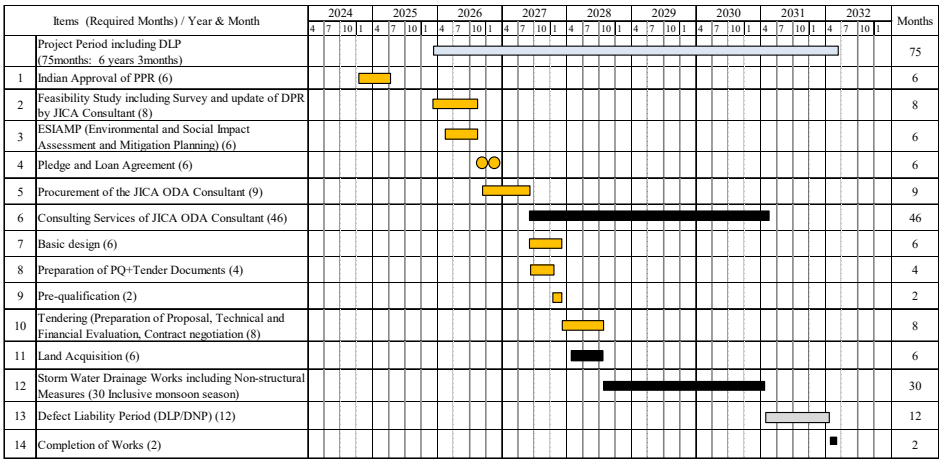
Appendix-7

DOCUMENTS FOR PROJECT APPROVAL

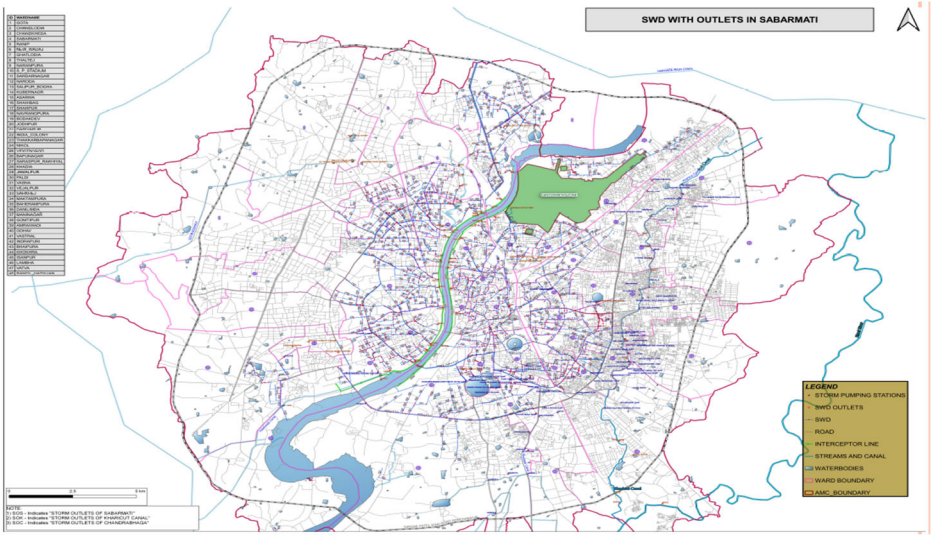
Appendix-7-1

