water is a necessity for workers. The domestic water supply shall be made available by the contractor.

- ▶ Safe drinking water conforming to the IS 10500:2012 for drinking water shall be provided;
- ▶ Private tanks can be utilized for provision of drinking water for the migrant labours;
- ▶ The direct usage of water from bore well should not be allowed and water shall be adequately treated;
- ▶ The Contractor(s) should regularly monitor the quality of drinking water available. In case of non-

compliance with the Drinking Water Specifications, additional treatment shall be provided, or alternative sources of water supply shall be arranged; and

- ▶ All tanks used for the storage of drinking water are constructed and covered to prevent water stored therein from becoming polluted or contaminated.

#### 5.5.7. Cooking Arrangements

136. The construction phase will involve the engagement of a large number of migrant labourers in the project area for a limited time. Hence, there shall be a requirement of the provision of cooking facilities (kitchen) as listed below:

- ▶ Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation;
- ▶ Adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water; and
- ▶ All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials;
- ▶ Food preparation tables are equipped with a smooth, durable, easily cleanable, non-corrosive surface made of non-toxic materials.
- ▶ To ensure that the fuel need of labourers in the project area does not interfere with the local requirements, necessary arrangements for supply of fuel to the labourers shall be done by the contractor.

#### 5.5.8. Wastewater Generation

137. There will be generation of wastewater from the campsite. About 80% of water used shall be generated as sewage/wastewater. Contractors shall ensure that the campsite is equipped with the septic tank and soak pit for disposal of sewage. It is also recommended that the storm water and sewage system should be separate. The surface water drainage shall include all necessary gutters, down pipes, gullies, traps, catch pits, manholes, etc. Sanitary and toilet facilities are constructed of materials that are easily cleanable. Sanitary and toilet facilities are required to be cleaned frequently and kept in working condition.

#### 5.5.9. Solid Waste Management

138. The municipal solid waste generated from the campsite will mostly comprise compostable wastes like vegetable (kitchen waste) and combustible waste like paper, cans, plastic and some non-degradable waste like glass/glass bottles. Improper disposal of solid waste will lead to health hazards to labourers as well as the nearby communities.

139. The following measures shall be adopted by contractors for ensuring effective management of solid waste:

- ▶ The solid wastes of domestic nature generated shall be collected and stored separately in appropriate containers with proper sealing on them;
- ▶ Separate bins with proper markings in terms of recyclable or non-recyclable waste shall be provided in the houses and kitchen premises in sufficient numbers for collection of garbage;
- ▶ Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation; and
- ▶ The contractor shall identify the nearest municipal solid waste storage facility and tie up with the

concerned urban local body for disposal of waste at frequent intervals.

#### 5.5.10. Medical Facilities

140. Effective health management is necessary for preventing the spread of communicable diseases among labour and within the adjoining community. The following medical facilities shall be provided by contractors for the construction workers:

- ▶ A first aid center shall be provided for the labour within the construction site equipped with medicines and other basic facilities;
- ▶ Adequate first aid kits shall be provided in the campsite in an accessible place. The kit shall contain all type of medicines and dressing material;
- ▶ Contractor shall identify and train an adequate number of workers to provide first aid during medical emergencies;
- ▶ Regular health check-ups shall be carried out for the construction labourers every six month and health records shall be maintained;
- ▶ Labours should have easy access to medical facilities and first aider; where possible, nurses should be available for female workers;
- ▶ First aid kits are adequately stocked. Where possible a 24/7 first aid service/facility is available;
- ▶ An adequate number of staff/workers is trained to provide first aid; and
- ▶ Information and awareness of communicable diseases, AIDS, etc. shall be provided to workers.

#### 5.5.11. Recreation Facilities

- ▶ Basic collective social/rest spaces are provided to workers.
- ▶ Facilities like a common television can be provided in labour camps

#### 5.5.12. Impact of influx of migrant labourer

- ▶ The contractor will preferably engage the local labour force except for the labourer's requiring special skills and the non-availability of such skilled labourers from the local area.
- ▶ Awareness of labourers/ workers on societal norms, taboos, and other cultural practices.
- ▶ Organise awareness creation and educational programmes for all workers and the general public on the behavioural changes required to prevent the spread of HIV/AIDS and other STDs.
- ▶ The 'Labour Influx and Construction Workers Campsite Management Plan' will be implemented.
- ▶ Project to assess and manage labour influx risk based on risks identified in the ESIA. Depending on the risk factors and their level, appropriate site-specific Labour Influx Management Plan and/or a Workers' Camp Management Plan.
- ▶ The project will incorporate the ESMP into the civil works contract. The responsibilities for managing these adverse impacts will be clearly reflected as a contractual obligation, with a mechanism for addressing non-compliance.
- ▶ Employment of any person less than 18 years of age will be strictly prohibited. The contractor will maintain a labour register with name, age, and sex with supporting document (preferably copy of Aadhar card or voter's ID card). This will be monitored by the Environmental and Social office of contractors.
- ▶ Contractor and labourer will sign a code of conduct to maintain good manners with the community and avoid GBV.

- ▶ Project will undertake awareness raising program for the workers and community on the risk of labour influx.

#### 5.5.13. Avoiding Gender Based Violence

- ▶ Contractor will prepare and implement robust measures to address the risk of gender-based violence that include:
  - mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
  - informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
  - introducing a Worker Code of Conduct as part of the employment contract and including sanctions for non-compliance (e.g., termination), and (iv) contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.
- ▶ Additional measures can aim to reduce incentives to engage with the local community by providing workers with the opportunity to spend their time off away from the host community, where feasible with a small transport allowance, ideally allowing workers to regularly return for brief visits to their families, spouses, and friends, or to visit nearby urban centers that provide a variety of legal social opportunities. For workers who need to travel further it may be attractive to forego weekends off in exchange for longer breaks that would allow for such home leave travel.

#### 5.5.14. Contractor's responsibility

141. Within 30 days from the appointed date, the Contractor shall prepare and submit 4 hard copies and 1 soft copy of Labour Influx and Worker's Camp Management Plan to the concerned PEA that addresses specific activities that will be undertaken to minimize the impact on the local community, including elements such as worker codes of conduct, training programs on HIV/AIDS, etc. A Workers' Camp Management Plan addresses specific aspects of the establishment and operation of workers' camps.

This Labour Influx and Worker's Camp Management Plan will include:

- (i) mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
- (ii) informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
- (iii) introducing a Worker Code of Conduct as part of the employment contract and including sanctions for non-compliance (e.g., termination), manual scavenging, engagement with local residents, child labour, non-discrimination, harassment of co-workers including women and those belonging to SC and STs and other minority social groups;
- (iv) Contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence;
- (v) training programs on HIV/AIDS and other communicable diseases;
- (vi) workers' Camp Management Plan addressing specific aspects of the establishment and operation of workers' camps provided the Local Body/ Executing Agency is unable to cater to the demand for affordable housing for this additional workforce in terms of rentals, hostels, apartments, etc.; and
- (vii) complaint handling mechanism at the project level

142. Additional measures that aim to reduce incentives to engage with the local community by providing workers with the opportunity to spend their time off away from the host community, where

feasible with a small transport allowance, ideally allowing workers to regularly return for brief visits to their families, spouses, and friends, or to visit nearby urban centers that provide a variety of legal social opportunities. For workers who need to travel further, it may be attractive to forego weekends off in exchange for longer breaks that would allow for such home leave travel.

## 5.6. GENDER BASED VIOLENCE (GBV)

143. The gender-based violence (GBV) risk rating for the National Ganga River Basin Project (P119085) is Low. Although risk is low, a list of activities is proposed to ensure the risk does not increase during the course of the project. The National Ganga River Basin Project (P119085) is the parent project for the National Ganga River Basin Project (P169111). The geographical spread, broad project interventions and associated risks and impacts are expected to be similar to the parent project at this stage.

144. To start the GBV retrofitting process, the World Bank team organized a workshop in line with requirements of the GBV Taskforce of the World Bank (2017). The emerging discussions also referred to the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redress) Act, 2013 and subsequently, constitution and functionality of Vishakha Committees. Further, the Bank team conducted an extensive mapping exercise of service providers in the state to strengthen the referral system for a potential victim. The Bank team put forth the context and internal risk assessment based on review of project documents and estimates of labor influx and scale of on-going construction. The risk rating for the parent project [National Ganga River Basin Project (P119085)] was evaluated to be 'Low'. However, given the specific context of some of the states such as Uttar Pradesh<sup>7</sup> and potential presence of women-headed households near construction sites in Madhya Pradesh, Uttar Pradesh, Bihar and West Bengal (plains topography - states) the following actions were recommended and agreed upon with the client:

- ▶ Sensitization of contractors and laborers by nodal officers
- ▶ Constitution and functionality of Vishakha Committee
- ▶ Strengthening of Grievance Redress Mechanism
- ▶ Strengthening of infrastructure on camp sites from a safety perspective.

145. The GBV assessment and action plan prepared in 2019 had identified several actions to be taken for GBV prevention and risk mitigation in NGRBP. Women help line numbers have been displayed at the sub-project level in all the states. In addition, Bihar and Jharkhand have displayed names and numbers of nodal persons identified for GBV GRM at all project sites. Furthermore, sensitization and awareness on GBV for labourers during tool box talks and safety induction training's is being done in Bihar and Jharkhand. A Public Grievance Redress System (PGRS), an online app developed by BUIDCO includes tabs for complaints on GBV which would be directed to the social specialist responsible for GBV grievance redress. So far, no GBV incident has been reported from any of the states. Signing of CoCs by all labour has already been done in Uttarakhand and others are in the process of translating CoC in local language and getting it signed by workers. SPMG Uttarakhand has translated the CoC into the local language and displayed at all project sites. Separate toilets and bathing facilities for women labourers have been provided in all labour camps. Awareness programmes for adjoining community members with the support of local counselors have been conducted in some sub-projects in Bihar, Jharkhand and West Bengal.

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<sup>7</sup> Uttar Pradesh had the highest number of crimes against women. While the state recorded 14.5% of the total cases of crimes against women, it accounted for 12.4% of the total number of rape cases, second only to Madhya Pradesh, which recorded 12.5% of the total rape cases in 2016.

### 5.6.1. Legal and policy environment for women's safety

146. Some of the key policies and laws pertaining to gender-based violence in India include the following:

- ▶ National Policy for the Empowerment of Women<sup>8</sup> Year of adoption: 2001.
- ▶ India has signed and ratified Convention on Elimination of Discrimination against Women (CEDAW)<sup>9</sup>. Since then, the national policy for Women 2016 and other policies and amendments on acts has been reflecting the principles highlighted in the related international conventions. The goal of this Policy is to bring about the advancement, development and empowerment of women.
- ▶ The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redress) Act, 2013, is introduced to prevent and provide redress of complaints of sexual harassment. One of the main provisions in this act is that it calls for constituting an Internal Complaints Committee at each office or branch with 10 or more employees/workers.
- ▶ The Protection of Women from Domestic Violence Act, 2005<sup>10</sup> defines domestic violence, describes the powers and duties of protection officers, service providers and lists the procedures for obtain reliefs.
- ▶ The Dowry Prohibition Act, 1961 makes giving and demanding dowry as a punishable offence. Section 8B identifies Dowry Prohibition Officers who are appointed not only to prevent the offence but also to collect evidence and perform additional functions that are deemed to serve the purpose of the act.
- ▶ The Protection of Children from Sexual Offences Act, 2012<sup>11</sup> has been framed to strengthen the legal measures for protecting children from any kind of sexual offences. Despite having sexual offences covered under different sections of Indian Penal Code, those existing sections do not entirely cover similar offences against children. Recognizing the children as a person of 18 years or below, the various offences have been clearly defined under this Act. The Act also defines the gravity of certain offences carried out against children and suggests stringent punishments accordingly.
- ▶ The Convention on the Rights of the Children<sup>12</sup> lays out a universal definition of 'child'. It articulates how children should be treated in a non-discriminatory manner and calls for action that considers the best interests of the child.
- ▶ India ratified the Convention for the Suppression of the Traffic in Persons and of the Exploitation of the Prostitution of Others<sup>13</sup> and following that, the country enacted The Immoral Traffic (Prevention) Act in 1956 and punishes trafficking in relation to prostitution.

### 5.6.2. State-level mitigation measures

- ▶ Registration of laborers: The state agencies have undertaken registration of laborers in collaboration with the labor department across the five states. This initiative covers migrant laborers as well and is beneficial for them to access health benefits, pension and several other safety nets deployed by the government. Additionally, it helps the state agencies keep track of laborers on-site.
- ▶ Separate toilets: While all camp-sites had separate toilet facilities for men and women laborers, it

<sup>8</sup> "Draft National Policy for Women 2-16\_0.pdf" on <http://wcd.nic.in/sites/default/files>

<sup>9</sup> <http://treaties.un.org/>

<sup>10</sup> "TheProtectionofWomenDomesticViolenceAct2005.pdf" on <http://ncw.nic.in/acts>

<sup>11</sup> "childprotection31072012.pdf" on <http://wcd.nic.in/sites/default/files>

<sup>12</sup> [http://www.unicef.org/crc/files/Rights\\_overview.pdf](http://www.unicef.org/crc/files/Rights_overview.pdf)

<sup>13</sup> <http://www.ohchr.org/en/professionalinterest/pages/trafficingpersons.aspx>

was noticed that several sites might not have adequate facilities to match the number of laborers staying and working on sites. A screening checklist will be created to monitor adequate provision of infrastructure at camp sites and ensure safety of women laborers.

- ▶ Grievance redress mechanism on-site: An established procedure to address complaints is being rolled-out across sites.
- ▶ Safety information on-site: Project sites will be required to prominently display safety related information for laborers.
- ▶ Awareness amongst communities: Across the five states, the project will undertake community level consultations and prominently display information related to the general helpline number, as well as contact details of junior/field engineers in case instances involving laborers come to the forefront.

## 5.7. ENVIRONMENTAL REGULATORY COMPLIANCE

147. In addition to the above, the investments should also comply with all the applicable environmental regulations and should secure required clearances / authorizations. **Table 5-3 Error! Reference source not found.** and **Table 5-4** provide a summary of such clearances and permissions.

**Table 5-3: Environmental Regulatory Requirements for Namami Gange investments**

S. No.	Type of Clearance	Applicability	Project Stage	Responsibility	Time Required
1	Environmental Clearance from MoEF&CC/SIAA	Applicable for select investments	Pre-Construction	EA	Not Applicable
2	Forest Clearance for land diversion	For forest land acquisition	Pre-Construction	EA	6-8 Months
3	Tree felling permission	For roadside tree cutting, incase sewers are to be laid	Pre-construction	EA	15 days
4	NOC and consents under Air, Water & Environment Act and noise rules from SPCB	For establishment of construction camp.	Construction stage (Prior to initiation of any work)	Contractor	2-3 Months
5	NOC and consents under Air, Water & Environment Act and noise rules from SPCB	For operating construction plant, crusher, batching plant etc.	Construction stage (Prior to initiation of any work)	Contractor	1-2 Months
6	Explosive License from Chief Controller of Explosives	For storing fuel oil, lubricants, diesel etc. at construction camp	Construction stage (Prior to initiation of any work)	Contractor	2-3 Months
7	Permission for storage of hazardous chemical from CPCB	Manufacture storage and Import of Hazardous Chemical	Construction stage (Prior to initiation of any work)	Contractor	2-3 Months
8	Quarry Lease Deed and Quarry License from State Department of Mines and Geology	Quarry operation (for new quarry)	Construction stage (Prior to initiation of any work)	Contractor	2-3 Months

S. No.	Type of Clearance	Applicability	Project Stage	Responsibility	Time Required
9	Permission for extraction of ground water for use in road construction activities from State Ground Water board	Extraction of ground water	Construction stage (Prior to initiation of any work)	Contractor	2-3 Months
10	Permission for use of water for construction purpose from irrigation department	Use of surface water for construction	Construction stage (Prior to initiation of any work)	Contractor	2-3 Months
11	Labour license from labour commissioner office	Engagement of Labour	Construction stage (Prior to initiation of any work)	Contractor	2-3 Months

Table 5-4: Environmental Regulatory Compliance during Construction and Operation of Namami Gange Investments

S. No	Project Portfolio	Applicable Legislations	Obligations	Responsibility
<b>A Sewerage &amp; Sanitation Investments</b>				
1.	Laying entirely new sewer Net Work or extension to existing network including providing house connections and gravity based interception and diversion arrangements to drains carrying sanitary sullage/dry weather flow	None	<ul style="list-style-type: none"> <li>• Ensure Air and Noise Quality is within stipulated limits of SPCB's</li> <li>• Ensure minimum hindrance to traffic, pedestrians and minimum interruption to services</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor during construction and operating agency during operation &amp; maintenance</li> <li>• ULB/EA/Contractor</li> </ul>
2.	Sewerage Network and Pumping Stations	Air Act, 1981 & Noise Rules as per EP Act, 1986	<ul style="list-style-type: none"> <li>• Ensure Air and Noise Quality is within stipulated limits of SPCB's</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor during construction and operating agency during operation &amp; maintenance</li> <li>• ULB/EA/Contractor</li> </ul>
3.	Sewerage Network, Pumping Station and Treatment Plant	Water Act, 1974 Hazardous Wastes (Management and Handling) Amendment Rules, 2000	<ul style="list-style-type: none"> <li>• Secure Consent to establish and Operate for sewage treatment plant from SPCBs and Ensure Air and Noise quality is within the stipulated limits of SPCB and CPCB</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor during construction and operating agency during operation &amp; maintenance</li> <li>• ULB/EA/Contractor</li> </ul>
4.	Low Cost Sanitation	None	<ul style="list-style-type: none"> <li>• Ensure Air and Noise Quality is within stipulated limits of SPCB's</li> <li>• Ensure minimum hindrance to traffic, pedestrians and minimum interruption to services</li> </ul>	
5.	Generators at Sewage Pumping Stations and Sewage Treatment Plant	Air Act 1981 & Noise Rules as per EP Act, 1986	<ul style="list-style-type: none"> <li>• Secure Consent to establish and Consent to Operate for sewage treatment plant from SPCBs</li> </ul>	ULB/EA/Contractor
			<ul style="list-style-type: none"> <li>• Ensure Air and Noise quality is within the stipulated limits of SPCB and CPCB</li> </ul>	
<b>B Industrial Pollution Control Investments</b>				
1.	Common Effluent Treatment Plants	Hazardous Wastes (Management and Handling) Amendment Rules, 2000	<ul style="list-style-type: none"> <li>• Secure the Consent to Establish and Consent to Operate from SPCBs</li> <li>• Obtain Environmental Clearance from MOEF&amp;CC</li> <li>• Ensure Air, water(surface and ground)and</li> </ul>	ULB/ EA/ Contractor

S. No	Project Portfolio	Applicable Legislations	Obligations	Responsibility
			Noise Quality is within stipulated limits of SPCB's/CPCB	
2.	Hazardous Waste Receiving, Treatment, Storage and Disposal Facilities	Hazardous Wastes (Management and Handling) Amendment Rules, 2000	<ul style="list-style-type: none"> <li>Secure the Consent to Establish and Consent to Operate from SPCBs</li> <li>Obtain Environmental Clearance from MOEF&amp;CC</li> <li>Ensure Air, water(surface and ground)and Noise Quality is within stipulated limits of SPCB's/CPCB</li> </ul>	ULB/ EA/ Contractor
<b>C Solid Waste Management Facilities</b>				
A.	Engineered Landfill Sites	MSW Rules, 2000 Air, Act, Water Act and EPA	<ul style="list-style-type: none"> <li>Secure the Consent to Establish and Consent to Operate from SPCBs</li> <li>Obtain Environmental Clearance from MOEF&amp;CC</li> <li>Ensure Air, water(surface and ground)and Noise Quality is within stipulated limits of SPCB's/CPCB</li> </ul>	ULB/ EA/ Contractor
B.	Composting Facilities	MSW Rules, 2000 Air Act Water Act and EPA	<ul style="list-style-type: none"> <li>Secure the Consent to Establish and Consent to Operate from SPCBs</li> <li>Obtain Environmental Clearance from MOEF&amp;CC</li> </ul>	ULB/ EA/ Contractor
			<ul style="list-style-type: none"> <li>Ensure Air, water(surface and ground) and Noise Quality is within stipulated limits of SPCB's/CPCB</li> <li>Ensure no odor and fly nuisance in and around the waste segregation units within the compost yard through appropriate mitigation measures</li> </ul>	
<b>D River Front Development Schemes</b>				
A.	River front development and beautification schemes	None	<ul style="list-style-type: none"> <li>Ensure Air and Noise Quality is within stipulated limits of SPCB's</li> <li>Ensure minimum hindrance to traffic, pedestrians and minimum interruption to services</li> </ul>	ULB/ EA/ Contractor

S. No	Project Portfolio	Applicable Legislations	Obligations	Responsibility
B.	Construction of Bathing Ghats	None	<ul style="list-style-type: none"> <li>• Ensure Air and Noise Quality is within stipulated limits of SPCB's</li> <li>• Ensure minimum hindrance to traffic, pedestrians and minimum interruption to services</li> </ul>	ULB/ EA / Contractor
C.	Redevelopment of cremation grounds situated along river banks	None	<ul style="list-style-type: none"> <li>• Ensure Air and Noise Quality is within stipulated limits of SPCB's</li> <li>• Ensure minimum hindrance to traffic, pedestrians and minimum interruption to services</li> </ul>	ULB/ EA/ Contractor
D.	Modification of electric /CNG crematoriums situated along river banks	Air Act, 1981	Secure No Objection Certificate from SPCB <ul style="list-style-type: none"> <li>• Consent to establish</li> <li>• Consent to Operate</li> <li>• Ensure Water, Air and Noise quality is within the stipulated limits of SPCB.</li> </ul>	ULB/EA/ Contractor

148. The Operational Policies of World Bank that are applicable for the project has been detailed out in **Table 5-3**.

## 6. RESETTLEMENT POLICY AND LAND ACQUISITION FRAMEWORK (RPLAF)

### 6.1. INTRODUCTION

149. River Ganga has significant economic, environmental and cultural value in India. Rising in the Himalayas and flowing into the Bay of Bengal, the river traverses a course of more than 2,500 km through the plains of north and eastern India. The Ganga basin – which also extends into parts of Nepal, China and Bangladesh – accounts for 26 per cent of India's landmass, 30 per cent of its water resources and more than 40 per cent of its population. The Ganga also serves as one of India's holiest rivers whose cultural and spiritual significance transcends the boundaries of the basin.

150. Despite its importance, extreme pollution pressures pose a great threat to the biodiversity and environmental sustainability of the Ganga, with detrimental effects on both the quantity and quality of its flows. Increasing population in the basin and haphazard urbanization and industrial growth has significantly impacted the water quality of River Ganga, particularly during the dry season.

151. The previous attempt to clean the river, such as Ganga Action Plan (GAP) launched in 1985 have provided some gains in arresting rate of water quality degradation, but lot more needs to be done. The lessons drawn from this prior experience indicate that improving water quality in the Ganga three-pronged approach has been adopted as mentioned below:

- (iv). Establishing a basin-level, multi-sectoral framework for addressing pollution in the river (including national/state policies and river basin management institutions);
- (v). Making relevant institutions operational and effective (e.g. with the capacity to plan, implement and manage investments and enforce regulations); and,
- (vi). Implementing a phased program of prioritized infrastructure investments (with emphasis on sustainable operations and mobilization of community support)

152. As a major first step in this direction, the Government of India (GoI) has established the National Ganga River Basin Authority (NGRBA) in 2009 and National Council for River Ganga (Rejuvenation, Protection and Management) in 2016, as an Authority has been created for comprehensive management of the river. The NGRBA was established through Gazette notification of the Government of India S.O. No. 521 (Extraordinary) dated 20 February 2009 under section 3 of the Environment Protection Act, 1986, as an empowered planning, financing, monitoring and coordinating authority for the Ganga River.

153. The Namami Gange Programme launched in 2015 has adopted a river-basin approach and has been given a multi- sectoral mandate to address both water quantity and quality aspects. Under Namami Gange Programme, diverse set of interventions for cleaning and rejuvenation of river Ganga have been taken up. These include pollution abatement activities including sewage, industrial effluent, Solid Waste etc., River Front Management, Aviral Dhara, Rural Sanitation, Afforestation, Biodiversity Conservation, Public Participation etc. The programme covers short term, medium term and long-term activities.

154. The pace of these projects has gathered momentum and all efforts are being made to complete these projects well within the respective timelines.

155. National Ganga River Basin Project (NGRBP) started in 2011 and funded by World Bank has now been included as a part of Namami Gange Programme.

## 6.2. NATIONAL MISSION FOR CLEAN GANGA (NMCG)

156. The National Mission for Clean Ganga was established in the form of a national level Program Management Group (PMG) in 2011, for seeking \$1bn assistance from World Bank. Cabinet Committee on Economic Affairs (CCEA) accorded approval on 28.04.2011 for the World bank assisted National Ganga River Basin Project (NGRBP) at an estimated cost of Rs. 7000 crore to be implemented by NMCG as a registered Society under the Societies Registration Act 1860, to act as an implementation arm of NGRBA (External Funding).

157. With change in Allocation of Business Rules, 1961 vide Gazette Notification dated 31.07.2014, the work related to Ganga & its tributaries was transferred to Ministry of Water Resources, River Development & Ganga Rejuvenation (Now Ministry of Jal Shakti) from the Ministry of Environment & Forests. The next major development in the evolution of NMCG was launch of Namami Gange Programme on 13<sup>th</sup> May 2015 with the approval of Cabinet as a Central Sector Scheme (100% central assistance), with components including all objectives of NGRBA. The non-lapsable fund of Rs 20,000 crore was earmarked for five-year period, 2015-2020.

158. The Namami Gange Program with a definite timeline of five year required a truly empowered implementing body. This realization led to reconstitution of NMCG as an Authority on 7<sup>th</sup> October 2016. With simultaneous dissolution of NGRBA, the present form of NMCG as an Authority is the designated body to take all necessary decisions and actions for pollution abatement and rejuvenation of River Ganga.

159. Later in 2019, **Ministry of Jal Shakti** was formed by merging Ministry of Water Resources, River Development & Ganga Rejuvenation and Ministry of Drinking Water and Sanitation. Now, NMCG falls under the Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti.

## 6.3. BRIEF PROJECT DESCRIPTION

160. The earlier NGRBP programme usually has 70% central share and 30% state share at the sub-project levels and support for 5 years of Operation and Maintenance. After launching of Namami Gange programme almost all the new projects sanctioned under Namami Gange Programme would have 100% funding from the Central Government for the entire life cycle cost of the assets created, which includes 15-year Operation & Maintenance cost as well. Namami Gange Programme has been segregated into three different components:

- ▶ **Component 1: Institutional Development:** This component will support to the national, state and municipal governments to strengthen implementation and financing arrangements and develop a framework to improve Ganga river basin management.
- ▶ **Component 2: Infrastructure Development:** Pertains to the initiatives to be undertaken under National Ganga Plan in 5 major sectors i.e. Infrastructure Development (Sewage Treatment, River Front Development, and Industrial Wastewater Treatment & Solid Waste Management), Ecological Sustainability and Research & Development and Communication & Public Outreach.
- ▶ **Component 3: Program communication and management:** NMCG conducts a range of vibrant communication activities ranging from ground-level community engagement exercises, social and traditional media outreach, public debates and lectures, to a flagship mass media campaign.

161. The Ganga-2 project is basically a continuation of Ganga-1 project with a portfolio of investment of US\$400 million under Ganga-2. The portfolio of river pollution mitigation projects to be implemented under the Namami Gange and its components areas under.

162. As regards to the **Social Impacts**, the requirement of land for all these investments is rather small. However, wherever there is displacement of titleholders/non-titleholders, it may involve resettlement issues and may result in temporary loss of access to private and common properties during construction. Social issues that may arise due to these kinds of investments are:

- ▶ Direct purchase of small land parcels for SPS/ Lifting station
- ▶ Land acquisition / taking for sewerage treatment plant leading to loss of livelihood / displacement of non-titleholders /titleholders
- ▶ Temporary land taking causing economic displacement
- ▶ Temporary loss of common grazing area

163. So far, in most cases, SPS and STPs have been designed in existing government land that is free of encroachment and other encumbrances. In case of requirement of private land, EAs have preferred direct purchase based on willing buyer – willing seller. Wherever, government land has been taken, non-titleholders have been compensated for assets and assisted in relocation (e.g., Patna RFD).

164. Most of these investments would be concentrated in one location and the requirement of land for these investments is rather small as compared to other infrastructure development investments. Hence, the social impacts would be minimal but in case of displacement Resettlement Action Plan<sup>14</sup> need to be prepared.

165. NMCG has developed an Entitlement Matrix, which is in line with Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement 2013 other applicable laws and Acts of the Government of India to address the issues related with affected persons.

166. R&R will be undertaken as per the entitlement matrix or State R&R policy where applicable, to address the issues related to the resettlement and rehabilitation of the affected persons.

167. This aims to resettle and rehabilitate the affected persons on account of its investments in a manner that they do not suffer from adverse effects and shall improve or at the minimum retain their previous standard of living, earning capacity and production levels. It is also the endeavor of the Namami Gange program that the resettlement shall minimize dependency and be sustainable socially, economically and institutionally.

168. Special attention will be paid for the improvement of living standards of marginalized and vulnerable groups.

169. The broad principles of the R&R policy are as below:

- ▶ The adverse impacts on persons affected by the project would be avoided to the extent possible.
- ▶ Where the adverse impacts are unavoidable, the project-affected persons will be assisted in improving or regaining their standard of living. Vulnerable groups will be identified and assisted to

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<sup>14</sup>e.g. places where Government land is available and no displacement is involved a Generic ESMP is prepared/to be prepared. Places where private land acquisition is involved /physical displacement or displacement of Non-title holders is required (e.g. cases like Patna RFD and Begusarai WWT), an abbreviated RAP /RAP is prepared/to be prepared.

improve their standard of living.

- ▶ All information related to resettlement preparation and implementation will be disclosed to all concerned, and community participation will be ensured in planning and implementation.
- ▶ Private negotiations will also be used for land acquisition as required.
- ▶ The persons affected by the project who does not own land or other properties but who have economic interest or lose their livelihoods will be assisted as per the broad principles brought out in this policy.
- ▶ Before taking possession of the acquired lands and properties, compensation and R&R assistance will be made to those who are available and willing to receive the entitlements in accordance with this policy.
- ▶ There would be no/or minimum adverse social, economic and environmental effects of displacement on the host communities but if needed specific measures would be provided.
- ▶ Broad entitlement framework of different categories of project-affected people has been assessed and is given in the entitlement matrix. Provision will be kept in the budget. However, anyone moving into the project area after the cut-off date will not be entitled to assistance.
- ▶ Appropriate grievance redress mechanism will be established at project level to ensure speedy resolution of disputes.
- ▶ All activities related to resettlement planning, implementation, and monitoring would ensure involvement of women. Efforts will also be made to ensure that vulnerable groups are included.
- ▶ All consultations with PAPs shall be documented. Consultations will continue during the implementation of resettlement and rehabilitation works.
- ▶ Cut of Date shall be preliminary notification under RFCTLR&R Act 2013 for titleholders and in case of Non-title holder's end date of socio –economic survey.

170. As required, a Resettlement Action Plan will be prepared including a fully itemized budget and an implementation schedule.

#### **6.4. PREPARATION OF RESETTLEMENT ACTION PLANS**

171. Having identified the potential impacts of the relevant investments, the next step is to develop action plans to mitigate the impacts. The RAPs will provide the link between the impacts identified and proposed mitigation measures to realize the objectives of involuntary resettlement. The investment specific RAP will consider magnitude of impacts and accordingly prepare a resettlement plan that is consistent with this framework before the sub-project is accepted for Namami Gange program financing. Any affected person will be assisted as provided in the National Policy or State Policy where applicable on resettlement and rehabilitation.

- a) The above RAP plan will be prepared as soon as subproject is finalized, prior to NMCG/SMCG's approval of corresponding civil works bid document.
- b) Investments that are not expected to have any land acquisition or any other significant adverse social impacts; on the contrary, significant positive social impact and improved livelihoods are exempted from such interventions.

## 6.5. SUB PROJECT APPROVAL

172. If a sub-project involves land acquisition against compensation or loss of livelihood or shelter, the implementing agency shall:

- a) not approve the subproject until a satisfactory RAP has been prepared and shared with the affected person and the local community; and
- b) not allow works to start until the compensation and assistance has been made available in accordance with the framework.

## 6.6. PROCEDURE TO BE FOLLOWED FOR SOCIAL IMPACT ASSESSMENT (SIA)

173. The EA will undertake a survey for identification of the persons and their families likely to be affected by the project. Every survey shall contain the following municipality or ward / village-wise information of, the project affected families:

- i. Members of families who are residing, practicing any trade, occupation or vocation in the project affected area;
- ii. Project Affected Families who are likely to lose their house, commercial establishment, agricultural land, employment or are alienated wholly or substantially from the main source of their trade occupation or vocation or losing any other immovable property.
- iii. Agricultural labourers and non-agriculture labourers.
- iv. Families belonging to scheduled caste categories
- v. Vulnerable persons such as the disabled, destitute, orphans, widows, unmarried girls, abandoned women, or persons above the age of 50 years of age, who are not provided or cannot immediately be provided with alternative livelihood, and who are not otherwise covered as part of a family;
- vi. Families that are landless (not having homestead land, agriculture land or ether homestead or agriculture land) and are below poverty line, but residing continuously for a period of not less than three years in the affected area preceding the date of declaration of the affected area;
- vii. Losing access to private property or common property resources

174. The EA on completion of the survey will disseminate the survey results among the affected community. Based on the social impact assessment survey, EA will prepare an action plan to mitigate or minimize the adverse impacts as identified during the survey. The draft mitigation plan in form of resettlement action plan (RAP) will be again disseminated among the affected individuals/ community. The feedback received from the affected groups will be incorporated to the extent possible before finalization of the RAP.

175. Every-draft Resettlement Action Plan (RAP) prepared shall contain the following:

- a) The extent of area to be acquired for the project, the name(s) of the corresponding village(s)/ municipality area and the method employed for acquiring land with the relevant documentation.
- b) village wise or municipality wise list of affected families and likely number of displaced persons by impact category

- c) family-wise and the extent and nature of land and immovable property in their possession indicating the survey numbers thereof, held by such persons in the affected zone;
- d) Socio-economic survey of affected people including income/asset survey of PAPs;
- e) a list of agricultural labourers in such area and the names of such persons whose livelihood depend on agricultural activities;
- f) a list of persons who have lost or are likely to lose their employment or livelihood or who have been alienated wholly and substantially from their main sources of occupation or vocation consequent to the acquisition of land and / or structure for the project;
- g) information on vulnerable groups or persons for whom special provisions may be made;
- h) a list of occupiers, if any;
- i) a list of public utilities and Government buildings which are likely to be affected;
- j) a comprehensive list of benefits and packages which are to be provided to project affected families by impact category;
- k) details of the extent of land available which may be acquired in settlement area for resettling and allotting of land to the project affected families;
- l) details of the basic amenities and infrastructure facilities which are to be provided for resettlement;
- m) the entitlement matrix;
- n) the time schedule for shifting and resettling the displaced families in resettlement zones;
- o) grievance redress mechanism;
- p) institutional mechanism for RAP implementation;
- q) monitoring and evaluation indicators and mechanism;
- r) budget; and
- s) Any other particulars as the Administrator for Resettlement and Rehabilitation may think fit to include for the information of the displaced persons.

#### **6.7. LAND ACQUISITION, R&R BENEFITS FOR AFFECTED FAMILIES**

176. In case land/house is acquired, as per Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLAR&R) Act, 2013 the compensation will be paid to the land holders/house owners and the resettlement and rehabilitation (R&R) benefits shall be extended to all the affected families as per provisions of the Act or state R&R Policies, where applicable and entitlement framework of this ESMF. Any affected and/or displaced family/person will be assisted as per the provisions of the RFCTLAR&R Act 2013 and/or state R&R Policies wherever applicable.

