

Guidelines for the Preparation of Urban River Management Plan (URMP) *for all Class I Towns in Ganga River Basin*

GRB EMP : Ganga River Basin Environment Management Plan

by

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Preface

In exercise of the powers conferred by sub-sections (1) and (3) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government has constituted National Ganga River Basin Authority (NGRBA) as a planning, financing, monitoring and coordinating authority for strengthening the collective efforts of the Central and State Government for effective abatement of pollution and conservation of the river Ganga. One of the important functions of the NGRBA is to prepare and implement a Ganga River Basin: Environment Management Plan (GRB EMP).

A Consortium of 7 Indian Institute of Technology (IIT) has been given the responsibility of preparing Ganga River Basin: Environment Management Plan (GRB EMP) by the Ministry of Environment and Forests (MoEF), GOI, New Delhi. Memorandum of Agreement (MoA) has been signed between 7 IITs (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and MoEF for this purpose on July 6, 2010.

This report is one of the many reports prepared by IITs to describe the strategy, information, methodology, analysis and suggestions and recommendations in developing Ganga River Basin: Environment Management Plan (GRB EMP). The overall Frame Work for documentation of GRB EMP and Indexing of Reports is presented on the inside cover page.

There are two aspects to the development of GRB EMP. Dedicated people spent hours discussing concerns, issues and potential solutions to problems. This dedication leads to the preparation of reports that hope to articulate the outcome of the dialog in a way that is useful. Many people contributed to the preparation of this report directly or indirectly. This report is therefore truly a collective effort that reflects the cooperation of many, particularly those who are members of the IIT Team. Lists of persons who are members of the concerned thematic groups and those who have taken lead in preparing this report are given on the reverse side.

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1. Urban River Management Plans (URMPs)

Almost all class I towns on Ganga River Basin (GRB) are situated beside (or very close to) river Ganga or its tributaries. The untreated and treated sewage from almost all such towns flow either directly or indirectly into these rivers. Further in towns situated beside rivers, the riverbank is a part of the urban landscape, which is often used for dumping solid waste, open defecation and other undesirable activities.

Prevention and management of the above adverse impacts on river and riverbanks in class I towns in the GRB constitute an important component of the Ganga River Basin Environment Management Plan (GRB EMP). It is proposed that URMPs be prepared for all class I towns of the GRB to systematically tackle the above issues through micro-level (town-wise) planning.

It is envisaged that an URMP will have a planning horizon of 25 years and will essentially be a compendium of all 'actions' to be undertaken during this time for comprehensive, 1) riverbank management and 2) wastewater management in the town. Once the URMP for a particular town is in place, investments can be made in various projects in a systematic and targeted manner for implementation of the URMP. Preparation of URMPs is thus essential for all class I towns in the Ganga River Basin (GRB).

2. Salient Features of Proposed URMPs

All towns in the GRB with population greater than 100,000 at present (2011 census), i.e., class I towns, must compulsorily prepare an 'Urban River Management Plan (URMP) which addresses the following issues.

1. Removal of encroachments and land acquisition for riverbank beautification and related development works.
2. Restriction/banning of certain activities on the riverbank or in the river, viz., open defecation, disposal of solid waste, washing of clothes, wallowing of cattle, throwing of floral offerings, disposal of corpses, routine bathing (as opposed to ritual bathing), etc.
3. Development/restoration of the riverbank area, i.e., construction / restoration of ghats, provision of public baths and toilets, construction of walkways, parks, other public spaces, access roads, commercial establishments, etc.
4. Prevention of the discharge of treated and untreated sewage into the river through construction of sewers and 'nala' diversion works.
5. Pumping and other infrastructure for conveyance of collected / diverted sewage to sewage treatment plants and construction / renovation of sewage treatment plants capable of treating the sewage to tertiary levels.
6. Reuse of tertiary treated sewage within the town or elsewhere for industrial, irrigation, horticultural, non-potable domestic and commercial uses, groundwater recharge, etc.

7. Disposal of sludge generated due to sewage treatment in an acceptable manner and reuse of sludge and sludge-derived products, i.e., manure, compost, etc. within the town and/or elsewhere.