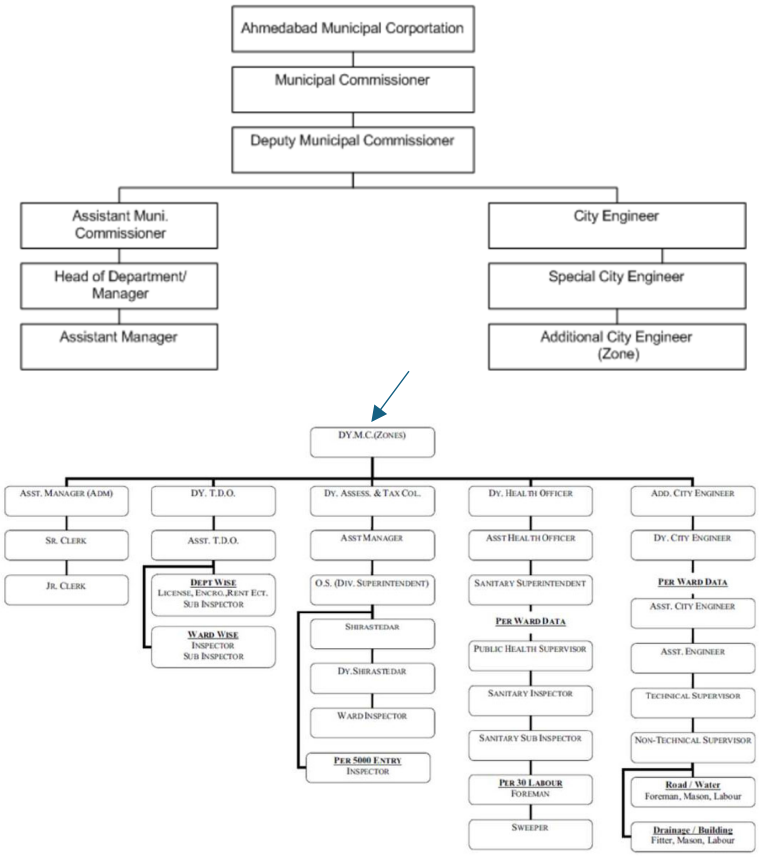
PRELIMINARY PROJECT REPORT FOR AHMEDABAD

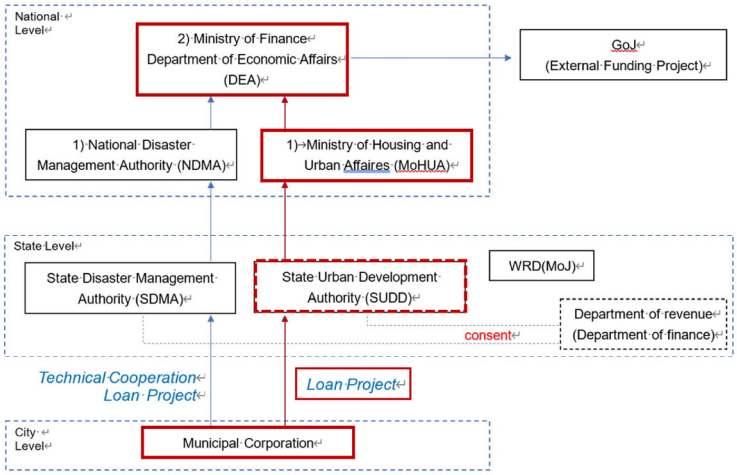
Preliminary Project Report (Ahmedabad)