177. Value of land to be determined as per various sections of the RFCTLAR&R Act, 2013 namely:

- ▶ Section 11 (1) publication of preliminary notification
- ▶ Section 26 (Market value of the land)
- ▶ Section 28 (parameters to be considered for market value)
- ▶ Section 29 (determination of value of attached things to the land).

- ▶ Section 30 (award of solatium)
- ▶ Project will be guided by First Schedule of RFCTLAR&R Act, 2013 for determination of land value.
- ▶ In case of land purchase through private negotiation, section 46 of RFCTLAR&R Act 2013 will be applicable. Project may also use any state specific instrument for direct purchase of land.

178. Provisions for R&R at the community level will be as follows:

- ▶ The common property resources and the community infrastructure shall be relocated in consultation with the community.
- ▶ During construction phase alternative access shall be provided in case of loss of access to private land / or common resource property.

179. Any unforeseen impacts shall be document and mitigated based on the principles agreed upon in policy Guideline.

180. The following is the entitlement matrix, as per RFCTLAR&R Act, 2013. The comparative analysis of RFCTLAR&R Act, 2013and World Bank’s Operational Policy 4.12 is at **Appendix V**.

**Table 6-1: Entitlement Matrix**

Type of Impact/Loss	Unit of Entitlement	Entitlements as per Policy
<b>1. Agricultural Land</b>		
Acquisition of agricultural land	Land Holder	<ul style="list-style-type: none"> <li>• Cash compensation as defined in First Schedule of RFCTLAR&amp;R Act, 2013 or any state policy.</li> <li>• Where jobs are created through the project, after providing suitable training and skill development in the required field, make provision for employment at a rate not lower than the minimum wages provided for in any other law for the time being in force, to at least one member per affected family in the project or arrange for adjoin such other project as may be required; or one- time payment of five lakhs rupees per affected family; or(c) annuity policies that shall pay not less than two thousand rupees per month Per family for twenty years with appropriate indexation to the Consumer Price Index for Agricultural Labourers (<b>RFCTLARR Act, 2013, Second Schedule – clause 4</b>).</li> <li>• In case of a project involving land acquisition on behalf of an acquiring body, each affected family which is involuntarily displaced shall get a monthly subsistence allowance equivalent to three thousand rupees per month for a period of one year from the date of award. (<b>RFCTLARR, 2013 – Second schedule; clause 5 para1</b>)</li> <li>• Each affected family that is displaced and has cattle, shall get financial assistance of such amount as the appropriate Government may decide but not less than Twenty-Five thousand rupees, for construction of cattle shed. (<b>RFCTLAR&amp;R Act, 2013 Second Schedule clause</b>)</li> <li>• Each affected family shall be given a one-time resettlement allowance of fifty thousand rupees only (<b>RFCTLARR,2013 – Second schedule; clause 10</b>)</li> <li>• In case of a project involving land acquisition on behalf of an acquiring body, the stamp duty and other fees payable for registration of the land or house allotted to the affected families shall be borne by the acquiring body. The land for house allotted to the affected families shall be free from all</li> </ul>

Type of Impact/Loss	Unit of Entitlement	Entitlements as per Policy
		encumbrances. The land or house allotted may be in the joint names of wife and husband of the affected families <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – clause 11).</b>
<b>2. House</b>		
i) Acquisition of House	Affected Family	<ul style="list-style-type: none"> <li>• If a house is lost in rural area, a constructed house shall be provided as per the Indira Awas Yojana specifications. If a house is lost in urban area, a constructed house shall be provided, which will be not less than 50 sq.mts. in plinth area <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – Clause 1 para 1).</b></li> <li>• Provided that any such family in urban areas which opts not to take the house offered, shall get a one-time financial assistance for house construction, which shall not be less than one lakh fifty thousand rupees <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – Clause 1 para3).</b></li> <li>• Provided further that if any affected family in rural areas so prefers, the equivalent cost of the house may be offered in lieu of the constructed house <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – Clause 1 para 4).</b></li> <li>• Each affected family which is displaced from the land acquired shall be given a monthly subsistence allowance equivalent to three thousand rupees per month for a period of one year from the date of award <b>(RFCTLARR, 2013 – Second schedule; clause 5 para1).</b></li> <li>• Right to salvage material from the demolished structures</li> <li>• Three months’ notice to vacate structures</li> <li>• One-time financial assistance of such amount as the appropriate Government may decide but not less than fifty thousand rupees, for shifting of the family, building materials, belongings and cattle. <b>(RFCTLARR, 2013 – Second schedule; clause 6)</b></li> <li>• Each affected family that is displaced and has cattle, shall get financial assistance of such amount as the appropriate Government may decide but not less than Twenty Five thousand rupees, for construction of cattle shed. <b>(RFCTLARR, 2013 – Second schedule; clause7)</b></li> <li>• Each affected person who is rural artisan, small trader or self-employed person who has been displaced shall get a one-time financial assistance of such amount as the appropriate Government may decide but not less than (Rs. 25,000/-) twenty-five thousand rupees, for construction of working shed or shop. <b>(RFCTLARR, 2013 – Second schedule; clause 8)</b></li> <li>• Each affected family shall be given a one-time resettlement allowance of fifty thousand rupees only <b>(RFCTLARR,2013-Second schedule; clause 10)</b></li> <li>• In case of a project involving land acquisition on behalf of an acquiring body, the stamp duty and other fees payable for registration of the land or house allotted to the affected families shall be borne by the acquiring body. The land for house allotted to the affected families shall be free from all encumbrances. The land or house allotted may be in the joint names of wife and husband of the affected families <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – clause 11).</b></li> </ul>
iii)BPL without homestead land and residing in the area for	Affected Family	<ul style="list-style-type: none"> <li>• Has been residing in the affected area continuously for a period of not less than three years preceding the date of declaration of the affected area and which has been</li> </ul>

Type of Impact/Loss	Unit of Entitlement	Entitlements as per Policy
not less than three years		<p>involuntarily displaced from such area, shall be entitled</p> <ul style="list-style-type: none"> <li>• If a house is lost in rural area, a constructed house shall be provided as per the Indira Awas Yojana specifications. If a house is lost in urban area, a constructed house shall be provided, which will be not less than 50 sq.mts. in plinth area <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – Clause 1 para1)</b>.</li> <li>• Provided that any such family in urban areas which opts not to take the house offered, shall get a one-time financial assistance for house construction, which shall not be less than one lakh fifty thousand rupees <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – Clause 1 para 3)</b>.</li> <li>• Provided further that if any affected family in rural areas so prefers, the equivalent cost of the house may be offered in lieu of the constructed house <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – Clause 1 para 4)</b>.</li> <li>• Right to salvage material from the demolished structures</li> <li>• Three months' notice to vacate structures</li> <li>• One-time financial assistance of such amount as the appropriate Government may decide but not less than fifty thousand rupees, for shifting of the family, building materials, belongings and cattle. <b>(RFCTLARR, 2013 – Second schedule; clause 6)</b></li> </ul>
<b>3. Livelihood losses</b>		
i) Rural artisan, small trader or self-employed Person displaced	Each affected person	<ul style="list-style-type: none"> <li>• Will get a one-time financial assistance of such amount as the appropriate Government may decide but not less than (Rs. 25,000/-) twenty-five thousand rupees, for construction of working shed or shop. <b>(RFCTLAR&amp;R Act, 2013. Second Schedule – clause 8)</b></li> </ul>
ii) Employment Assistance	Affected Family	<ul style="list-style-type: none"> <li>• Where jobs are created through the project, after providing suitable training and skill development in the required field. make provision for employment at a rate not lower than the minimum wages provided for in any other law for the time being in force, to at least one member per affected family in the project or arrange for a job in such other project as may be required <b>(RFCTLAR&amp;R Act 2013, Second Schedule, Clause4(a).);</b></li> <li>• The acquiring body shall give preference to the affected persons or their groups or cooperatives in the allotment of outsourced contracts, shops or other economic opportunities coming up in or around the project site; and</li> <li>• The acquiring body shall give preference to willing landless labourers and unemployed affected persons while engaging labour in the project during the construction phase.</li> </ul>
<b>4. Other Benefits</b>		
i) Additional assistance for Scheduled Caste families	Affected Family	<p>Appropriate level in Scheduled Areas under the Fifth Schedule to the Constitution, as the case may be, shall be obtained. in all cases of land acquisition in such areas, including acquisition in case of urgency, before issue of a notification under this Act, or any other central Act or a state Act for the time being in force <b>(RFCTLAR&amp;R Act, 2013 section 41(3))</b>.</p> <ul style="list-style-type: none"> <li>• In case of a project involving land acquisition on behalf of a Requiring Body which involves involuntary displacement of the Scheduled Castes families, a Development Plan shall be prepared, in such form as may be prescribed. Laying down the details of procedure for settling land rights due, but not settled and restoring titles of the Scheduled Castes on the</li> </ul>

Type of Impact/Loss	Unit of Entitlement	Entitlements as per Policy
		<p>alienated land by undertaking a special drive together with land acquisition (<b>RFCTLAR&amp;R Act, 2013 section 41 (4)</b>).</p> <ul style="list-style-type: none"> <li>Where the affected families belonging to the Scheduled Castes are relocated outside of the district then, they shall be paid an additional twenty-five per cent rehabilitation and resettlement benefits to which they are entitled in monetary terms along with a one-time entitlement of fifty thousand rupees (<b>RFCTLAR&amp;R Act, 2013 section 41(11)</b>).</li> <li>Provided that in every project those persons losing land and belonging to the Scheduled Castes will be provided land equivalent to land acquired or two and a one- half acres, whichever is lower (<b>RFCTLAR&amp;R Act 2013, Second Schedule; clause2</b>)</li> <li>In addition to subsistence allowance of INR 50,000, the Scheduled Castes displaced shall receive an amount equivalent to fifty thousand rupees. (<b>RFCTLAR&amp;R Act, 2013, Second Schedule, , clause 5, para2</b>)</li> </ul>
ii)One time Resettlement allowance	Any Affected family not already covered under clause 2 (iii)	<ul style="list-style-type: none"> <li>Shall be entitled to one-time resettlement allowance of fifty thousand rupees (<b>RFCTLAR&amp;R Act 2013, Second Schedule clause10</b>).</li> </ul>
<b>5. Exemptions from stamp duty etc.</b>		
		In case of a project involving land acquisition on behalf of an acquiring body, the stamp duty and other fees payable for registration of the land or house allotted to the affected families shall be borne by the acquiring body. The land and house allotted will be in the joint names of wife and husband of the affected families. The land for house allotted to the affected family shall be free from all encumbrances ( <b>RFCTLAR&amp;R Act, 2013 clause 11</b> )
<b>6. Trees and standing crops</b>		
Trees on land being acquired	Land holders	<ul style="list-style-type: none"> <li>Market value of the trees to be computed as per the provisions of Horticulture and Forest Department.</li> </ul>
Standing crops at the time of acquisition, if any	Land holders	<ul style="list-style-type: none"> <li>Advance notice to harvest crops</li> <li>Market value of standing crops to be computed as per provisions of Agriculture Department.</li> </ul>

*Please note that this is bare minimum and Project should also consider the additional R&R provisions given in state specific policy / rules.*

181. According to the assessment of the preliminary list of prioritized works, there may be need for private land acquisition in some cases which could result in involuntary displacement and loss of livelihood. However, project involuntary resettlement is likely to be of small scale and would not trigger the need for a full resettlement action plan. Nevertheless, as a precaution, the classification of subprojects of the ESMF describes actions and procedures to be followed in case any involuntary displacement does occur. If involuntary displacement takes place, the principles and procedures defined in the Framework will apply.

182. Once the location of the works is known during project implementation, individual resettlement or land acquisition plans will be prepared for each sub-project. The Resettlement Action Plans will be reviewed and approved by SMCG/ NMCG before being implemented.

183. During DPR preparation, analysis of alternatives will be carried out to avoid or reduce involuntary acquisition of private land.

184. Immediately after FR approval and in parallel with DPR preparation, the EA along with the ULB would initiate land acquisition process for the project. This would facilitate identification of the land, its survey and preliminary cost estimation so that the State Govt. is in readiness to issue the appropriate notification under prevalent LA Act upon approval of DPR for speedy acquisition of the land.

## **6.8. CONSULTATION AND INFORMATION DISCLOSURE**

### **6.8.1. Consultation**

185. The Consultation process envisages involvement of all the stakeholders at each stage of project planning and implementation. The EA /SMCG will be responsible for ensuring participation of the community at sub-project level. Involvement of the community is not limited to interactions with the community but also disclosing relevant information pertaining to the project tasks. Community participation shall be undertaken at the following stages:

- ▶ Sub Project identification stage-to sensitize the community about the project and their role;
- ▶ Planning Stage-for disseminating information pertaining to the project, work schedule and the procedures involved; finalization of project components with identification of impacts, entitled persons, mitigation measures; and Grievance Redress; and
- ▶ Implementation Stage - for addressing temporary impacts during construction and monitoring for transparency in the project implementation

### **6.8.2. Identification Stage**

186. Dissemination of project information to the community and relevant stakeholders is to be carried out by the EA at this stage of the project initiative. The community at large shall be made aware of the project alternatives and necessary feedback is to be obtained. This should include the process being followed for prioritization of the identified investments. Community and other stakeholders should be involved in the decision making to the extent possible. Information generated at this stage should be documented for addressal of queries arising out of the Right to Information Act, 2005.

### **6.8.3. Project Planning Stage**

187. Sub-project information is to be distributed amongst the community towards increasing their awareness and their roles and responsibilities. Planning stage is intended to be an interactive process with the community at least in two stages. Initially while finalizing the best fit alternative to a sub-project and second at the finalization of the detailed designs. This would be a joint responsibility of the consultants undertaking the design if not carried out by the EA in house and the EA itself.

188. Consultations with Project Affected Persons and their profiling are mandatory as per the requirements of SIA and preparation of RAP. This needs to be done as socio- economic and census surveys as part of the detailed designs. Consultations with respect to and cultural aspects are to be carried out as part of the Social Impact Assessments for all alternatives and the selected alternative sub-project option.

### **6.8.4. Implementation Stage**

189. Consultations as part of the implementation stage would be direct interactions of the implementation agency with the Project Affected Persons. These would comprise of consultations towards relocation of the PAPs, relocation of cultural properties, and towards addressal of impacts on common property resources (CPRs) such as water bodies, places of religious importance, community buildings, trees etc.

190. With the implementation of the R&R provisions in progress, consultations and information dissemination is to be undertaken to let the affected persons informed of the progress. Implementation stage also involves redress of grievances in case of R&R aspects as well as relocation of common property resources through the grievance redress mechanisms. These would usually be one to one meeting of PAP or community representatives with the grievance redress committees established for the project.

#### 6.8.5. Information Disclosure

191. The mechanism of information dissemination should be simple and be accessible to all. Two of the important means that have been followed until now include briefing material and organization of community consultation sessions. The briefing material (all to be prepared in local language) can be in the form of (a) brochures (including project information, land requirements and details of entitlements including compensation and assistance to be given to the PAPs) that can be kept in the offices of local self-government (municipal office in case of urban area and gram panchayat office in case of rural area) and EA; (b) posters to be displayed at prominent locations and (c) leaflets that can be distributed in the impacted zone of the sub project. Consultation meetings should also be organized at regular intervals by the EA to acquaint the PAPs of the following:

- ▶ Timeline and progress of the project;
- ▶ Information on compensation and entitlements;
- ▶ Information on land acquisition and market valuations of property;
- ▶ Time line for acquisition.

192. Also, opinion and consensus of the community needs to be sought for common and cultural property relocation. Information disclosure procedures are mandated to provide citizen centric information as well as all documentation necessary for addressing any queries under Right to Information Act that came into effect from October 2005. Disclosure of information will enhance governance and accountability specifically with respect to strengthening of monitoring indicators to help Namami Gange program.

193. This Information Disclosure Policy is intended to ensure that information concerning the Namami Gange program, activities will be made available to the public in the absence of a compelling reason for confidentiality. Information shall be provided in a timely and regular manner to all stakeholders, affected parties, and the general public. Access by the public to information and documentation held or generated by NMCG and EAs will facilitate the transparency, accountability, and legitimacy as well as operations overseen by it. As a part of its disclosure policy, all documents shall be made available to the public in accordance with relevant provisions of the RTI Act, except when otherwise warranted by legal requirements. A designated Information Officer shall be responsible for ensuring timely and complete dissemination in accordance with this policy.

#### 6.8.6. Information to be disclosed

194. The Table 6-2 below specifies the type of additional information and frequency of dissemination for investments which are financed either from domestic or donors' funds. In addition to the information specified in the table, the following information shall also be displayed / disseminated, wherever applicable.

- ▶ Project specific information need to be made available at each contract site through public information kiosk
- ▶ Hard copy of the ESAMP and RAP shall be placed at construction site and also at SMCG office. Community will be informed about the same during finalization of RP / ESMP and through social intermediation process".

- ▶ Project Information brochures shall be made available at all the construction sites as well as the office of implementation agency and the office of Engineer in charge.
- ▶ Reports and publications, as deemed fit, shall be expressly prepared for public dissemination e.g., English versions of the SIA and RAP and Executive Summary of SIA and RAP in local language.
- ▶ Wherever civil work will be carried out a board will be put up for public information which will disclose all desired information to the public, for greater social accountability.
- ▶ All information will be translated into local language and will be disclosed to the public through the Panchayat, District Magistrate's office, concerned EA offices, websites of NMCG and SMCGs.

Table 6-2: Information to be disclosed

Topic	Documents to be disclosed	Frequency	Where
Resettlement, Rehabilitation and Land Acquisition	Resettlement Action Plan (RAP).	Once in the entire project cycle. But to remain on the website and other disclosure locations throughout the project period.	On the website of NMCG, SMCG and EAs The client would make the RAP available at a place accessible to displaced persons and local NGOs, in a form, manner, and language that are understandable to the PAPs in the following offices: DM's Office State and District Libraries Local municipal and <i>gram panchayat</i> office Office of the contractor Office of the EA
	Resettlement & Rehabilitation Policy translated in local language	Once in the entire project cycle.	Distributed among Project Affected Persons (PAP)
	Information regarding impacts and their entitlements in local language	Once at the start of the project and as and when demanded by the PAP.	Through one-to-one contact with PAPs. Community consultation List of PAPs with impacts and entitlements to be pasted in the EA office and website of SMCG and EAs
	R&R and LA monthly progress report.	10th day of every month	Website of EA. Hard copy in the office of EA and contractor in local language
	RAP Impact Assessment Report	At midterm and end of the RAP implementation	NMCG, SMCG and EA's Website in local language.
	Land Acquisition notifications	As required under the LA Act	SMCG and EA's website. Hard copy in the office of EA and contractor in local language
	Grievance redress process.	Continuous process throughout the project cycle.	On the web sites of NMCG, SMCG, EAs Hard copies in local language in the following offices: DM's Office Local municipal and gram panchayat office, Office of the contractor Office of the EA; Also PAPs to be informed on one to one contact by EAs

Topic	Documents to be disclosed	Frequency	Where
Public Consultation	Minutes of Formal Public Consultation Meetings	Within two weeks of meeting	On the web sites of NMCG/SMCG, EAs Hard copies in local language in the following offices: DM's Office Local municipal and <i>gram panchayat</i> office Office of the contractor Office of the EA
Other Documents	Environment and Social Management Framework (ESMF)	Once in the entire project cycle. But to remain on the website and other disclosure locations throughout the project period.	On the website of EA, SMCG, NMCG and World Bank
	Environment and Social Due Diligence Report (ESDDR)	Once in the entire project cycle. But to remain on the website and other disclosure locations throughout the project period.	On the website of EA, SMCG, NMCG and World Bank
	Environment and Social Management Plan (ESMP)	Once in the entire project cycle. But to remain on the website and other disclosure locations throughout the project period.	On the website of EA, SMCG, NMCG and World Bank
	Environment and Social Impact Assessment (ESIA)	Once in the entire project cycle. But to remain on the website and other disclosure locations throughout the project period.	On the website of EA, SMCG, NMCG and World Bank

### 6.8.7. Stakeholder mapping

195. Through the formal and informal consultation, stakeholder mapping has been done, identifying their interests concerned with the project activities, refer **Table 6-3**.

**Table 6-3: Stakeholder Mapping**

Stakeholder Category	Interests	Potential/Probable impacts
<b>Primary stakeholders</b>		
Project affected people	Access to the facility, Project entitlement, Time-bound delivery of benefits, enhanced quality of life	(+/-)
Beneficiaries	Access to the facility, Project entitlement, Time-bound delivery of benefits, enhanced quality of life	(+/-)
<b>Secondary stakeholders</b>		
NMCG; SMCG; Municipalities; EAs (For e.g., Uttarakhand Peyjal Nigam, UP Jal Nigam, Bihar Urban Infrastructure Development Corporation, Urban Development Department, Kolkata Metropolitan Development	Project implementation, Contracting; Project management, Monitoring and evaluation	(+/-)

Stakeholder Category	Interests	Potential/Probable impacts
Authority)		
NGOs, CSOs, Research institutes (GB Pant Institute of Himalayan Environment and Development, PSI, Shree Hari Ganga Samiti, IIT Kanpur, Ganga Sewak Samaj, WWF, CEE, Centre for flood management studies, Krishi Gram Vikas Kendra, IIT Kharagpur, Calcutta University, Ramakrishna Mission)	Development, Community participation, and Community welfare	(+/-)

196. This is a tentative mapping is likely to change during the project implementation. Each of these stakeholders will be part of the consultation process and their views will be incorporated into the project design. The key stakeholders in can be grouped into two categories viz., primary and secondary. Their respective roles are presented below:

#### 6.8.8. Primary Stakeholders

197. Project Affected Persons (PAPs) have the following roles:

- i) Participate in public meetings and identify alternatives to avoid or minimize displacement
- ii) Assist DPR consultants and NGOs in developing and choosing alternative options for relocation and income generation
- iii) Participate in census survey and meetings with host population
- iv) Provide inputs to entitlement provisions, thus assisting in preparation of the resettlement action plan
- v) Participate in grievance redress as members of grievance redress cells(GRC)
- vi) Decide on relocation and management of common properties
- vii) Labour and other inputs in the project
- viii) Members of implementation committee

198. Beneficiaries and Host Population has the following roles:

- i) Assist DPR consultants and NGOs in data collection and design
- ii) Provide inputs to site selection
- iii) Identify possible conflict areas with PAPs
- iv) Identify social and cultural facilities needed at resettlement sites
- v) Assist in identification and design inputs for IG schemes
- vi) Help develop consultation process between hosts and PAPs.
- vii) Manage common property
- viii) Participate in local committees.
- ix) Assist PAPs in integration with hosts.

#### 6.8.9. Secondary Stakeholders

199. NMCG, SMCGs, EAs, Municipalities have the following roles:

- i) Establish separate cell for social development
- ii) Notification at various stages for land acquisition and joint measurement of land to be acquired along with the revenue department
- iii) Design and approval of resettlement policy
- iv) Coordinate with line departments such as telephone, state electricity board, public health engineering department and forest department for shifting of utilities and cutting of trees
- v) Participate with NGOs in verification survey of PAPs and categorization of PAPs
- vi) Participate in consultations with PAPs and beneficiaries
- vii) Designing and distribution of ID cards along with NGO
- viii) Coordinate and facilitate relocation of displaced persons including designing and construction of resettlement colony / vendor market; provision of basic amenities; distribution of plots / houses / to residential and/or commercially displaced persons
- ix) Coordinate with NGO in identifying land for relocation of common property resources
- x) Coordinate with civil construction contractor to relocate common property resources
- xi) Permission and liaison with line departments for provision of basic amenities in resettlement colonies, land acquisition and income restoration schemes;
- xii) Coordinate with revenue department for facilitating disbursement of compensation and resettlement and rehabilitation assistances
- xiii) Monitoring of physical and financial progress
- xiv) Approval of micro plans
- xv) Participate in training programs for income restoration organized by NGOs
- xvi) Consult with panchayat and block office to facilitate inclusion of PAPs' name for poverty alleviation schemes of government of India.

200. **NGOs have following roles:**

- i) Develop rapport with PAPs and between PAPs and EAs;
- ii) Verification of PAPs;
- iii) Consultations with the community;
- iv) Assess the level of skills and efficiency in pursuing economic activities, identify needs for training and organize programmes either to improve the efficiency and/or to impart new skills;
- v) Assist PAP in receiving rehabilitation entitlements due to them;
- vi) Motivate and guide PAP for proper utilization of benefits under R&R policy provisions;
- vii) Assist PAPs in obtaining benefits from the appropriate development programmes;
- viii) Help PAPs in increasing their farm income through provision of irrigation facility or improving farm practices;
- ix) Ensure marketing of produce particularly those under self-employment activities;
- x) Complete the consultation at the community level and provide support by describing the entitlements to the entitled persons (EPs) and assisting them in their choices;

- xi) Accompany and represent the EPs at the Grievance Redress Committee meeting;
- xii) Assist EPs to take advantage of the existing government housing schemes and employment and training schemes that are selected for use during the project;
- xiii) Promote location specific Community Based Organizations (CBOs) of PAPs to handle resettlement planning, implementation and monitoring; and
- xiv) Create awareness among PAPs of HIV/AIDS, trafficking of women and child, child labour, health and hygiene

#### 6.9. LOW IMPACT CATEGORIES

201. Low impact category investments are those which are likely to cause minimal or no adverse environmental impacts on human populations or the physical environment. The impacts in case of low category investments are largely localized and are temporary in nature. In such cases, detailed ESA would not be required.

202. These investments would require the preparation of an Environmental and Social Mitigation Plan as a part of the DPR either as a separate chapter or a volume (as needed), analyzing the environmental and social issues and providing the corresponding mitigation measures. There will also be a separate section in the summary of the document mentioning the key mitigation measures proposed through the ESMP.

203. A Guidance Note for carrying out ESA is provided in **Appendix II**, and an outline Environment and Social Management Plan for low impact category investments is provided in **Appendix II**. However, during the project preparation, these measures shall be validated with actual site conditions and updated to make these more project-specific.

204. All ESAs, ESMPs, and RAPs of all investments will be shared with the SMCGs for review and clearance. The NMCG and SMCGs may obtain expert opinion as necessary for reviewing environmental and social screening, ESAs, ESMPs and RAPs.

205. The EA/DPR consultant will prepare the ESMP in accordance with the specifications and conditions included in the bid documents. The generic terms of reference for the scope of DPRs would be suitably amended in each case in accordance with the screening and assessment provided in the FR.

#### 6.10. STAKEHOLDER CONSULTATIONS AND DISCLOSURE OF ESA

206. Planning and design of all the investments will include adequate consultations with the project-affected groups and other stakeholders and will specifically focus on the project's environmental and social impacts. For High impact category investments, the consultation with these groups shall be carried out at least twice: (a) shortly after screening and before the terms of reference for the ESA are finalized; and (b) once a draft ESA report is prepared. In addition, such groups will be consulted throughout project implementation as necessary to address ESA-related issues that affect them. This will enable to elicit and address the concerns of the stakeholders and address them upfront in the project feasibility and design of the project.

207. In order to facilitate meaningful consultations and also effective participation of the stakeholders in the project, all the project related information will be shared with the likely project-affected groups and local NGOs, in a timely manner prior to consultation and in a form and language that are understandable and accessible to the groups being consulted.

208. In case of High impact category investments, a summary of the proposed project's objectives, description, and potential impacts will be provided for the initial consultation. For consultation after the draft ESA report is prepared, a summary of the ESA's conclusions will be provided. In addition, the draft ESA report will be made available at all relevant public locations, accessible to project-affected groups and the stakeholders. The ESA report will also be disclosed in website of the SMCGs and NMCG.

209. Consultations were done in ESA prepared under Namami Gange: Stakeholder and public consultation were undertaken at various stages at the local, regional and district levels, so as to incorporate the various environmental concerns and needs of the community and the relevant stakeholders (SMCG, EA, other departments irrigation department, forest department etc.). Specific attention has been paid to Project Affected Persons, habitations or livelihoods will be directly impacted by the proposed sub-project, shopkeepers, Students etc. The minutes of consultations undertaken at various stages along with attendance has also been presented in the ESA reports prepared under Namami Gange Program. As per ESMF guideline, stake holder and public consultations were undertaken at following level:

- ▶ SMCG Office: Consultations with concerned Environmental, Social personal, GRM officer, Land and revenue officer, Project Director and other concerned staff.
- ▶ District Level: Consultations were majorly undertaken with respective District collector, Development officer (District Level), Sub divisional Magistrate (SDM), District Education officer, District Transport Officer etc.
- ▶ Implementation level (Execution Agency): Majorly discussions were held with Project coordinator, Project Manager, respective Assistant & Junior engineer who are responsible at field level execution and plan.
- ▶ Community level: Panchayat Officer, Area representative of respective Town, NGOs
- ▶ Household level: Majorly project affected people, households who' s habitation or livelihood are getting affected due to investment, local beneficiaries
- ▶ Sensitive locations of local community: Temple, School, any gathering area fairground etc.

## **7. IMPLEMENTATION, MONITORING AND REPORTING ARRANGEMENTS**

### **7.1. GENERAL**

210. Namami Gange program provides financial assistance for implementation of river pollution abatement/mitigation investments in Ganga main stem states. In addition to complying with various technical and performance standards, the investments to be supported under this program shall comply with the Environmental and Social Management Framework. The implementation, monitoring and reporting arrangements for the ESMF have been worked out within the overall institutional structure for implementation of the Namami Gange program, as described in the sections below.

### **7.2. NAMAMI GANGE INSTITUTIONAL ARRANGEMENTS**

211. As nodal Ministry for the Namami Gange program, the Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation (DoWR, RD&GR) through NMCG is the primary implementing agency for the project at the national level. The implementing agencies at the state level are the State Mission for Clean Ganga (SMCGs). At the local level, specific Executing Agencies (EAs) will be selected for implementation of various activities, including infrastructure investments under the Namami Gange program. EAs may include parastatal organizations, Special Purpose Vehicles and Joint Ventures (SPVs/JVs), Urban Local Bodies (ULBs), appropriate state-level departments, NGOs, or public institutions.

212. The main functions of the various agencies with regard to the Namami Gange program include the following:

- ▶ The NMCG will be responsible for overall project planning and management at the national level; direct implementation of the national level activities; ensuring satisfactory implementation of the state-level investments and activities; providing guidance, support and approvals to the SMCGs where needed; and monitoring implementation performance;
- ▶ The SMCGs will be responsible for project planning and management at state level, ensuring satisfactory implementation of the state-level investments and Activities; direct implementation of some of the state-level activities; providing guidance, support and approvals to the state EAs where needed; and monitoring implementation performance of the EAs;
- ▶ The EAs will plan and implement the activities/investments and put in place arrangements for satisfactory and sustainable operation and maintenance of the assets created. The EAs will be responsible for all contract management, including preparation of feasibility reports and DPRs, and seeking the necessary approvals.

### **7.3. IMPLEMENTATION, MONITORING AND REPORTING ARRANGEMENTS FOR THE ESMF**

213. Within the above overall implementation Guideline of the Namami Gange program, environmental and social due diligence will be carried out by the relevant agencies at each stage of the project cycle in accordance with the guidance provided in the ESMF.

214. A Social Development Officer and an Environmental Officer are appointed for managing social and environmental issues (including safeguards issues) at both central level as well as in each of the project states. These officers assist the EAs in implementation of ESMF provisions.

215. In the EA, an officer each are designated as social and environment officer who are responsible for the implementation of ESMF tasks at the field level with the assistance and participation of the local self-government. These officers also have the responsibility of implementing safeguard activities along with other project components, and for co-ordination among different agencies, such as the local self- government, Revenue Department etc. During implementation, meetings will be organized by the SMCGs inviting all EAs in the state for providing information on the progress of the project work.

216. An independent Environment and Social/Compliance Monitoring Audit will be conducted by third party inspection agency for each of the sub projects. A sample terms of reference for the audit is presented in **Appendix VI**.

217. The project cycle for an investment under the Namami Gange program and the interface with the ESMF requirements are summarized hereunder.

### 7.3.1. Project Screening

218. Upon receipt of request for funding, SMCG will assess the eligibility of the sub-project in line with the agreed framework. The scope of the project would be discussed and the guidelines for project preparation would be shared. The screening criteria and categorization of sub-projects on that basis would also be explained. Once the FR is approved and the categorization of the sub-project has been agreed upon, the EA would be advised on the appropriate DPR preparation toolkit that needs to be followed.

219. The EA will prepare a Detailed Project Report (DPR) including Environment and Social management plan (ESMP) tailored to the specific sub-project (for Low impact category investments). For High impact category investments, the EA will engage external agencies to undertake preparation of the ESMP (including RAP as relevant) in line with the requirements of ESMF. While initiating the ESMP (including RAP, as relevant), the EA/ external agency will be guided by the model Terms of Reference appended and shall interact with the Environmental and Social Specialists in the SMCG to seek guidance in the finalization of scope of work and the development of the plans. Once the ESIA & ESMP is approved by SMCG, it will be forwarded to NMCG. The Environmental and Social Specialists of NMCG will review the document and will forward the same to World Bank with their comments.

220. On receipt of the ESIA & ESMP (including RAP, as relevant), the World Bank and NMCG specialists will evaluate the completeness of the documents and their compliance with the ESMF. Further actions, if any required, will have to be carried out by the EA prior to the appraisal of the project.

### 7.3.2. Environment and Social Assessment for the HAM based PPP Projects:

The agreed action for Environment and Social assessment of projects under HAM projects include:

- ▶ ESDDR along with Environment and Social Management Action Plan (ESMAP) will be prepared at the DPR stage;
- ▶ The ESDDR will cover the basis nature of the projects, a very brief description of the environment and present status along with screening checklist and an analysis of environmental and social issues associated with the project.
- ▶ The ESDDR (carried out by the project) will describe the future action plan to be taken during the detailed design stage by the Concessionaire<sup>15</sup> like:

<sup>15</sup> Concessionaire is a company who signs the concession agreement with the owner (NMCG/SMCG/Executive Agency) to complete the investment under Hybrid Annuity Mode (HAM).

- Various regulatory clearances (e.g. environmental clearance, forest clearance, NOC etc. as applicable)
- Preparation of Environmental and Social Assessment (ESA)/EIA
- Resettlement Action Plan (RAP), as applicable
- other actions, and management measures to be implemented by the Concessionaire

221. ESDDR can become part of the bidding document. The public consultation and disclosure process will continue during project implementation. The draft EIA/EMP/RAP etc. for the specific sub-projects will be discussed with the affected communities and the final documents will be placed on the websites of the NMCG and the SMCGs. The copies of the EMP and RAP will also be placed at the offices of the executing agencies, district magistrate and contractor's office. The executive summary of the EIA and RAP will also be translated into local language and placed in the office of the Gram Panchayat of the affected villages.

222. The details of the ESDDR process including approval are in **Addendum I**.

### 7.3.3. Project Appraisal

223. During project Appraisal, the SMCG will appraise the project preparation leading to the approval of the DPR. The aspects that will be appraised during the project appraisal will include the following aspects:

- ▶ Environmental and social suitability of site
- ▶ Adequacy of the ESMP (including RAP, as relevant) as per the ESMF including analysis of alternatives, if possible
- ▶ Compliance with regulatory requirements and clearances
- ▶ Comprehensiveness of the ESMP (including RAP, as relevant) in light of the project specific environmental and social issues
- ▶ Integration of environmental and social mitigation measures into the design, wherever relevant/required
- ▶ Arrangements for implementation of ESMP (including RAP, as relevant), including institutional capacity and contractual provisions
- ▶ Inclusion of ESMP (including RAP, as relevant) budgets in the project cost and contract documents
- ▶ ESMP (including RAP, as relevant) monitoring and reporting arrangements
- ▶ Need for any legal covenant to address specific environmental risks including regulatory risks, if any
- ▶ Risk analysis /allocation
- ▶ environment and social enhancements (if any /applicable)

224. The Environment and Social Management Plan (ESMP) prepared for the project will form part of the bidding documents, in addition to the references to various acts relating to environment and labor, and the implementation of the same will be monitored by SMCG and NMCG.