URMPs for all class I towns along the river Ganga or its tributaries, viz., **Kanpur URMP**, **Allahabad URMP**, etc. when taken together, shall constitute a Regional URMP, viz., **Ganga Regional URMP**, **Yamuna Regional URMP**, etc. All regional URMP in the Ganga basin, when taken together, shall constitute the **Ganga Basin URMP**.

3. Preparation of URMPs

- URMPs should be prepared immediately (within 6 – 12 months) for all Class I towns in the Ganga River Basin, i.e., towns with population greater than 100,000 at present (2011 census).
- Preparation of URMPs will be the responsibility of the individual towns. The state governments and NGRBA shall extend all possible help (including financial and technical assistance wherever necessary) to the ULBs for the preparation of URMPs.
- For many cities, most of the data/information required for preparation of the URMPs may be available in city master plans, city development plans, city sanitation plans, and from other sources. In such cases, URMP can be prepared in much less time, mostly utilizing secondary data. In general, primary data collection is to be minimized and only resorted to when no relevant secondary data is available.
- The planning horizon in the URMP should be 25 years, i.e., 2013-2038.
- A typical URMP should have two parts; a) relevant secondary and primary information and data presented in both electronic and hardcopy form, and b) a listing and associated descriptions of 'actionable' items, i.e., areas in which projects need to be undertaken, as determined on the basis of the collected information/data.
- For each of the 'actionable' items, several 'work packages' must be specified in the URMP. Proper sequencing of all 'work packages' over the plan horizon should be suggested in the URMP. The 'work packages' must be specified such that completion of all 'work packages' over the plan horizon shall result in the objectives of URMP being completely fulfilled.
- The 'work packages' must be specified in sufficient details such that detailed project reports (DPRs) can be prepared based on these 'work packages' as and when required and put up for funding from various sources.
- URMPs must be prepared by all Class I towns within six months to one year as per guidelines outlined in this report.
- The URMPs prepared as per guidelines specified in this report will be submitted to NGRBA for vetting and final approval. An expert standing committee will be set up by NGRBA for this purpose.

- After finalization of URMPs, DPRs based on ‘work packages’ specified in URMPs shall only be eligible for funding by NGRBA.
- ULBs will have the option of amending the URMPs any time during the planning horizon of 2013-2038, through addition/modifications to the original plan. However, any such amendments must be vetted by the expert standing committee constituted for the vetting and approval of URMPs.

Immediate Actions Required:

1. *The list of towns for which URMPs needs to be prepared should be identified and the respective ULBs instructed accordingly regarding preparation of URMPs.*
2. *A workshop must be organized with concerned ULBs as participants, where the requirements, importance and desired contents of URMPs are to be explained.*

Important Points:

1. *All Class I towns in the GRB shall necessarily prepare an URMP within the next 6 – 12 months.*
2. *An expert standing committee will be set up for NGRBA for vetting and approving the URMPs.*
3. *The DPRs prepared based on ‘actionable’ items in URMPs shall only be eligible for future funding by NGRBA.*

4. Components of URMPs

A URMP should have ‘actionable’ items to ensure that the riverbank in the town is cleaned, developed and beautified such that it is easily accessible to the citizens as a public space suitable for various spiritual, religious, recreational, socio-cultural and other outdoor activities. Further, ‘actionable’ items to ensure prevention of the discharge of treated or untreated sewage into the river (either directly or indirectly) and ‘actionable items’ to ensure that treated sewage is reused / recycled should also be a part of the URMP. Main components of the URMP are described as follows.

4.1. Removal of Encroachments and Land Acquisition

Main Objective:

All public land on the riverbank needs to be cleared from encroachments and constant vigil must be kept to ensure that it is not re-encroached. Some of this land may be made available for riverbank beautification and development projects.

Information Required:

- Digital map of the river and riverbank area under consideration, clearly showing the land use patterns, land ownership and areas encroached.

- Survey of the various encroached areas, including population, and livelihood of the people.

Actionable Items:

Item 4.1.1: Removal of encroachments from the riverbanks. Compensation, resettlement and rehabilitation issues for population affected by the removal of encroachments.

Item 4.1.2: Assignment of land for riverbank beautification and development projects.