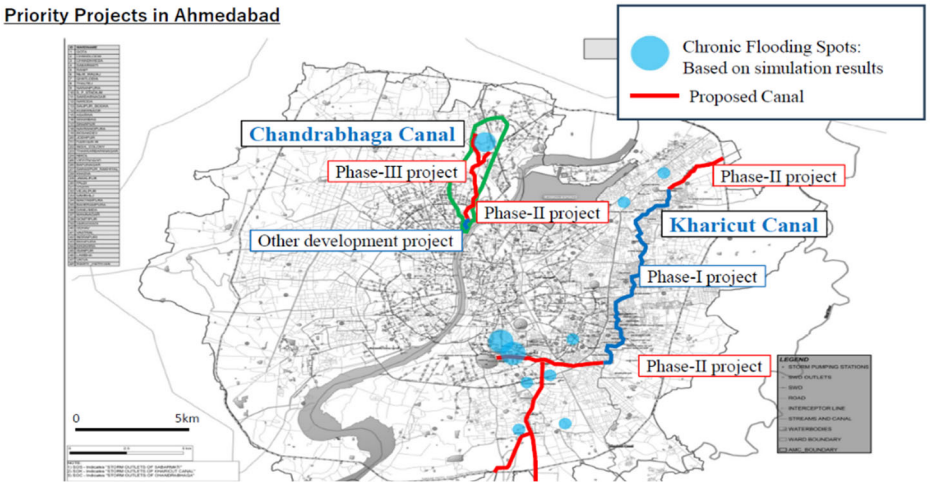
<table>
<tr><td>1</td><td>Name of the Project</td><td>Development of Kharicut and Chandrabhaga Canal and Stormwater Drainage System Center and suburban area of AMC</td></tr>
<tr><td>2</td><td>Sectoral area</td><td>Stormwater Drainage (Urban flood mitigation)</td></tr>
<tr><td>3</td><td>Total Financial Outlay</td><td>Total: INR 2,000-2,500 Cr, JPY 38-57billion
(exchange rate:1Rp.=1.89JPY dated on May 30,2024)
- Development of Kharicut Canal (Phase-II): INR 1,230Cr (tentative)
- Remodeling of Chandrabhaga Drain (Phase-II): INR 250Cr (tentative)
- Development of SWD facilities in the center and outskirts of AMC: INR 500-1000 Cr (tentative)</td></tr>
<tr><td>4</td><td>Details of the external development agencies
(and the amount sought form each)</td><td>Japan International Cooperation Agency （JICA）</td></tr>
<tr><td>5</td><td colspan="2">Financial arrangement
<table>
<tr><td>Total external assistance</td><td colspan="4">Counterpart funds being made available by</td><td>Total</td></tr>
<tr><td>International Donor</td><td>Implementing Agency</td><td>State Government</td><td>Central Government</td><td>Others, if any</td><td></td></tr>
<tr><td>JICA</td><td>Ahmedabad Municipal Corporation (AMC)</td><td>UDUH Gujarat state government</td><td>MoHUA</td><td>DEA</td><td></td></tr>
<tr><td>(85%)</td><td colspan="2">(15%)</td><td>(-)</td><td>(-)</td><td>(100%)</td></tr>
</table></td></tr>
<tr><td>6</td><td>Project duration (dates/months/years) Implementation Schedule</td><td>Taking into consideration time required for all further steps to be taken, implementation plan is prepared as shown below:


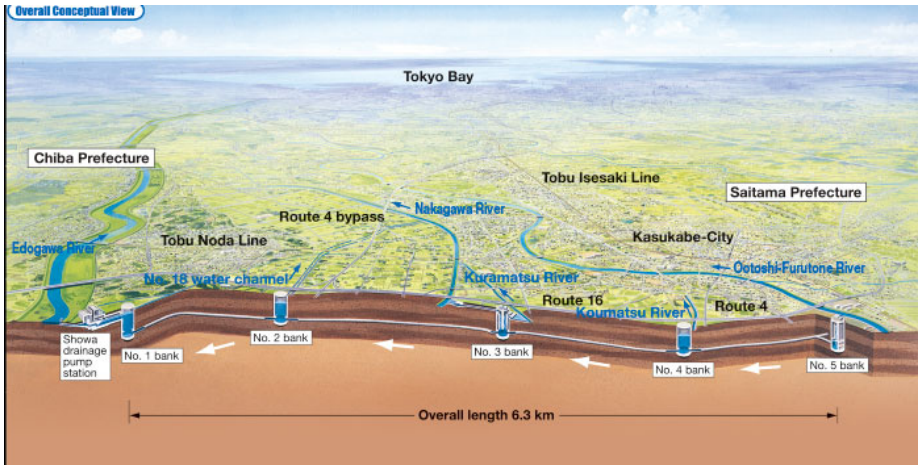
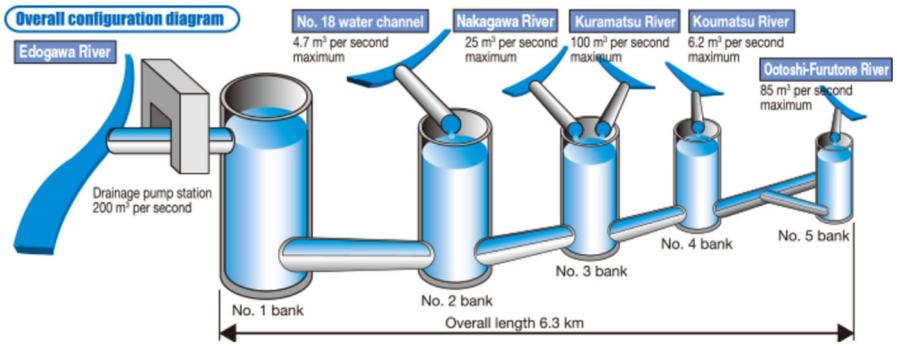
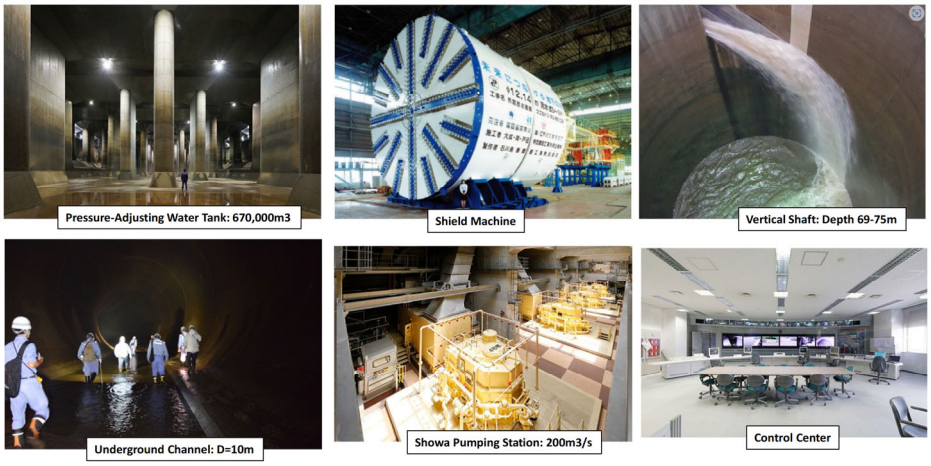
Note: For the period of construction works, the monsoon season is inclusive. Project duration is expected to be 75 months (6 years and 3 months including DLP).
Note: The above implementation schedule is desirable proposal. There are risks of delay throughout the project by delay of approval procedures by both Indian and Japanese relevant authorities, land acquisition procedure, necessary action due to environmental and social clearance, etc.
Tentative Schedule
• Approval of PPR by Indian authority: 6 months
• Feasibility Study including site survey and update DPR: 8 months
• Approval of Update DPR and ESIAMP (Environmental and Social Impact Assessment and Mitigation Planning) after submission of DPR: 6 months
• Procurement of Consultant: 9 months</td></tr>
</table>

		• Design (Basic design) and preparation of tender document: 6 months • Procurement of contractor: 10 months • Construction: 30 months • Defect Liability Period: 1 year • Final Payment: 2 months
7	Location of project	Ahmedabad is the capital city in the Gujrat state. The city is the center of the state from the viewpoint of politic, economic and industry. Ahmedabad city is generally flat with the average elevation of +53.0 above MLS. The total area of Ahmedabad is 480 km^2. General map of Ahmedabad is shown below.  Ahmedabad is located in a hot and semi-arid climate. There are mainly three seasons, summer, monsoon, and winter. The weather is hot from March to June, with the average maximum temperature of 43℃ and average minimum of 24℃. In winter season, the temperature becomes 30℃ at average maximum and 13℃ at average minimum, respectively. Ahmedabad is divided into two area eastern and western by Sabarmati River which flows from north to south. There are 30 outlets connecting into Sabarmati River from the tributaries. Based on topography and the alignment of those tributaries, Ahmedabad is divided into seven (7) drainage zones. Development project of Kharicut canal is in the North zone and South zone, and that of Chandrabhaga canal is in the West zone, respectively.
8	Previous phases, if any	<Kharicut Canal> Construction of Kharicut Canal (Phase-I) is under implemented by the 50% of AMC's fund and 50% of WRD fund. All the construction works for Phase-1 is to be completed by 2025. <Chandrabhaga Canal> AMC is implementing the improvement of the Chandrabhaga canal from the downstream to upstream. Currently, DPR for Phase-II project has already been prepared. At the downstream end of the Chandrabhaga canal, AMC own funded development project, namely Gandhi Ashram Memorial and Precinct Development Project, which includes the improvement of the canal is being implemented. <Other Potential Project> There is no specific previous phase of the project since this project is the improvement of existing stormwater drainage facilities.
9	Statutory Clearances required	The statutory Clearances are needed from the following Authorities: 1. Municipal Board of Ahmedabad Municipal Corporation (AMC) 2. Public Work Department (if any land comes under PWD)