### 7.3.4. Project Approval and Disbursement

225. After requisite approvals and concurrence are obtained, SMCG will discuss implementation of environmental and social management measures of the project with the EA to ensure that these are suitably incorporated into the respective legal/contractual documents, for implementation by the EA.

226. The civil works will be initiated only after the required land has been acquired and declared free from encroachments and other encumbrances and the EA has the physical possession of the land. Before the start of civil works the compensation must be disbursed to the landowners. During implementation, consultations with the communities shall be undertaken by the EA / NGOs for providing information on the progress of the project work. The roles and responsibility of each of the Agency/Official involved are further detailed in **Appendix VII**.

### 7.3.5. Monitoring and Reporting Arrangements

227. The NMCG, through the respective SMCGs will monitor all the approved investments under the Namami Gange program to ensure conformity to the requirements of the ESMF. The monitoring will cover all stages of construction, operation and maintenance. The monitoring will be carried out through the environmental and social safeguard compliance reports that form a part of Quarterly Progress Reports for all investments and regular visits by the environmental and social specialists of the NMCG and SMCGs. In addition to the above, the NMCG will undertake an annual ESMF audit and will review the status of ESMF compliance, as per the sample terms of reference provided in **Appendix VI**.

228. The NMCG will review these audit reports and identify technical, managerial, policy or regulatory issues with regards to the compliance of the ESA reports. The identified technical issues will be duly incorporated in the subsequent investments. Policy and regulatory issues will be debated internally by the NMCG's internal review committee and the need for appropriate interventions will be determined. These interventions could include appropriate revision of ESMF document or suitable analytical studies to influence policy or programs of the state, if found necessary / warranted.

229. An external evaluation of the RAP implementation prepared under Namami Gange program will also be undertaken twice during the implementation of the project – mid-term and at the end of the implementation. **Table 7-1** below details out the mitigation measures for each impact type, monitoring measures, responsibility and timeline.

230. During implementation, meetings will be organized by the SMCGs inviting all EAs in the state for providing information on the progress of the project work. The project cycle for an investment under the Namami Gange program and the interface with the ESMF requirements are summarized **Table 7-1** and **Table 7-2**.

**Table 7-1: Mitigation, Monitoring, Responsibility and Timeline**

S. No	Impact	Indicators to be Monitored	Monitoring Measures	Responsible Agency	Timeline
1	Land acquisition	<ul style="list-style-type: none"> <li>• Land acquired (in ha.)</li> <li>• Number of project affected persons.</li> <li>• Number of project affected persons paid compensation for land</li> <li>• Timely disbursement of land compensation.</li> <li>• Amount paid as land compensation.</li> <li>• Dissemination of information to affected persons on benefits/entitlement.</li> <li>• Number of grievance received and resolved</li> </ul>	Regular internal monitoring by the EA and SMCG and periodic evaluation	EA	12 months from the start date. Compensation to be paid before the start of civil works.

S. No	Impact	Indicators to be Monitored	Monitoring Measures	Responsible Agency	Timeline
2	Acquisition of house/ structure	<ul style="list-style-type: none"> <li>Number of house/ structures affected by the project.</li> <li>Number of project affected persons whose house/ structure has been affected.</li> <li>Dissemination of information to affected persons on benefits/entitlement.</li> <li>Timely disbursement of house/structure compensation.</li> <li>Amount paid as house/structure compensation.</li> <li>Number of grievances received and resolved.</li> </ul>	Regular internal monitoring by the EA, SMCG and periodic evaluation	EA	
3	Loss of livelihood or source of livelihood	<ul style="list-style-type: none"> <li>Number of project affected persons who have lost their livelihood or source of livelihood.</li> <li>Number of affected persons received R&amp;R assistance.</li> <li>Number of families provided alternative resettlement house/ arrangement.</li> <li>Number of vulnerable project affected people received R&amp;R assistance/additional support.</li> <li>Amount paid as R&amp;R assistance.</li> <li>Number of grievances received and resolved.</li> </ul>	Regular internal monitoring by EA; midterm and end term evaluation	EA	12 months from the start date of the activities of the priority investment. Assistance to be paid before the start of civil works.
4	Loss of access to private and / or common property	<ul style="list-style-type: none"> <li>Number of private/common property affected.</li> <li>Number of private/common property relocated.</li> <li>Amount spent on private/common property.</li> <li>Number of grievances received and resolved.</li> </ul>	Regular internal monitoring by the EA; midterm and end term evaluation	EA, ESMF Auditors	12 months from the start date of the activities of the priority investment. Assistance to be paid before the start of civil works.
5	Displacement of Non-Titleholders	<ul style="list-style-type: none"> <li>Number of affected persons (informal/ non-titleholders) received R&amp;R assistance.</li> <li>Number of families provided alternative resettlement house/ arrangement.</li> <li>Number of vulnerable people received R&amp;R assistance/additional support.</li> <li>Amount paid as R&amp;R assistance.</li> <li>Number of grievances received and resolved.</li> </ul>	Regular internal monitoring by the EA; midterm and end term evaluation	EA, ESMF Auditors	

S. No	Impact	Indicators to be Monitored	Monitoring Measures	Responsible Agency	Timeline
6	Gender Action Plan	<ul style="list-style-type: none"> <li>Improvement in perception of safety among women.</li> <li>Number of gender sensitization workshops held for staff and implementing agencies.</li> <li>Number of women PAPs whose sources of livelihoods/ income will be affected by project.</li> <li>Number of women PAPs who received resettlement assistance.</li> <li>Number of women employed at the construction site.</li> <li>Number of facilities in construction and camp site for women and men (toilets, crèches, temporary housing, medical aid, etc.).</li> <li>Number of women members on the GRC or related group that has been constituted.</li> <li>Number of grievances received and resolved</li> </ul>	Regular internal monitoring by the social development professional of EA along with NGO; mid-term and end term evaluation	EA, ESMF Auditors	12 months from the start date of the activities of the priority investment, followed by annual audit
7	ESAMP Implementation	<ul style="list-style-type: none"> <li>Ambient Air quality (SOx, NOx, PM 10, PM 2.5, other Volatile Organic Compounds, at project site STP, MPS etc.</li> <li>Treated water discharged as per agreed standard</li> <li>Noise level at project site (STP, MPS etc.)</li> <li>Soil Quality at project site</li> </ul>	Regular internal monitoring by the Project concessionaire /DBOT operator/ EA; midterm and end term evaluation	Project concessionaire, EA/SMCG/NMCG; Third party ESMF Audit	During O&M phase
8	Sludge Disposal mechanism	<ul style="list-style-type: none"> <li>Quantity of sludge generated</li> <li>Quantity of sludge disposed</li> <li>Quantity of Sludge disposed to a designated disposal site</li> </ul>	Regular internal monitoring by the Project concessionaire /DBOT operator/ EA; midterm and end term evaluation		
9	Survival of Plantation	<ul style="list-style-type: none"> <li>Survival of plants provided in buffer zone of STP, SPS, MPS, Lift Stations</li> </ul>	Shall be ensured by Project concessionaire; third party Audit/ NGO		
10	Occupational Health and Safety (as per World Bank)	<ul style="list-style-type: none"> <li>Accidents and injuries reported</li> <li>Zero incidents period</li> </ul>	Regular internal monitoring by the Project concessionaire /DBOT operator/		

S. No	Impact	Indicators to be Monitored	Monitoring Measures	Responsible Agency	Timeline
	group's General EHS guideline)		EA; midterm and end term evaluation		
11	Annual Environmental and Social Audit	<ul style="list-style-type: none"> <li>Implementation of ESMF provisions as provided in the Site specific ESMP for HAM Project/ ESMAP for DBOT projects</li> </ul>	Annual Audit	Third Party E&S Audit	Various stages of the project development

Table 7-2: ESMF Implementation and Monitoring Arrangements

Milestones	Objectives	Process	Responsibility	World Bank 'Role	Decision/Target/Deliverable
1. Sub- Project Screening (at the FR stage)	To approve categorization of proposed sub-projects into high/ low impact investments	a. Discussions with EA to <ul style="list-style-type: none"> <li>- assess eligibility of project based on Namami Gange's priorities in consonance with Mission Clean Ganga</li> <li>- identify scope of project report</li> </ul> b. EA to submit FR along with proposed impact categorization c. SMCG may seek expert opinion	<ul style="list-style-type: none"> <li>• NMCG</li> <li>• SMCG</li> <li>• EA</li> </ul>	<ul style="list-style-type: none"> <li>• For the projects which are to be funded by the World Bank, the requisite documents (like ESDDR, RAP, ESAMP etc.) shall be shared with the bank for further review and finalize for disclosure. After approval of ESDDR and ESAMP they will be implemented as per the approved ESMF and apart from the monitoring of SMCG, NMCG, World Bank will also monitor these projects once in six months during their mission visit.</li> </ul>	<ul style="list-style-type: none"> <li>• Decision to proceed or not</li> <li>• Identification of impact category</li> </ul>
2. Sub- Project Appraisal (at the DPR stage)	To ensure satisfactory compliance with ESMF	a. Detailed appraisal of the ESMP (including RAP, where relevant), including site visits/investigations if necessary, assess suitability of site, adequacy of ESMPs, risk analysis and regulatory clearances b. EA to submit ESMP as part of DPR for approval	<ul style="list-style-type: none"> <li>• SMCG</li> <li>• NMCG</li> </ul>		<ul style="list-style-type: none"> <li>• Review report and decide to               <ul style="list-style-type: none"> <li>- accept</li> <li>- accept with modifications</li> <li>- reject and instruct to resubmit DPR</li> </ul> </li> </ul>
3. Approval	Approvals from SMCG/ NMCG/ World bank	a. SMCG to recommend to NMCG b. NMCG to recommend to Empowered Committee and World Bank (wherever applicable) c. Review of Sub Project EAs and ESAMPs by the World Bank including review and clearance of EA TORs for High Impact projects by the Bank	<ul style="list-style-type: none"> <li>• SMCG</li> <li>• NMCG</li> <li>• World Bank</li> </ul>		<ul style="list-style-type: none"> <li>• Approval of DPR</li> </ul>
4. ESMP Implementation Monitoring and Review	Ensure Implementation of agreed ESMP (including RAP, where applicable)	a. Prepare quarterly progress reports b. Schedule field visits as required c. Third party audit	SMCG, EA, Contractors		<ul style="list-style-type: none"> <li>• Quarterly Progress Report</li> </ul>

#### 7.4. SOCIAL ACCOUNTABILITY AND GRIEVANCE REDRESS MECHANISM

231. The Ganga River Basin Project primarily involves laying sewerage network and pumping stations, sewerage treatment plant, common effluent treatment plants, river front development, and low cost toilets. Though possibility of land taking is minimal, the civil works may create temporary adverse impact on community in terms of dust, loss of access to residential and commercial properties, traffic congestion, etc. In order to address these impacts, project, project has developed resettlement policy framework. That apart, project has also proposed three tier grievance redress mechanisms. The project will have three tier grievance redress mechanisms. The audit mechanism will be established for the project. The key approaches that would be adopted for ensuring accountability would be a combination of participatory processes guiding investment level third party audit, community's feedback on performance of the project and record citizens' recommendations for improvement and a strong grievance redress mechanism. The project will have a communication strategy focusing on efficient and effective usage of print and electronic media, billboards, posters, wall writing, and adoption of any other method suiting local context, logistics, human and financial resources.

232. Presently, one GRM officer has been appointed in NMCG to address all queries registered in the NMCG portal. The GRM officer is supported by one social expert who coordinates with all the SMCGs. At SMCG level, reporting of grievances are being monitored by environmental and social experts. All Executing Agencies have a GRM mechanism at each project site. The project manager and deputy project managers are in-charge of these GRMs. To register grievances, a register has been kept at all project site offices and sometime field team receives grievances over mobile phones as well as on WhatsApp messages. To resolve the grievances, project manager from EAs side and contractor's project engineer and his team work together to sort out the grievances at the earliest. If site team is unable to resolve the issue on its own, the complaint/matter is brought up to senior management of EA and also discussed in monthly review meetings and escalated to the level of SMCG and NMCG. In continuation, Grievance Redress Committees (GRCs) has also been constituted in some of the basin States. The GRC discusses grievances on weekly basis at their safety meetings<sup>16</sup>. The complaints received at different levels of the project (Contractor, PIU and EA) should be directed to the GRC to initiate the action and take the corrective measures as required. If the complainant is not satisfied, he/she can escalate the grievance by registering it in Centralized Public Grievances Redress and Monitoring System (CPGRAM) portal of NMCG. The State-wise grievance mechanism is at **Appendix VIII**.

233. The three tiers GRM of the project includes:

- i. **First Tier at Investment level:** The representative of PEA at the investment level will be the first level contact for any aggrieved person. The individuals / community can approach the representative to register their grievance or to give feedback. Each project site will have feedback register. The community / individual will have the right to register their feedback. The feedback register will be monitored every fortnight by Social Development Officer of SPMG. The SDO along with the PEA representative will be responsible for addressing the grievances registered if any or will forward the same to the SPMG. Scanned copy of the feedback register will be forwarded to the SPMG which will be part of the overall grievance database. Monthly report will be generated from the scanned copies. That apart, the project sties will have information board with the (i) name of the PEA; (ii) investment type and brief information on the civil works, and implementation timeframe ; (iii) name of the concerned representative; social

<sup>16</sup> Draft Report on GBV-GRM in National River Ganga Basin project (NGRBA), 2019

development specialist at SPMG and NMCG and their cell phone numbers; (iv) the toll free number to register grievances. The PEA will prepare a monthly report on these cases and submit to the SPMG.

- ii. **Second Tier: SPMG and NMCG Level:** An *Integrated Grievance Redress Mechanism* (IGRM) will be established at the SPMG level that will register user complaints using combination of various mediums (e.g. a dedicated toll free phone line, web based complaints, written complaints in feedback register and open public days) and address them in a time bound system. The project will appoint a grievance redress officer solely responsible for handling phone and web-based complaints. The person will be responsible for directing the aggrieved person to the concerned official through e-mail. On receiving any phone call or web based or email, a unique number will be generated which will be the reference number for the caller and he can trace the progress of his grievance / query through that number. Any complaint lodged will be addressed within 15 days of receiving the complaint. System will have escalation matrix i.e. if grievance / query remains untended or there is no response from the concern officer for specified period then system will escalate the grievance / query to next level through email. The toll-free line will be monitored between 10 AM to 5.30 PM on all working days. Any call made before or after the stipulated time, will get recoded and from the voice mail an e- mail will be generated addressed to the grievance officer. The grievance officer will then direct that mail to the concerned official and follow-up. The recorded message will be responded back the next day. The project will also commit itself for proactive disclosure and sharing of information with the key stakeholders, including the communities/beneficiaries. The website of NMCG and SPMGs will have the name and number of social development officer of SPMGs and NMCG. The website of PEAs will have the number of the concerned site representative responsible for addressing grievances / feedback.

234. As part of IGRM, a Grievance Redress Cell (GRC) will be set up at the project level to deal with the safeguards related grievances. The staffing of GRC will include the followings:

- Chairperson: District Collector / Magistrate/Deputy Commissioner or his / her representative
  - Convener: District Social Coordinator
  - Members: Representative from the community and PAPs if any, Representative from the executing agency, Community mobilizer of the concerned village
- ▶ The GRC will have its own bye laws. The functions of the GRC will redress grievances of the community towards the safeguards issue such as loss of land and/or livelihood, resettlement, relocation assistance, etc. The GRC will only deal/hear the issues related to individual grievances and will give its decision/verdict within 15 days after hearing the aggrieved PAPs. The final verdict of the GRC will be given by the Chairman/Head of GRC in consultation with other members of the GRC and will be binding to all other members.
- ▶ The list of GRC members should be on the website of PEA, SPMG and NMCG. All grievances recorded in GRC and responses given should be part of the total grievance database and should be accessible through web.
- iii. **Third tier at Mission Director's Level:** In case grievance is not addressed at the first two levels, the aggrieved person can approach the Mission Director of NMCG. The contact person for the

aggrieved person in NMCG will be Social Development Specialist who will be responsible to prepare all background documentation for the Mission Director to consider the case with all required information. The SD Specialist in SPMG and representative of PEA at the investment level will be responsible to inform the aggrieved person the process of contacting NMCG. All grievances recorded with NMCG and responses given should be part of the total grievance database and should be accessible through web.

## 7.5. TRAINING AND CAPACITY BUILDING

235. Being a new entity, the NMCG & SMCGs staff will need additional training in the management of environmental and social issues of the program. The training program for various relevant stakeholders will include an orientation program on the ESMF, Project Management, Engineering and Public Health. Course outline for various modules, the duration and the participation envisaged has been illustrated in **Table 7-3**.

236. The training program along with exposure visits is to be coordinated and anchored by NMCG with the support from agencies / individuals experienced in safeguard aspects of urban infrastructure investments for developing courses on conducting training programs. The trainers will be identified from expert agencies such as ASCI, TERI, TISS, CSE, Water Aid, etc. NMCG will prepare an annual training / exposure visit calendar with respect to Environment and Social Safeguard and related subjects such as Solid Waste Management, Fecal Sludge Management, Circular Economy, etc.

237. The training will focus on the relevant World Bank Safeguard policies, EHS guidelines as well as environmental and social issues. The contents will basically focus on the ESMF, concept, regulatory requirements, Environment and Social priority issues, project cycle of Namami Gange program investments, outline of EA / SA and report formats in respect of the Environmental aspects. In respect of social aspects the course content will focus on the R & R policies and procedures, Land Acquisition process, identification of PAPs, Social entitlement frameworks, social assessment, RP techniques, and Risk Assessment and management skills. The generic training program is elaborated in **Table 7-3**.

238. In addition to the above, Namami Gange program will make a conscious effort to mainstream the environmental and social issues within the training programs of NMCG. The program will be structured in such a way that it clearly brings out the value addition and enhancement benefits of proper management of environmental and social issues.

239. As part of the capacity building exercise, NMCG also aims at developing decentralized local capacity on managing environmental and social issues associated with various investments. In order to achieve the above objective, the specialists will develop a network of technical manpower resources such as staff from universities / research institutions, civil society organizations, etc. These persons will be trained during the course of Namami Gange program, so that they can provide support to the ULBs in implementing ESMP (including RAP, as relevant) recommendations and also offer support on an on-going basis.

Table 7-3: Generic Training Programme

Programs	Contents	Duration / Schedule	Participants	Programs	Contents
<b>Program 1</b>  Orientation Program / Workshop for Project Development agency	<b>Module 1 - ESMF Profile</b> <ul style="list-style-type: none"> <li>Namami Gange Concept</li> <li>ESMF Concept</li> <li>Regulatory Requirements-E&amp;S Priority Issues</li> <li>Sub project types of Namami Gange program</li> <li>ESA and SESA Process Outline</li> <li>Reports &amp; Formats</li> <li>Relevant World Bank Operational Policies and EHS guidelines</li> </ul>	<b>Module 2 Environmental Assessment Process</b> <ul style="list-style-type: none"> <li>Environmental Laws &amp; Regulations</li> <li>EIA process</li> <li>Identification of Environmental Impacts</li> <li>Impact Identification Methods</li> <li>Identification Mitigation Measures</li> <li>Formulation of Environmental Management Plan</li> <li>Implementation and Monitoring</li> <li>Institutional Mechanism</li> </ul>	<b>Module 3 Social Assessment Process</b> <ul style="list-style-type: none"> <li>Social Assessment process</li> <li>Description of Namami Gange program R&amp;R and gender frameworks and procedures and National requirements</li> <li>LA process</li> <li>Necessity for RAP and its preparation process</li> </ul>	1½day  (1 <sup>st</sup> , 3 <sup>rd</sup> and 5 <sup>th</sup> year of the project)	<ul style="list-style-type: none"> <li>Environment and social staff of NMCG and SMCG</li> <li>Heads of Statutory Boards and other monitoring agencies</li> </ul>
<b>Program - 2</b>  Orientation Program / Workshop for Project Implementing agency	<b>Module 1 - ESF Profile</b> <ul style="list-style-type: none"> <li>Namami Gange Concept</li> <li>ESMF Concept</li> <li>Regulatory Requirements-E&amp;S Priority Issues</li> <li>Sub project types of Namami Gange program</li> <li>ESA and SESA Process Outline</li> <li>Reports &amp; Formats</li> <li>Relevant World Bank Operational Policies and EHS guidelines</li> </ul>	<b>Module 2 Environmental Assessment Process</b> <ul style="list-style-type: none"> <li>Environmental Laws &amp; Regulations</li> <li>EIA process</li> <li>Identification of Environmental Impacts</li> <li>Impact Identification Methods</li> <li>Identification Mitigation Measures</li> <li>Formulation of Environmental Management Plan</li> <li>Implementation and Monitoring</li> <li>Institutional Mechanism</li> </ul>	<b>Module 3 Social Assessment Process</b> <ul style="list-style-type: none"> <li>Social Assessment process</li> <li>Description of Namami Gange's R&amp;R and gender frameworks and procedures and National requirements</li> <li>LA process</li> <li>Necessity for RAP and its preparation process</li> </ul>	1½day  (1 <sup>st</sup> , 3 <sup>rd</sup> and 5 <sup>th</sup> year of the project)	<ul style="list-style-type: none"> <li>Municipal Commissioners of the ULBs and Heads of EAs</li> <li>Engineering/Public Health personnel from the ULBs and social and environment staff of EAs</li> <li>Engineering personnel from Statutory Boards, and environment and social staff of potential private operators / consultants.</li> </ul>

Programs	Contents				Duration / Schedule	Participants
<p><b>Program-3</b></p> <p>Workshop on Sectoral Environmental and Social Assessment</p>	<p><b>Module 1– Water supply, sewerage and sanitation</b></p> <ul style="list-style-type: none"> <li>• ESMF Concept</li> <li>• Relevant World Bank Operational Policies and EHS guidelines</li> <li>• Regulatory Requirements-E&amp;S Priority Issues</li> <li>• Outline of ESA Process</li> <li>• Identification of Environmental and Social Impacts</li> <li>• Developing Mitigation Measures including entitlement frameworks</li> <li>• Formulation of Environmental and Social Management Plan including preparation of Resettlement Action Plan</li> <li>• Implementation and Monitoring arrangements</li> <li>• Budget preparation for implementation of ESMP</li> <li>• Case Studies</li> </ul>	<p><b>Module 2– Solid waste management</b></p> <ul style="list-style-type: none"> <li>• ESMF Concept</li> <li>• Relevant World Bank Operational Policies and EHS guidelines</li> <li>• Regulatory Requirements- E&amp;S Priority Issues</li> <li>• Outline of ESA Process</li> <li>• Identification of Environmental and Social Impacts</li> <li>• Developing Mitigation Measures including entitlement frameworks</li> <li>• Formulation of Environmental and Social Management Plan including preparation of Resettlement Action Plan</li> <li>• Implementation and Monitoring arrangements</li> <li>• Budget preparation for implementation of ESMP</li> <li>• Case Studies</li> </ul>	<p><b>Module 3– River Front Development</b></p> <ul style="list-style-type: none"> <li>• ESMF Concept</li> <li>• Relevant World Bank Operational Policies and EHS guidelines</li> <li>• Regulatory Requirements-E&amp;S Priority Issues</li> <li>• Outline of ESA Process</li> <li>• Identification of Environmental and Social Impacts</li> <li>• Developing Mitigation Measures including entitlement frameworks</li> <li>• Formulation of Environmental and Social Management Plan including preparation of Resettlement Action Plan</li> <li>• Implementation and Monitoring arrangements</li> <li>• Budget preparation for implementation of ESMP</li> <li>• Case Studies</li> </ul>	<p><b>Module 4 – Open Forum</b></p> <ul style="list-style-type: none"> <li>• Feedback and comments from the Participants.</li> </ul>	<p>1½ days</p> <p>(every alternate years)</p> <p>(Introduction will be common to all and participants will be split according to their respective sectors)</p>	<ul style="list-style-type: none"> <li>• Municipal Commissioners of the ULBs and heads of other EAs.</li> <li>• Engineering/Public Health personnel from the ULBs and other EAs.</li> <li>• Engineering personnel from Statutory Boards, and potential private operators / consultants.</li> <li>• Environment and social staff of NMCG; SMCGs; and EAs</li> </ul>

## 8. PUBLIC CONSULTATIONS AND DISCLOSURE

### 8.1. GENERAL

240. The development of the ESMF is based on a consultative process that engaged key stakeholders at the national, state, and local levels and sought their feedback. Key government agencies have been consulted at the various levels to obtain their consent on the ESMF in general and specially on the land acquisition process and resettlement framework.

241. National level consultations on ESMF were held as follows:

- i. April 17, 2010: A meeting on the international River clean-up experiences was held at Scope Complex, Lodi Road, New Delhi where MoEF&CC, World Bank, States, ULBs, NMCG expert members, and some NGOs participated. Consultations on broad outline of ESMF were conducted.
- ii. Sept.1, 2010: A meeting was organized in MoEF&CC with States and PIAs–It was first consultant meeting on ESMF where MoEF&CC made a presentation and draft of ESMF was shared with the States.
- iii. Oct. 25-26, 2010: A workshop for consultation on Investment frameworks and ESMF was organized in the World Bank where States, PIAs, NMCG and World Bank participated and agreed on the broad contours of the ESMF. It was agreed that States would conduct the public consultations at important towns where projects are likely to be implemented under the program.

242. Following the national level consultations, public consultations have been carried out in sample sub project areas in each of the five participating states to get feedback and suggestions from the affected community on the ESMF. The dates of these consultation meetings were announced in the local newspapers in advance so that all interested parties could participate and provide suggestions. The ESMF was translated into local language and disclosed on the websites and placed with the offices of the nodal agencies prior to the consultation meetings. Representatives of the State Nodal Agencies facilitated the public consultation meetings. The consultants preparing the ESMF attended the public consultation meetings in all the states to note the stakeholder suggestions and feedback. The minutes of the meeting was prepared highlighting the key discussions and issues raised by the stakeholders.

243. The schedule of the public consultations at the state level is provided in **Table 8-1**. The minutes of the meetings are given in the sections that follow.

**Table 8-1: Details Of The Public Consultations Held at The Five Selected States**

S.No	State	State Nodal Agency	Venue	Date	Time
1	Uttarakhand	Uttarakhand Peyjal Nigam	Nagar Pallika Bhawan, Haridwar, Uttarakhand	10 <sup>th</sup> December 2010.	2:30 pm to 5:00 pm
2	West Bengal	Urban Development Department	Kolkata, West Bengal	21 <sup>st</sup> December 2010	2:00 pm to 4:00 pm
3	Jharkhand	Urban Development Department, Jharkhand)	Vikash Bhawan D.C. Office, Sahibganj,	23 <sup>rd</sup> December 2010	11:00 am to 2:00 pm

S.No	State	State Nodal Agency	Venue	Date	Time
			Jharkhand		
4	Uttar Pradesh	Ganga Pollution Control Unit, U.P Jal Nigam	Nagar Nigam, Guest House, Kanpur, Uttar Pradesh	28 <sup>th</sup> December, 2010	3:00 pm to 5:30 pm
5	Uttar Pradesh	Ganga Pollution Control Unit, U.P Jal Nigam	Sadan Hall, Nagar Nigam, Prayagraj, Uttar Pradesh	29 <sup>th</sup> December 2010	3:00 pm to 5:00 pm
6	Bihar	Department of Urban Development	Patna, Bihar	4 <sup>th</sup> January 2011	3:00 pm to 5:00 pm

## 8.2. PUBLIC CONSULTATION MEETINGS

244. Public Consultation on Environment and Social Management Framework (NGRBA Program) was held at various locations from December 2010 to August 2017. The public consultations were conducted with State Nodal Agency, consultancy team, NGOs, project affected persons and other stakeholders. The issues and suggestions of the public consultations is at **Appendix IX**.

245. The public consultations was conducted wherein the details about the Environment and Social Management Framework, starting from the current status of river Ganga, future government plans, possible assistance by World Bank, overall significance of ESMF, stake-holder participation during the project, etc. was discussed and explained with the respective government officials. Various agencies involved in implementing the current programme were also explained in detail to the gathering. The guidelines were translated to vernacular and made available to public and all the documents related to NGRBA program has been uploaded in the MoEF&CC/NMCG website.

**Table 8-2: Summary of the Public Consultations**

S.No.	Date of consultations	Details of Consultation	Issues discussed
1	10 <sup>th</sup> December 2010	Public consultation on Environment and Social Management Framework, held at Haridwar, Uttarakhand	<ul style="list-style-type: none"> <li>• Education and awareness among PAPs especially youth, to keep river Ganga clean.</li> <li>• Provision of sanitation facilities along with O&amp;M for tourists and pilgrims.</li> <li>• Ensure active participation from NGOs, local communities and panchayats in the various stages of the project.</li> <li>• Efforts to minimize negative impacts on socio cultural beliefs and traditions regarding river Ganga during sub project implementation.</li> <li>• Regular O&amp;M for sustainable management of facilities provided during the project.</li> <li>• Lack of Solid Waste Management Plan.</li> <li>• Time gap between planning and implementation of the project needs to be minimized.</li> <li>• All safety and precautionary measures must be taken to avoid accidents during construction phase.</li> <li>• Ensure proper coordination between Government agencies/ departments.</li> </ul>
	21 <sup>st</sup> December 2010	Public consultation on Environment and Social Management Framework, held at Kolkata, West Bengal	<ul style="list-style-type: none"> <li>• Ensure treated sewerage wastewater to only flow into the river.</li> <li>• Need of ladies' changing room (as part of the RFD sub-project) and the need of low-income scheme (as</li> </ul>

S.No.	Date of consultations	Details of Consultation	Issues discussed
			<p>part of the sewerage and sanitation subproject).</p> <ul style="list-style-type: none"> <li>• O&amp;M cost for the first five years will be included within the project cost.</li> <li>• Efforts to be exerted for installation of WSP for treatment of city sewage.</li> <li>• House connections in the sewerage system need guarantee from the municipal authorities.</li> <li>• Recycling and reuse of treated wastewater must receive serious attention.</li> <li>• One must conceive ecologically balanced wastewater treatment system for abatement of river pollution.</li> <li>• The small industries need to be shifted to the common location so that their wastewater is managed in an efficient manner (through the CETP).</li> <li>• To adhere to the untreated sewage from various point and non- point sources fall into the river, municipal engineers should be involved in the decision-making process.</li> </ul>
	23 <sup>rd</sup> December, 2010	Public Consultation on Environment and social management Framework (NGRBA Program), held at Sahibganj, Jharkhand	<ul style="list-style-type: none"> <li>• Slum areas need to be considered and sensitized while planning any projects/schemes.</li> <li>• Projects must be location specific and the paying capacity of the community has to be considered while planning the projects.</li> <li>• Anti-erosion projects/ works, which is currently under CWC, should be included in the Ganga main stem project.</li> <li>• Dead animals are disposed in river Ganga as there are no burial places for animals. Nagar Palika also does not have any disposal place for dead animals.</li> </ul>
	28 <sup>th</sup> December, 2010	Public Consultation on Environment and Social Management Framework (NGRBA Program), held at Kanpur, Uttar Pradesh	<ul style="list-style-type: none"> <li>• Disposal of unburnt or half burnt dead bodies into the river Ganga should be prohibited.</li> <li>• More crematoriums should be built, and existing ones should be renovated to cater to the need of growing population.</li> <li>• Proper sanitation facilities during religious occasions and other festivals.</li> <li>• Inclusion of social development projects in the projects portfolio proposed by NGRBA program.</li> <li>• Promotion of awareness generation at community and school levels especially in the fields of better solid waste disposal (idols, calendar, flowers, polythene), promote usage of crematoriums, etc.</li> <li>• Involvement of local communities (Pandits) for maintaining the river ghats to curbs pollution.</li> <li>• Facilitate reuse of treated wastewater for agricultural practices, parks, firefighting, etc.</li> <li>• Facilitate usage of this buffer zone for afforestation or flower plantation).</li> <li>• Creation of Ganga Heritage Zone to focus development and protection against pollution.</li> <li>• Adopt bioremediation techniques for treating wastewater until the new STPs become functional.</li> <li>• Facilitate proper solid waste management along with the provision of utilization of compost in</li> </ul>

S.No.	Date of consultations	Details of Consultation	Issues discussed
			agricultural/gardening activities. <ul style="list-style-type: none"> <li>• Prohibition of reverse boring of wastewater by the industries which are likely to pollute groundwater.</li> <li>• Ensure proper coordination between Government agencies/ departments.</li> </ul>
	29 <sup>th</sup> December, 2010	Public Consultation on Environment and Social Management Framework (NGRBA Program), held at Prayagraj, Uttar Pradesh	<ul style="list-style-type: none"> <li>• Continuous and regular mechanism of creating awareness among community and school children's through street plays, public and religious gatherings (Mela), displaying banners, etc.</li> <li>• Proper sanitation facilities along with efficient operation and maintenance systems during religious occasions and other festivals.</li> <li>• Community involvement needs to be ensured during the project initiation and implementation stage of the project.</li> <li>• implementation activities of the projects must be completed in time to avoid the problems of traffic diversions, public congestions, and commercial displacement especially during Maha Kumbh Mela.</li> <li>• Promote reuse of treated wastewater for irrigation and gardening purposes.</li> <li>• Mechanism for proper solid waste management along the banks of both river Ganga and Yamuna.</li> <li>• Provision of wastewater treatment facility at Dhobi Ghat for caustic soda-based effluents.</li> <li>• Imposing strict regulation on upcoming new colonies to establish their own STPs.</li> <li>• Ensure proper site selection for pumping stations along with efficient operation and maintenance of pumping stations in order to avoid back flow or clogging of sewers.</li> <li>• Request to start sewer and drainage projects simultaneously and completed in time to avoid mixing of wastewater with drainage water.</li> <li>• Ensure technically feasible solutions while designing the alignment of sewer lines and dimensions of the sewer to cater the needs of growing population.</li> <li>• Request to maintain minimum size of the sewer more than 150mm to avoid clogging of sewers.</li> </ul>
	4 <sup>th</sup> January, 2011	Public Consultation on the Environmental and Social Management Framework (ESMF) for the National Ganga River Basin Authority (NGRBA Program) held at Patna, Bihar	<ul style="list-style-type: none"> <li>• Awareness about the program projects and sub-projects must be generated to a large extent in order to ensure implementation and effectiveness.</li> <li>• Documents and messages delivered to the public must be made in simple language and easily comprehensible.</li> <li>• Ensure proper coordination between Government agencies/ departments.</li> <li>• 'Livelihood links' that exist with the Ganga River and the related projects should be highlighted.</li> <li>• Before implementation of projects, the location of projects must be consulted with the local people of the project-affected area.</li> <li>• Local institutional support could be taken for project planning and development.</li> <li>• Encroachment of lands and construction of</li> </ul>

S.No.	Date of consultations	Details of Consultation	Issues discussed
			residential complex should not take place in the River Catchment areas. <ul style="list-style-type: none"> <li>• Solid Waste Management related projects must implement a door-to-door collection system.</li> <li>• Effluent discharge limits for slaughterhouses along the riverbanks should also be established.</li> <li>• Various check dams could be built on the tributaries of the river Ganga in order to achieve better flood and disaster management.</li> <li>• 'Arsenic-zones' adjacent to the riverbanks that must be addressed.</li> <li>• Technical trainings should be provided to concerned officials and elected members for better implementation of the projects.</li> </ul>
	4 <sup>th</sup> August, 2017	Consultation with the SMCGs and EAs on the revised ESMF for Namami Gange Programme held at New Delhi	<ul style="list-style-type: none"> <li>• At the DPR stage Environment and Social Due Diligence Report (ESDDR) along with Environment and Social Management Action Plan (ESMAP) to be prepared.</li> <li>• ESDDR to cover the basis nature of the projects, a very brief description of the environment and present status along with screening checklist and an analysis of environmental and social issues associated with the project.</li> <li>• ESDDR to describe the future action plan to be taken during the detailed design stage by the Concessionaire.</li> </ul>

### 8.3. MECHANISM FOR CONTINUED PARTICIPATION

246. The effectiveness of the ESMF implementation is directly related to the degree of continuing involvement of the community. Participation of community and PAPs in the planning and implementation of the sub project will ensure that investment and mitigation measures are suited to the needs of the community as well as adversely impacted population. Their continued involvement and participation during implementation will both increase the probability of successful implementation of both the sub project as well as ESMAP.