4.2. Restriction / Banning of Undesirable Activities

Main Objective:

Certain undesirable activities like, open defecation, disposal of solid waste, dhobi ghats, etc. should eventually be banned in both public and private lands on the riverbank. Certain undesirable activities like washing of clothes, wallowing of cattle, throwing of floral offerings, disposal of corpses, routine bathing, etc. must be discouraged, and hence severely restricted in both public and private lands on the riverbank.

Information Required:

- Digital map of the concerned area showing areas where, a) open defecation and b) solid waste dumping is prevalent.
- Digital map of the concerned area showing areas where, a) 'dhobi ghats', b) washing of clothes and routine bathing, c) wallowing of cattle, d) throwing of floral offerings, e) disposal of corpses, and f) other undesirable activities that are prevalent.

Actionable Items:

Item 4.2.1: Banning of open defecation in the concerned area. Provision of portable/zero-discharge toilet facilities in the area.

Item 4.2.2: Banning of the disposal of solid waste on the riverbank. Alternate arrangements for riverbank solid-waste disposal.

Item 4.2.3: Removal of 'Dhobi Ghats'. Providing alternate arrangements/structures for large-scale washing of clothes.

Item 4.2.4: Restriction on routine bathing and washing of clothes. Alternate arrangements for bathing, such as provision of bath houses with complete treatment and/or recycle/reuse of gray water.

Item 4.2.5: Restriction on wallowing of cattle. Arrangements for the removal of dairies from the concerned area.

Item 4.2.6: Banning disposal of un-burnt / half-burnt corpses from cremation ghats into rivers. All such corpses to be cremated (if required, free of charge) in electric crematoriums provided for this purpose.

Item 4.2.7: Restriction on disposal of floral offerings in riverbanks and into the river. Alternate arrangements, such as composting/ vermi-composting or other arrangements to be made.

4.3. Riverbank Beautification and Development

Main Objective:

Some land on the riverbank to be made available for riverfront beautification and development/restoration initiatives such as, construction of walkways, parks, other public spaces, access roads, commercial establishments, etc. Existing structures on the riverbanks such as, ghats, important places of worship, monuments of historical significance, etc. should be restored/rehabilitated.

Information Required:

- Digital map of the concerned areas where riverbank beautification and development projects are to be undertaken.
- Information regarding the status of the land in areas identified above, whether encroached, etc.

Actionable Items:

Item 4.3.1: Construction/renovation of access roads and parking for the concerned area earmarked for riverfront development.

Item 4.3.2: Development/re-development of areas designated as public spaces such as, walkways, parks, important places of worship, areas of historical significance, etc.

Item 4.3.3: Development/re-development of areas earmarked for commercial establishments.

4.4. Sewage Collection and Diversion Works

Main Objective:

Provisioning for all sewage generated in the town to be collected through underground sewage system. Further, provisioning for diversion of all sewage flowing into the river through, i) large and small 'nalas', and ii) sewers, to sewage treatment plants.

Data Requirement:

Full information regarding present water supply and sewage generation along with status of sewage collection, treatment and disposal is required in digital form in the GIS platform. Data should pertain to (but not limited to) the following points.

1. Map of the town clearly showing the location of the town with respect to nearby surface water bodies and other major geographical features.
2. Map showing various wards of the town, current population in each ward, and expected population in each ward by 2035.

3. Map showing sources of domestic water supply for the town, a) location of surface water intake structures and water treatment plants, b) locations of deep tube wells, c) location of shallow tube-wells, and c) other sources.
4. Current quantity of water supplied from, a) water treatment plants, b) deep tube wells, c) shallow tube-wells, d) other sources, and expected water supply from these and other sources by 2035.
5. Map showing the present network of sewers in the town. Also, current sewage flows in trunk sewers, location of 'nalas', sewage flow in 'nalas' and the expected sewage flows in 2035 if no further action is taken.
6. Map showing locations of current sewage pumping stations, 'nala' tapping works, and sewage treatment plants.
7. Map showing locations where sewage, either treated or untreated is discharged into surface water bodies.

Actionable Items:

Item 4.4.1: Construction/renovation of main sewers, branch sewers, laterals and house connections for collection of sewage from individual households. In the long term, sewage from all households, including slum areas must be collected by the underground sewer system.