		3. Transportation Department (if required) 4. Environment Clearance (if any land comes under PWD) 5. Gas Pipeline Authority (if required) 6. Water Department (if any pipeline is on the Right of Way during drain construction)	
10	Statutory clearance obtained	No statutory clearance has been obtained.	
11	Details of Feasibility Studies done, if any	No DPR and no FS have been prepared except for DPR for Chandrabhaga (Phase-II).	
12	Implementing Agency	AMC Ahmedabad Municipal Corporation	The implementing agency for this project is the Ahmedabad Municipal corporation (AMC). AMC will be involved in all phases (planning, project preparation, financing, implementation, O&M, and evaluation) of Stormwater drainage, water supply, and sanitation project development in Ahmedabad. The Stormwater Drainage Division of the AMC includes a Planning Section, an Implementation Section, and an Administration Section. The Planning Section will be engaged in the planning and Detail Design of the Project. The Implementation Section is responsible for ordering and supervising the construction of the Project. The Management Section is responsible for the maintenance and management of the facility after the completion of the Project. The organization chart for the project related to AMC is shown in the figure below.  Figure Organization Chart of AMC

	・Central line ministry	MoHUA Ministry of Housing and Urban Affairs	The Ministry of Housing and Urban Affairs (MoHUA) is responsible for formulating policies, supporting and monitoring programs and coordinating the activities of various Central Ministries, State Governments and other national authorities related to urban development, town and country planning besides addressing development issues. MoHUA is undertaking schemes to create facilities to manage urban drainage (SWD) and sewerage. MoHUA is implementing several funding schemes such as the Amrut scheme, the Jawarharlal Nehru National Urban Renewal Mission (JnNURM), etc. Once the project is officially approved by Gujarat UDD, the official request is submitted to DEA through MoHUA as below.  Figure Project Approval Procedure
	・Administrative State Government	Gujarat state Urban Development Department	SUDD will authorize AMC to implement the project and provide budgetary provision to the 'Stormwater Drainage' department.
13	Basic design of the project		
	Goals and Objectives		The proposed project aims to improve the current water logging situation around the stormwater drainage canals by the expansion of the canal and installation of holding tank. In according to the latest Central Public Health & Environmental Engineering Organization (CPHEEO) manual published in 2019, design rainfall return period for urban drainage of 5-year storm will be applied.
	Activities involved		In accordance with the goals and objectives of the project, following activities are involved: 1) Consulting services on Survey, Feasibility Study, Detailed Design, Tendering Assistance and Construction Supervision 2) Capacity development to maintain operation capacity of underground tunnels and canals 3) Construction works for: *a.* Kharicut Canals *b.* Chandrabhaga Canals *c.* Stormwater drainage facility in AMC 4) Environmental and Social Impact Assessment including Mitigation Planning (ESIAMP) 5) Public consultations for the dissemination of the project components among the stakeholders