247. **Plan for Continued Participation:** The following set of activities is required for effective implementation of ESMF.

248. **Information Disclosure:** For the benefit of the community in general and PAPs in particular, ESMF and other safeguard instruments will be translated in local language and kept at SMCG, EA's office, operator/concessionaire's office and sub project site.

249. **Community Participation:** For effective implementation of ESMF, it is essential to provide scope of involving communities and PAPs in the process. The mechanism of involving communities is suggested below in **Table 8-3**.

Table 8-3: Mechanism for Continued Participation

Project Stage	PAPs	EAs	Community	Project & Local Officials
Planning	<ul style="list-style-type: none"> <li>• Participate in public meetings</li> <li>• Identify alternatives to avoid or minimise displacement</li> <li>• Assist in developing and choosing alternative options for relocation and income generation</li> <li>• Help to choose resettlement sites.</li> <li>• Participate in survey</li> <li>• Participate in meeting with host population</li> <li>• Provide inputs to entitlement provisions</li> <li>• Assist in preparation of action plan</li> <li>• Suggest mechanism for grievance redress conflict resolution and participate in grievance redress</li> </ul> <p>Participate in coordination committees</p>	<ul style="list-style-type: none"> <li>• Assist in impact assessment</li> <li>• Assist in census and SE survey</li> <li>• Participate in coordination committee</li> <li>• Participate in group meetings</li> <li>• Design and implement an information campaign</li> <li>• Support group formation, problem identification and planning for PAPs and hosts,</li> <li>• Design and Participatory process</li> <li>• Suggest mechanism for grievance redress of conflict resolution.</li> </ul> <p>Assist in preparation of action Plan</p>	<ul style="list-style-type: none"> <li>• Provide information or various aspects of host communities</li> <li>• Assist in data collection and design</li> <li>• Provide inputs to site selection</li> <li>• Identify possible conflict areas with PAPs</li> <li>• Identify social and cultural facilities needed at resettlement sites</li> <li>• Assist in identification of IG schemes</li> <li>• Provide inputs for design of IG schemes</li> <li>• Help develop a process of consultation between hosts and PAPs.</li> </ul> <p>Suggest mechanism for grievance redress and conflict resolution.</p>	<ul style="list-style-type: none"> <li>• Provide information on PAP skills etc.</li> <li>• Suggest ways to minimise impacts</li> <li>• Indicate local staff and budget capacity for relocation.</li> <li>• Assist NGO in information dissemination</li> <li>• Participate in consultations</li> <li>• Examine the feasibility of IG schemes and discuss with PAPs.</li> </ul> <p>Help document and consultations.</p>
Implementation	<ul style="list-style-type: none"> <li>• Participate in implementation support activities</li> <li>• Participation in local decision making activities.</li> <li>• Decide on management of</li> </ul>	<ul style="list-style-type: none"> <li>• Provide ongoing information for PAPs and hosts</li> <li>• Provide support in group management</li> <li>• Monitor entitlement provision by</li> </ul>	<ul style="list-style-type: none"> <li>• Assist APO in relocation</li> <li>• Manage common property at site</li> <li>• Participate in local committees.</li> <li>• Assist PAPs in integration with Hosts.</li> <li>• Assist PAPs in use of new production system.</li> </ul> <p>Use established mechanisms for grievance redress.</p>	<ul style="list-style-type: none"> <li>• Process IG proposals</li> <li>• Participate in grievance redress</li> <li>• Provide assistance under local schemes.</li> </ul> <p>Participate as member of Implementation committee.</p>

Project Stage	PAPs	EAs	Community	Project & Local Officials
	<p>common properties</p> <ul style="list-style-type: none"> <li>• Participate in grievance redress mechanism.</li> <li>• Monitor provision of entitlements</li> <li>• Labour and other inputs of site</li> <li>• Labour and other inputs at site</li> <li>• Credit and other group scheme management</li> <li>• O&amp;M of sites and project inputs</li> <li>• Members of implementation committee</li> </ul>	<p>implementation of IG schemes.</p> <ul style="list-style-type: none"> <li>• Assist implementing live deptts.</li> <li>• Provide support to RAP implementation .</li> <li>• Training to eligible PAPs</li> <li>• Support to vulnerable groups</li> <li>• Evaluate community process and social preparation</li> <li>• Provide advice on grievance redress.</li> </ul> <p>Be an interface between PAPs and PWD for grievance redress, especially for vulnerable groups, and those with low levels of literacy.</p>		
M&E	<ul style="list-style-type: none"> <li>• Participate in grievance tribunals</li> <li>• Report to project on IG schemes</li> <li>• Report on service quality of sites</li> </ul>	<ul style="list-style-type: none"> <li>• Provide information to project staff on vulnerable groups</li> <li>• Act as M&amp;E agency for project</li> <li>• Act as external monitors for project (where not previously involved)</li> </ul>	Provide inputs to M&E of R&R	<ul style="list-style-type: none"> <li>• Ongoing interaction with PAPs to identify problems in IG programme.</li> <li>• Participants in correctional strategies.</li> </ul>

## End Notes

### Definitions

The following definitions are used in the documents:

- ▶ **Cut-off date:** In the cases of land acquisition affecting legal titleholders, the cut-off date would be the date of issuing the preliminary notice u/s 11(1) of the RFCTLARR Act, 2013. In cases where people lack title, the cut-off-date shall be the date of completion of the Census survey undertaken by the project authority.
- ▶ **Project Affected Person:** Affected persons are those who stand to lose all or part of their physical and non- physical assets including homes, productive land, community resources, commercial properties; livelihood; and socio-cultural network.
- ▶ **Project Displaced person:** A displaced person is a person who is compelled to change his/her place of residence and/or workplace or place of business, due to the project.
- ▶ **Affected family means:**
  - (i) A family whose land or other immovable property has been acquired;
  - (ii) a family which does not own any land but a member or members of such family may be agricultural labourers, tenants including any form of tenancy or holding of usufruct right, share-croppers or artisans or who may be working in the affected area for three years prior to the acquisition of the land, whose primary source of livelihood stand affected by the acquisition of land;
  - (iii) family whose primary source of livelihood for three years prior to the acquisition of the land is dependent on forests or water bodies and includes gatherers of forest produce, hunters, fisher folk and boat-rent and such livelihood is affected due to acquisition of land;
  - (iv) a member of the family who has been assigned land by the State government or the Central Government under any of its schemes and such land is under acquisition;
  - (v) a family residing on any land in the urban areas for preceding three years or more prior to the acquisition of the land or whose primary source of livelihood for three years prior to the acquisition of the land is affected by the acquisition of such land.
- ▶ **Definition of Family:** "family" includes a person, his or her spouse, minor children; minor brothers and minor sisters dependent on him: Provided that widows. Divorcees and women deserted by families shall be considered separate family.
- ▶ **Displaced Family:** "displaced family" means any family, who on account of acquisition of land has to be relocated and resettled from the affected area to the resettlement area;
- ▶ **Wage Earner:** A person who is working with a commercial establishment or working as a labour in an agriculture land, which is being affected by the project.
- ▶ **Non-Title Holder:** A person, who has trespassed Government land, adjacent to his/her own land or asset, to which he/she is not entitled, and deriving his/her livelihood prior to the cut-off date.  
Or a person who is landless and has settled on publicly owned land without permission and has been occupying publicly owned building without authority prior to the cut-off date.

- ▶ **Below Poverty Line (BPL):** A family whose annual income from all sources is less than a designated sum as fixed by the concerned State Government, in which the project falls, will be considered to be below Poverty Line.
- ▶ **Vulnerable Person:** Unless otherwise specifically mentioned in this document, a person who has been designated under 'Below Poverty Line' category as identified by the concerned State Government will be considered a vulnerable person. Disadvantaged persons belonging to SC, ST, disabled/handicapped, and woman heading the household are also recognized as vulnerable persons. Also vulnerable persons such as the disabled, destitute, orphans, widows, unmarried girls, abandoned women ,or persons above fifty years of age; who are not provided or cannot immediately be provided with alternative livelihood , and who are not otherwise covered as part of family;
- ▶ **Entitled Person:** person adversely impacted by the project and is entitled to some kind of assistance as per the project entitlement framework
- ▶ **Titleholders (THs):** Persons who possess legal documents in support of claims made towards ownership of structure or land are titleholder.
- ▶ **Sharecroppers:** Persons who cultivate land of a titleholder on certain conditions
- ▶ **Landowner:** "land owner" includes any person -
  - (i) whose name is recorded as the owner of the land or building or part thereof, in the records of the authority concerned; or
  - (ii) under any other law for the time being in force; or who is entitled to be granted Patta rights on the land under any law of the State including assigned lands: or
  - (iii) any person who has been declared as such by an order of the court or Authority
- ▶ **Interested Person:** "person interested" means-
  - (i) all persons claiming an interest in compensation to be made on account of the acquisition of land under this Act;
  - (ii) a person interested in an easement affecting the land;
  - (iii) persons having tenancy rights under the relevant State laws including share- croppers by whatever name they may be called; and
  - (iv) any person whose primary source of livelihood is likely to be adversely affected;

## Appendices

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## Appendix I: Guidance on EIA of High impact category Sub-Project

(To be finalized by SMCG with inputs from NMCG/ MoWR, RD&GR as applicable)

### Introduction

High impact category investments require a full EA to be done by environmental consultants, separate from any evaluation performed by the design consultants. The environmental consultants must closely interact with the design consultants in order to obtain the necessary data, information, reports and support as required. The EA process must be carried out, and the EA&EMP reports must be prepared. This guidance includes a typical term of reference and suggests the structure and content of the EA & EMP report. The terms of reference are general in content. As it is likely that there are some specific environmental issues that require to be addressed and these are known in advance, these need to be informed to the environmental consultants.

### Terms of reference

The following terms of reference should be used:

#### Description of Project

- ▶ To provide a full description of the project, with details on specific sites, populations impacted, project design, implementation schedule, number / types of connected industries, details of any pre-implementation activities (i.e. public education and/or involvement, pilot studies, etc.), operation and maintenance activities, required off-site investments, project life span, etc. Project description should also include any and all required information as stipulated below.

#### Policy and legal Guideline

- ▶ To collect information on the prevailing World Bank Safeguard policies, national, state and local laws and EHS Guidelines pertinent to environmental quality, health and safety, waste management guidelines, air and water quality regulations, protection of sensitive areas, land uses control and others. Manner of complying with relevant laws, such as the appropriate avenue for submission of required materials, should be described in detail.
- ▶ To convey to the contractor / relevant implementing actor the manner in which the enforcing body will conduct its monitoring / enforcement activities, as well as information as to what government assistance (e.g. technical assistance) government bodies can provide to the actor so as to facilitate the actor's compliance.
- ▶ To determine its applicability of all laws to the proposed sub-project and to include the specific clearances/approvals that must be obtained by the SGRBA/contractor/relevant implementing actor.
- ▶ To assist the SMCG/ contractor/ relevant implementing actor in any clearances/ approvals that may be required to implement the sub-project in terms of completing forms/ applications and defending the sub-project before Government committees.

#### Baseline Study of Proposed Project Area

- ▶ To assemble, evaluate and present baseline data on the relevant environmental characteristics of the sub-project area, including changes anticipated before the commencement of the project. The description of the baseline environmental setting shall be worked out from the secondary data

sources supplemented by the primary data collected as part of the various surveys carried out as part of the EA preparation.

- ▶ To describe the physical environment: geology; topography; soils; climate and meteorology; ambient air quality; noise quality; surface and ground-water hydrology; existing sources of air emissions; existing water pollution discharges; and receiving water quality, etc. Description should include both a general overview of overall study area, as well as more detailed information for specific implementation sites.
- ▶ To describe the biological environment: flora; fauna; rare or endangered species; sensitive habitats, including reserved forests, wildlife reserves and sanctuaries etc. Description should include both a general overview of overall study area, as well as more detailed information for specific implementation sites.
- ▶ To describe the socio-cultural environment: population; land use; planned development activities; community structure; employment; distribution of income, goods and services; recreation; public health; cultural properties; and, common property resources, etc. Description should include both a general overview of overall study area, as well as more detailed information for specific implementation sites.

#### **Public consultation**

- ▶ To carry out public consultation and participation as an integral part of the EA. Consultation sessions shall be carried out with different stakeholder groups at the local, regional and district levels, so as to incorporate the various environmental concerns and needs of the community and the relevant stakeholders. Specific attention should be paid to Project Affected Persons.
- ▶ (PAPs), namely, those whose habitations or livelihoods will be directly impacted by the proposed sub-project.
- ▶ To ensure the effectiveness of the consultations and the full participation of all stakeholders in the project, all relevant information shall be shared with the likely PAPs and local NGOs in a timely manner prior to the consultation and in a form and language that are understandable and accessible to the groups being consulted.
- ▶ To ensure that consultations with these groups are carried out at least at the following two occasions: (a) shortly after environmental screening and before the terms of reference for the EA are finalized; and (b) once a draft EA report is prepared. Such groups should also be consulted throughout project implementation as necessary to address EA-related issues relevant to them, allowing relevant stakeholders the opportunity to share their concerns during both the design and implementation phases of the project.
- ▶ To make available both the initial draft EA and the report's conclusions at all relevant public locations accessible to PAPs and relevant stake holders. The EA report shall also be disclosed in website of the SMCG and NMCG.

#### **Impact analysis**

- ▶ To identify, analyze and evaluate the different kind of impacts, and to distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long- term impacts.
- ▶ To determine the impacts on sensitive receptors identified during the baseline environmental analysis.
- ▶ To determine the impacts on sensitive areas: critical natural habitats (such as conservation areas,

sanctuaries, sacred groves, etc.) and migration routes; “induced development”; historic, cultural and religious buildings and sites; archaeological sites and tourism areas, etc.

### **Analysis of alternatives**

- ▶ To describe alternatives that were examined in the course of developing the proposed project and identify other alternatives, which would achieve the same objectives. The concept of alternatives extends to siting, design, technology selection, construction techniques and phasing, and operating and maintenance procedures.
- ▶ To compare alternatives in terms of potential environmental impacts and suitability under local conditions. A “no project,” or Business as Usual, scenario should also be considered, wherein the environmental impacts of taking no action will be estimated.

### **Mitigation**

- ▶ To identify feasible and cost-effective mitigation measures that may reduce potentially significant adverse environmental impacts to acceptable levels, capital and recurrent costs of the measures. These measures should be identified prior to construction of any investments or investments.
- ▶ To specify in a table the description of the measure along with who is responsible and when it has to be implemented.
- ▶ To include relevant drawings and technical specifications that would be required to implement the mitigation measure effectively during the design phase of any project or sub-project.

### **Monitoring**

- ▶ To prepare detailed arrangements in a plan for monitoring implementation of mitigating measures and the impacts of the sub-project during construction and operation.
- ▶ To include in the initial plan an estimate of capital and operating costs, and a description of other inputs (such as training and institutional strengthening) needed to carry it out. These estimates should occur during the initial design/planning phase of the sub-project.
- ▶ To document in the initial plan what will be monitored, who would do it, who would receive its outputs, how much it would cost, how it would be financed and what other inputs (e.g. training) are necessary.
- ▶ To include in the initial plan a list of environmental monitoring parameters, and detailed specifications (methods, schedule, etc.) for performance/compliance monitoring during construction, and operation stage of the sub-project.

### **Management**

- ▶ To identify institutional needs to implement the recommendations of the EA. This would include manpower requirements, skill requirements and training, organizational mechanisms and information dissemination requirements.
- ▶ To recommend any further studies of environmental issues which should be undertaken during project implementation.

### **Others**

- ▶ To document the important contributors to the EA and to record interagency/forum/consultation meetings; including list of both invitees and attendees.

### **Suggested structure and content of an EIA report**

The EIA report should have the following structure and content:

- ▶ Executive Summary- project details, policy Guideline, baseline conditions, significant environmental impacts, salient points of the analysis of alternatives, salient mitigation and monitoring measures, and budget.
- ▶ Project Description-Concise description of the proposed project and its geographic, ecological, social and temporal context.
- ▶ Policy, Legal and Administrative Guideline - Government policies, environmental legislations and regulations currently under force.
- ▶ Baseline Data - Assessment of the physical, biological and socioeconomic conditions of the project locations.
- ▶ Environmental impacts-Prediction and assessment of the project's likely positive and negative impacts, in quantitative terms to the extent possible. The more significant environmental impacts and those that are considered critical by the public are to be further focused in this chapter.
- ▶ Analysis of Alternatives-Comparison of feasible alternatives to the project site/right-of-way, technology, design and operation – including the 'without project' situation – in terms of their potential environmental impacts
- ▶ Mitigation and monitoring measures - Enlisting and description of environmental impacts and the remedial measures to be taken. Preferably, this contains a comprehensive table containing a brief description of the impact, the type of remedial measure (prevention or mitigation or enhancement), the description of the measures, phase wherein applicable - pre-construction, construction and operational phases, and implementation responsibility.
- ▶ Budgets

### Structure and content of an EMP

The EMP report should have the following structure and content:

- ▶ Introduction - Objective, scope, proponent's background, brief description of the sub-project and the purpose of the EMP
- ▶ Remedial Measures - Description and enlisting of the environmental impacts and remedial measures to be taken. Preferably, this contains a comprehensive table containing a brief description of the impact, the type of remedial measure (prevention or mitigation or enhancement), the description of the measures, phase wherein applicable - pre-construction, construction and operational phases, and implementation responsibility.
- ▶ Organizational arrangements for implementation - Institutional Guideline being established to ensure the implementation of the EMP.
- ▶ Environmental performance indicators are to be chosen and the basis for their selection. A linkage between these indicators and the important environmental impacts and the associated remedial measures needs also to be established.
- ▶ Monitoring mechanisms to be adopted that include reporting progress, frequency of monitoring, enhanced monitoring during specific seasons such as monsoons, etc.
- ▶ Mechanisms to ensure an ongoing dialogue with the public during the construction and operational phases.

The budget for the EMP implementation should be included in the overall sub-project. This should cover costs – mitigation, monitoring, training and public / stakeholder consultation and participation - due to be incurred during the construction and operational phases.

## Appendix II: Generic Environmental Guidelines / Management Plan for Low impact category Investments

(To be finalized by SMCG with inputs from NMCG as applicable)

Activity	Potential Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
<b>I. Sewerage and Sanitation Investments</b>				
<b>A. Design and Development Phase</b>				
Land Acquisition **	Loss of tree cover	<ul style="list-style-type: none"> <li>Undertake afforestation in nearby areas</li> </ul>	ULB/ Project Implementing Agency	SMCG/ NMCG
Treated Water Disposal into nearby stream ***	<ul style="list-style-type: none"> <li>Pollution of stream water and other water bodies receiving STP discharges due to reduction in efficiency or non-working of STP</li> </ul>	<ul style="list-style-type: none"> <li>Ensure efficient working condition. – Choice of treatment process, construction technique, equipment and skilled operation and supervision critical to maintain effluent quality compliance.</li> <li>The treated water quality shall comply with the standards laid down by the state pollution control board for disposal onto the land, water body or for irrigation use.</li> </ul>	ULB/ Project Implementing Agency	SMCG/ NMCG
Sludge Disposal***	<ul style="list-style-type: none"> <li>Disposal of sludge leading to contamination of land and water.</li> </ul>	<ul style="list-style-type: none"> <li>Providing adequate and safe sludge disposal facilities</li> </ul>	Design Consultant, ULB/ Project Implementing Agency	SMCG/ NMCG
Provision for Accidental leakages/ bursts **	<ul style="list-style-type: none"> <li>Flooding of the nearby areas with untreated sewage in event of accidental leakages or bursts</li> </ul>	<ul style="list-style-type: none"> <li>The Design Consultants should design for bypass arrangements, to discharge untreated sewage.</li> </ul>	Design Consultants and EA	SMCG/ ULB
	<ul style="list-style-type: none"> <li>Low lying areas in the site, which can get flooded during monsoons</li> </ul>	<ul style="list-style-type: none"> <li>Provide proper drainage arrangements so that the water does not stagnate on the site</li> </ul>	Design Consultants and EA	SMCG/ ULB
Location of STP*	<ul style="list-style-type: none"> <li>Nuisance hazards to neighboring areas.</li> </ul>	<ul style="list-style-type: none"> <li>Careful planning and design of STP with adequate buffer zones. Future growth of the Surrounding areas shall be considered.</li> </ul>	Design Consultants and EA	SMCG/ ULB
Developing sewage pumping station*	<ul style="list-style-type: none"> <li>Noise and odor nuisance to surrounding areas.</li> </ul>	<ul style="list-style-type: none"> <li>Select appropriate location away from sensitive locations such as schools and hospitals.</li> <li>Provide sufficient buffer areas</li> <li>Follow standard codes for selection pumps and other</li> </ul>	Design Consultants and EA	SMCG/ ULB

Activity	Potential Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
		apparatus. Use less noise making and easy to operate equipment.		
<b>B. Construction Phase</b>				
<i>Excavation, cutting and filling operations***</i>	Soil and water contamination by improper disposal of construction and demolition waste.	<ul style="list-style-type: none"> <li>Ensure immediate transportation of accumulated waste to an identified site.</li> </ul>	Contractor/ Project Implementing Agency	SMCG/ ULBNMCG
	Damage to standing crops due to construction activities.	<ul style="list-style-type: none"> <li>Construction activities shall be planned so as not to damage any crops. In case if it is inevitable provide monetary compensation to the owners</li> <li>Immediately transport accumulated construction waste to a site identified for the purpose.</li> </ul>	Contractor / Project Implementing Agency	SMCG/ ULBNMCG
	Temporary flooding due to excavation during monsoons.	<ul style="list-style-type: none"> <li>Provide suitable arrangements for drainage control.</li> </ul>	Contractor / Project Implementing Agency	SMCG/ /NMCG
	Noise, vibration and dust from construction activities.	<ul style="list-style-type: none"> <li>Use of less noise generating equipment for all activities, provision for personal protective equipment, earmuffs, etc. for construction; avoid construction activities during nights; and sprinkle water on site and remove excess matter from the site as soon as possible.</li> </ul>	Contractor / Project Implementing Agency	SMCG/ /NMCG
	Safety hazards to labor.	<ul style="list-style-type: none"> <li>Provide adequate safety precautions such as helmets, safety shoes, gloves, etc.</li> </ul>	Contractor / Project Implementing Agency	SMCG/ / NMCG
Laying of sewer network *	Spillage of fuel and oil	<ul style="list-style-type: none"> <li>Store tanks and drums for excess capacity; forbid pouring into soils or drains; enforce adequate equipment maintenance procedures</li> </ul>	Contractor / Project Implementing Agency	SMCG/ / NMCG
	Noise and vibration disturbances to residents and businesses	<ul style="list-style-type: none"> <li>Establish schedule and other specific restrictions; limit work to daylight hours as possible; use of less noise generating equipment, proper maintenance</li> </ul>	Contractor / Project Implementing Agency	SMCG/ / NMCG
Laying of sewer network *	Dust generation	<ul style="list-style-type: none"> <li>Water sprinkling, removal of excess materials, cleaning of sites upon completion of activities.</li> </ul>	Contractor / Project Implementing Agency	SMCG/ / NMCG
	Reduced pedestrian and vehicle access to	<ul style="list-style-type: none"> <li>Establish work sequence and methods to minimize access</li> </ul>	Contractor / Project	SMCG/ / NMCG

Activity	Potential Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
	residences and businesses	disruption; provide alternative safe access as possible; temporary bridges and crossings, detours and walkways.	Implementing Agency	
	Temporary water supply interruptions	<ul style="list-style-type: none"> <li>Establish coordination procedures for cut-off; minimize time for replacement operations; and appropriate scheduling as necessary.</li> </ul>	Contractor/ Project Implementing Agency	SMCG/ /NMCG
	Increased traffic inconvenience (emissions, congestions, longer travel times)	<ul style="list-style-type: none"> <li>Use alternate traffic routing; ensure coordination with local authorities; routine control and maintenance of equipment.</li> </ul>	Contractor/ Project Implementing Agency	SMCG/ and Traffic Police
Construction Camps*	Health impacts due to absence of housing and sanitation facilities in labour camps.	<ul style="list-style-type: none"> <li>Provision of appropriate housing, water supply, and sanitation facilities.</li> </ul>	Contractor / Project Implementing Agency	SMCG/ NMCG
	Impacts on surrounding environment due to improper drainage and solid waste management facilities in construction camps.	<ul style="list-style-type: none"> <li>Provide proper temporary drainage and solid waste collection and disposal facilities at the construction site.</li> </ul>	Contractor / Project Implementing Agency	SMCG/ /NMCG
<b>C. Operation Phase</b>				
Treatment and Disposal ***	<p>Impairment of receiving water quality in surface/sub-surface source due to inadequate /inefficient Treatment.</p> <p>Contamination groundwater supplies due to leaching and impact on soil and agriculture</p>	<ul style="list-style-type: none"> <li>Monitor the treated sewage/effluent quality and ensure compliance with PCB standards for effluent disposal into surface water bodies, on land or for the agricultural use.</li> <li>The treated water quality shall comply with the standards laid down by the state pollution control board for disposal onto the land, water body or for irrigation use.</li> </ul>	Operator/ EA	SMCG/ /NMCG
Treatment and Disposal ***	Problems arising due to bad odor, insects, polluted air, noise pollution, etc.	<ul style="list-style-type: none"> <li>Provide buffer zones in the form of green belt around the STP; to be ensured during the design and development phase itself.</li> </ul>	Operator/ EA	SMCG/ /NMCG
	Indiscriminate disposal of sludge leading to contamination of land and soil.	<ul style="list-style-type: none"> <li>Prepares a sludge disposal plan and adheres to the same.</li> </ul>	Operator/ EA	SMCG/ /NMCG
	Health and safety of workers due to the release of toxic gases	<ul style="list-style-type: none"> <li>Ensure safe operation and maintenance practices are followed and plans for</li> </ul>	Operator/ EA	SMCG/ /NMCG

Activity	Potential Negative Impact/Concern	Mitigation Measures	Responsible Agency for Mitigation	Monitoring Agency
	and hazardous material.	emergencies are in place.		
	Reduced land values in nearby areas and aesthetics affected.	<ul style="list-style-type: none"> <li>Adequate buffer zones during development and construction phase should mitigate the affect considerably.</li> </ul>	EA	SMCG/ /NMCG

**Note:** \*\*\* denotes – Significant Impact; \*\* Denotes-Moderate Impacts and \*- Minor Impact.

**Appendix -IIIA: Sample EMP for the Sewage Treatment Plant**

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
<b>Sewerage and Sanitation Investments</b>					
<b>A. Design and Development Phase</b>					
Sewage Treatment plant	Treated water disposal into nearby stream	<ul style="list-style-type: none"> <li>Pollution of received water body ( river) or land due to inefficient treatment or non- operation of STP</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>The treated water quality shall comply with the prescribed standards of the bid document and other applicable conditions of consent to establish issued by the state pollution control board.</li> <li>Selection of best available sewage treatment technology with High BOD removal efficiency.</li> <li>Ensuring development and compliance to standard operation and maintenance practices.</li> <li>Provision of effective screening at inlet of STP for removal of grit, fine plastics and other suspended solids</li> <li>Provision of effective separation and controlled disposal of digested sludge</li> <li>Provision effective disinfection before discharge of treated water for irrigation or to river</li> </ul>	DBO Operator
	STP Breakdown	<ul style="list-style-type: none"> <li>Discharge of untreated sewage leading river pollution.</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>Provision of adequate holding capacity adequate for storage of sewage to prevent flow of untreated sewage to river.</li> </ul>	DBO Operator
	Flooding of STP area	<ul style="list-style-type: none"> <li>Rain water may flood the STP area in absence of adequate provision of diverting rain water flow towards STP from periphery area.</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>Suitable drainage provision shall be made to divert the rain water likely to be accumulated from peripheral catchment area of STP, to natural drainage stream or area.</li> </ul>	DBO Operator
	Sludge disposal	<ul style="list-style-type: none"> <li>Disposal of sludge leading to contamination of land and water.</li> </ul>	Permanent	<ul style="list-style-type: none"> <li>Efficient Sludge dewatering with minimum land involvement shall be adopted.</li> <li>Provision shall be made for intermittent</li> </ul>	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
				<p>storage of digested sludge at STP site.</p> <ul style="list-style-type: none"> <li>• Digested Sludge from a waste treatment plant may constitute a hazardous and nonhazardous waste, therefore periodic testing of Sludge to assess the content of hazardous chemical should be identified (as per MOUD manual 2016) before it final disposal at the identified dumping site of MC. Dumping shall be done when the authorized land fill site is not available nearby to project region.</li> <li>• The digested sludge shall be utilized as manure or disposed to suitable site as approved by DBO engineer. If disposal is made for landfill, the site shall be located away from habitation; and water bodies and shall be pre-approved by concerned authorities like Municipal corporation, Pollution Control Board or urban development authority.</li> </ul>	
<p>Provision for safety of workers and safe operation of STPs</p>	<ul style="list-style-type: none"> <li>• Accidents leading to injury or death of workers (Fall of workers from Height, Fall into deep water tanks, Short Circuiting)</li> <li>• Accidental slip, trip and fall in walk ways or work areas</li> <li>• Fire</li> <li>• Exposure to toxic gas such as chlorine</li> </ul>		<p>Permanent</p>	<ul style="list-style-type: none"> <li>• Ensure adequate provision of Handrails on both sides of walkways close to deeper tanks and STPs need to be ensured;</li> <li>• All electric switches (including unit specific on-off switches installed at respective units ) and panels should have adequate protection from rain water to prevent short-circuiting</li> <li>• Proper earthing with installation of earth circuit breakers shall be made</li> <li>• Walkways designs shall be made with proper Slope to avoid accumulation of rain water. Material handling and storage shall be so designed that walk way surface remains free</li> </ul>	<p>DBO Operator</p>

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
Sewage Pumping Station	<ul style="list-style-type: none"> <li>Noise/Odor/fly nuisance hazards to neighboring areas.</li> <li>Cutting of Trees</li> </ul>	Permanent		from wet or oil surface situation to prevent slips, trip fall accidents. <ul style="list-style-type: none"> <li>Provision of interlock system to either stop STP or divert untreated effluent to holding tanks in case of short circuiting, or mall functioning of STP</li> <li>Prepare emergency preparedness plan including identification of assembly area in case of fire</li> </ul>	
	<ul style="list-style-type: none"> <li>Noise/Odor/fly nuisance hazards to neighboring areas.</li> <li>Cutting of Trees</li> </ul>	Permanent		<ul style="list-style-type: none"> <li>Ensure minimum noise generation at pump station in STP;</li> <li>Minimize Tree cutting if involved.</li> <li>Tree plantation of at least two rows around the periphery of STP site and landscaping to prevent spread of bad odor with large canopy/ broad leaves trees like Sesum, Neem, Bargad, Teak, Sal, etc.</li> <li>Accumulated sludge and solid waste to be cleared within 24 hours and spraying of suitable herbicides on accumulated sludge/solid waste to reduce odor.</li> </ul>	DBO Operator
	<ul style="list-style-type: none"> <li>Noise and odor nuisance hazards to neighboring areas.</li> <li>Cutting of Trees</li> </ul>	Permanent		<ul style="list-style-type: none"> <li>Ensure minimum noise generation at pump station in SPS by use of less noise generating equipment meeting prescribed noise standards as applicable and enclosed generators.</li> <li>Minimize Tree cutting if involved.</li> <li>Tree plantation of at least two rows around the periphery of SPS site and lands capping to prevent</li> <li>Accumulated sludge and solid waste to be</li> <li>Cleared at short intervals and spraying of suitable herbicides on accumulated</li> </ul>	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
<p style="text-align: right;">sludge/solid waste to reduce odor</p> <ul style="list-style-type: none"> <li>• Provision for regular maintenance and</li> <li>• switching off equipment when not in use</li> </ul>					
<b>B. Construction phase</b>					
Sewage treatment plant and Sewage pumping station	Excavation	Loss of topsoil due to excavation activities.	Temporary	<ul style="list-style-type: none"> <li>• Excavation shall be planned in such a manner that such that no damage occurs to existing structures.</li> <li>• Top soil should be separately stockpiled and utilized for green belt develop mentor landscaping after completion of work</li> </ul>	DBO Operator
		Construction waste	Temporary	<ul style="list-style-type: none"> <li>• All the associated construction waste should be properly managed by storing and disposing off at suitable refusal sites approved by DBO engineer.</li> </ul>	DBO Operator
		Nuisance due to domestic solid waste disposal	Temporary	<ul style="list-style-type: none"> <li>• Provide two bins for recyclable and non-recyclable wastes.</li> <li>• Ensure that recyclable and non-recyclable wastes are collected in segregated manner in theses bins before disposal. Recyclable material should be sold. Non-recyclable material should be disposed to designated land fill area of the city.</li> <li>• Provide adequate sanitation facility for workers at construction sites.</li> </ul>	DBO Operator
		Dust Generation due to construction activities	Temporary	<ul style="list-style-type: none"> <li>• Excavated material transported by trucks will be covered and/or wetted to prevent dust nuisance.</li> <li>• Suppressing dust generation by spraying water on stockpiles and unpaved movement areas</li> <li>• Water sprinkling over excavated areas, unpaved movement areas and stockpiles.</li> <li>• Transportation of loose construction material through covered trucks.</li> </ul>	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
				<ul style="list-style-type: none"> <li>• Use dust curtains (poly-sheets/ sheets) around the construction area for containing dust spread.</li> <li>• Construction equipment must comply with pollution norms and carry Pollution under Control certificate.</li> </ul>	
	Temporary flooding due to uneven dumping of construction waste		Temporary	<ul style="list-style-type: none"> <li>• The construction waste material should be stored on the higher areas of the site and or areas where water may accumulate creating flooding like situation</li> </ul>	DBO Operator
	Temporary flooding due to uneven dumping of construction waste		Temporary	<ul style="list-style-type: none"> <li>• The construction waste material should be stored on the higher areas of the site and or areas where water may accumulate creating flooding like situation</li> </ul>	DBO Operator
	Spillage of fuel and oil		Temporary	<ul style="list-style-type: none"> <li>• Care to be taken to store fuel and oil (if required) at a place away from any drainage channel/nalla preferably to be stored in drums mounted on a concrete paved platform with slop draining to small spills collection pit.</li> </ul>	DBO Operator
	Noise and vibration disturbances to residents and businesses		Temporary	<ul style="list-style-type: none"> <li>• Construction activities to be carried out in daytime with prior intimation to local residents and shopkeepers.</li> <li>• Use of low noise and vibrating equipment (such as enclosed generators with mufflers, instruments with built in vibration dampening and improved exhaust), to meet standards as prescribed by CPCB<sup>17</sup>.</li> <li>• Provision of protective equipment (PPE) like earmuffs and plugs for construction workers.</li> <li>• Provision of noise barriers as feasible in inhabited</li> </ul>	DBO Operator