Item 4.4.2: Construction/renovation of trunk sewers in a phased manner for the conveyance of the sewage to the sewage treatment plant. In the long-term, all sewage generated in the town must be collected and conveyed to sewage treatment plants.

Item 4.4.3: Construction/renovation of intercepting sewers for diverting the flow of small 'nalas'/drains into the sewer system. All sewage flowing in small 'nalas'/drains must be diverted to the underground sewer system. This is a short-medium term solution, which will hopefully become redundant once a comprehensive sewage collection system is developed for the whole town.

Item 4.4.4: Construction/renovation of 'nala'/drain tapping works for diverting discharges of large 'nalas'/drains to the sewer system. All sewage flowing in large 'nalas'/drains to be diverted from rivers and other surface water bodies and into sewers or directly to sewage treatment plants. This is a short-medium term solution, which will hopefully become redundant once a comprehensive sewage collection system is developed for the whole town.

4.5. Sewage Pumping Stations and Sewage Treatment Plants

Main Objective:

Sewage collected through the sewer system or diverted from rivers should be collected in sump wells and pumped to existing or new sewage treatment plants (STPs). Construction of new STPs and pumping stations and renovation of existing STPs and existing pumping stations is necessary for this purpose.

In case of newly proposed STPs, the ultimate capacity of the STP should be worked out as per population projections over the next 25 years and land for the STP must be acquired accordingly. However, the actual construction of the STP must be done in phases, with the initial size approximately restricted to the wastewater flow currently available (i.e., collected) for treatment. As and when wastewater collection increases, corresponding additional treatment capacity may be added in modular fashion, until the ultimate capacity is reached.

There must also be a provision for the construction of new STPs in a decentralized manner at multiple locations in the town, i.e., wherever sufficient quantities of collected sewage is available.

Existing STPs to be renovated, but only to the extent of the current availability of sewage at the STP. Further renovation to be planned in modular fashion as and when availability of sewage increases.

All new/renovated sewage treatment plants must be designed to treat sewage up to tertiary levels (see Report No. 003_GBP_IIT_EQP_S&R_02), such that it can be reused for various purposes. The sludge generated through sewage treatment must be, i) disposed in an acceptable manner, ii) further processed to obtain sludge-derived products, viz., compost, manure, electricity, etc. to be used locally or otherwise.

Data Requirement:

1. Map of the town showing the locations of the existing sewage treatment plants, installed capacity and the sewage quantity actually treated.
2. Information regarding technology adopted for sewage treatment and performance of the existing sewage treatment plants.
3. Information regarding production of sludge and sludge-derived products, i.e., electricity, manure, compost, etc., from existing sewage treatment plants.

Actionable Items:

Item 4.5.1: Construction/renovation of sewage pumping stations for conveying sewage flowing in trunk sewers and large 'nalas' to sewage treatment plants. Capacity for pumping all sewage generated to sewage treatment plants must be created.

Item 4.5.2: Construction of new STPs, clearly showing the area of the town from which sewage will be diverted to the STP. All sewage generated in the town to be diverted to new or existing STPs.

Item 4.5.3: Renovation of existing STPs, clearly showing the area of the town from which sewage will be diverted to the STP. All sewage generated in the town to be diverted to new or existing STPs.

4.6 Storage, Transport and Reuse Infrastructure for Treated Water and Sludge

Main Objective:

The long-term objective is that treated sewage should be stored in reservoirs and conveyed through canals or pipelines for reuse within the city or elsewhere for industrial, irrigation, horticultural, non-contact/non-potable domestic and commercial uses, groundwater recharge, etc.

Data Requirement:

1. Map of the town showing the locations of the existing ponds, reservoirs and canals/nalas/small rivers which can be used for storage and conveyance of treated sewage.
2. Analysis regarding the reuse potential of treated sewage for industrial, horticultural and non-contact/non-potable commercial uses or for irrigation purposes in the town or elsewhere. Plan regarding how the entire treated sewage can be reused.
3. Analysis regarding reuse potential of sludge and sludge-derived products, i.e., compost, manure, etc. in the city and surrounding rural area. Plan regarding safe disposal and reuse of all sludge and sludge-derived products.
4. Map showing existing depressions/low lying areas/wetlands in the city or in the surrounding areas which can be used for storage of treated sewage.
5. Map showing possible alignments of storm water drains, canals, etc., for conveyance of treated sewage for various reuse purposes.
6. Map showing areas where treated sewage can be used for groundwater recharge.