		Outputs of the project (Project Scope)	1) Project Components are consisting of the followings: a. Construction of box drain canals b. Road and street light c. Training on operation and maintenance for facilities 2) Location of Facilities Location map for the facilities is shown in Figure below.  2) Technical Information for each component: **Kharicut Canal:** The estimated flood in Kharicut canal at Vinzol Vehla for 1 in 10 years return period is 578 cumecs. Out of 578 cumecs, the estimated flood water upto Narmada Main Canal is 433 cumecs is planned to be diverted to the Sabarmati River. The flood from the free catchment area in the downstream of Narmada Main Canal is estimated to be 145 cumecs which is likely to flow through Kharicut Canal. After developing the box drain Kharicut canal can cater the 72 Cumecs, and to cater the rest of the discharge Canal Syphon and Storm water drains parallel to Canal syphon is proposed under this project. **Chandrabhaga Canal:** The Chandrabhaga drain is local drain/tributary of Sabarmati River. The drain is having a catchment area of 25 sq km and originates in the Railway and ONGC colony area near Chandkheda and meets the Sabarmati River between Vadaj Circle and Sabarmati Ashram. AMC proposed to develop the drain by providing a defined waterway so as to prevent flooding in the area along with necessary inlets to allow storm water inflow from the surrounding areas and necessary outlet at Sabarmati River. The total length the drain to be developed is 2.0 km. (From Railway Culvert at Ranip upto Prabodh Raval Bridge) **Other development project:** To be proposed in the coming stormwater drainage master plan to improve the insufficient existing stormwater drainage network.
		Outcome of the project	By implementing the project, following outcomes are envisaged: 1) Minimizing impacts such as traffic disruption, general assets and infrastructures damages due to water logging 2) Improving water quality for irrigation purpose 3) Minimizing water borne diseases and health risk with minimizing water logging 4) Increasing recreational opportunities for the resident 5) Minimizing losses of payment for the resident

		Foreign Component and Technical Coop. component *Note: Project scope and its applicable technologies are not yet determined. Therefore, variety of Japanese technologies applied for SWD works are indicated.	**1. Foreign Component** <u>1) Underground Tunnel</u> There are multiple projects of this type of underground facility in Japan. One similar project with regards to urban drainage facilities is the "Underground Tunnel" (a massive underground discharge tunnel) technology applied in Tokyo Outer Underground Discharge Tunnel as shown in following figures.   Overall configuration diagram  Figure: Example of Tokyo Outer Underground Discharge Tunnel
			<u>2) Regulation pond</u> When there is a limit to the flow capacity of the downstream river channel, regulation pond temporarily stores part of the floodwaters, and preventing flooding downstream. The stored water is discharged by pump after the downstream water

level drops.

The below figure is an example of the Nogawa Osawa Regulation Pond. The regulation pond has two reservoirs, and floodwaters first flow into the first reservoir near the intake. If the capacity of the first reservoir is exceeded, it flows into the second reservoir. This structure takes into consideration maintenance aspects such as reducing the effort required for cleaning.

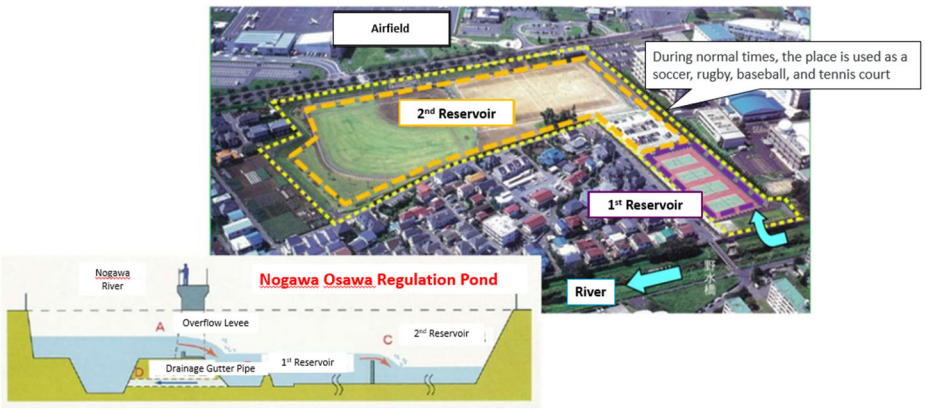


Figure: Example of Tokyo (Regulation pond)

3) River Retarding Basin

This is a method of developing part of the underground space in an urban area as an underground storage tank to prevent flooding. As an example, Yokohama City in Kanagawa Prefecture is utilizing the underground space of the Kawawa rail yard of the Yokohama Municipal Subway Green Line as an underground reservoir to achieve early flood control effects and minimize the impact on the river environment. This area is at high risk of flooding due to the nearby Tsurumi River and Kawawa River. The operation of underground storage during heavy rainfall is as follows.