<sup>17</sup> <http://moef.gov.in/citizen/specinfo/noise.html>

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
General: safety during construction	Safety and Health Hazard	Safety hazards to labours and public	Temporary	<p>areas, particularly near sensitive zones like hospitals, schools etc.</p> <ul style="list-style-type: none"> <li>• DG set to be fitted acoustic enclosure.</li> <li>• Comply with the Occupational health and Safety act of India</li> <li>• Ensure that the contact details of the police or security company and ambulance services nearby to the site.</li> <li>• Ensure that the handling of equipment and materials is supervised and adequately instructed.</li> <li>• Follow safe practices for working at height or confined area or underground working for safety of workers</li> <li>• Erect warning signs/ tapes and temporary barriers and/or danger tape, marking flags, lights and flagmen around the exposed Construction works warn the public and traffic flow of the inherent dangers</li> <li>• Provide adequate PPE to workers such as helmets, safety shoes, gloves, dust masks, gumboots, etc. to Workers</li> <li>• Provide handrails on both sides of walkways close to deeper tanks and STPs need to be ensured;</li> <li>• Smaller on and off switches at STP units to be installed with protection from rain water to minimize electrical short circuit;</li> <li>• Monthly reporting of all accidents and immediate reporting to DBO engineer and owner.</li> </ul>	DBO Operator
Construction camps (if adopted)	Sanitation	Nuisance due to absence of facility of sanitation and solid waste management	Temporary	<ul style="list-style-type: none"> <li>• Labour camp if provided, must have adequate provision of shelter, water supply, sanitation and solid waste management</li> </ul>	DBO Operator
<b>C. Operation phase</b>					
Sewage treatment plant	Treatment and Disposal of	River, land or ground water pollution due to discharge of	Permanent	<ul style="list-style-type: none"> <li>• Monitor the treated sewage quality and ensure compliance with PCB standards for effluent</li> </ul>	DBO Operator

Activity	Treated Water and Sludge	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
Sewage pumping station	Treated Water and Sludge	untreated or partially treated sewage due to inadequate or inefficient STP operations.			disposal into surface water bodies, on land or for the agricultural use. <ul style="list-style-type: none"> <li>Follow standard operating procedures for operation and maintenance.</li> <li>Undertake periodic audit as per these Procedures.</li> <li>Comply with all applicable condition of consent to operate</li> <li>Quarterly monitoring of influent sewage, treated sewage, upstream and downstream point of treated sewage disposal point to river</li> </ul>	
		Problems arising due to bad odor, insects, polluted air,		Temporary	<ul style="list-style-type: none"> <li>Maintain the green belt as per provision of design to prevent spread of bad odor with large canopy/ broad leaves trees like Sesum, Neem, Bargad, Teak, Sal, etc.</li> <li>Accumulated sludge and solid waste to be Cleared within 24 hours and spraying of suitable herbicides on accumulated sludge/solid waste to reduce odor.</li> <li>Quarterly monitoring of Ambient Air Quality with respect to PM10, PM2.5, Sox and NOx, CO and Odor at three locations ( at STP site, minimum 500 m away from STP site in up-wind and down-wind direction of STP area.</li> </ul>	DBO Operator
		Increase in Ambient Noise Level and discomfort to neighboring people		Temporary	<ul style="list-style-type: none"> <li>Proper handling and regular maintenance of operating machines including pumps, generators, air diffusers, etc.</li> <li>Quarterly Monitoring of Ambient Noise level to check compliance to standards.</li> <li>Quarterly monitoring of ambient noise levels (day and night) at same locations as of ambient air monitoring</li> </ul>	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
	Indiscriminate disposal of sludge leading to contamination of land and soil.		Temporary	<ul style="list-style-type: none"> <li>• Prepares sludge disposal plan as per desire stage provisions and guidelines and adhere to the same.</li> <li>• Ensure proper functioning of STP for digestion of sludge and ensure adequate functioning of dewatering units for efficient functioning of system</li> </ul>	DBO Operator
	River, land or ground water pollution due to discharge of untreated or partially treated sewage due to inadequate or inefficient STP operations.		Temporary	<ul style="list-style-type: none"> <li>• Ensure compliance with PCB standards for effluent disposal into surface water bodies, on land or for the agricultural use.</li> <li>• Follow standard operating procedures for operation and maintenance.</li> <li>• Undertake periodic audit as per these procedures.</li> <li>• Comply with all applicable condition of consent to operate</li> </ul>	DBO Operator
Sewage Pumping Station	Waste Handling	Bad odor, Health hazard and public nuisance	Temporary	<ul style="list-style-type: none"> <li>• Provision for regular clearance of sludge and solid waste to minimize odor nuisance</li> <li>• Ensure maintenance of Green belt as planned</li> <li>• Periodic disposal of accumulated sludge/solid waste to designated land fill sites of the city.</li> </ul>	DBO Operator
General Safety	Workers exposure to hazardous materials/ situations	<ul style="list-style-type: none"> <li>• Serious/health/ safety hazards</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>• Ensure availability of PPE for maintenance workers.</li> <li>• Follow safety measures and Emergency preparedness plan evolved at design stage</li> </ul>	DBO Operator

Appendix -IIIB: Sample EMP for the Sewerage Network

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
<b>Sewerage and Sanitation Investments</b>					
<b>A. Design and Development Phase</b>					
Sewerage Network (Trunk Sewer Line)	Accidental leakages/ bursts	<ul style="list-style-type: none"> <li>• Due to accidental burst or leakage of sewers, flooding of the nearby areas</li> <li>• Backlogging due to unexpected heavy flowrates</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>• Designing sewers with adequate capacity and flow velocity</li> <li>• Provision for Regular inspection and maintenance of the sewers</li> </ul> Preparation of safety and Emergency Preparedness plan	DBO Operator
Sewage Pumping Station	Location of Sewage Pumping Station and Pumping of sewage from District C to STP	<ul style="list-style-type: none"> <li>• Noise and odor nuisance hazards to neighboring areas.</li> <li>• Cutting of Trees</li> </ul>	Permanent	<ul style="list-style-type: none"> <li>• Ensure minimum noise generation at pump station in SPS by use of less noise generating equipment meeting prescribed noise standards as applicable and enclosed generators.</li> <li>• Minimize Tree cutting if involved.</li> <li>• Tree plantation of at least two rows around the periphery of SPS site and landscaping to prevent spread of bad odor with large canopy/ broad leaves trees like Sesum, Neem, Bargad, Teak, Sal, etc.</li> <li>• Accumulated sludge and solid waste to be cleared at short Intervals and spraying of suitable herbicides on accumulated sludge/solid waste to reduce dour.</li> </ul> Provision for regular maintenance and switching off equipment when not in use;	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
<b>B. Construction phase</b>					
Sewerage (laying of sewers) and Sewage Pumping station	Excavation, cutting, back filling, compaction and construction operations	Damage to underground utilities like water, gas line, electricity and telephone conduits, etc. due to construction activities.	Temporary	<ul style="list-style-type: none"> <li>Identify existing underground other utility structures, lines through available records and in consultation with concerned authorities and plan construction activities accordingly to minimize damage to such utilities. These underground utilities encountered in excavating trenches carefully shall be supported, maintained and protected from damage or interruption of service until backfills complete and settlement has taken place.</li> </ul>	DBO Operator
		Accidents/ damages due to erosion/ sliding of vertical sides of excavated trenches while places the pipes	Temporary	<ul style="list-style-type: none"> <li>Maintaining the excavation by Shoring trench sides by placing sheeting, timber shores, trench jacks, bracing, piles, or other materials</li> <li>Exposed surface shall be resurfaced and stabilized. Exposed surface will be resurfaced and stabilized by making the sloping sides of trench to the angle of repose at which the soil will remain safely at rest.</li> </ul>	DBO Operator
		Generation of substantial debris, top soil and muck during construction	Temporary	<ul style="list-style-type: none"> <li>Top soil shall be preserved and maybe used for agricultural purpose or development of city parks.</li> <li>Soil and debris may be managed for planned land filling and landscaping;</li> <li>Debris may be suitably stored to filling back the excavated areas after placing the trunk sewer lines.</li> </ul>	DBO Operator
		Dust Generation ( Air Pollution) due to excavation, cutting, back filling and compaction operations	Temporary	<ul style="list-style-type: none"> <li>Water sprinkling over excavated areas, unpaved movement areas and stockpiles.</li> <li>Transportation of loose construction material through covered trucks.</li> </ul>	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
				<ul style="list-style-type: none"> <li>Use dust curtains (poly sheets/ sheets) around the construction area for containing dust spread at SPS building construction site.</li> <li>Construction equipment must comply with pollution norms and carry Pollution Under Control certificate.</li> </ul>	
	Noise and vibration disturbances to residents and businesses		Temporary	<ul style="list-style-type: none"> <li>Construction activities to be carried out in daytime with prior intimation to local residents and shopkeepers.</li> <li>Construction work near schools and colleges to be carried out during vacations and work near hospitals to be completed on priority basis (in shorter time period with alternate provision of traffic, accessibility of exit/entry gates etc.).</li> <li>Use of low noise and vibrating equipment meeting Prescribed noise standards.</li> <li>Provision of protective equipment (PPE) like earmuffs and plugs for construction workers.</li> <li>Provision of noise barriers in inhabited areas, particularly near sensitive zones like hospitals, schools etc.</li> <li>DG set to be fitted acoustic enclosure.</li> </ul>	DBO Operator
	Temporary flooding due to excavation during monsoons or blockage of surface drains		Temporary	<ul style="list-style-type: none"> <li>Stockpiled areas to be bordered by berms;</li> <li>Stockpiles to be done in high areas to avoid flow in storm water run-off channels and erosion;</li> </ul>	DBO Operator
	Increased traffic inconvenience (emissions, congestions, longer travel times, blockage of access)		Temporary	<ul style="list-style-type: none"> <li>Alternate traffic routing must be adopted in consultation with concerned traffic police authorities. Proper traffic planning is made for narrow lane areas.</li> <li>Work should be completed on priority near business and Market place to minimize business loss.</li> </ul>	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
				<ul style="list-style-type: none"> <li>Care should be taken to minimize congestion and negative impacts at schools and hospitals. Safe access shall be maintained to these places during construction.</li> <li>Provide temporary crossing/ bridges as may be required to facilitate normal life and business</li> </ul>	
	Settlement of backfilled area after construction		Temporary	<ul style="list-style-type: none"> <li>The backfilling material shall be free from petroleum products, slag, cinders, ash or other material.</li> <li>Backfilling activity shall be completed within five days of laying of sewer.</li> <li>Proper compaction as per the soil condition and retain the original level of alignment and grade.</li> </ul>	DBO Operator
	Spillage of fuel and oil		Temporary	<ul style="list-style-type: none"> <li>Care to be taken to store fuel and oil (if required) at a place away from any drainage channel/nalla preferably to be stored in drums mounted on a concrete paved platform with slop draining to small spills collection pit.</li> </ul>	DBO Operator
	Nuisance due to solid waste disposal		Temporary	<ul style="list-style-type: none"> <li>Provide two bins for recyclable and non-recyclable wastes.</li> <li>Ensure that recyclable and non-recyclable wastes are collected in segregated manner in these bins before disposal. Recyclable material should be sold. Non-recyclable material should be disposed for designated land fill area of the city.</li> <li>Provide adequate sanitation facility for workers at construction sites.</li> </ul>	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
<ul style="list-style-type: none"> <li>General: safety during construction</li> </ul>	Accidents	Safety hazards to labours and public	Temporary	<ul style="list-style-type: none"> <li>Comply with the Occupational health and Safety act of India</li> <li>Ensure that the contact details of the police or security company and ambulance services nearby to the site.</li> <li>Ensure that the handling of equipment and materials is supervised and adequately instructed.</li> <li>Erect warning signs/ tapes and temporary barriers and/or danger tape, marking flags, lights and flagmen around the exposed construction works warn the public and traffic flow of the inherent dangers.</li> <li>Provide adequate safety precautions such as helmets, safety shoes, gloves, dust masks, gumboots, etc. to workers</li> <li>Monthly reporting of all accidents and immediate reporting to DBO engineer and owner.</li> </ul>	DBO Operator
<b><i>C. Operation phase</i></b>					
Sewer line	Leakage/ overflows	Water pollution and possibility of mixing with water supply line	Temporary	<ul style="list-style-type: none"> <li>Regular monitoring of sewer line and manholes for visible leakages/overflows.</li> <li>Immediate repair shall be carried out to plug the leakages. Restore these were and other utility services if damaged due to leakages.</li> </ul>	DBO Operator
Sewage Pumping Station	Waste Handling	Bad odor, Health hazard and public nuisance	Temporary	<ul style="list-style-type: none"> <li>Provision for regular clearance of sludge and solid waste to minimize odor nuisance</li> <li>Ensure maintenance of Green belt as planned</li> <li>Periodic disposal of accumulated sludge/solid waste to disposal site as approved by DBO engineer.</li> </ul>	DBO Operator

Activity	Potential Impact/Concern	Negative	Duration of impact	Mitigation Measures	Responsible agency
Sewage Cleaning Equipment	Extracted Sewage Sludge handling and cleaning equipment maintenance waste handling	Bad odor, Health hazard and public nuisance and possible land contaminations	Temporary	<ul style="list-style-type: none"> <li>• Ensure that extracted sewage sludge collected during sewers cleaning are disposed to disposal site as approved by DBO engineer.</li> <li>• Sewage solids shall not be disposed on road sides or non-Designated areas.</li> <li>• Equipment cleaning waste shall be disposed to public sewer or STP inlet for treatment</li> <li>• Waste oil if any generated shall be separately collected. It shall be sold to authorized waste oil recyclers.</li> </ul>	DBO Operator
General Safety	Workers exposure to toxic gases in sewers and hazardous materials during sewer maintenance work	<ul style="list-style-type: none"> <li>• Serious/health/ safety hazards</li> <li>• The toxic gases are likely to contract communicable diseases from exposure to pathogens present in the sewage.</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>• During cleaning/ maintenance operation, the sewer line will be adequately vented to ensure that no toxic or hazardous gases are present in the line.</li> <li>• Ensure availability of PPE for maintenance workers.</li> <li>• Follow safety and Emergency Preparedness plan prepared at design stage</li> <li>• Monthly reporting of all accidents and immediate reporting to DBO engineer and owner.</li> </ul>	DBO Operator

**Appendix IV: State River Conservation Authorities<sup>18</sup>:****Bihar**

Name of the Authority:- Bihar State Ganga River Conservation Authority

Headquarter of the Authority :- Patna

**COMPOSITION OF THE AUTHORITY**

(a) Chief Minister, Bihar	ex-officio Chairperson
(b) Minister, Finance, Government of Bihar	ex officio Member
(c) Minister, Urban Development and Housing, Government of Bihar	ex officio Member
(d) Minister, Water Resources, Government of Bihar	ex officio Member
(e) Minister, Environment and Forests, Government of Bihar	ex officio Member
(f) Minister, Public Health Engineering, Government of Bihar	ex officio Member
(g) Chief Secretary, Government of Bihar	ex-officio Member Secretary

**STATE GANGA REJUVENATION, PROTECTION AND MANAGEMENT COMMITTEE, STATE OF BIHAR**

(a) Chief Secretary, Government of State of Bihar	ex-officio Chairperson
(b) Principal Secretary, Department of Finance, Government of State of Bihar	ex-officio Member
(c) Principal Secretary, Department of Urban Development and Housing, Government of State of Bihar	ex-officio Member
(d) Principal Secretary, Department of Environment and Forest, Government of State of Bihar	ex-officio Member
(e) Principal Secretary, Department	ex-officio Member
(f) Principal Secretary, Department of Public Health Engineering, Government of State of Bihar	ex-officio Member
(g) Chairman, Bihar State Pollution Control Board, Government of State of Bihar	ex-officio Member
(h) Managing Director, Bihar Urban Infrastructure Development Corporation Ltd.	ex-officio Member
(i) Principal Chief Conservator of Forest, Government of State of Bihar	ex-officio Member
(j) Project Director, State Mission for Clean Ganga, Bihar	ex-officio Member-Convener
<b>Nominated Members:</b>	
(k) Shri Uma Shankar Singh, Retired Engineer-in-Chief, Department of Water Resource, Government of State Bihar, Patna.	Member
(l) Prof. Santosh Kumar Chaudhary, Retired Professor, NIT, Patna	Member
(m) Dr. Sunil Kumar Chaudhary, Head of Botany Post Graduation Department, T.M. University, Bhagalpur, (Dolphin Specialist)	Member

1. <http://moef.nic.in/modules/recent-initiatives/NGRBA/ImplementingStructure.html>

2. Gazette of India notification no. 1053, April 2017

3. Gazette of India notification no. 1941, July 2017

(n) Dr. Sameer Kumar Sinha, Convener, W.T.I. Regional Head, Bihar and Eastern Uttar Pradesh (River System)	Member
(o) Shri S. N. Jaiswal, Scientist (Solid Waste Management), Bihar State Pollution Control Board.	Member

**Jharkhand**

Name of the Authority: - Jharkhand State Ganga River Conservation Authority

Headquarter of the Authority: - Ranchi

**COMPOSITION OF THE AUTHORITY**

(a) Chief Minister, Jharkhand	ex-officio Chairperson
(b) Minister, Environment and Forests, Government of Jharkhand	ex officio Member
(c) Minister, Finance, Government of Jharkhand	ex officio Member
(d) Minister, Urban Development, Government of Jharkhand	ex officio Member
(e) Minister, Water Resources and Irrigation, Government of Jharkhand	ex officio Member
(f) Chief Secretary Government of Jharkhand	ex-officio-Member Secretary

**STATE GANGA REJUVENATION, PROTECTION AND MANAGEMENT COMMITTEE, STATE OF JHARKHAND**

(a) Chief Secretary, Government of Jharkhand	ex-officio Chairperson
(b) Addl. Chief Secretary/Principal Secretary/Secretary, Department of Finance, Government of State of Jharkhand	ex officio Member
(c) Principal Secretary/Secretary, Urban Development & Housing Department, Government of State of Jharkhand	ex officio Member
(d) Addl. Chief Secretary/Principal Secretary/Secretary, Department of Environment & Forest, Government of State of Jharkhand	ex officio Member
(e) Principal Secretary/Secretary, Water Resource Department, Government of State of Jharkhand	ex officio Member
(f) Principal Secretary/Secretary, Drinking water & sanitation Department, Government of State of Jharkhand	ex officio Member
(g) Chairman, Jharkhand State Pollution Control Board, Government of State of Jharkhand	ex officio Member
(h) Chairman & Managing Director, JUIDCO Ltd	ex officio Member
(i) Principal Chief Conservator of Forest, Government of Jharkhand	ex officio Member
(j) Project Director, State Mission for Clean Ganga, Jharkhand	Member-Convener
<b>Nominated Members:</b>	
(k) Dr. Makarand M. Ghangrekar, Professor, Department of Civil Engineering, Indian Institute of Technology, Kharagpur – 721 302. India	Member
(l) Dr. Chintalacheruvu Madhusudana Rao, Assistant Professor, Department of Civil Engineering, National Institute of Technology Jamshedpur, Jamshedpur-831014, Jharkhand, India	Member
(m) Dr. Alok Sinha, Centre of Mining Environment, Department of Env. Science and Engg., Indian School of Mines, Dhanbad-	Member

826004, D-16, Teachers Colony, Indian School of Mines	
(n) Dr. Ram Prashad Sharma, Retired Deptt. of Science & Technology, Govt. of Jharkhand, Sector – 4, RH-2, Block-C, Row House, National Game, Housing Complex (NGHC), Hotwar, Ranchi – 835 217	Member

**Uttar Pradesh**

Name of the Authority: - Uttar Pradesh State Ganga River Conservation Authority

Headquarter of the Authority: - Lucknow

**COMPOSITION OF THE AUTHORITY**

(a) Chief Minister, Uttar Pradesh	ex-officio Chairperson
(b) Minister, Environment, Government of Uttar Pradesh	ex officio Member
(c) Minister, Forests, Government of Uttar Pradesh	ex officio Member
(d) Minister, Finance, Government of Uttar Pradesh	ex officio Member
(e) Minister, Urban Development, Government of Uttar Pradesh	ex officio Member
(f) Minister, Irrigation Government of Uttar Pradesh	ex officio Member
(g) Minister, public Works Department, Government of Uttar Pradesh	ex officio Member
(h) Minister, Housing, government of Uttar Pradesh	ex officio Member
(i) Mayor, Kanpur	ex officio Member
(j) Mayor, Varanasi	ex officio Member
(k) Mayor, Prayagraj	ex officio Member
(l) Chairman, State Advisory Board, Government of Uttar Pradesh	ex officio Member
(m) Chief Secretary, Government of Uttar Pradesh	ex-officio Member Secretary

**State Ganga Rejuvenation, Protection and Management Committee, State of Uttar Pradesh**

(a) Chief Secretary, Government of State of Uttar Pradesh	ex-officio Chairperson
(b) Principal Secretary/Secretary, Department of Finance, Government of State of Uttar Pradesh	ex-officio Member
(c) Principal Secretary, Department of Housing and Urban Planning, Government of State of Uttar Pradesh	ex-officio Member
(d) Principal Secretary/Secretary, Department of Environment, Government of State of Uttar Pradesh	ex-officio Member
(e) Principal Secretary/Secretary, Department of Forest, Government of State of Uttar Pradesh	ex-officio Member
(f) Principal Secretary, Department of Irrigation and Water Resources, Government of State of Uttar Pradesh	ex-officio Member
(g) Principal Secretary/Secretary, Department of Urban Development, Government of State of Uttar Pradesh	ex-officio Member
(h) Principal Chief Conservator of Forests, Government of State of Uttar Pradesh	ex-officio Member
(i) Chairman, Uttar Pradesh Pollution Control Board	ex-officio Member
(j) Managing Director, Uttar Pradesh Jal Nigam	ex-officio Member
(k) Project Director, State Mission for Clean Ganga, Uttar	Member-Convener

Pradesh	
<b>Nominated Members:</b>	
(l) Smt. Preeti Chaturvedi, Scientist F & H and Equatic Oxyology Division, I.T.R.C., Lucknow	ex-officio Member
(m) Prof. R.C. Vaishya, Environmental Engineering, MNIT, Prayagraj	ex-officio Member
(n) Shri B.D. Tripathi, Coordinator Centre for Environmental Science & Technology, BHU, Varanasi	ex-officio Member
(o) Dr. Suresh Kumar Rohilla, Saket-12-A, Flat No. 14-A, Vaishali Apartment, New Delhi	ex-officio Member
(p) Shri Neeraj Srivastava, (Ganga Activist) 7/81-Narayan Deep, Annexe, Tilak Nagar, Kanpur	Members

**West Bengal**

Name of the Authority: - West Bengal State Ganga river Conservation Authority

Headquarter of the Authority: - Kolkata

**COMPOSITION OF THE AUTHORITY**

(a) Chief Minister, West Bengal	ex-officio Chairperson
(b) Minister, Environment, Government of West Bengal	ex officio Member
(c) Minister, Finance, Government of West Bengal	ex officio Member
(d) Minister, Urban Development, Government of West Bengal	ex officio Member
(e) Minister, Irrigation, Government of West Bengal	ex officio Member
(f) Chief Secretary, Government of West Bengal	ex-officio Member Secretary

**STATE EXECUTIVE COMMITTEE**

(a) Chief Secretary, Government of West Bengal	ex-officio Chairperson
(b) Secretary, finance, Govt. of West Bengal	ex-officio Member
(c) Secretary, Urban Development, Govt. of West Bengal	ex-officio Member
(d) Secretary, Irrigation, Govt. of West Bengal	ex-officio Member
(e) Chairman, west Bengal Pollution Control Bengal	ex-officio Member
(f) Managing Director, Project Implementing Agency, Govt. of west Bengal	ex-officio Member
(g) Principal Chief Conservator of Forests, Govt. of West Bengal	ex-officio Member
(h) Engineer-in-Chief, Irrigation Department, Govt. of west Bengal	ex-officio Member
(i) Chief Executive Officer, Kolkata Metropolitan Development Authority	ex-officio Member
(j) Chief Engineer, KMDA (dealing with Ganga Action Plan)	ex-officio Member

(k) Chairman, Kolkata Port Trust	ex-officio Member
(l) Municipal Commissioner, Kolkata Municipal Corporation	ex-officio Member
(m) Three experts from relevant fields to be nominated by the Government of west Bengal	Members
(n) Secretary, Department of environment, Govt. of west Bengal	ex-officio Member Secretary

### INVESTMENT INITIATIVES IN THE MAIN GANGA BASIN STATES

#### STATE- BIHAR

NRCP States			
Till 31/03/10 :	GAP-II	NGRBA	TOTAL
Sanctioned Cost:	395.18	25396.28	25791.46
No of Schemes Sanctioned:	18	3	21
No of Schemes Completed:	14	0	14
Funds Released by GOI:	315.13	1537.00	1852.13
Expenditure (including State Govt. Share):	297.54	0.00	297.54 Lakhs

#### STATE- JHARKHAND

NRCP States				
Till 31/03/10 :	DAP	GAP-II	NRCP	Total
Sanctioned Cost:	41.44	20.67	375.62	437.73Lakhs
No of Schemes Sanctioned:	4	2	9	15
No of Schemes Completed:	4	2	0	6
Funds Released by GOI:	19.81	0	425.60	445.41Lakhs
Expenditure (including State Govt. Share):	36.99	24.57	97.65	159.21Lakhs

#### STATE- UTTAR PRADESH

NRCP States							
Till 31/03/10 :	YAP	YAP-II	GoAP	GoAP-II	GAP-II	NGRBA	Total
Sanctioned Cost:	28266.50	11507.94	5575.09	26304.22	19811.76	0.00	91465.29 Lakhs
No of Schemes	146	5	31	30	45	0	257

Sanctioned:	
No of Schemes Completed:	146      2      29      7      32      0      216
Funds Released by GOI:	24001.50 7752.00 4314.72 16743.46 13827.77 1272.00 67911.45Lakhs
Expenditure (including State Govt. Share):	27323.02 7882.84 5287.86 28912.43 16074.92 0.00 85481.07Lakhs

**STATE- UTTARAKHAND**

Till 31/03/10 :	GAP-II	NGRBA	TOTAL
Sanctioned Cost:	7062.15	6402.54	13464.69 Lakhs
No of Schemes Sanctioned:	44	10	54
No of Schemes Completed:	32	0	32
Funds Released by GOI:	3138.42	1793.62	4932.04 Lakhs
Expenditure (including State Govt. Share):	5065.57	0.00	5065.57 Lakhs

**STATE- WEST BENGAL**

NRCP States						
Till 31/03/10 :	DAP	MAP	GAP-II	CETP	NGRBA	Total
Sanctioned Cost:	398.41	5488.23	23560.84	8292.00	10579.97	48319.45Lakhs
No of Schemes Sanctioned:	10	3	202	4	13	232
No of Schemes Completed:	10	1	155	2	0	168
Funds Released by GOI:	10.74	500	19206.63	4224.00	5708.00	29649.37Lakhs
Expenditure (including State Govt. Share):	392.20	1803.36	16250.90	3952.00	0.00	24902.49Lakhs

**Appendix V: Comparative Analysis of Right to Fair Compensation and Transparency in LAR&R (RFCTLAR&R) Act 2013 and World Bank Policy 4.12- Involuntary Resettlement.**

Serial No.	Topics/Issues/Areas	World Bank OP4.12	RFCTLAR&R	Gaps and Addressal
1	Application of LA	Direct economic and social impacts that both result from Bank-assisted investment projects. Applies to all components of the project that result in involuntary resettlement, regardless of the source of financing.	<b>Section 2</b> Applicable to projects where government acquires land for its own use, hold and control, including PSU and for public purpose; for PPP where ownership of land continues to vest with Govt; private companies where 80% of <b>land owners</b> <sup>19</sup> have given consent or 70% in case of PPP.	No gap identified.
2	Principle of avoidance	Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project design	Alternatives to be considered as Act in chapter II, point # 4 (d) says "extent of land proposed for acquisition is the absolute bare minimum needed for the project; and (e ) says land acquisition at an alternate place has been considered and found not feasible.	No gap identified
3	Linkages with other projects		No such provision	Provision of OP 4.12 will prevail
4	Application of R&R	Same as above	In addition to the above, <b>Section 2(3)</b> land purchased by private company as prescribed by Govt. or when part acquired by Govt.	No R&R for non-titleholders in national law. Entitlement matrix in RPF has provision of R&R assistance for non-titleholders
5	Affected area	Involuntary take of land resulting in loss of shelter, loss of assets or access to assets, loss of income sources or means of livelihood	<b>Section3(b):</b> Area notified for 'acquisition'	Provision of OP 4.12 will be followed in this project.
6	Family	All adversely affected people whether have formal legal rights or do not have formal legal rights on land	<b>Section 3(m)</b> includes person, his and her spouse, minor children, minor brothers and sisters dependent. Widows, divorcees, abandoned women will be considered as separate family.	The entitlement matrix of RPF also considers non -titleholders as affected family

<sup>19</sup> Land Owner – whose land and immovable property acquired and land assigned by state or central govt. under any scheme (Section 3 c (i) and (v))

Serial No.	Topics/Issues/Areas	World Bank OP4.12	RFCTLAR&R	Gaps and Addressal
7	Affected family for eligibility		<p><b>Section 3 (a):</b> whose land and other immovable property acquired.</p> <p><b>(b) &amp; (e):</b> Family residing in affected area such as labourers, tenants, dependent on forest and water bodies, etc. whose primary source of livelihood is affected due to acquisition</p> <p><b>(c)</b> Scheduled tribes and other forest dwellers whose rights recognized under the Forest Dwellers Act 2006 <i>(not Applicable in this project).</i></p> <p><b>(f)</b> Family assigned land by state or central government under any schemes</p> <p><b>(g)</b> Family residing on any land in urban area that will be acquired or primary source of livelihood affected by acquisition.</p>	<p>This provision leaves scope for interpretation and some of the issues remain unanswered especially in context of urban areas when people use public land for shelter and livelihood and is not acquired but transferred from one agency to another. Will they be recognized as “affected family”?</p> <p>The entitlement matrix of RPF also considers non -titleholders as affected family</p>
8	Cut-Off date	Date established by the borrower and acceptable to the Bank. In practice it is the date of census.	<b>Section 3 c (ii), (iv) (vi):</b> Families residing for preceding 3 years or more prior to “acquisition of land”.	For titleholders, provision of RFCTLAR&R Act of 2013 will prevail. For non-titleholders, end date of census survey will be cut off date.
9	Non-application of Chapter II	Stand-alone SIA for all investments	<b>Section 6(2):</b> Irrigation projects where EIA is required under other laws, provisions of SIA not applicable.	No gaps found.
10	Consultation – Phase I during preparation	Consultation a continuous process during planning and implementation	<p><b>Section 4(1)</b> date issued for <i>first consultation</i> with PRIs, Urban local bodies, Municipalities, etc. to carry out SIA.</p> <p><b>Section 5:</b> Public hearing of SIA in affected area. Provide adequate publicity of date and time.</p>	No gaps found.
11	Time duration to prepare SIA and SIMP	Draft Social Assessment, Resettlement Action Plan and or Social Management Framework prepared before appraisal.	<b>Section 4 (2): within six months</b> from the date of its commencement.	No gaps found
12	Disclosure – Stage I	To be disclosed before appraisal and 120 days before board date.	<b>Section 6(1):</b> Translated in local language available in PRI institutions and local urban government bodies; district administrative offices and websites of concerned. Government agency.	No gaps found

Serial No.	Topics/Issues/Areas	World Bank OP4.12	RFCTLR&R	Gaps and Addressal
13	Formation of Expert Group to appraise SIA and SIMP	Appraised by Bank staff	<b>Section 7(1):</b> Constitute a multi-disciplinary Expert Group include members of decentralized Govt. Institutes (PRIs, ULBs).	No gaps found.
14	Time stipulated for Group to submit its report	Before the decision meeting for appraisal	<b>Section 7(4):</b> Submit its report <b>within two months from the date of its constitution</b>	No gaps found.
15	Scope of work of the Expert group	Social Assessment, resettlement action Plan reviewed and appraised by Bank staff and approved by Regional safeguard advisor	<b>Section 7 (4)(a &amp; b):</b> assess whether it serves any public purpose or not; if social costs outweigh potential benefits then should be abandoned; <b>Section 7 (5) (a &amp; b):</b> if serves public purpose, then it has considered minimum land acquisition, and alternate options to minimize displacement; potential benefits outweigh social costs	-
16	Consultation – Phase II during appraisal	In practice consultation workshops are organized in project affected areas at district and state level.	<b>Section 2 (2):</b> Prior consent of 80% and 70% of land owners in PPP and where private company has approached the govt. to acquire balance land has been obtained,	-
17	Disclosure – Stage II	Information dissemination through the planning and implementation	Section 7 (6): recommendations of expert group under 7(4&5)to be made public in local language in district and block administrative office and PRIs	-
18	Minimize impact on multi- cropland	Select feasible design that has minimal adverse impact.	<b>Section 10:</b> In case multi-crop land is to be acquired under exceptional circumstances, the area to be acquired cannot exceed aggregate of land of all projects in district or state. The area to be acquired cannot exceed the total net sown area of the district or state. Wasteland equivalent to twice the area acquired will be developed.	-
19	Information dissemination of preliminary notice	Continuous part of the preparation and participation	<b>Section 11 (1), (2) &amp; (3):</b> Notice published in local language and meetings called of gram sabahs, municipalities to provide full information about the purpose of the project, summary of SIA and particulars of administrator appointed for R&R’ summary of R&R scheme	-
20	Updating land records	To be part of RAP	<b>Section 11 (5):</b> Once established that the land is required for public purpose, accordingly notice to be issued <b>under section 19 following which land records to be updated within two months</b>	-
21	Census and	To be part of RAP	<b>Section 16 (1) (2):</b> carry out census of affected people and	-

Serial No.	Topics/Issues/Areas	World Bank OP4.12	RFCTLAR&R	Gaps and Addressal
	preparation of R&R schemes		their assets to be affected, livelihood loss and common property to be affected; R&R scheme including time line for implementation.	
22	Information dissemination and Public hearing - Stage III	Consultation throughout the process is mandatory	<b>Section 16(4)&amp;(5):</b> mandatory to disseminate information on R&R scheme including resettlement area and organize public hearing on the Draft R&R scheme in each Gram Sabha, Municipality and consultations in Scheduled area as required under PESA.	-
23	Approval of R&R Scheme		<b>Section 17 &amp; 18:</b> Draft R&R Scheme to be finalized after addressing objections raised during public hearing and approved.	-
24	Final declaration of R&R Scheme	Approved RAP including budgetary provisions to implement it	<b>Section 19 (2):</b> Only after the requiring body has deposited the money will the govt. issue the notice along with <b>19(1)</b> .	-
25	Time period stipulated.	Included in RAP - Time line synchronized with Government's procedures or adopts innovative methods to reduce the time which is based operated on the principles of participation and transparency.	<b>Section 19 (2):</b> the entire process to update land records, disseminate information, preliminary survey, census, hearing of objections, preparation of R&R schemes and approval, deposit of money must <b>complete within 12 months</b> from the date on which section 11, the preliminary notice issued. <b>Section 19 (7):</b> If the final declaration not made within 12 months of section 11 (1), the process will lapse, except under special circumstances.	-
26	Preparation of land acquisition plans	Included in RAP.	<b>Section 20:</b> Land marked, measured for preparation of acquisition plans.	-
27	Hearing of claims		<b>Section 21(1) (2):</b> Notices issued indicating Governments intension to take possession of land, and claims on compensation and R&R can be <b>made not less than one month and not more than six month</b> from the date of issue of section 21(1).	-
28	Time period stipulated for declaring the award		<b>Section 25:</b> It is required to announce the award <b>within 12months of issue of Section 19 (final declaration to acquire land, approved R&amp;R scheme)</b> after completing land acquisition plans, hearing of objection, settling individual claims for declaration of the award. If award not made within the stipulated time, the entire proceedings will lapse.	No gaps found.
29	LA Act 1984		<b>Section 24:</b> where award is not declared under section 11, or	-

Serial No.	Topics/Issues/Areas	World Bank OP4.12	RFCTLAR&R	Gaps and Addressal
	deem to lapse and RFCTLAR&R is applicable		where made five years ago but land not taken in possession or where award declared but money not deposited in the account of majority of beneficiary.	
30	Methodology for determining market value for land	Full replacement Cost	<b>Section 26 and First Schedule:</b> Recognizes 3 methods and whichever is higher will be considered which will be multiplied by a factor given in Schedule First; compensation given earlier will not be considered; if rates not available floor price can be set; steps to be taken to update the market value.	-
31	Valuation of structures	Full Replacement cost	<b>Section 29 (1)</b> without deducting the depreciated value.	-
32	Solatum and interest		<b>Section 30(1)</b> 100% of the compensation amount <b>Section 30(3):</b> 12% per annum on the market rate from the date of notification of SIA to the date of ward or land taken over	-
33	R&R Award	Total cost included in RAP to resettle and rehabilitate the affected persons and assist in their efforts to improve their livelihoods and standards of living or at least to restore	<b>Section 31, Second Schedule:</b> A family as a unit will receive R&R grant over and above the compensation and those who are not entitled to compensation. <b>Second Schedule:</b> Homeless entitled to constructed house, land for land in irrigation projects in lieu of compensation, in case of acquisition for urbanization	-
34		them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher	20% of developed land reserved for owners at a prices equal to compensation' jobs or one-time payment or annuity for 20 years' subsistence grant, transportation, land and house registered on joint name husband and wife, etc.	
35	Transparency		<b>Section 37(1):</b> Information of each individual family including loss, compensation awarded, etc. will be available on the website.	-
36	Possession of land	Taking of land and related assets may take place only after compensation has been paid and, where applicable, resettlement sites and moving allowances have been provided to the displaced	<b>Section 38(1):</b> Land will be taken over by the government within three months of compensation and 6 months of R&R benefits disbursed; infrastructure facilities at resettlement sites will be completed within 18 months from the date of award made under section 30 for compensation; in case of irrigation and hydel projects R&R completed six months	-

Serial No.	Topics/Issues/Areas	World Bank OP4.12	RFCTLAR&R	Gaps and Addressal
		persons.	prior to submergence.	
37	Multiple displacement		<b>Section 39:</b> Additional compensation equivalent to compensation determined will be paid to displaced	This section does not cover those who may not be physically displaced but lose land over a period of time for multiple projects, expansion works or periodic widening of roads, etc. and may be left with marginal holding or landless.
38	Acquisition for emergency purpose	Not permeable in bank funded projects	<b>Section 40 (5):</b> 75% additional compensation will be paid over and above the compensation amount	-
39	Prior consent before acquisition and alienation	Mandatory to carry out Free, Prior, Informed Consultation with Indigenous people.	<b>Section 41(3)</b> Mandatory to get consent from Gram sabah, Panchayat, Autonomous Councils in Scheduled areas.	-
40	Development plans for SC and ST	Indigenous Peoples' Development plan required along with RAP. Land for land for is an option across all sectors.	<b>Section 41:</b> Separate development plans to be prepared, settle land rights before acquisition; provision of for alternate fuel fodder, non-timber produce on forest land to be developed within 5 years; 1/3 <sup>rd</sup> compensation amount to be paid as first installment and rest at the time of taking possession; ST to be resettled within Scheduled area; land free of cost for community purpose; land alienation will be null and void and ST and SC considered for R&R benefits; fishing rights restored in irrigation and hydel projects; if wish to settle outside the district additional benefits to be provided in monetary terms; all rights enjoyed under other laws will continue. <b>Second Schedule:</b> additional provisions for SC&ST for land for land in irrigation projects, additional sum over and above the subsistence grant,	-
41	Institutional arrangement	Institutional arrangement must be agreed upon and included in RAP, IPDP.	<b>Section 43-45:</b> Appointment of administrator, R&R Commissioner, when more than 100 acres of land is to be acquired, R&R Committee will be formed at project level, social audit to be carried out by Gram Sabha and Municipalities.	-
42	Change of land use		<b>Section 46(4):</b> Land will not be transferred to the requisitioning authority till R&R is not complied with in full.	-
43	Monitoring and Evaluation	Indicators and monitoring system included in RAP and IPDP	<b>Section 48-50:</b> Set up National and State level Monitoring Committee to review and monitor progress	-

Serial No.	Topics/Issues/Areas	World Bank OP4.12	RFCTLAR&R	Gaps and Addressal
44	Authority to settle claims		<b>Section 51-74:</b> the Authority will be set up settle any legal disputes that arise from acquisition and R&R, the aggrieved party can move to the high court thereafter.	-
45	Exempt from tax and fee		<b>Section 96:</b> Compensation and agreements will not be liable to tax	-
46	No change in status of land acquired		<b>Section 99:</b> Once the land is acquired for a particular purpose, its purpose cannot be changed	-
47	Return of unutilized land		<b>Section 101:</b> If the acquired land remains unutilized for 5 years, then it will be returned to original owner, heir or included in land bank	-
48	Distribution of increased value of land transferred		<b>Section102:</b> 40% of appreciated value of acquired land will be distributed to owners provided no development has taken place.	-

## Appendix VI: Sample Terms of Reference for Environmental and Social Audit of Namami Gange Program Investments

### 1. Background:

The National Ganga River Basin Authority with an objective to ensure no entry of polluted water into the River Ganga is supporting number of pollution prevention and river conservation activities in the five basin states of UP, Bihar, Jharkhand, West Bengal and Uttaranchal.