Actionable Items:

Item 4.6.1: Renovation of existing surface water bodies in the town/surrounding rural area for storage of treated sewage and groundwater recharge.

Item 4.6.2: Construction of surface water bodies in the town/surrounding area for storage and groundwater recharge of treated sewage.

Item 4.6.3: Construction/renovation of pipelines/open channels for conveyance of treated sewage, 1) to storage structures, 2) from storage structures to reuse points in the town and elsewhere.

Item 4.6.4: Production and use of sludge-derived products, i.e., manure, compost, etc. in the town or in other areas.

5. Implementation of URMPs

5.1. Work Packages and DPRs

As mentioned earlier, several 'work packages' will be specified in the URMP for every 'actionable' item. These 'work packages' will be proposed in a phased manner for gradual implementation of the URMP. The proposed work packages specified in URMPs must have

sufficient details such that DPRs can be prepared based on these 'work packages' by the ULBs as and when funding becomes available.

5.2. Funding Sources

As far as external funding is concerned, NGRBA will be the nodal agency for making funds available to ULBs for the implementation of the URMPs in a phased manner over the 25 year time horizon. Funding may be made available through NGRBA for this purpose from several ministries, with MoEF, MoUD and MoWR being the major contributors. Depending on the nature of the project to be funded, any of the above or other ministries may choose to provide funding for a particular project.

The suggested funding priority of MoEF should be as follows,

1. Work packages based on 'actionable' Items 4.4.2 – 4.4.4 concerning sewage diversion works and 'actionable' items 4.5.1 – 4.5.3 concerning sewage pumping stations and sewage treatment plants.
2. Work packages based on 'actionable' items 4.2.1 – 4.2.7 concerning the banning of undesirable activities in the river and in the riverbank.
3. Work packages based on 'actionable' items 4.6.1 - 4.6.4 concerning infrastructure for storage, conveyance and reuse of treated water and use of sludge and sludge-derived products.
4. Work packages based on 'actionable' items 4.1.1 – 4.1.2 concerning removal of encroachments and land acquisition for riverbank beautification and development.
5. Work packages based on 'actionable' items 4.3.1 – 4.3.3 concerning riverbank beautification and development.
6. Work packages based on 'actionable' item 4.4.1 concerning construction of main sewers, branch sewers, laterals and house connections for collection of sewage from individual households.

The suggested funding priority of MoUD should be as follows,

1. Work packages based on 'actionable' item 4.4.1 concerning construction of main sewers, branch sewers, laterals and house connections for collection of sewage from individual households.
2. Work packages based on 'actionable' Items 4.4.2 – 4.4.4 concerning sewage diversion works and 'actionable' items 4.5.1 – 4.5.3 concerning sewage pumping stations and sewage treatment plants.
3. Work packages based on 'actionable' items 4.1.1 – 4.1.2 concerning removal of encroachments and land acquisition for riverbank beautification and development.
4. Work packages based on 'actionable' items 4.2.1 – 4.2.7 concerning the banning of undesirable activities in the river and in the riverbank.

5. Work packages based on 'actionable' items 4.3.1 – 4.3.3 concerning riverbank beautification and development.
6. Work packages based on 'actionable' items 4.6.1 - 4.6.4 concerning infrastructure for storage, conveyance and reuse of treated water and use of sludge and sludge-derived products.

The suggested funding priority of MoWR should be as follows,

1. Work packages based on 'actionable' items 4.6.1 - 4.6.3 concerning infrastructure for storage, conveyance and reuse of treated water.
2. Work packages based on 'actionable' items 4.1.1 – 4.1.2 concerning removal of encroachments and land acquisition for riverbank beautification and development.
3. Work packages based on 'actionable' items 4.2.1 – 4.2.7 concerning the banning of undesirable activities in the river and in the riverbank.

In addition, the ULBs should try to fund at least some 'work packages' in the URMP through internal accruals (i.e., local tax and other local revenue), especially in the later stages of the plan horizon of 25 years. Some 'work packages' may also be implemented through the involvement of private parties using the Public-Private-Participation (PPP) model.