- When the water level of the Tsurumi River rises due to heavy rainfall, water flows in through the “overflow dike,” which is one level lower than the dike upstream of the underground storage area.
- By storing water in underground reservoirs, the flow volume of the Tsurumi River is reduced, and the surrounding and downstream areas are protected from flood risk.
- After rainfall, when the water level of the Tsurumi River drops, and there is no danger of it rising again, the gates of the drainage culverts downstream of the underground storage is opened and the water is gradually flow into the river.

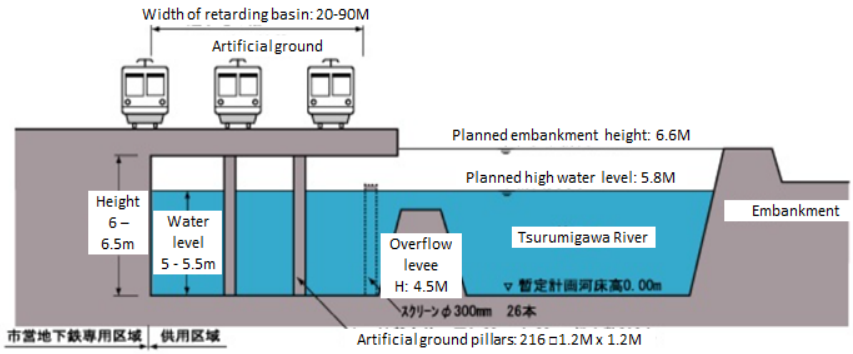


Figure: Example of Yokohama (River Retarding Basin)

4) Stormwater Drainage Pump (Stand-by Operation)

The features of this system is as follows:

- Full speed operation is possible even no rainwater in a pump suction pit. → Suitable for discharging peak flow coming into downstream in a short time.
- Simple steps to start and less time to re-start. → Easy to re-start and reduction of the number of backup pump.
- Reduction of electric consumption (Air operation is 5～20% and air-water mixed operation is 20～100% compared with full operation (100%)). → Operation and maintenance cost is lower than normal type pump.

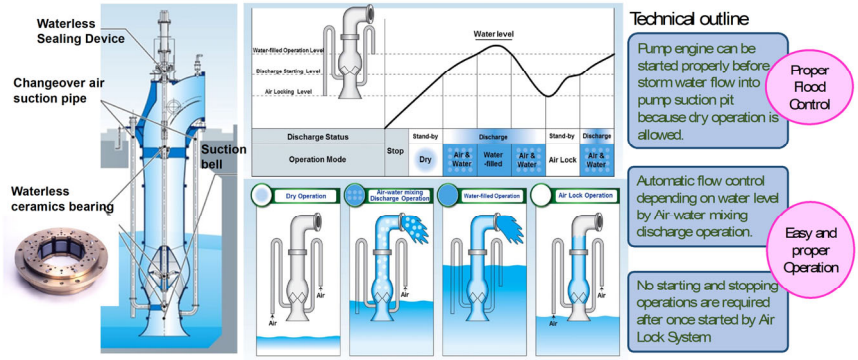


Figure Vertical mixed flow pomp not require pump suction pit

5) Underground Storage Tunk

"Plastic media for underground storage or filtration facilities" to mitigate flood damage from urban drainage, is developed by foreign companies as shown below.

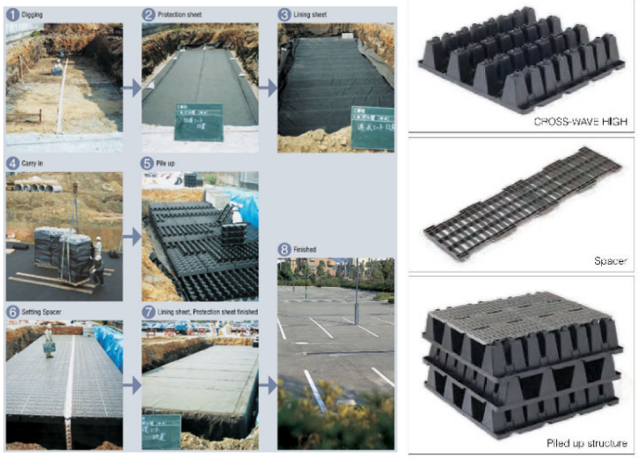


Figure Plastic Storage Tank

6) Compact pumping station by adopting Submergible Pumps for Pump Gate

Currently, the Haji Ali Pumping Station, which has started operation with BRIMSTONOWAD-II at MCGM, uses a submersible pump type.
However, the gate is installed in the drainage and is not integrated with the pump.
In recent years, countries with advanced urban drainage technology have developed compact and highly economical equipment that integrates pumps and gates, eliminating the need for bypass channels for the purpose of drawing in storm water.
Consider introducing this latest equipment.