Namami Gange program believes that each of its investments will improve living standards and the environment of the River in and around project locations. Namami Gange program is committed to implementing these activities in an environmentally sound, socially acceptable way. This has reflected its environmental and social commitments through its Environmental and Social Management Framework (ESMF). All investments financed by Namami Gange program should be in consonance with its ESMF.

### 2. Objectives:

- ▶ To audit the conformity of environmental and social categorization of investments approved by the Namami Gange during the Financial Year\_, with respect to the categorization prescribed in the ESMF of Namami Gange program
- ▶ To audit the compliance of the environmental and social aspects of approved investments, which are under implementation.

### 3. Outline of the tasks to be carried out: The, following tasks are to be carried out:

#### (a) To Audit the Environmental and Social Categorization of Approved Investments:

The audit process will check the conformity of environmental and social categorization of investments approved by the Namami Gange with respect to environmental and social categorization in the ESMF of Namami Gange program (i.e.) whether the Environmental and Social categorization specified for the approved investments are in conformity with environmental and social categorization specified in the ESMF.

#### (b) Auditing the compliance of the Approved Investments:

The audit process will check the compliance of environmental and social aspects during construction, operation and maintenance of investments approved by Namami Gange program, across all categories and different sub-project locations. Adequacy of the ESMP (including RAP, where relevant)

Audit the adequacy of the ESMP (including RAP, where relevant) and recommend practicable measures to include/improve the management measures and the agency responsible for carrying out the measures, wherever found inadequate. The best practices and possible environmental and social enhancement measures with respect to the audited investments will be documented.

#### (c) Reporting:

To review the status report submitted by the project Management consultant on the implementation of ESMP (including RAP, where relevant) and the process adopted by design consultants in identification and mitigation measures while preparing the DPRs. To report on the adequacy and timely submission of the Quarterly Progress Reports including the process involved in addressing the risk management.

(d) Audit Report

The findings of the review and audit should be summarized in a tabular form and will include compliance, non-compliance, best practices and enhancement measures along with the name of the agency responsible for each of the above. In case of non-compliances, the consultants need to undertake a follow up visit after giving enough time (depending on the type of corrective measures) for the agency responsible to take corrective actions.

4. Final outputs (i.e., Reports, drawings etc.). That will be required of the Consultant;

- ▶ Environmental and Social Audit Reports indicating conformity of investments approved by Namami Gange, relating to the financial year, with ESMF Framework.
- ▶ Environmental and Social Audit report indicating the conformity to agreed standards during construction, operation and maintenance of the approved investments.

## Appendix VII: Roles and Responsibilities of Social Development Specialists

LEVELS	ROLES and RESPONSIBILITIES
NMCG Social Development Officer	<ul style="list-style-type: none"> <li>● Finalize ESMF;</li> <li>● Provide policy guidance to the state level counterparts</li> <li>● Ensure dissemination of R&amp;R Policy at national level</li> <li>● Monitoring R&amp;R and Land acquisition activities. Make budgetary provisions for R&amp;R activities</li> <li>● Liaison with state administration for land acquisition and implementation of RAP;</li> <li>● Participate in state level meetings</li> <li>● Finalize TOR of contracting NGO for implementation and external agency for monitoring and evaluation</li> <li>● Prepare training schedule for state and project level social development officials for capacity building to implement the RAP;</li> <li>● Prepare TOR for any studies required and qualitative dimensions to the implementation of RAP;</li> <li>● Facilitate appointment of consultants to carry out the studies and co-ordinate them.</li> <li>● Monitor physical and financial progress on implementation of RAP;</li> </ul>
SMCG/ – Social Development Officer	<ul style="list-style-type: none"> <li>● Co-ordinate with district administration and NGO responsible for implementation of ESMF/RAP;</li> <li>● Translation of R&amp;R policy in local language and ensure dissemination at state; district and community level - prepare pamphlets on policy for information dissemination</li> <li>● Coordinate with the state and district level officials for acquisition of private land and implementation of ESMF/ RAP; Liaison with district administration for dovetailing of government schemes for Income Restoration Schemes</li> <li>● Monitor physical and financial progress of implementation of RAP,</li> <li>● Participate in the project level meetings</li> <li>● Report progress, highlighting social issues not addressed, to provide for mid-course correction,</li> <li>● Coordinate training of project level staff with agencies involved.</li> <li>● Organize by-monthly meetings with NGO to review the progress of R&amp;R and gender actions</li> </ul>
Project Level – Executing Agency (EA)	<ul style="list-style-type: none"> <li>● Disclosure of RAP and entitlements and also ensure that copies are made available to the PAPs;</li> <li>● Oversee land availability and coordinate with local revenue official for land acquisition</li> <li>● Dissemination of Project Information at various stages of project as envisaged in the ESMF/RAP</li> <li>● Ensure community involvement in every stage of the subproject</li> <li>● Documentation and disclosure of consultations</li> <li>● Shall be first level of grievance redress and will guide PAPs further to redress their grievances</li> <li>● Ensure disbarment of compensation and / or entitlements as per schedule</li> <li>● Responsible for addressal of additional unforeseen impacts during construction</li> <li>● Ensuring incorporation of social issues in DPRs</li> <li>● Supervising the ESMF tasks during implementation &amp; its progress</li> <li>● Collect data pertaining to the evaluation and monitoring indicators</li> <li>● Will prepare monthly progress report and quarterly process documentation report</li> </ul>

LEVELS	ROLES and RESPONSIBILITIES
Social Specialist of Supervision Consultants	<ul style="list-style-type: none"> <li>• Ensure social screening of investments;</li> <li>• Implement the agreed social mitigation measures;</li> <li>• Ensure compliance of national and other applicable laws and Acts pertaining to social,</li> <li>• Sensitize and help build capacity of the EA officials towards the implementation of the ESMF provisions.</li> <li>• Assist Environment and Social Development Officer of EA in preparing monthly progress and quarterly process documentation reports</li> </ul>
NGO	<ul style="list-style-type: none"> <li>• Conduct the verification for the affected families and update the census and socio-economic data</li> <li>• Develop rapport with PAFs and between PAFs and EA</li> <li>• Design and carry out information campaign and consultations with the local community during the implementation of the RAP,</li> <li>• Provide information to PAFs and local community and conduct awareness on R&amp;R Policy and distribute the policy to the affected families</li> <li>• Prepare and submit the micro plans for the PAFs</li> <li>• Assist the PAFs in receiving the compensation and rehabilitation assistance</li> <li>• Motivate and guide PAP for productive utilization of the compensation and assistance amount</li> <li>• Assess the level of skills and efficiency in pursuing economic activities, identify needs for training and organize training program</li> <li>• Assist PAFs in approaching the grievance redress mechanism</li> <li>• Assist the PAFs in getting benefits from the appropriate local development schemes</li> <li>• Prepare monthly progress reports and participate in monthly review meetings</li> <li>• Participate in the training program for capacity building</li> <li>• Carry out other responsibilities as required from time to time</li> </ul>

## Appendix VIII- State-wise Grievance Mechanism

### Grievance Redress Mechanism in Uttarakhand

#### GRIEVANCE REDRESS MECHANISM

As the works of I&D and STP at Muni-ki-Reti, Dhalwala and Lakhargaht at Rishikesh is being started in the Rishikesh town, most of the impacts are construction-related, and therefore it is anticipated that improper or inadequate implementation of ESMP may lead to disturbance and inconvenience to local people. In order to provide a direct channel to the affected persons for approaching project authorities and have their grievance recorded and redressed in an appropriate time frame, PIU-Rishikesh has established a Grievance Redress Mechanism, which has been functioning throughout the construction period. A Complaint receiving system has been put in place at each site with the help of Community Awareness & Public Participation. A Complaint Register has been made available at the PIU Office, with a display board indicating availability of such facility. This will accept complaints regarding the environment safeguard issues in implementation of the subproject. The grievances received and actions taken shall be included into the environmental monitoring reports submitted to NMCG and the World Bank. The following stages have been followed in grievance redress:

Stage 1: Complaints received (written or oral communication) is being registered in Complaint Register assigning complaint number with date of receipt

- I. The PIU Officer will review the complaint and direct the Contractor for necessary action; depending on the type/nature of complaint the Contractor will be given reasonable time for corrective action.
- II. Contractor must take corrective actions or as directed by PIU.
- III. The action taken has been documented in the Complaint Register, and the complaint will be closed if it is satisfactorily addressed, and the complainant will be informed through e-mail/telephonically.

Stage 2: In case of no satisfactory action in Stage-1, the complainant can approach General Manager, Ganga / SPMG for necessary action;

- I. General Manager, Ganga / SPMG with the assistance of PIU will initiate the action and take the corrective measures as required.
- II. Upon satisfaction of complainant, the case will be closed and marked as resolved.

Stage 4: If it is not resolved at GRC, the complainant can approach Court of Law. However, as none of the impacts are complex, long-term or significant, it is unlikely that there have been any unresolved issues after the two stages.

#### GRC at Rishikesh

12. A Grievance Redress Cell (GRC) has been constituted in the PIU Rishikesh to record and redress public grievances with effect from 10<sup>th</sup> December 2018 vide office order 4294/Karya-12/47 dated 10.12.2018. The office orders have been appended

A dedicated team under the supervision of the Project Manager has been appointed for recording and forwarding the grievances to the concerned officers. The progress of the grievances so recorded addressed as well as the one pending is being compiled on monthly basis and submitted to NMCG.

Concerned PIU has been applied for toll free number for registering grievances.

Grievance Redressal Cell is applicable for addressing the Environmental and Social Safeguards Issues at the ongoing construction sites under world bank funded projects.

कार्यालय महाप्रबन्धक  
निर्माण सप्टल (गंगा)  
उत्तराखण्ड पेयजल निगम  
जगजीतपुर, पोस्ट-कन्खल  
हरिद्वार-249408



Office of General Manager  
Construction Circle (Ganga)  
Uttarakhand Peyjal Nigam  
Jagjeetpur, Post-Kankhal  
Haridwar-249408

Email-gmgangabw@gmail.com

Letter No. 4294/Karya-12 / 47 date 10-12-2018

Through - Email/Post

### Office Order

#### Establishment of Grievance Redressal Cell (GRC) in Ganga Unit (Project Implementation Unit) Rishikesh.

The works under Namami Gange program in Rishikesh and Muni Ki Reti town are in execution phase. Public concerns and grievances from the community needs and urgent attention by the Concerned Officer.

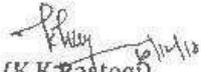
The program is attempting to record the public grievances from the community in multiple ways, so that its quick redressal is undertaken in a time bound manner. Keeping the above in mind, the Grievance Redressal System (GRC) is being strengthening in the following way:

1. Project Engineer concern will record the complaints through direct interaction with the public on the sites and submit the grievances to the concerned officer.
2. Contact Nos. of concerned staff of the Unit, Rishikesh will be provided to the general public for early follow up the grievances.

In this regard a Grievance Redressal cell (GRC) is being constituted in the C&M Unit (Ganga), UKPJN, Rishikesh comprising of the following staff/public officer:

1. PM, Rishikesh henceforth will be in charge of the GRC.
2. Concern Project Engineer from Unit, Rishikesh will be assigned duty for compiling of the grievances to put up to the concerned authority.
3. Environment Officer and SCD Officer SPMG, Dehradun will oversee the grievances under overall supervision of PM, Rishikesh.

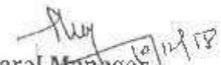
The GRC with immediate effect on 15.11.2018, will put up the complied progress of all concerns, complaints and grievances recorded, attended, closed along with pending cases on weekly basis to the, GM, Ganga, UKPJN, Haridwar.

  
(K.K. Rastogi)  
General Manager

#### Endt. No. and date as per above:-

Copy to the following for information and necessary action.

1. PM, C&M Unit (Ganga), Uttarakhand Peyjal Nigam, Rishikesh.
2. All PE's, C&M Unit (Ganga), Uttarakhand Peyjal Nigam, Rishikesh.
3. Environment Officer & SCD Officer, SPMG, Dehradun.
4. M/s R.K. Engineers Sales Ltd., Vibhuti Khand, Gomati Nagar, Lucknow.
5. M/s GDCL-EMIT JV, B-228, Okhla Industrial Area, Phase-I, New Delhi.

  
General Manager

## Grievance Redress Mechanism in Uttar Pradesh

### INTEGRATED GRIEVANCE REDRESSAL SYSTEM- UTTAR PRADESH- STATUS OF SMCG UTTAR PRADESH

SMCG is working as per provisions specified in the NGRBA framework and Government of Uttar Pradesh guidelines. GOUP has developed comprehensive system of grievance redressal and have ensured all departments to have a dedicated Grievance Redressal Officer. All Head of Offices under GoUP have to register their office at **Samadhan / JanSunvai** portal.

**Samadhan / JanSunvai** is an integrated system for grievance redressal in Uttar Pradesh to achieve the goal of good governance using technological solution and mechanized processes to avoid human errors integrating all stakeholders. A citizen can freely and conveniently file a grievance, track the grievance lodged on all important platform and receive response to his satisfaction both in terms of quality and time. Along with lodging of complaints, citizen can also interact with Government/Departments/Offices in an easy and transparent manner. Complaints from all sources will be available on a single platform to all departments which will improve access, redressal & monitoring.

SMCG and all Executing Agency along with their district offices are registered on this platform. Any person, organization can lodge complain, give suggestion to any office, program or project. Once the complaint is registered, it is properly analysed by Grievance Redressal Officer and the appropriate response is prepared for the complaint with the help of concerned officer. If the complaint or advice is related to another department, it is sent or transferred through the Samadhan portal to the concerned officer / department to sort out the problem.

**Samadhan / JanSunvai** is time bound solution providing portal.

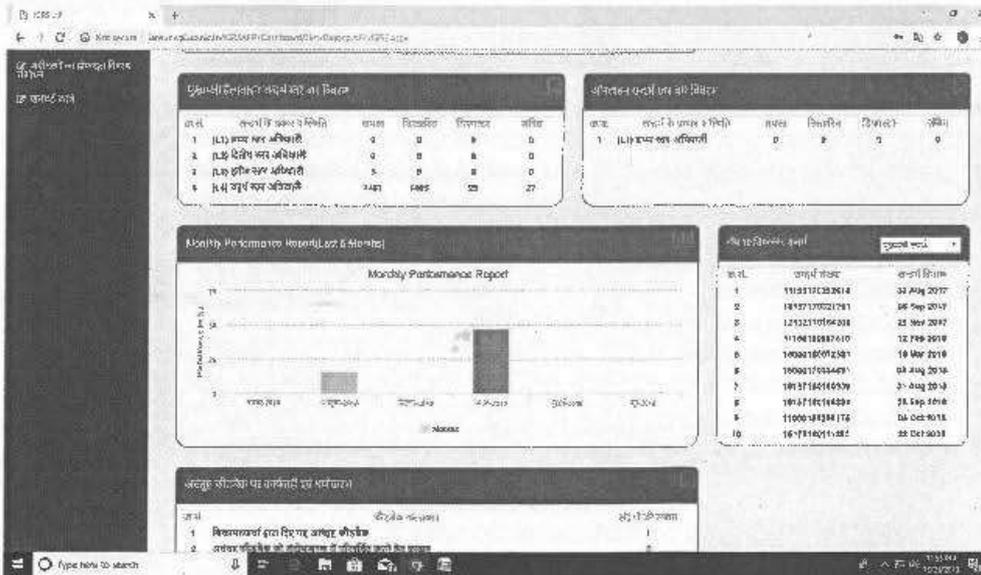


## INTEGRATED GRIEVANCE REDRESSAL SYSTEM- UTTAR PRADESH- STATUS OF SMCG UTTAR PRADESH

The screenshot shows the top navigation bar of the Samadhan website with the following options: Register Grievance, Track Grievance, Send Reminder, and Give Feedback. Below this is the 'Jansunwai - Basic Concept' section. It includes a paragraph explaining that Samadhan is an integrated system for grievance redressal in Uttar Pradesh, aiming for good governance through technology. Below the text are four icons representing: Register Grievance (Easy communication through various departments/offices), Track Grievance (Track the grievance through Registered User's Email/ID and Officers' action/Report), Send Reminders (Forwarding of Reminders to the user/grievances clearing SLA, 2000-2022), and Your Feedback (Facility to send feedback/suggestions regarding redressal of grievances).

This screenshot displays the 'Jansunwai- Android App for Citizen & Officers' page. It features a background image of a group of people and a central image of a smartphone showing the app's interface. The text on the page includes: 'Jansunwai- Android app has been developed to a better and world of public governance', 'A citizen can freely and conveniently file and track grievance through the mobile app', and 'Departmental officers can also manage/track and get responses to their filed work on them through this app'. At the bottom, there are two buttons: 'For Public' and 'For Departmental Officers'.

**INTEGRATED GREIVANCE REDRESSAL SYSTEM- UTTAR PRADESH-  
STATUS OF SMCG UTTAR PRADESH**



**Grievance Redress Mechanism in Bihar**

**Grievance Redress Mechanism for NMCG Projects under  
Implementation in BUIDCo**

National Mission for Clean Ganga (NMCG) under the Ministry of Water Resources, River Development & Ganga Rejuvenation has set an objective to ensure effective abatement of pollution and conservation of the river Ganga by adopting a river basin approach for comprehensive planning and management.

Under the flagship Program of Namami Gange, several sewerage projects have taken up along the banks of river Ganga in Bihar. Under these projects, grievance redressal mechanism is proposed to establish. In 14<sup>th</sup> Implementation Mission meeting at NMCG Office Delhi, a detail discussion was held and a common approach to solve the grievances was finalized which is detailed below:-

1. On receipt of complains and suggestions from different stake holders & citizens, a plan of action is devised accordingly. (SPMG)
2. Time bound reply to the petitioners after doing a root cause analysis (RCA) of the incoming complaint as per rules & regulations of the Government.(SPMG)
3. Co-ordination with Executing Agencies (like BUIDCo, NBCC), SPMG and the Government Department -UD&HD for effective redressal of the complains. (SPMG)
4. Maintenance of records and procedures through proper filing as per rules will be done by the Grievance Redressal Officer of SPMG.(SPMG)
5. BUIDCo has already taken a toll free number which will be activated shortly and the same will be displayed on BUIDCo website and each project site. In BUIDCO GRM will work in three tier(EA)
6. First tier- Control room will collect and segregate the data project wise and forward to concerned Project Director in a week time.(EA)
7. Second tier- At each project site, a Grievance Redressal Committee will work consisting of PD BUIDCo, DPD BUIDCo, Safeguard officer, BUIDCo, Project Manager (contractor),Health & Safety Officer(contractor). Along with toll free number, detail of Grievance Redressal Committee will be displayed on the site. This committee will resolve the issues in 15days.If fail to resolve, the issue will be forwarded to BUIDCo level(EA).
8. Third tier- At this stage a committee consisting of MD BUIDCo, SPMG team leader, Chief Engineer BUIDCo, PD HQ and Safeguard Specialist BUIDCo will resolve the issues in a month time as this committee will sit once in a month.(EA)

**Grievance Redress Mechanism in Jharkhand**

**Grievance Redressal Mechanism**

SPMG Jharkhand dedicated cell within the UD Department, with the objective of serving as the dedicated institution for effective implementation of the NGRBA program activities at the state level. To Address the grievances NGRBA frame works Governance and Accountability Action Plan (GAAP) an official Notification No 54 dated 07/07/2015 published . A three layer Grievance mechanism is working currently.

**A. At SPMG Level**

- |      |  |                  |
|------|--|------------------|
| I.   | Project Director                             | Chairman         |
| II.  | Project Manager (unit head) SPMG             | Member           |
| III. | Communication-cum-Social Development Manager | Member Secretary |

**B. At Juideo (Executing Agency) Level**

- |      |                              |                  |
|------|------------------------------|------------------|
| I.   | Project Director (Technical) | Chairman         |
| II.  | General Manager              | Member           |
| III. | Assistant Project manager    | Member Secretary |

**C. At ULB Level**

- |      |                                     |                  |
|------|-------------------------------------|------------------|
| I.   | Executive officer                   | Chairman         |
| II.  | Assistant Engineer /Junior Engineer | Member           |
| III. | Head Clerk                          | Member Secretary |

Contractor also maintained grievance register at site level .

Any grievance can be submitted at afore said committee. And It will addressed at that level or may be coordination of all. Beside this District administration also receive the grievances which transferred to ULB and then it addressed at appropriate level.

People can also log their grievances at UD&HD Public Grievances Management System Portal through

web interaction <https://pgms.dmajharkhand.in/>

Toll Free No 1800-120-2929

Landline No 0651-7122727

WhatsApp :7633928444

Email: [info@dmajharkhand.in](mailto:info@dmajharkhand.in)



## लोक शिकायत प्रबंधन प्रणाली

झारखण्ड सरकार आपके द्वार



श्री सुनील कुमार  
उप मुख्य सचिव  
जनक कल्याण विभाग



श्री अनिल कुमार  
उप मुख्य सचिव  
जनक कल्याण विभाग

नगर विकास एवं आवास विभाग, झारखण्ड सरकार द्वारा झारखण्ड के सभी कहेरी नगर निकासों के लिए लोक शिकायत प्रबंधन प्रणाली (PGMS) लागू किया गया है।

सड़क, नाली, सारथ - सफाई से सम्बंधित	वाताय शुद्धिकरण से सम्बंधित
नाली या रोड निर्माण के समय में	Death, Birth Certificates या Trade License से सम्बंधित
Tax, Assessment या Holding Number से सम्बंधित	विभाग के पदाधिकारी या कर्मियों के कार्यकलाप से सम्बंधित
अवैध निर्माण या नक्शा सम्बंधित	प्रधानमंत्री आवास योजना से सम्बंधित (PMAY)
अतिक्रमण से सम्बंधित	राष्ट्रीय शहरी आजीविका मिशन से सम्बंधित (NULM)
नगर विकास एवं आवास विभाग से सम्बंधित अन्य शिकायतें	रचरच भारत पिरान से सम्बंधित (SBM)
जलापूर्ति से सम्बंधित	वेपर लाइट से सम्बंधित

राज्य के नगरपालिका स्तरीय शिकायतों से सम्बंधित अपनी शिकायतें, निम्न माध्यमों एवं दिवस वकते पर संपर्क कर संपन्न से मलिनार (सुबह 10 बजे से रात 6 बजे) तक दर्ज कर सकते हैं।

**Toll Free No.**  
**1800-120-2929**

**Landline No.**  
**0651-712-2727**

**WhatsApp & sms**  
**7633928444**

**Website**  
[www.dmajharkhand.in](http://www.dmajharkhand.in)

**Email**  
[info@dmajharkhand.in](mailto:info@dmajharkhand.in)



शिकायत प्रणाली



हेल्पलाइन



WhatsApp



वेबसाइट



ईमेल

अधिक जानकारी के लिए अपने नगर निकास / नगर प्रबंधन / नगर परिषद / नगरपालिका के कार्यालय में संपर्क करें।  
नगर विकास एवं आवास विभाग, झारखण्ड सरकार

नगर विकास एवं आवास विभाग द्वारा जनहित में जारी। Follow us: [f](#) [t](#) [@dmagms](#)

Mukhyamantri Jansamvad Kendra is another state government tool to address public grievances  
<http://cmjansamvad.jharkhand.gov.in/>

Post : JAN SAMVAD KENDRA

SUCHNA BHAWAN

Near Audrey House, Mayers Road  
 Ranchi, Jharkhand-834008

Web interation <http://jansamvad.jharkhand.gov.in>

Email: [cm-jansamvad@jharkhandmail.gov.in](mailto:cm-jansamvad@jharkhandmail.gov.in)

Facebook [cm-jansamvad](#)

Twitter - [cm-jansamvad](#)



The departmental and Mukhyamantri Jansamvad grievances also redirected ULB/JUIDCO/SPMG for redressal of grievance .

**Grievance Redress Mechanism in West Bengal**

12/24/2018

[https://mail.gov.in/iwc\\_static/layout/shell.html?lang=en&3.0.1.2.0\\_15121607](https://mail.gov.in/iwc_static/layout/shell.html?lang=en&3.0.1.2.0_15121607)**Subject: Regarding "REPORT ON GRIEVANCE REDRESSAL"**

Date: 12/24/18 04:32 PM

To: director.projects@nmcg.nic.in

From: APD WBSPMG &lt;apd.wbspmg@gmail.com&gt;

Cc: spmg.programdirector@gmail.com,

mahua bhattacharya &lt;mahua.wbspmg@gmail.com&gt;

ANNEXURE V : WEST  
BENGAL

Sir,

*The Report on Grievance Redressal mechanism is given below as desired-*

Normally a complaint is received at the project site or it is addressed directly to NMCG or WBSPMG through mail. After its receipt the same is forwarded to our Executing Agencies (EAs) like KMDA or KMC for its officers to take appropriate action by required intervention based upon the nature of complaint petition. After taking necessary action on the complaint, The Action taken report (ATR) is forwarded to the complainant with intimation to NMCG as required. This process is usually takes 4 to 7 days.

Regards,

Asst. Project Director, WBSPMG

**Grievance Redress Mechanism in NMCG**

ANNEXURE VI : NMCG

File No.P-15011/3/2018/SMD/NMCG  
 Government of India  
 Ministry of Water Resources  
 River Development and Ganga Rejuvenation  
 (National Mission for Clean Ganga)

Dated: 26.12.2018

**OFFICE MEMORANDUM**

Subject: Small Write-up on Grievances Redressal Mechanism with reference to email dated 24.12.2018 from Director (Projects), NMCG -reg

The under signed is directed to refer to the email dated 26.12.2018 the on the subject cited above from Director (Projects), NMCG regarding the brief description on Grievances Redressal Mechanism under Centralized Public Grievance Redress and Monitoring System (CPGRAM) regulated by the Department of Administrative Reforms and Public Grievances (DARPG) since June 2007.

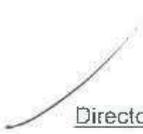
2. In this context, it is stated that the Public Grievances Redressal is one of the flagship initiatives for the reformation in governance started by Central Government through addressing the grievances of general public. The National Mission for Clean Ganga (NMCG) under Ministry of Water Resources, River Development and Ganga Rejuvenation is one of the parts of this mechanism. One Deputy Secretary has been exclusively nominated as a Nodal Officer to carry out the functions relating to public grievances of NMCG. Around 02 on line grievances and approx 1 to 2 off line grievances by and large relating to projects works undertaken by NMCG and its supporting agencies are received every day which are forwarded both by the Ministry of WR, RD & GR/ PMO/ President Secretariat. On receipt of the same, as a course of action, the Nodal Officer uses to seek reply to the issues raised by the applicants from the concerned officers in NMCG. After receipt of the reply, the same is forwarded to the applicants. If the matter relates to the State Project Management Groups (SPMGs) of Ganga Basin States (Uttar Pradesh, Bihar, Jharkhand, West Bengal and Uttarakhand), the grievances are forwarded to the concerned State with the request to furnish reply direct to the applicants under intimation to NMCG.

This issues with the approval of the Competent Authority.



(K K Sapra)

Under Secretary (NMCG)



Director(Projects), NMCG

## Appendix IX: Minutes of Public Consultation Meetings

1. Public Consultation on Environment and Social Management Framework (NGRBA Program), held at Haridwar, Uttarakhand

### Minutes of Meeting

**Date:** 10<sup>th</sup> December, 2010.

**Time:** 2:30 PM to 5:00 PM

**Venue:** Nagar Pallika Bhawan, Haridwar, Uttarakhand

### Attended by:

- State Nodal agency (Uttarakhand Peyjal Nigam): Mr. Prabhat Raj (Executive Engineer), Mr. S. C Gupta (General Manager), Mr. Y. K Mishra (Project Manager),
- Consultancy team from TERI: Mr. Sakaram Somayaji, Mr. C. G. Hiremath, Ms. C. Sita Lakshmi
- Number of participants: 22 (representatives from NGOs, elected members of Nagar Pallika Haridwar and concerned individuals from Uttarkashi, Gangotri, Dehradun and Haridwar)

The public consultation meeting was flagged-off by Mr. Y. K Mishra who welcomed the participants and briefed them about the agenda of the meeting. Further the meeting was carried forward by Mr. Prabhat Raj, who presented the details about the Environment and Social Management Framework, starting from the current status of river Ganga, future government plans, possible assistance by World Bank, overall significance of ESMF, stake-holder participation during the project, etc. A brief summary of all the important points discussed during the meeting are mentioned in the following points:

- ▶ A target-oriented, continuous and regular mechanism to create education and awareness among the people, particularly the younger generation about the importance of keeping river Ganga clean.
- ▶ Provide proper sanitation facilities, along with efficient operation and maintenance systems, to the tourists and pilgrims (like the Kaavadis) who visit the state during religious occasions and other festivals.
- ▶ Active participation from the NGOs, the local communities and the panchayats needs to be ensured in the process of planning, implementation and monitoring of the project.
- ▶ All efforts should be made to safeguard and minimize any possible negative impact on the socio-cultural beliefs and traditions of the local communities regarding river Ganga, while implementing the sub-projects.
- ▶ Regular operation and maintenance mechanism for sustainable management of the facilities created during the sub-projects, along with sufficient budgetary provisions.
- ▶ In order to ensure proper cleaning of Ganga, all the tributaries in the state also needs to be covered under the project.
- ▶ A common concern among the stakeholders was the lack of any solid waste management plan, as of today, in the district. This project should incorporate suitable mechanisms for proper solid waste management in the river basin.
- ▶ To avoid time and cost run-over, the time gap between planning and implementation of the project needs to be minimized. This will also prevent the project to suffer due to price-escalations and consequent budget insufficiency.
- ▶ All safety and precautionary measures must be taken to avoid any accidents during the construction phase of the projects. Although the notice of the project along with other details and the specific

agenda of the meeting was made available on the website of Peyjal Nigam, the ward members of Nagar Pallika, Haridwar suggested that hard copies of these details be provided to them individually, as internet is not easily accessible by everyone, so as to make their participation more effective.

- ▶ Ensure proper coordination between different government agencies/ departments with clear allotment of responsibilities and provide sufficient accountability at each level.

The meeting was concluded by Mr. Y. K. Mishra followed by vote of thanks given by Mr. S.C Gupta.

## 2. Public Consultation Meeting on Environment and Social Management Framework (NGRBA Program) held at Kolkata

### **Minutes of Meeting**

**Date:** Tuesday, 21 December, 2010

**Time:** 2p.m.

**Venue:** Unnayan Bhawan, Salt Lake, Kolkata

### **Attended by:**

- Mr. N. Dey, Special Secretary, Urban Development Department, Government of West Bengal, Mr. Chunar Dey, DGO,GAP
- Consultancy team from TERI: Dr. Sujana Dhar, Ms. Avanti Roy Basu
- No. of participants: 43 (including representatives from Barrackpore, Khardah, Panihati, Kamarhati, Gaeshpur, Konnagar, Serampore, Naihati, Halisahar, Mahestala, Behrampore, Jangipur, Nabadwip, Bhatparamunicipalities, Kolkata Metropolitan Development Authority, Howrah Municipal Corporation, Chandannagar Municipal Corporation, West Bengal Pollution Control Board, Jadavpur University, ME Directorate and KMW&SA).