'Work Packages' which can potentially be funded by ULBs using local resources or through PPP model include,

- Funding for the work packages under 'actionable' item 4.4.1 concerning construction of main sewers, branch sewers, laterals and house connections for collection of sewage from individual households.
- Funding for the work packages under 'actionable' items' 4.1.1 – 4.1.2 concerning removal of encroachments and land acquisition for riverbank beautification and development.
- Funding for the work packages under 'Actionable Items' 4.3.1 – 4.3.3 concerning riverbank beautification and development.
- Funding for work packages under 'actionable' items 4.6.3 and 4.6.4.

6. Why URMPs are Essential

As mentioned earlier, for each of the 'actionable' items, several 'work packages' will be specified in the URMP. The 'work packages' must be specified such that completion of all 'work packages' over the plan horizon shall result in the objectives of URMP being completely fulfilled. The 'work packages' specified in an URMP thus constitute a compendium of all 'projects' to be completed in a town in the plan horizon for comprehensive riverbank and wastewater management.

Once this kind of detailed micro-level (town-wise) information is available, DPRs based on the 'work packages' can be solicited from or submitted by ULBs to various agencies,

including NGRBA for funding and implementation. Even ULBs by themselves can initiate some projects based on internal accruals or through the PPP model.

Further, a readily available record of projects completed, ongoing and not yet sanctioned can be kept for each town. Proper phasing of various projects in a town will be possible. The progress of various towns towards completion of objectives of the URMPs will also be readily available.

Once the URMPs are in place, the quantum of work to be done over the next 25 years in the GRB for achieving the goals for URMPs will be known. Based on this information, yearly funding requirements towards URMPs implementation can be readily computed and a 25 year plan of funding requirements can also be made.

At the present time, many projects on riverbank and wastewater management in various towns are being sanctioned by various ministries under various programmes (e.g., GAP I, GAP II, JNNURM, etc.), with the general objective of improvement of the state of rivers in the GRB. However, in the absence of URMPs, it appears that the micro-level planning that is required for obtaining the optimal benefits from such projects is not in place.

6.1. URMPs vs Other City-Specific Development Plans

For some towns of the GRB, one or more city-specific development plans, i.e., city master plans, city development plans, city sanitation plans, etc. prepared by various agencies may already be available. It is thus possible that some of the 'actionable' items in the URMPs may already have been included in one or more of these plans in some form or other.

It must however be emphasized that city-specific development plans mentioned above are 'city-centric', i.e., their main objective is the development in the town and not necessarily the prevention and management of adverse impacts to the river bank and the river. Hence 'actionable' items related to riverbank management, wastewater management and treated sewage recycling/reuse in a town are often either, 1) not included, or, 2) included with insufficient emphasis and detail, in the above city-centric plans.

In contrast, the proposed URMP is a river-centric plan, whose main purpose is the delineation of a roadmap for prevention and management of adverse impacts on river bank and the river from adjoining urban centers.

To further emphasize the points made above, the type of projects sanctioned under, 1) a typical city sanitation plan (CSP), 2) proposed under URMP, and 3) currently funded by MoEF (as per revised DPR guidelines) were compared (see Appendix 1). Based on this comparison, it is clear that a CSP does not include many projects necessary for comprehensive riverbank management, wastewater management and treated sewage recycling/reuse that are necessary for prevention and management of adverse impacts on river bank and the river from adjoining urban centers.

Further, it is clear that there is a nearly complete overlap between projects currently being sanctioned by MoEF (as per revised DPR guidelines) and those proposed under URMPs (the exceptions being projects concerning reuse/recycle of treated sewage, which are given more emphasis under URMP). Preparation of URMPs will thus provide the underlying planning structure that is required for obtaining the optimal benefits from implementation of such projects.

Under the circumstances, it is clear that the micro-level (town specific) planning that is essential for preparing a roadmap for effective prevention and management of adverse impacts on riverbank and the river from adjoining urban centers can only be achieved through preparation of URMPs for all Class I towns of the GRB.