The public consultation meeting was initiated by Mr. N. Dey who welcomed the participants and briefed them about the agenda of the meeting. The details of the Environment and Social Management Framework (ESMF), including the future activities planned by the government, possible assistance by World Bank, overall significance of the ESMF, stakeholder participation during the project, etc. were discussed.

A brief summary of the important points discussed during the meeting are mentioned below.

- ▶ The various river pollution mitigation projects to be implemented under NGRBP, namely sewerage and sanitation schemes, sewage treatment plants (new/ up gradation), solid waste management, industrial pollution control initiatives and river front development schemes were highlighted. He stressed on the importance of the treated sewage water to only flow into the river.
- ▶ Mr. Dey presented the genesis of the NGRBP/Namami Gange and informed the participants that the mission is to clean River Ganga by 2020 and to bring the water quality to acceptable limits, which primarily flows through 5 states, namely, Uttar Pradesh, Uttarakhand, Bihar, Jharkhand and West Bengal.
- ▶ He described the structure of the NGRBA/Namami Gange, chaired by the Hon'ble Prime Minister of India. The organizational structure of the NGRBP/Namami Gange is as follows: At the national level, NGRBA /Namami Gange was chaired by the Hon'ble Prime Minister of India, and the Empowering Steering Committee (ESC) has been formed. At the state level, SGRBA (State Ganga River Basin Authority) /SMCG is chaired by the Hon'ble Chief Minister of the respective states. Also, State Project Planning and Monitoring Unit/ SMCG will be the state nodal agency and will be formed in

West Bengal shortly. The SMCG will be a registered body and will be headed by the Principal Secretary of the State Urban Development Department. The State Executing Agency (SEA) will be formed at the state level. For execution of the project, EA (Executing Agency) – NGO or any state agency. City level monitoring agencies at the district level will also be formed.

- ▶ He discussed in length about the purpose of the ESMF (Environment and Social Management Framework) including matters related to land acquisition, entitlement issues, resettlement and rehabilitation of the Project Affected Persons (PAPs).
- ▶ The laws and regulations as well as World Bank Safeguard policies applicable to the project were discussed.
- ▶ The environmental categorization of the various sub-projects envisaged under the NGRBP was discussed.
- ▶ He mentioned that based on proper guidelines, Feasibility Reports (FR) will be prepared, and after obtaining necessary approvals from the state government and GoI, the DPR will be documented. The modifications will be made at the FR stage, and not at the DPR stage.
- ▶ Many activities related to RFD have already been implemented in many parts of the state. He stressed on the need of ladies' changing room (as part of the RFD sub-project) and the need of low-income scheme (as part of the sewerage and sanitation subproject).
- ▶ The O&M cost for the first five years will be included within the project cost and will follow the 70:30 pattern (70% by GoI and 30% by state government). The funds will flow from GoI to SMCG to EA.
- ▶ The representatives of Panihati, Mahestala, Bhatpara, Gayeshpur and Chandan Nagar municipalities raised their queries, which were successfully handled by Mr. Chunar Dey (GAP), Prof. A Majumdar (Jadavpur University) and Dr. T K Gupta (WBPCB).
- ▶ Observations that the different agencies mostly failed to operate and maintain properly the sewage treatment plants e.g. Activated Sludge Process, Trickling Filters etc. constructed under GAP-Phase I and Phase- II were heard. The STPs like Waste Stabilization Ponds (WSP), however installed under GAP Phase I and Phase II operated and maintained satisfactorily. So, efforts must be exerted for installation of WSP for treatment of city sewage. Accordingly, land selection (in rural areas) and acquisition should receive priority for interest of the work.
- ▶ Prof. Mazumder stated that the current phase of GAP envisages installation of sewerage system in the town. The storm water during rain will flow along surfacedrainsleadingtoGanga.Thushouseconnectionsintheseweragesystem need guarantee from the municipal authorities. If house connections are not done then sullage will continue to get discharged in the river. Thus house connection is a challenge for the future action plan.
- ▶ He also mentioned that recycling and reuse of treated wastewater must receive serious attention in the projects. This will ensure use of treated wastewater in agriculture, pisciculture, ground water recharging etc. One must conceive ecologically balanced wastewater treatment system for abatement of river pollution
- ▶ One of the objectives of GAP must be the positive impact on public health, Non- point pollution needs also to be addressed, and more thrust is needed to ensure peoples' participation in the programme.

Representatives of certain municipalities expressed their opinions and suggestions during the participatory discussion, and a few experts present in the meeting presented their views accordingly. A brief summary of the interactive session is given below:

- ▶ Panihati Municipality – Under the Ganga Action Plan, 13 towns were covered in the 1st phase within KMA including Panihati. However, the representative of Panihati Municipality complained that the sewage treatment plant (STP) constructed under GAP I is currently non-functional.
- ▶ Mahestala Municipality – There are several small-scale industrial units in Mahestala, which discharge untreated/partially treated wastewater directly into the river and pollute it. The representative of Maheshtala Municipality opined that due to financial reasons, it is not possible for these small units to set up wastewater treatment facilities at an individual level. Also, there is no sewerage network in Maheshtala. As a response to this, Dr. T K Gupta, Chief Engineer, West Bengal Pollution Control Board (WBPCB) suggested that Common Effluent Treatment Plant (CETP) will be constructed for which land has to be identified. The formalities of land possession (for the CETP) may be discussed in the Committee meeting at a later stage during the project. The smaller industries need to be shifted to the common location so that their wastewater is managed in an efficient manner (through the CETP).
- ▶ Bhatpara Municipality – There are 18-19 large-scale industries in Bhatpara. The sewerage system in Bhatpara is decades old, with problems like sewerage congestion due to weak O&M practices. Even after making repeated requests to the WBPCB, no actions were taken from their end. Therefore, the problems related to management of industrial wastewater as well as sewage do exist in a big way. Dr.T.K. Gupta assured that he will take necessary actions to address their grievances.
- ▶ Gayeshpur Municipality – The problems discussed by the representative of Gayeshpur municipality are similar to that of Bhatpara. He added that there is land available in Gayeshpur for any construction that might be required.
- ▶ Chandan Nagar Municipality–Untreated sewage from various point and non- point sources fall into the river. The representative from Chandan Nagar Municipality was of the opinion that municipal engineers should be involved in the decision-making process.

The meeting ended with the vote of thanks given by Mr. Dey. He was grateful for the overwhelming response of the participants for the meeting and requested their whole- hearted participation throughout the project.

3. Public Consultation on Environment and social management Framework (NGRBA Program), held at Sahibganj, Jharkhand

#### **Minutes of Meeting**

**Date:**23<sup>rd</sup> December, 2010

**Time:** 11:00 am to 2:00 pm

**Venue:** Vikash Bhawan, D.C. Office, Sahibganj, Jharkhand

#### **Attended by:**

- State nodal agency:
  - Mr. K. Ravi Kumar (District Commissioner, Sahibganj)
  - Mr. Sangram Besra (Deputy Secretary, Urban Development Department)

- Mr. Gajanand Ram (Associate town planner, Urban Development Department, Jharkhand)
- Mr. Sisir Kumar Soren (Executive officer, Sahibganj)
- Mr. Suresh Kumar (Executive officer, panchyat, Rajmahal)
- Consultancy team from TERI: Mr. Sunil Kumar, Ms.G.Mini
- Number of Participants: 75 Representatives from NGOs, elected members of Nagar palika Sahibganj and concerned individuals from Sahibganj and Rajmahal.

The public consultation meeting was flagged-off by Mr. K. Ravi Kumar (District Commissioner, Sahibganj) and Mr. Gajan and Ram (Associate town planner, Urban Development Department, Jharkhand) who welcomed the participants and briefed them about the agenda of the meeting.

Further the meeting was carried forward by Mr. Gajanand Ram, who presented the details about the Environment and Social Management Framework (ESMF), starting from the current status of river Ganga, future government plans, possible assistance by World Bank, stakeholder participation during the project and the overall significance of ESMF. Various agencies involved in implementing the current programme were also explained in detail to the gathering. The guidelines were translated to vernacular and made available to public and also all the documents related to NGRBA program has been uploaded in the MoEF&CC/NMCG website.

Mr. K Ravi Kumar and Mr. Gajanand Ram also briefed the gathering about the earlier efforts (GAPI and GAPII) to clean Ganga. The main reasons for the program to be not so successful were cited as lack of proper operation and maintenance of assets created and comprehensive planning.

The Projects Planned under NGRBA program in Sahibganj and Rajmahal are:

- ▶ Sewage treatment system
- ▶ Solid waste management
- ▶ Improved crematorium
- ▶ River front beautification

A no. of sub-Projects would be considered under the above-mentioned categories. Another important component considered under NGRBA program would be to create public awareness to check activities, which contribute to pollution in the river.

A brief summary of all the important points discussed during the meeting are mentioned below:

- ▶ It was informed that in Rajmahal & Sahibganj majority of the population lived in slum areas and they also need to be considered and sensitized while planning any projects/schemes. At the moment the fringe population are availing all the infrastructural benefits without being accountable to any kind of maintenance. Earlier there were only 18 wards in 2001 census and currently there are around 28 wards.
- ▶ It was emphasized that the projects have to be location specific and the paying capacity of the community has to be considered while planning the projects.
- ▶ Small industrialists were conspicuous by their absence in public consultation meeting, hence it was opined that they should also be included in any further meetings especially the brick manufacturing industries which are normally situated at the bank of the rivers.
- ▶ The public wanted to know whether the levy of public contribution/tax for operation and

management of the existing projects and upcoming projects under the scheme would be same for the local public and the industrialist. It was clarified that reference of taxation system would be as per State Govt. decision.

- ▶ It was expressed that in the upcoming sewerage project there should not be any mixing of drinking water pipelines with sewerage pipelines. Also solid waste should not be diverted towards sewer drainage. In response to the questions raised, the DC clarified the technical details of the drainage system and assured that mixing of drainage and drinking water cannot happen.
- ▶ A common concern among stakeholders was the indifference towards the rules and regulations when it comes to usage and maintenance of the infrastructure facilities provided. For instance, in spite of some existing drainage network people still continue to dispose their waste into the river, open defecation is common, littering of riverbanks is widespread. So how will the agency ensure discipline when the new projects come up? In response to the questions and concerns raised the D.C. conveyed that part of the problem is due to lack of manpower in Urban Local Bodies. New recruitments will take place and effective measures will be put in place to abide by the rules and regulations.
- ▶ It was suggested that projects should not be like as how case it should be fruitful to the entire beneficiary.
- ▶ It was suggested that anti erosion projects/ works, which is currently under CWC, should be included in the Ganga main stem project.
- ▶ Since Sahibganj is an underdeveloped district levy of tax should be lesser as compared to other major towns and cities. Another justification given for less levy of tax is that Sahibganj being a non-industrial area/zone becomes the least polluter of the river. Hence, “polluter pays” concept has to be considered and higher taxes have to be levied from high polluting towns and cities.
- ▶ Currently dead animals are disposed in river Ganga as there are no burial places for animals. Nagar Palika also does not have any disposal place for dead animals.
- ▶ Another suggestion was to ensure proper coordination between different government agencies/ departments especially the Drinking Water and Sanitation Department and the urban body while implementing the project.
- ▶ The community was keen to know both tangible and intangible benefits of the project, which was explained to them in detail by the District collector and the Associate town planner.
- ▶ People did not voice any concern regarding R&R issue. They mentioned that they are largely satisfied by the existing compensation scheme.
- ▶ A common concern voiced by the stakeholders was regarding the difficulty of land acquisition in khas mahal state of government. Nearly 1000 acres of land in Sahibganj comes under khas mahal state. There is a high possibility that certain portion of the khas mahal land would come under project (mainly for – laying pipelines, sewerage junctions, pump house, sewage treatment plant etc.) and giving compensation for such land will create problems as these lands are claimed both by the government and the community.
- ▶ Peoples were also largely concerned about the decreased river flow of Ganga and expressed their doubts about the existence of the river in another 10 to 12 years. Most of the queries related to planning and implementation of the project raised were satisfactorily answered by the D.C. and Associate Town planner.

The meeting was concluded by Mr. Gajan and Ram followed by vote of thanks, especially to Mr. K.Ravi

Kumar (District commissioner) for their presence and valuable suggestions.

4. Public Consultation on Environment and Social Management Framework (NGRBA Program), held at Kanpur, Uttar Pradesh

**Minutes of Meeting**

**Date:** 28<sup>th</sup> December, 2010.

**Time:** 3:00 PM to 5:30 PM

**Venue:** Nagar Nigam, Guest House, Kanpur, Uttar Pradesh

**Attended by:**

- State Nodal agency (Ganga Pollution Control Unit, U.P Jal Nigam): Mr. C M. Chaudhary (General Manager), Mr. Mukesh Kumar (Project Manager)
- Consultancy team from TERI: Ms. Sonia Grover, Ms. Swati Dabral, Mr. C. G Hiremath
- Number of participants: 38 (Mayor, Commissioner, Additional Municipal Commissioner, elected members of Kanpur Municipal Corporation, representatives from NGOs and Schools, concerned government officials).

The public consultation meeting was initiated by Mr. C M. Chaudhary who welcomed the participants and briefed them about the agenda of the meeting. Further Mr. Mukesh Kumar presented the scope and objectives of the Environment and Social Management Framework (ESMF). Details about the ongoing and proposed projects under NGRBA program for Kanpur city was also presented during the meeting. A summary of the important points discussed during the meeting are mentioned below:

- ▶ Disposal of unburnt or half burnt dead bodies into the river Ganga should be prohibited and promotion of social institutions to perform last religious rites of unidentified and unclaimed dead bodies.
- ▶ More crematoriums should be built, and existing ones should be renovated to cater to the need of growing population.
- ▶ Stakeholders' involvement at both project planning and implementation phase of the projects.
- ▶ Provision of proper sanitation facilities during religious occasions and other festivals.
- ▶ Inclusion of social development projects in the projects portfolio proposed by NGRBA program.
- ▶ Promotion of awareness generation at community and school levels especially in the fields of better solid waste disposal (idols, calendar, flowers, polythene), promote usage of crematoriums, etc.
- ▶ Involvement of local communities (Pandits) for maintaining the river ghats to curbs pollution. Initiative to start same rituals with the bodies specified for burning in electric crematorium as is done with normal bodies to enhance acceptance of e-crematoria.
- ▶ Administrative and financial support for regular operation and maintenance of the projects.
- ▶ Establishment of institutional facilities for monitoring and maintaining the minimum flow (at least 50% of the volume generated) in the river, which is currently being interrupted by infrastructural activities (dams, barrages, diversions) on the upstream side of river Ganga.
- ▶ Facilitate reuse of treated wastewater for agricultural practices, parks, firefighting, etc.

- ▶ Provision of segregated wastewater treatment from industry and domestic sectors.
- ▶ Provision of buffer zones (no-man zone)/integrated river front development for protection of river ghat against pollution (solid and liquid waste disposal, infrastructural development). Facilitate usage of this buffer zone for afforestation or flower plantation)
- ▶ Creation of Ganga Heritage Zone to focus development and protection against pollution.
- ▶ Adopt bio-remediation techniques for treating wastewater until the new STPs become functional.
- ▶ Facilitate proper solid waste management along with the provision of utilization of compost in agricultural/gardening activities.
- ▶ Prohibition of reverse boring of wastewater by the industries which are likely to pollute groundwater.
- ▶ Proper coordination between different government agencies during appraisal of the proposals and environmental impact assessment of the projects which may cause time delay for execution.

The meeting was concluded followed by vote of thanks given by Mr. C M. Chaudhary.

5. Public Consultation on Environment and Social Management Framework (NGRBA Program), held at Prayagraj, Uttar Pradesh

**Minutes of Meeting**

**Date:** 29<sup>th</sup> December, 2010.

**Time:** 3:00 PM to 5:00 PM

**Venue:** Sadan Hall, Nagar Nigam, Prayagraj, Uttar Pradesh

**Attended by:**

- State Nodal agency (Ganga Pollution Control Unit, U.P Jal Nigam): Mr. A K Mittal (General Manager)
- Consultancy team from TERI: Ms. Sonia Grover, Ms. Swati Dabral, Mr. C. G Hiremath
- Number of participants: 22 (Mayor, elected members of Nagar Palika Prayagraj, representatives from press and concerned government officials).

The public consultation meeting was flagged-off by Mr. A K Mittal who welcomed the participants and briefed them about the agenda of the meeting along with details of upcoming and proposed projects under NGRBA program. Further the meeting was carried forward by TERI's representatives, who presented the scope and objectives of the Environment and Social Management Framework and requested participants to share their concerns/suggestions with respect to the framework. A brief summary of the important points discussed during the meeting are mentioned below:

- ▶ A continuous and regular mechanism of creating awareness among community and school children's through street plays, public and religious gatherings (Mela), displaying banners, etc.
- ▶ Provision of proper sanitation facilities along with efficient operation and maintenance systems during religious occasions and other festivals.
- ▶ Community involvement needs to be ensured during the project initiation and implementation stage of the project.
- ▶ The implementation activities of the projects must be completed in time to avoid the problems of traffic diversions, public congestions, and commercial displacement especially during Maha Kumbh

Mela.

- ▶ Promote reuse of treated wastewater for irrigation and gardening purposes.
- ▶ Mechanism for proper solid waste management along the banks of both river Ganga and Yamuna.
- ▶ Provision of wastewater treatment facility at Dhobi Ghat for caustic soda based effluents.
- ▶ Imposing strict regulation on upcoming new colonies to establish their own STPs.
- ▶ Ensure proper site selection for pumping stations along with efficient operation and maintenance of pumping stations in order to avoid back flow or clogging of sewers.
- ▶ Request to start sewer and drainage projects simultaneously and completed in time to avoid mixing of wastewater with drainage water.
- ▶ Ensure technically feasible solutions while designing the alignment of sewer lines and dimensions of the sewer to cater the needs of growing population.
- ▶ Request to maintain minimum size of the sewer more than 150 mm. to avoid clogging of sewers.
- ▶ Ensure sufficient distance/depth while aligning the sewer lines adjacent to the water supply lines to avoid contamination of drinking water.

The meeting was concluded followed by vote of thanks by Mr. A K Mittal

6. Public Consultation on the Environmental and Social Management Framework (ESMF) for the National Ganga River Basin Authority (NGRBA Program) held at Patna, Bihar

**Minutes of Meeting**

**Date:** 04/01/2011

**Time:** 03:00 pm to 5:00 pm

**Venue:** Conference hall, urban development office, Vikas Bhawan, Patna, Bihar.

**Attended by:**

- State nodal agency:
  - Dr. D.K. Shukla (Special Secretary, Urban Development and Housing Department, Government of Bihar)
  - Mr. A.K. Sharma (CGM, Bihar Urban Infrastructure Development Corporation Ltd. Bihar)
  - Mr. P.U. Asnani (Team leader, UTAST-SPUR, Bihar)
  - Mr. Satish Chand Agrawal (Senior Environment and Public Health Engineer, SPUR-UTAST, Bihar)
  - Mr. Sanjay Shakya (Infrastructure and Procurement specialist, SPUR- UTAST, Bihar)
  - Mr. Chand Rehmani (BUDA, Urban Development and Housing Deptt.)
- Consultancy team from TERI: Mr. Sunil Kumar, Mr. Avneesh Nayal
- Number of Participants: 26 Representatives from NGOs, elected members of Nagar Palika and concerned individuals from Patna and other districts of Bihar.

The public consultation meeting was flagged-off by Mr. Satish Chand Agrawal (Senior Environment and public health engineer, SPUR-UTAST, Bihar), and Mr. P.U. Asnani (Team leader, UTAST-SPUR, Bihar) who welcomed the participants and briefed them about the agenda of the meeting.

Further, the meeting was carried forward by Mr. P.U. Asnani, who presented the details about the Environmental and Social Management Framework (ESMF), starting from the current status of river Ganga, future government plans, possible assistance by the World Bank, stakeholder participation during the project and the overall significance of the ESMF. Various agencies involved in implementing the current programme were also explained in detail to the gathering.

The guidelines were translated to vernacular and made available to public and also all the documents related to NGRBA program have been uploaded onto the MoEF&CC/NMCG, department website.

Mr. P.U. Asnani and Mr. Satish Chand Agrawal also briefed the gathering about the upcoming projects and list of towns selected under the NGRBA program. Total 21 towns have been selected from 9 districts of the Bihar state.

The upcoming Projects Planned under NGRBA program in Bihar are:

- ▶ Sewage treatment plants including Dhobi Ghat and Community toilet
- ▶ Integrated Solid waste management
- ▶ Improvement of crematorium
- ▶ River front development

A number of sub-projects would be considered under the above-mentioned categories. Another important component considered under NGRBA program would be to create public awareness to check river-polluting activities

A brief summary of all the important points discussed during the meeting are mentioned below:

**Social and organizational concerns/suggestions:**

- ▶ Awareness about the program projects and sub-projects must be generated to a large extent in order to ensure implementation and effectiveness.
- ▶ For all projects, elected representatives of the state must lead the way and communicate efficiently with the public.
- ▶ Documents and messages delivered to the public must be made in simple language and easily comprehensible. This will ensure that they are made aware, will respond positively to their duties and will contribute to the implementation of projects.
- ▶ It is essential for good communication and transparency between the elected representatives (ward councilors, mayor) and government officials to ensure efficient execution of the projects.
- ▶ A higher level of cooperation and contribution from the State Pollution Control Board will be required.
- ▶ 'Livelihood links' that exist with the Ganga River and the related projects should be highlighted. For this, a task force or Ganga Panchayat should be constituted. These task force units would partake in Capacity Building of locals and training of Urban Local Bodies.
- ▶ Before implementation of projects, the location of projects must be consulted with the local people

of the project-affected area.

- ▶ Local institutional support could be taken for project planning and development.
- ▶ Encroachment of lands and construction of residential complex should not take place in the River Catchment areas.

**Environmental and Technical concerns/suggestions:**

- ▶ Solid Waste Management related projects must implement a door-to-door collection system in order to reduce the number of waste collection points. All efforts to be made to make the town a bin free city.
- ▶ Effluent discharge limits for slaughterhouses along the riverbanks should also be established. In addition, these slaughterhouses must be made modern and more environment-friendly. The State Pollution Control Board should strictly implement the Environment Protection Act particularly for slaughter houses discharging their waste in to river Ganga without treatment.
- ▶ Various check dams could be built on the tributaries of the river Ganga in order to achieve better flood and disaster management. In this way, formation of islands in the course of Ganga can also be stopped. In addition, small hydropower plants could also be setup.
- ▶ There are various 'Arsenic-zones' adjacent to the riverbanks that must be addressed.
- ▶ A master plan is to be developed for the entire Ganga River Basin using Remote Sensing and GIS under the NGRBA program.
- ▶ Integrated River Basin projects should also be developed under NGRBA program.
- ▶ The demarcation of 'Heritage Zones' must be done about 1-2km adjacent to the river bank area. These zones will be protected and could serve as recreational and scenic areas.
- ▶ Technical trainings should be provided to concerned officials and elected members for better implementation of the projects.

The SPUR-UTAST on behalf of Urban Development Department has submitted comments on ESMF (copy attached). Finally, the meeting was concluded by Mr. P.U. Asnani followed by vote of thanks.

7. Consultation with the SMCGs and EAs on the revised ESMF for Namami Gange Programme held at New Delhi on 04.08.2017.

**Minutes of Meeting**

**Date:** 04/08/2017

**Time:** 10:30 am to 1:30pm

**Venue:** Conference Room, National Mission for Clean Ganga, New Delhi

**Attended by:**

- Dr. Nikhil Ranjan, Monitoring and Evaluation Officer, SMCG, Bihar
- Shri R.B.Singh, Senior Procurement Specialist, SMCG,UP
- Shri Biplab Debnath, EE/KMDA, Govt. of West Bengal
- Shri Kinkar Sarkar, EE/KMDA, Govt. of West Bengal
- Shri Faizuallah Khan, Enforcement Coordinator, NMCG

- Shri K.K. Sapra, Under Secretary, NMCG, MoWR, RD&GR
- Shri Vijay Yadav, Asst. Civil Engineer, NMCG
- Dr. Pravin Mutiyar, Director (T-III), NMCG
- Shri Mohd. Najeeb Ahsan, Sr. Social Management Specialist, NMCG
- Shri Saumyasib Mukhopadhyay, Sr. Environmental Specialist, NMCG

A brief presentation of the revision of ESMF was given by the NMCG's Environmental and Social Experts. The provisions of revised land acquisition and R&R acts were discussed in length and new entitlement matrix was also explained. Further the provisions made in the revised ESMF for implementation of (i) Retro-financing of projects and (ii) Hybrid Annuity based PPP projects were discussed in length.

- ▶ For the Hybrid Annuity Based projects, it was agreed that at the DPR stage only Environment and Social Due Diligence Report (ESDDR) along with Environment and Social Management Action Plan (ESMAP) will be prepared.
- ▶ The ESDDR will cover the basis nature of the projects, a very brief description of the environment and present status along with screening checklist and an analysis of environmental and social issues associated with the project.
- ▶ The ESDDR to describe the future action plan to be taken during the detailed design stage by the Concessionaire like:
  - Various regulatory clearances (e.g. environmental clearance, forest clearance, NOC etc. as applicable)
  - Preparation of Environmental and Social Assessment (ESA)/EIA
  - Resettlement Action Plan (RAP), as applicable
  - other actions, and management measures to be implemented by the SPV
  - / PPP Concessionaire / operator

125 (A) the public consultation and disclosure process will continue during project implementation. The draft EIA/EMP/RAP etc. for the specific sub-projects will be discussed with the affected communities and the final documents will be placed on the websites of the NMCG and the SMCGs. The copies of the EMP and RAP will also be placed at the offices of the executing agencies, district magistrate and contractor's office. The executive summary of the EIA and RAP will also be translated into local language and placed in the office of the Gram Panchayat of the affected villages.

**ADDENDUM-I****Addendum to Environmental and Social Management Framework of Namami Gange Programme (April 2017)****Environmental and Social Safeguards Management in PPP Projects**

This addendum document shall be read in conjunction with Environmental and Social Management Framework (ESMF) for Namami Gange Program 2011(revised in December 2016)

**A. Financing Projects under PPP Model:**

1. Under the NGRBA framework, National Mission for Clean Ganga (NMCG) shall finance only commercially viable projects under PPP model. Viable projects may also include those projects that will become viable after receiving viability gap funding under a government scheme.
2. In order to be eligible for funding through NGRBA framework under Namami Gange program, in PPP mode:
  - a) The project will be developed (i.e. designed, financed, built and operated for a specific term) by a private sector entity selected under a Private-Public Partnership (PPP) concept through annuity or Hybrid annuity or any contractual arrangement between a public entity and a private company whereby risks from design, construction, and/or operations, and/or financing are fully or partially transferred to the private company.
  - b) A Special Purpose Vehicle (SPV) will be formed and will assign overriding priority to PPP projects that are implemented by private sector entities, selected through a competitive bidding process.
3. This addendum outlines the framework and procedures to be followed for managing environmental and social safeguard issues in PPP projects that may be implemented through NGRBA framework under Namami Gange Program.

**B. Environmental and Social Safeguards Management for PPP Projects under**

4. All sub-projects and activities to be developed and operated under PPP mode following NGRBA Framework shall carry out an Environmental and Social Due-Diligence (ESDD) of the respective sub-project. The ESDDR shall be prepared by the Executing Agency (EA) as part of the feasibility / Detailed Project Report (DPR) and shall be based on (i) field investigations of all the proposed sub-project facilities and (ii) formal consultations with the stake holders.
  5. The ESDDR shall comprise of (i) a description of the sub-project and its components (ii) an environmental and social profile of the sub-project areas and the proposed project facilities (iii) an Environmental and Social Screening and categorization of the sub-project as outlined in Section 4.3 of Environmental and Social Management Framework of NGRBA / Namami Gange Program (iv) an analysis of environmental and social issues associated with the project and (v) Environmental and Social Management Action Plan (ESMAP) outlining various regulatory clearances, preparation of Environmental and Social Assessment (ESA) Resettlement Action Plan (RAP), other actions, and management measures to be implemented by the SPV / PPP Concessionaire / operator and various other participating agencies in line with the requirements of ESMF for a particular safeguard category of subproject.

6. The State Mission for Clean Ganga (SMCG) will primarily be responsible for the preparation of ESDDR and ESMAP and overall management of their implementation.
7. The ESDDR along with ESMAP shall be submitted to NMCG along with the DPR for appraisal. Upon receipt of the ESDDR, NMCG will review the project categorization as per the ESMF, applicable regulatory clearance requirements and the ESMAP. Their view will follow the process outlined in the Section 4 of the ESMF, including the approval of The World Bank.
8. The ESDDR and ESMAP upon approval and prior to the initiation of the PPP bid process, shall be disclosed locally in the website of EA, SPMCG, NMCG and in the info-shop of the World Bank.
9. The ESMAP shall be included in the PPP bid document, clearly outlining the responsibility for various safeguard management actions including the preparation of ESA RAP for the sub-project in line with its safeguard requirements outlined in section 4 of the ESMF.
10. During the implementation, the selected SPV / PPP concessionaire / operator/ prepare a design specific detailed ESMP/EIA/SIA/RAP report (as applicable) as per the ESMF and obtain approval of NMCG and The World Bank before the technical closure of the subproject and starting the construction work. All necessary environmental clearance<sup>20</sup>, regulatory clearances and land clearances shall be obtained as per the applicable regulations of Government of India and the State Government before the commencement of construction works.
11. The ESMP/EIA/SIA/RAP reports shall be prepared by the SPV in line with the guidelines provided in the ESMF and shall be disclosed locally in the websites of EA, SMCG, NMCG and also in the info shop of The World Bank.
12. The SPV / PPP concessionaire / operator shall be responsible for the implementation of final ESMP/EIA/SIA/RAP and their recommendations. The EA for the sub-project will supervise the implementation and NMCG with the help of SMCG will monitor the all the safeguard actions. This responsibility allocation and institutional arrangements for the sub-project shall be clearly spelled out in the bid document.

**C. Safeguard Compliance Monitoring and Reporting for PPP Projects**

13. Projects financed by NMCG on PPP mode will be periodically monitored by the Lender's Independent Engineer (LIE) or similar technical agency and the quarterly reports (including the compliance to ESMAP) shall be shared with the SMCG and NMCG. The following procedures related to safeguards compliance monitoring & reporting will apply.
  - i) The PPP Partner/SPV will submit monthly Environmental and Social Compliance Monitoring Report (ESCMR) to LIE. EA and SMCG for various project activities/actions agreed as per the ESMAP/ESMP/EIA/SIA/RAP reports. A sample format for the compliance monitoring for a sewerage project is given in **Enclosure 1**.
  - ii) The LIE will review the ESCMR, conduct field inspections and submit the report to SMCG along with

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<sup>20</sup> For the present portfolio of projects under NGRBA programme, currently only Regional Solid Waste Management projects may attract Environmental Clearance. However, time to time the clearance requirement may also be applicable to other projects as well as per the amendments of EIA notifications.

recommended follow up actions.

- iii) Environment and Social Safeguard Specialists of SMCG/EA will also conduct quarterly / monthly compliance monitoring of the projects through site visits based on ESCMR and LIE's recommendations. In absence of necessary specialists, such safeguard monitoring is to be done by the concerned safeguard specialists of PMC appointed by SMCG.
- iv) Safeguard specialists of NMCG will also make quarterly visits to projects site to ensure compliance to the agreed ESMAP and other safeguard documents as prepared by SPV along with LIE report. Indicative checklists of the documents that are required to be checked during the site visits of SMCG/EA/NMCG are given in **Enclosure 2**.
- v) An annual audit of all PPP projects will be conducted by the NMCG along with other sub-projects in line with the provisions of the ESMF.

## Enclosure 1: Sample Format for Periodic Environmental Monitoring Report

### 1. EMP for XXXX Sub-Project

#### 1.1. Introduction –XXX Town

The components taken up for XXX are detailed in the following Table.

Package	Sub Project	Physical Completion (%)	Date of Award	Date of Completion
HRR-1	Providing Under Ground Drainage system to XXX City Municipal Council			
	UGD Network (Total –.)			
	Manhole (Total - Nos.)			
	House Service Connections ( Total – Nos.)			
	Wet well (No,)			
	Sewage Treatment Plant -			

The status of Environmental Management Plan (EMP) for the month of March, 2015 are presented in the following sections

#### 1.2. Permissions/Consents/Clearances/Approvals:

Particulars	Sub Project	SPCB	Railways	PWD	Utility shifting	Forest	Minor Irrigation	Irrigation*
Consent/Clearances/ Permissions/Approval Status (Date of Clearance and completion status)	UGD & STP	CFE obtained On xxxx	Cleared on)	Cleared on	Cleared	NA	NA	NA

*Note: For details refer Monthly Progress Report March, 2015.; NA-Not Applicable;*

#### 1.3. Field Visits & Training Conducted

Field Visit	Date	Sites Visited	Persons Met	Remarks

#### 1.4. Compliance to EMP

Particulars	Sub Project	Complied	Compliance to EMP
Pre-Construction Phase	Sewerage System & STP	√	Details on EMP are made part of Contractor Agreement Page No. xx (Contract Agreement dated xxx )
Construction Phase	Sewerage & STP	√	Details on EMP are made part of Contractor Agreement Page No.xxxx1. Contractor complying with EMP are monitored by the Site Engineer and xxxx on daily basis (Provided in Annexure 1)
Monitoring Requirements & Specifications	Sewerage System & STP	√	Details on EMP is made part of Contractor Agreement Page No. xxxx Informed the Contractor to comply the same

Insert Construction Stage EMP (in Annexure) table here and provide compliance status, and Recommendations for each EMP measures

### 1.5. Redress of Grievances

Sub Project	Registers Maintained	No. of Grievances received in the month	Action Taken
Sewerage System & STP	√	Xx	

### 1.6. Labour Registration

The contractor has submitted the renewed labour license with a validity period of one year from xxxxx (Annexure x of EMP Report).

### 1.7. Summary and Conclusions

EMP monitoring being done daily (see Annexure1) on the critical issues and following improvements / positive developments are observed. Various issues are detailed out in Annexure 8).

S.no.	Details	Compliance Status
1	Labour License	Complied – Renewed upto xxx
2	Project Information Board	Complied at STP
3	Grievance Register	Complied
4	Identification of dumping land for surplus earth	Complied
5	In order to avoid drain blockages, removing of left out excavated material to be cleared on urgent basis	Complied,

However, the following issues need to be addressed.

Sl	Issues/Deviations	Compliance status last visit	Corrective Actions taken	Compliance status during this month
1	Safety measures, Helmets, Gum boots, First Aid Kits, barricading etc. needs to be provided at all locations			
2	Name of contact person with phone number to be included in project information board.			
3	Labours staying in the STP Camp Site. Presently there is no toilet and no bathing facility			
4.	Accessibility for Public			
5	Maintaining safe slope at work site and avoid collapsing of soil/ avoid accidents			
6.	Drain Cleaning			
7	Soil Sinking stretches/Soil collapse			
8	Pipeline trenches and Manhole construction pit kept open since 10 to 15 days in xxx place			
9	Precautions for Opening Manhole			

**Attachment 1: Photographs**


**Enclosure 2: Checklist of Documents to be checked during the site inspection**

1. Environmental Impact Assessment(EIA) and Environmental Management Plan (EMP) reports/ ESIA Study/ Initial Environmental Examination Study Report
2. Copy of various clearances like (Environmental Clearance, forest clearance and NOC)from various authorities like MoEF&CC, SPCB, other state level regulatory authorities etc. and , RAP and SMP as applicable and grievance register.
3. HSE Manual/Plan prepared for the project, if any
4. Detailed Project Report(DPR)
5. Proposed Institutional arrangement (Project Site Organogram) in place for implementation and monitoring of EMP;
6. Annual EMP Budget and its expenditure status
7. Disaster Management Plan (DMP),as applicable
8. Onsite and offsite Emergency Preparedness Plan, as applicable
9. Any other Miscellaneous study done for project regarding Environmental safeguards Aspects

**Annexure - R6****No. T-12/2015-16/1086/NMCG****National Mission for Clean Ganga****Ministry of Water Resources, River Development & Ganga Rejuvenation  
Government of India**1<sup>st</sup> Floor, Major Dhyan Chand

National Stadium New Delhi – 110002

Dated: 19<sup>th</sup> May 2017

To,  
The Project Director, SPMG  
UP State Ganga River Conservation Agency  
Government of Uttar Pradesh  
2, Lal Bahadur Shastri Marg  
Lucknow-226001

**Sub: Administrative Approval and Expenditure Sanction for the project on "Interception, Diversion & Sewage Treatment Plants (STP) Works" For Naini (District G) & Phaphamau (District F) in Allahabad city and Jhunsi Area of Allahabad district under Namami Gange Programme at an estimated cost of ₹ 767.597 Crores (Rupees Seven Hundred Sixty Seven Crores Fifty Nine Lakhs Seventy Thousand only) under Hybrid Annuity based PPP mode.**

Sir,

I am directed to convey the Administrative Approval and Expenditure Sanction for the project on "Interception, Diversion & Sewage Treatment Plants (STP) Works" For Naini (District G), Phaphamau (District F) and Jhunsi Area District: Allahabad Under Namami Gange Programme at an estimated cost of ₹ 767.597 Crores (Rupees Seven Hundred Sixty Seven Crores Fifty Nine Lakhs Seventy Thousand only) with 100% central funding with the following major project components.

**a. Naini (District G)**

- Construction of Nala Tappings - 05 Nos.
- Sewage Pumping Stations (New) - 3 Nos.
- Rising Main (300 + 800 + 900 mm) – (950 + 700 + 200 m).
- Interceptor/ Trunk Sewer (1400 + 1600 mm) – 6335 m (3840 + 2495 m).
- Trunk Sewer (350 + 600 mm) – 3190 m (350 + 2840 m).
- Construction of STP 42 MLD (14 + 14 + 14) - 01 no.
- Effluent channel (1600 mm) – 1 km.

**b. Phaphamau (District F)**

- Construction of Nala Tappings - 02 Nos.
- Sewage Pumping Stations (New) - 2 Nos.
- Rising Main (350 + 500 mm) – 750 + 50 m.
- Trunk Sewer (500 + 600 + 800 mm) – 985.08 m (144.36 + 245.47 + 595.25 m).
- Construction of STP 14 MLD (7 + 7) - 01 no.



- Effluent channel (1000 mm) – 1.1 km.
- c. **Jhunsi:**
  - Construction of Nala Tappings - 13 Nos.
  - Sewage Pumping Stations (New) - 2 Nos.
  - Rising Main (600 mm) - 570 m.
  - Ghat Sewer Line/ Interceptor/ Trunk Sewer (200 + 250 + 300 + 400 + 800 mm) – 2700 m (585 + 520 + 240 + 255 + 1100).
  - Gravity Main/ Trunk Sewer (900 mm) – 3198 m.
  - Construction of STP 16 MLD (8+8) - 01 no.
  - Effluent channel (900 mm) – 2 km.
- d. **For all I/ D and STP Works:**
  - Online Monitoring for STP - 06 Nos. (Inlet & Outlet)
  - Solar Power Plant – 1 MW (Naini), 500 KW (Phaphamau) & 200 KW (Jhunsi).
  - Micro Hydro Power Plant – 500 KVA (Naini), 2.5 KW (Phaphamau & Jhunsi).
  - O & M for I/ D and STP Works – 15 years.

2. The summary of project cost is given below and detailed cost break-up is at Annexure-I.

Sl.No	Description of Work	Estimated Cost in ₹ Lakhs		
		Naini	Phaphamau	Jhunsi
<b>A</b>	<b>Costs to be borne by Central Government</b>			
1	Capital Works Cost	14447.21	4999.57	7635.09
2	Miscellaneous Items (ESMP, GAAP, CPO, Power Connection & Labour Cess)	434.71	225.56	271.55
3	Project Preparation & supervision Charges (limited to 4% max for each)	1155.78	399.966	610.808
	<b>Total Capital Cost - Subtotal (1+2+3)</b>	<b>16037.70</b>	<b>5625.10</b>	<b>8517.44</b>
4	15 Year's O & M Cost	21771.19	10918.76	13889.46
	<b>Total Project Cost</b>	<b>37808.89</b>	<b>16543.86</b>	<b>22406.91</b>
	<b>Total</b>			<b>76759.66</b>

3. Administrative Approval and Expenditure Sanction for the project is granted subjected to the conditions as per Annexure –II.
4. The period of completion of the project is 36 (Thirty Six) months from the date of this sanction, including bidding process, award of work, as per Annexure – III, and 15 years Operation & Maintenance.
5. The grantee institution i.e. 'Uttar Pradesh Rajya Ganga Nadi Sanrankshan Abhikaran', the State Programme Management Group (SPMG), is an agency of the State Government constituted with the objective of serving as the dedicated institution for effective implementation of the NGRBA programme activities at the State level, and the State is responsible in the long term for the conservation and health of the State's stretch of the river Ganga.
6. The 'Uttar Pradesh Jal Nigam' is the executing agency for the project to take up the I/ D and STP Works pertaining to pollution abatement of the River Ganga in the identified areas of Allahabad, Uttar Pradesh along river Ganga on hybrid annuity based PPP model.
7. The compliance with the observations of TPA, NMCG & World Bank will be ensured by UPJN. Further, UPJN may ensure that there are no overlaps with the works being

undertaken by GOUP and obtain necessary NOCs, including land availability, from the State required for the project before awarding the contract.

8. The project will be implemented on hybrid annuity based PPP mode.
9. Any procurement of goods, works and consultancy if required by UPJN as part of implementing the project proposal shall be made strictly as per the prevailing procurement guidelines of Govt. of India/NGRBA framework / World Bank guidelines (if applicable).
10. The project will be funded under EAP Component -World Bank assisted project (Component A of Namami Gange), subject to the NOC received from World Bank, otherwise the funding will be from National Ganga Plan. The NMCG/Government of India reserves the right to withdraw the sanction at any stage, if it is convinced that the fund has not been properly utilized or appropriate progress is not being made.
11. In case of violation of any of the conditions of the letter of award or in case of closure or dissolution of the executing agency, the Government shall take possession of all the assets of the organization acquired out of the Government funds and use them in any manner deemed appropriate or to recover from the organization the value of such assets at its discretion.
12. This AA&ES is issued based on the appraisal and sanction of the Executive Committee (EC) vide its 3<sup>rd</sup> meeting held on 11<sup>th</sup> May 2017, and under the financial powers delegated vide OM No. 1 (3)/PF.II/2001 dated 15.11.2007 amended vide OM number 24(35)/PF-II/2012 dated 29/08/2014 of the Ministry of Finance (Deptt. Of Expenditure), with the approval of Director General – National Mission for Clean Ganga and concurrence of Director (Finance) vide Dy. No. 325/ED-Finance (NMCG) dated 17.05.2017.

Yours faithfully,



(Nityananda Ray)

Deputy Secretary, SMD

**Copy forwarded for information & compliance of below mentioned conditions to:-**

- 1) The Chief Secretary, Government of Uttar Pradesh, Lucknow-226001.
- 2) The Managing Director, UP Jal Nigam, 6-Maharana Pratap Marg, Lucknow, 226001

**Copy forwarded for information to:-**

- 1) PS to Hon'ble Minister (WR, RD & GR), Shram Shakti Bhawan, N. Delhi-110001
- 2) PPS to Secretary, MoWR, RD & GR, Shram Shakti Bhawan, New Delhi-110001
- 3) PS to Director General, NMCG
- 4) Executive Director (Finance), NMCG, N. Delhi
- 5) Executive Director (Projects), NMCG, N. Delhi
- 6) Executive Director (Technical), NMCG, N. Delhi
- 7) Executive Director (Admin), NMCG, N. Delhi
- 8) NMCG Officials / Sanction Folder /Guard File/Computer Cell, MIS/ NMCG.



(Nityananda Ray)

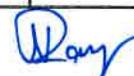
Deputy Secretary, SMD

Annexure-I

**Summary of cost of the project proposal of  
 "Interception, Diversion & Sewage Treatment Plants (STP) Works" For Naini (District G) &  
 Phaphamau (District F) in Allahabad city and Jhunsi Area District of Allahabad district  
 under Namami Gange Programme**

## a. Naini:

Sl.No	Description of Work	₹ in Lakhs
<b>A</b>	<b>Interception &amp; Diversion Works</b>	
1	9.525 km trunk sewer line	4552.9
2	Nala Tapping works (5 nos.)	75.61
3	Main Sewage Pumping Station (42.5/ 60.0 MLD Avg.)	1124.5
4	Rising Main from MPS to STP (900 mm, 200 m)	53
5	Mawaiya Sewage Pumping Station (33.5/ 45 MLD Avg.)	1027.41
6	Rising Main from SPS to Trunk Sewer (800 mm, 700m)	180.31
7	Mahewaghat SPS (2.5/ 3.5 MLD Avg.)	613.1
8	Rising Main from SPS to Trunk Sewer (300 mm, 950 m)	126.11
	<b>Sub Total (A)</b>	<b>7752.94</b>
<b>B</b>	<b>Sewage Treatment Plant</b>	
1	Sewage Treatment Plant (42 MLD)	5670
2	Effluent disposal arrangement (1600 mm, 1 km)	409.27
3	Installation of 1.0 MW capacity Solar Power Plant	600
4	Installation of 500 kVA capacity Micro Hydro Power Plant	15
	<b>Sub Total (B)</b>	<b>6694.27</b>
	<b>Sub Total (A+B)</b>	<b>14447.21</b>
<b>C</b>	<b>Miscellaneous Items</b>	
1	Communication & Public Outreach	45
2	GAAP	30
3	Environmental Mitigation Plan (EMP)	80
4	UPPCL Charges	135.24
5	Labour Cess @ 1%	144.47
	<b>Sub Total (C)</b>	<b>434.71</b>
	<b>Sub Total (A+B+C)</b>	<b>14881.92</b>
<b>D</b>	<b>Project Preparation &amp; Supervision</b>	
1	Project Preparation (subject to the ceiling of 4% of A+B)	577.89
2	Project Supervision (subject to the ceiling of 4% of A+B)	577.89
	<b>Sub Total (D)</b>	<b>1155.78</b>
	<b>Total Capital Works (A+B+C+D)</b>	<b>16037.70</b>
<b>E</b>	<b>15 Year's O &amp; M Cost</b>	<b>21771.19</b>
	<b>Total Project (Naini) Cost</b>	<b>37808.89</b>

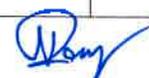


## b. Phaphamau:

Sl. No	Description of Work	₹ in Lakhs
<b>A</b>	<b>Interception &amp; Diversion Works</b>	
1	0.985 km trunk sewer line (500 – 800 mm)	371.87
2	Nala Tapping works (2 nos.)	49.95
3	Shantipuram Main Sewage Pumping Station (14.0/ 21 MLD Avg.)	1007.39
4	Rising Main from MPS to STP (500 mm, 50 m)	11
5	Basna Sewage Pumping Station (5.5/ 8.0 MLD Avg.)	716.46
6	Rising Main from SPS to 350 mm Ø Trunk Sewer (750 m)	73.2
	<b>Sub Total (A)</b>	<b>2229.87</b>
<b>B</b>	<b>Sewage Treatment Plant</b>	
1	Sewage Treatment Plant (14 MLD)	2100
2	Effluent disposal arrangement (1000 mm, 1.1 km)	362.2
3	Installation of 500 KW capacity Solar Power Plant	300
4	Installation of 2.5 KW capacity Micro Hydro Power Plant	7.5
	<b>Sub Total (B)</b>	<b>2769.7</b>
	<b>Total (A+B)</b>	<b>4999.57</b>
<b>C</b>	<b>Miscellaneous Items</b>	
1	Communication & Public Outreach	25
2	GAAP	20
3	Environmental Mitigation Plan (EMP)	40
4	UPPCL Charges	90.56
5	Labour Cess @ 1%	50
	<b>Sub Total (C)</b>	<b>225.56</b>
	<b>Total (A+B+C)</b>	<b>5225.13</b>
<b>D</b>	<b>Project Preparation &amp; Supervision</b>	
1	Project Preparation (subject to the ceiling of 4% of A+B)	199.983
2	Project Supervision (subject to the ceiling of 4% of A+B)	199.983
	<b>Sub Total (D)</b>	<b>399.966</b>
	<b>Grand Total Capital Works (A+B+C+D)</b>	<b>5625.10</b>
<b>E</b>	<b>15 Year's O &amp; M Cost</b>	<b>10918.76</b>
	<b>Total Project (Phaphamau) Cost (A+B+C+D+E)</b>	<b>16543.86</b>

## c. Jhansi:

Sl.No	Description of Work	₹ in Lakhs
<b>A</b>	<b>Interception &amp; Diversion Works</b>	
1	2.7 km Ghat sewer line (200-800 mm)	563.81
2	Nala Tapping works (13 nos.)	266.78
3	Main Sewage Pumping Station (16/ 20 MLD Avg.)	916.61
4	Rising Main from MPS to STP (50 m, 600 mm)	13.81
5	Shastri Bridge SPS (16/ 20 MLD)	977.16
6	Rising Main from SPS (570 m, 600 mm)	142.23
7	3.198 Km Diversion Trunk Sewer (900 mm)	1762.28
	<b>Sub Total (A)</b>	<b>4642.68</b>
<b>B</b>	<b>Sewage Treatment Plant</b>	



1	Dismantling existing 1.5 MLD ADA Trivenipuram STP	30
2	Sewage Treatment Plant (16 MLD)	2400
3	Effluent disposal arrangement (2.0 km, 900 mm)	434.91
4	Installation of 200 KW capacity Solar Power Plant	120
5	Installation of 2.5 KW capacity Micro Hydro Power Plant	7.5
	<b>Sub Total (B)</b>	<b>2992.41</b>
	<b>Sub Total (A+B)</b>	<b>7635.09</b>
<b>C</b>	<b>Miscellaneous Items</b>	
1	Communication & Public Outreach	25
2	GAAP	20
3	Environmental Mitigation Plan (EMP)	40
4	UPPCL Charges for 16 MLD SPS & 16 MLD MPS	110.2
5	Labour Cess @ 1%	76.35
	<b>Sub Total (C)</b>	<b>271.55</b>
	<b>Sub Total (A+B+C)</b>	<b>7906.64</b>
<b>D</b>	<b>Project Preparation &amp; Supervision</b>	
1	Project Preparation (subject to the ceiling of 4% of A+B)	305.404
2	Project Supervision (subject to the ceiling of 4% of A+B)	305.404
	<b>Sub Total (D)</b>	<b>610.808</b>
	<b>Sub Total (A+B+C+D)</b>	<b>8517.448</b>
<b>E</b>	<b>15 Year's O &amp; M Cost</b>	<b>13889.46</b>
	<b>Total Project (Jhusi) Cost of DPR</b>	<b>22406.91</b>

<b>Total Project Cost (Naini, Phaphamau &amp; Jhusi) In crore rupees</b>	<b>767.60</b>
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Land required for SPS has been identified and will be purchased by the State/ Allahabad Nagar Nigam at its own cost. State/ Executing Agency has kept provision of ₹ 4.2 Crores (Naini), ₹ 4.0 Crores (Phaphamau) and ₹ 2.4 Crores (Jhusi) in the DPR towards land acquisition.



Annexure-II**Conditions on Administrative Approval and Expenditure Sanction for the project on Interception, Diversion & Treatment Works" For Naini (District G) & Phaphamau (District F) in Allahabad city and Jhunsi Area of Allahabad district under Namami Gange Programme****1.0 General Conditions:**

- i. 'Uttar Pradesh Ganga Nadi Sanrakshan Abhikaran', the State Programme Management Group (SPMG), which is a registered society, shall be responsible for overall planning, management and effective implementation of the project at state level.
- ii. 'Nagar Nigam, Allahabad' i.e. 'Municipal Corporation of Allahabad' shall be the Urban Local body (ULB) responsible for ensuring commitment to ownership, commitment to reforms for sustainable O & M, and community involvement.
- iii. The Uttar Pradesh Jal Nigam (UPJN) shall be the Executing Agency (EA) of the project to be implemented under the guidance of the SPMG, in coordination and consultation with the ULB and overall monitoring of the National Mission for clean Ganga (NMCG) as per provisions laid down in the NGRBA programme framework.
- iv. The project will be executed in Hybrid Annuity based PPP model and needs to be suitably aligned with the 'Strategic Sanitation Plan'/ 'City Sanitation Plan'/ 'Master Plan' for Allahabad city. Also, synergy shall be ensured with other Central/State sponsored programme like JnNURM, UIDSSMT etc. in the city of Allahabad to avoid any overlap / duplication.
- v. The cost towards 15 years Operation and Maintenance (O & M) has been included in the project cost. However, Operation and Maintenance (O & M) of the project in Hybrid Annuity based PPP model for the period beyond 15 years will be responsibility of the State Government/ Urban Local Body. Sustainable revenue generation from beneficiaries, re-use of treated effluent and waste to energy etc. shall be encouraged.
- vi. State Government shall submit a final DPR including ESAMP in accordance with the TPA / NMCG / World Bank observation before bidding including compliance to the following:
  - a. The detailed project implementation plan, detailed design and engineering of the project shall be undertaken by UPIN based on extensive survey and investigation before execution. Disaster management concerns shall also be taken into account while executing the project.
  - b. Quotation for solar power plant needs to be obtained.
  - c. Cost breakup needs to be provided for micro hydro power plant.
  - d. Outfall drain level needs to be provided.
  - e. Bye pass arrangements need to be provided in case of any failure of STP.
  - f. Sections of gravity main and outfall channel need to be provided.
  - g. Hydraulic gradients and energy lines need to be provided for the flow in proposed sewers.
  - h. Justification of 1000 mm diameter pipe and effluent channel rate analysis needs to be submitted.
  - i. Quotation needs to be provided for STP for which per MLD cost is too high (about 21 Cr. for 14 MLD, i.e. 1.5 Cr. per MLD).



- j. BOD in the two drains is too low (Shantipuram drain BOD: 40.0 mg/L, Basna drain BOD: 36.2 mg/L). As per the GPS coordinates of the drains available in the DPR, it appears that one of the drain is a canal/river. The main issue with the water quality of drains is high Coliform. To address this issue, the tender may be called on technology neutral basis.
- k. An undertaking to be provided by UPJN that trunk sewer being proposed is not being proposed in any other scheme.
- l. It must be ensured that all foundations are above High Flood Level. Proper soil testing needs to be ensured before any construction.
- vii. State Government / Executing Agency shall comply with all the observations of TPA/ NMCG/ WB before bidding and during implementation wherever possible.
- viii. State Government / Executing Agency shall generate wastewater flow data (drain), wastewater characteristics and river water quality monitoring through actual monitoring and analysis at regular intervals (at-least monthly basis).
- ix. State Government/ Executing Agency shall appoint a Transaction Advisor in consultation with NMCG for facilitating the bidding process on Hybrid Annuity based PPP model.
- x. State Government/ Executing Agency shall follow the applicable procurement procedures (WB present guidelines if funded under WB Assisted Project).
- xi. State Government/ Executing Agency shall ensure reuse of treated water from Naini STP to Meja Thermal Power Plant of NTPC and also explore potential reuse of the treated water from other STPs as well.
- xii. All components of the project shall be completed within specified time limits and the resources and outputs and outcomes are to be ensured as envisaged in the approved project. Completion Report shall be submitted to NMCG on completion of the project.
- xiii. Any additional component relevant for project or any component require modification or deletion, may be added or modified or deleted as the case may be, only with the prior approval of the Competent Authority.
- xiv. Any project cost overrun or time overrun will be brought in the notice of NMCG. Decision of cost overrun and time overrun will be granted based upon discussion in Executive Committee (EC) of NMCG. Cost overrun, if any will be borne by the Central Government.
- xv. Staffs that may be employed for preparation, execution or operation of the project by the EA are not to be treated as employees of the SPMG/ NMCG. The deployment of such staff at the time of completion or termination of the project will not be the concern or responsibility of the SPMG/ NMCG.
- xvi. Optimal utilization of the assets relating to the project and created under Ganga Action Plan or any other Central/ State Plan shall also be ensured by the SPMG/ EA/ ULB.
- xvii. All data, records, documents and material related to the project shall be stored properly and catalogued by the SPMG/ EA for reference and retrieval including regular uploading/ disclosure/ updating of such data on website.
- xviii. The State/ SPMG/ EA shall ensure that all provisions of the RTI Act 2005 are adhered to as far as information pertaining to the project is concerned.
- xix. The State/ SPMG/ ULB shall ensure that public is informed in the State/ city of Allahabad regarding implementation of the project and soliciting their co-operation and views as applicable.
- xx. For the provisions made under IEC activities, the SPMG shall make suitable arrangements with Nagar Nigam, Allahabad for executing the 'Communication and Public Outreach'



programme under its supervision towards sensitization of people for abatement of pollution and conservation of river Ganga.

- xxi. Conditions / commitments indicated in this Approval, Executive Committee Memorandum, Minutes and other documents including those to be fulfilled before finalizing the bid document(s) shall be strictly adhered to in the project implementation and management. The SPMG will ensure fulfillment of such conditions before finalizing the bid(s) by the EA. Copies of EC Memorandum, Minutes, appraisal reports, observations and other related documents are already circulated.

## 2.0 The release of funds is subject to the following terms and conditions:-

### 2.1 Annual Plan and Procurement Plan:

- i. The Annual Plan and yearly Procurement Plan shall be prepared by the month of November every year for the next financial year as per the provisions made in the NGRBA programme framework and submitted by the SPMG to the NMCG for necessary approval and budget allocations.
- ii. The SPMG shall furnish to the NMCG annually a report of its work within three months from the closing of the respective financial year.

### 2.2 Financial Aspects:

- i. Funds shall be made available to the agencies strictly as per the 'Financial Management Manual (FMM)' of the NGRBA programme framework.
- ii. The SPMG/ ULB shall take all necessary legal and executive measures to ensure adequate resources available for operation & maintenance of the assets created under the Project to fulfill its mandate.
- iii. The funds released for the project shall be held in an interest earning NGRB project bank account of the SPMG (the mother account). The interest thus earned shall be credited to the project and reflected in the Interim Un-Audited Financial Reports (IUFRs) from time to time and shall be adjusted towards future funds release for the project. For any diversion of funds, the signatory of the bank account(s) shall be held responsible.
- iv. The SPMG/ EA are not permitted to seek or utilize funds for the same purpose from any other organization (Government, semi-Government, autonomous or private) without prior approval of the competent authority.
- v. The sanctioned amount should be spent exclusively thereon as per the scope of the project and within the stipulated time. For carrying forward any work(s)/ activities beyond the specified time limit prior approval of the NMCG should be obtained.
- vi. It is the responsibility of the SPMG/ EA/ ULB to ensure that the assets are exclusively used for the purpose for which the grant is sanctioned and to maintain the assets and their records properly.
- vii. All the assets acquired/created out of the grants shall not be disposed of, encumbered, or utilized for any purpose other than that for which sanctioned without prior approval of the Government.



### 2.3 Audit:

- i. The Comptroller & Auditor General of India (the External Auditor) at his discretion shall have the right of access to the project related books and accounts of the SPMG/ EA for the purpose of Audit.
- ii. The books of accounts of the grantee, relating to this grant, shall be open to Audit by the Internal Auditor of the SPMG and the External Auditor.
- iii. The overall auditing arrangements to cover both periodical internal and annual external audit of project shall be ensured as per the 'Financial Management Manual (FMM)' of the NGRBA programme framework.

#### 2.4 Flow of Funds:

The fund releases by the NMCG shall be remitted by Electronic transfer to the SPMG account. The fund shall flow from the SPMG account to a separate sub-project specific zero balance bank account (the 'child account') of the EA in the same bank of SPMG. The following details may be kept updated from time to time to enable electronic remittance:-

- i. Bank account details of EA, both in figures and words, to SPMG.
- ii. Bank account details of EA and SPMG both in figures and words to NMCG.
- iii. MICR Code and IFSC Code of the Bank Branch (es).
- iv. Necessary authorization by the SPMG to its Bank to receive the remittances on its behalf and to issue necessary bank receipt to the NMCG's bank for receipt of funds.
- v. Necessary authorization by the EA to its bank and under such authorisation, to issue payment instruction to pay contractors / suppliers / service providers for undertaking project activities.
- vi. The NMCG Bank will transfer funds from the NMCG's account to the SPMG account on submission of Interim Un-Audited Financial Report (IUF) and other documents/ information as prescribed in the Financial Management Manual (FMM), of the NGRBA programme framework.
- vii. The SPMG Bank will transfer funds from the SPMG's account (mother account) to the child account of EA as soon as payment instruction is issued by the EA to its banker for transfer funds to contractors / suppliers / service providers account on the same date through 'Real Time Gross Settlement (RTGS)' and thus at the end of any given day, the EA child account will always have a zero balance.

#### 2.5 Submission of Monthly and Quarterly Physical Progress Report (MPPR / QPPR):

- i. The Monthly Physical Progress Reports (MPPRs) shall be submitted by the 5<sup>th</sup> day of every month regularly by the EA to the SPMG and by the 10<sup>th</sup> day of every month regularly by the SPMG to the NMCG. The Quarterly Physical Progress Reports (QPPRs) shall be submitted to the Uttar Pradesh State Ganga River Conservation Authority' and NMCG within 30 days from the end of each quarter.
- ii. The MPPRs in standard format, to be developed by the EA in consultation with SPMG, shall be signed by at least two designated officers of the EA, one of whom will be Chief Project Coordinator, UPJN and also by at least two designated officers of the SPMG, one of whom will be the Programme/ Project Director.
- iii. The signing officers will indicate her/ his name and designation in full in capital letters and affix official seal under the signature. While MPPR submitted by fax will be acceptable for commencement of processing the case, ink-signed MPPR must follow by Post.

- iv. Consistency between physical progress and expenditure shall be maintained and reasons for substantial variations i.e., more than 10% shall be appropriately explained against each item.

#### **2.6 Submission of Accounting and Financial Reports (AFR) by the EA:**

- i. The EA shall furnish monthly 'Accounting and Financial reports (AFRs)' by the 10<sup>th</sup> day of every month with all relevant documents and materials as per the 'Financial Management Manual (FMM)' of the NGRBA programme framework after commencement of the project to the SPMG and by the 20<sup>th</sup> day of every month regularly by the SPMG to the NMCG.
- ii. The 'Accounting and Financial Report (AFR)' in standard format, to be developed by the EA in consultation with SPMG, shall be signed and stamped by the Head of the Accounts Department and Head of the Organization, UPJN.
- iii. The name and designation of the officers signing the AFR shall be clearly mentioned in full and in capital letters. While AFR submitted by fax will be acceptable for commencement of processing the case, ink-signed AFR must follow by Post.
- iv. As part of the AFR, the EA shall submit the followings to the SPMG:
  - v. Invoices of suppliers/ contractors against which online payment instructions issued by the EA in the previous month.
  - vi. A list of invoices received and not paid during the previous month.
  - vii. A list of contracts signed during the previous month.

#### **2.7 Submission of Utilisation Certificates (UCs):**

- i. The quarterly Utilisation Certificates (UCs) in the prescribed format (GFR 19A & 19B) shall be furnished by the EA to the SPMG in respect of grant-in-aid received during the various quarters within 30 days from the end of quarter, duly signed and stamped by the Head of the Organisation, Head of the Accounts Department and field level functionary at executive engineer level / Principal Investigator, as applicable.
- ii. The SPMG shall submit quarterly UCs, duly countersigned and stamped by the Head of the SPMG and the State authorities within 15 days on receipt of the same from the EA.

#### **2.8 Inspection and Monitoring:**

- i. The 'Uttar Pradesh State Ganga River Conservation Authority' and its Standing Executive Committee shall ensure close monitoring and evaluation of progress of the project, and also monitor implementation performance of the EA.
- ii. The SPMG shall ensure appointment of agency (ies) for third party inspection (TPI)/ evaluation of the project strictly as per letter No. A-12012/2/2010-NRCD-II dated 1<sup>6th</sup> September, 2010. The EA through the SPMG shall submit copies of the TPI Reports along with their responses/comments to the NMCG. Releases of funds will be subject to compliance of TPI reports.
- iii. City level Citizen's Monitoring Committees (CMC) shall be constituted in the Allahabad city to serve as a transparency mechanism on flow of project / programme related information to citizens and key stakeholders and to garner their feedback on project / programme processes, as described in the NGRBA programme framework. Social audit will be conducted by the CMC as per the provisions of the NGRBA programme framework.

- v. NMCG may depute any person to visit the SPMG/ EA for the purpose of monitoring its work and accounts of the SPMG. Full co-operation shall be provided by the EA to the persons deputed for inspection.
- iv. Time and cost overrun leading to delay in implementation of projects is viewed with serious concern by the Central Government and as per instructions contained in Cabinet Secretary's D.O. letter No. 261/1/10/2000-Cabinet, dated June 4, 2001 read with Planning Commission's D.O. letter No. O-14015/2/98-PAMD, dated 19.08.1998 (kindly visit NGRBA website/ 'Project Monitoring' for details), mandatory review of the project must be carried out from time to time so as to assess the expenditure trend and time schedule of the project and appropriate action against those responsible for delay shall be taken, in accordance with the instructions.
- vi. The Director General, NMCG may monitor overall progress of project periodically from time to time.



a. Naini:

IMPLEMENTATION PLAN FOR I&D AND STP FOR THE DRAINS & NALA OF NAINI (DISTRICT-G) OF ALLAHABAD CITY																																									
ID	Task Name	Duration (Months)	Year - 1				Year - 2				Year - 3				Year - 4				Year - 5				Year - 6				Upto 15 years from commissioning														
			I-Q	II-Q	III-Q	IV-Q																																			
1	Finalisation of Bid Document	2	■																																						
2	Publication of Bid notification	1	■																																						
3	Receipt of Bids from Bidders	2		■																																					
4	Bid Evaluation and Recommendation	3			■																																				
5	Approval by NMCG	0.5				■																																			
6	Award of Work Contract	0.5					■																																		
7	Construction, testing & commissioning	27																																							
8	15 Years Operation & Maintainar	180																																							

Page 1

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कार्यालय महाप्रबन्धक  
निर्माण मण्डल (गंगा)  
उत्तराखण्ड पेयजल निगम,  
जगजीतपुर, पोस्ट-कनखल  
हरिद्वार-249408

45097



Annexure - R7 472

Office of General Manager  
Construction Circle (Ganga)  
Uttarakhand Pejal Nigam,  
Jagjeetpur, Post-Kankhal,  
Haridwar-249408

Email:-gmgangahw@gmail.com

Letter No. 5212 / Karya-6 / 61 date : 15-10-2025

सेवा में,

Mr. Rajat Gupta  
Sr. Specialist,  
NMCG,  
New Delhi.

विषय:- Nala Tapping and Sewerage Status.

महोदय,

- उपरोक्त विषयक आपसे दूरभाष पर हुई वार्ता के क्रम में उत्तराखण्ड राज्य के विभिन्न नगरों में नाला टैपिंग व सीवरेज व्यवस्था के सम्बन्ध में विभिन्न शाखाओं से प्राप्त सूचना संकलित कर अग्रेत्तर कार्यवाही हेतु प्रेषित की जा रही है।

संलग्नक :- उपरोक्तानुसार।

भवदीय

(आर0के0 जैन)  
महाप्रबन्धक

पृष्ठांकन एवं दिनांक तदैव।

प्रतिलिपि :-

- कार्यक्रम निदेशक, एस0एम0सी0जी0, नमामि गंगे, देहरादून को सादर सूचनार्थ प्रेषित।
- मुख्य अभियन्ता (मु0), प्रधान कार्यालय, उत्तराखण्ड पेयजल निगम, देहरादून को सादर सूचनार्थ प्रेषित।
- परियोजना प्रबन्धक (सिविल/याँत्रिक), निर्माण एवं अनुरक्षण इकाई (गंगा), उत्तराखण्ड पेयजल निगम, ऋषिकेश/श्रीनगर/हरिद्वार एवं अधिशासी अभियन्ता, दून शाखा/निर्माण शाखा/याँत्रिक शाखा, उत्तराखण्ड पेयजल निगम, देहरादून/ऊधमसिंह नगर/रामनगर/हल्द्वानी को उनके द्वारा उपलब्ध करायी गयी सूचना के क्रम में सूचनार्थ प्रेषित।

महाप्रबन्धक

**NALA TAPPING AND SEWERAGE STATUS**

Sl. No.	Office	Name of Town	Number of Nala	Status of tapping	Status of sewerage network and house connections
1	PM, Barkot	Uttarkashi	4	All 4 No. Nalas Tapped	Sewer network partially available. No work of sewerage network is sanctioned/ under execution.
2	PM, Srinagar	Badrinath	6	All 6 No. Nalas Tapped	Sewer network partially available. No work of sewerage network is sanctioned/ under execution.
3	PM, Srinagar	Joshimath	5	All 5 No. Nalas Tapped	Sewer network partially available. No work of sewerage network is sanctioned/ under execution.
4	PM, Srinagar	Gopeshwar	7	All 7 No. Nalas Tapped	Sewer network partially available. No work of sewerage network is sanctioned/ under execution.
5	PM, Srinagar	Nandprayag	3	All 3 No. Nalas Tapped	Only I&D work executed, No Sewerage work is sanctioned / under execution.
6	PM, Srinagar	Karnprayag	7	All 7 No. Nalas Tapped	Only I&D work executed, No Sewerage work is sanctioned / under execution.
7	PM, Srinagar	Rudraprayag	8	All 8 No. Nalas Tapped	Only I&D work executed, No Sewerage work is sanctioned / under execution.
8	PM, Srinagar	Srinagar Including Srikot Gangnali	19	All 19 No. Nalas Tapped	Sewer network partially available. No work of sewerage network is sanctioned/ under execution.
9	PM, Srinagar	Kirtinagar	2	All 2 No. Nalas Tapped	Only I&D work executed, No Sewerage work is sanctioned / under execution.
10	PM, Srinagar	Devprayag	4	All 4 No. Nalas Tapped	Sewer network partially available. Work awarded for laying of 217 M Sewer line.
11	PM, Rishikesh	Swargashram	20	All 20 No. Nalas Tapped	Sewer network partially available. No work of sewerage network is sanctioned/ under execution.
12	PM, Rishikesh	Tapovan	5	All 5 No. Nalas Tapped	Sewer network partially available. No work of sewerage network is sanctioned/ under execution.
13	PM, Rishikesh	Muni Ki Reti	16	15 No. Nalas Tapped, 1 No. Nala tapping under progress	Sewer network partially available. No work of sewerage network is sanctioned/ under execution.
14	PM, Rishikesh	Rishikesh	4	All 4 No. Nalas Tapped	Sewer network partially available. Work of sewerage network is sanctioned and under execution.
15	PM, Haridwar	Haridwar	22	All 22 No. Nalas Tapped	Sewer network partially available. Work of sewerage network is sanctioned under KfW German Bank funded programme and under execution.
16	EE, CD, Ramnagar	Ramnagar	6	All 6 No. Nalas Tapped	Only I&D work executed, No Sewerage work is sanctioned / under execution.
17	EE, CD, USN	Udham Singh Nagar	19	18 No. Nalas Tapped and 1no.Nala tapping under progress	Only I&D work executed, No Sewerage work is sanctioned / under execution.
18	PM, Srinagar	Tilwara	3	3 No. Nalas tapping under progress	Only I&D work executed, No Sewerage work is sanctioned / under execution.
19	EE, Doon Division	Dehradun	1	1 No. Nala tapping under progress	Sewer network partially available. Few works of sewerage network is sanctioned/ under execution for addition in sewerage coverage.
20	PM, Rishikesh	Kotdwar	9	9 No. Nalas tapping under progress	Only I&D work is sanctioned / under execution.
		<b>Total</b>	<b>170</b>		