Appendix 1

Items concerning Urban River Management included in City Sanitation Plan, Proposed URMP and Revised DPR Guidelines

Topics/Items	Included in CSP	Included in URMP	Included in Revised DPR Guidelines
River Front Development			
Approach platforms and steps leading to river	X	√	√
Changing rooms for male and female	X	√	√
Toilet, washroom and drinking water facilities at ghats	X	√	√
Sitting facilities for people	X	√	√
Lighting and landscaping of area	X	√	√
Construction of walkways, parks and parking lots	X	√	√
Commercial establishments and activities	X	√	√
Platform for cultural and recreational programs	X	√	√
Removal of encroachments and land acquisition	X	√	X
Improvement of small ghats	X	√	√
Restoration of important places of worship and monuments of historical significance	X	√	X

Appendix 1 (Continued)

Items concerning Urban River Management included in City Sanitation Plan, Proposed URMP and Revised DPR Guidelines

Topics/Items	Included in CSP	Included in URMP	Included in Revised DPR Guidelines
Restriction/Banning of Undesirable Activities (Non-point Pollution Sources) and Alternative Arrangements			
Open defecation	√	√	√
Provision of portable/zero discharge toilet at household/community levels	√	√	√
Manual scavenging	√	√	X
Prevention of dumping of MSW on or near the riverbank	X	√	√
Dhobi ghats	X	√	√
Routine bathing	X	√	X
Bath houses with treatment and recycle/reuse of gray water	X	√	X
Wallowing of cattle	X	√	√
Floral offerings	X	√	X
Washing vehicles in river	X	√	√
Disposal of carcass/dead bodies	X	√	√
Disposal of corpses from burning ghats/crematoria	X	√	√
Removal of dairies	X	√	√

Appendix 1 (Continued)

Items concerning Urban River Management included in City Sanitation Plan, Proposed URMP and Revised DPR Guidelines

Topics/Items	Included in CSP	Included in URMP	Included in Revised DPR Guidelines
Strom Water & Sewage Collection, Diversion, Pumping, Treatment, Recycle and Reuse			
Management of storm water and drainage	√	√√	√
Septic tank	√	√√	√
Human excreta management	√	√√	X
Black wastewater treatment and disposal	√	√	X
Gray water treatment and disposal	√	√	X
Gray water treatment and recycle/reuse	X	√	X
Construction of main, branch, trunk and lateral sewers	√	√	√
Construction of intercepting sewers	X	√	√
Nala tapping	X	√	√
Sewage pumping stations	√	√	√
Rising main	√	√	√
Sewage treatment plants (STPs)	√	√	√
Extension/Renovation of existing STPs	√	√	√
Decentralized treatment	√	√	√
In-situ sewage treatment through bioremediation	X	√√	√

Appendix 1 (Continued)

Items concerning Urban River Management included in City Sanitation Plan, Proposed URMP and Revised DPR Guidelines

Topics/Items	Included in CSP	Included in URMP	Included in Revised DPR Guidelines
Strom Water & Sewage Collection, Diversion, Pumping, Treatment, Recycle and Reuse			
Prevention of treated and untreated sewage discharged into river	X	√	X
Tertiary treatment of sewage	X	√	√
Treated sewage effluent recycle/reuse	√	√	√
Construction of surface storage reservoir and surface water bodies for recycle/reuse	X	√	X
Canal and pipelines for reuse of treated sewage	X	√	X
Renovation of existing surface water bodies	√	√	X
Sludge treatment and management	√	√	√
Use of sludge-derived products	X	√	√
Public-private-partnership (PPP)/BOT financing model	√	√	√
O&M of sewerage schemes	X	√	√

Appendix 1 (Continued)

Items concerning Urban River Management included in City Sanitation Plan, Proposed URMP and Revised DPR Guidelines

Topics/Items	Included in CSP	Included in URMP	Included in Revised DPR Guidelines
Solid Waste Management			
Solid Waste Management	√	√√	X
Riverbank Solid Waste Management	X	√	√
Afforestation			
Along the river banks	X	√	√
Campuses of STPs, pumping stations and effluent channel	X	√	√
Pathways and areas around crematoria	X	√	√
Around bathing ghats	X	√	√
Around community toilet complexes	X	√	√
Open spaces belonging to ULBs	X	√	√
Public Participation and Awareness			
Public participation	√	√√	√
Public awareness	√	√√	√
Capacity Building			
	√	X	√
Note: '√√' indicates not included in URMP, but will be included in other reports of GRB EMP			