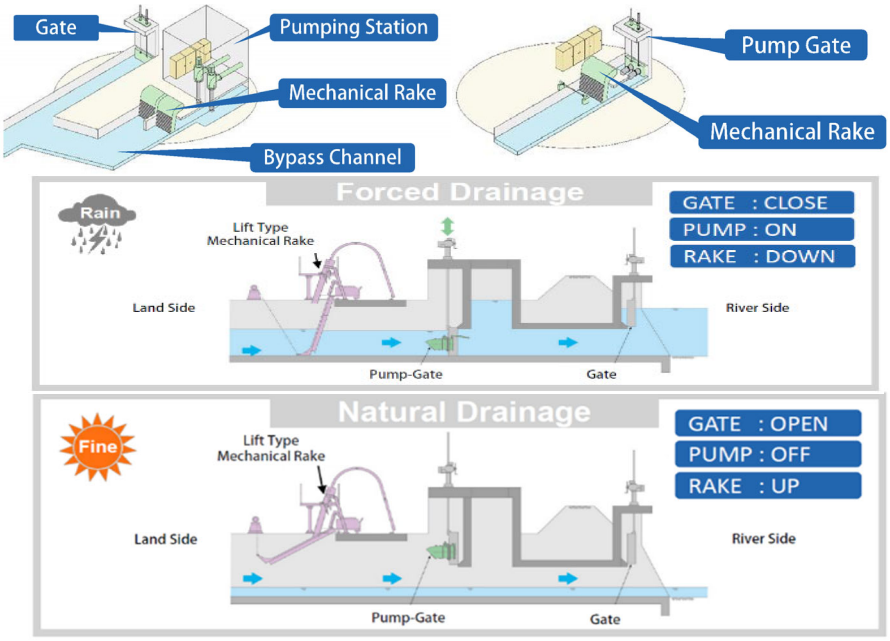


Figure Submergible Pumping system installing Pump Gate

4) Stormwater Drainage Pump Vehicle

Pumping Station has a fixed drainage position. For this reason, pumps cannot be operated in limited flooded areas (subway station premises, underpass roads, etc.).
For this reason, we will consider introducing a stormwater drainage pump vehicle that can transport the pump and prime mover.

Figure Example of Stormwater Drainage Pump Vehicle

2. Technical Cooperation Comportment

1) Improve early warning system

a) Collection and organization of information
b) Issues with current Standard Operation Procedure
c) Formulate a plan for improvement of the early warning system based on actual wastewater operation results.
d) Measures to coordinate with the Control Operation Centre (improvement of DRR methods)
e) Consideration of means of communication (disaster prevention radio, flood level board, etc.)

2) Public awareness campaign to prevent dumping of solid waste into existing wastewater systems (improved solid waste management)

a) Organize issues such as the degree of impact on the environment and human health caused by the inflow of waste
b) Identification of beneficial targets/areas for awareness-raising activities in socio-economic activities.
c) Holding WS in mobile classrooms at elementary and junior high schools
d) Brainstorming with sewerage departments, holding workshops through VE, etc., and sharing soft measures

14 Target population/groups

1) Characteristics of Ahmedabad city

In 2011, the urban area had a population of 6.35 million, ranking 47th in the world and 7th in the country. Agriculture and cotton textile industries are thriving. There are relatively many Muslims (about 20% of the population) and many mosques have been built. There are also many Jain temples. It is a modern city with many factories in the suburbs and is economically blessed. It was registered on the World Heritage List in 2017.

2) Population and population growth rate of Ahmedabad city

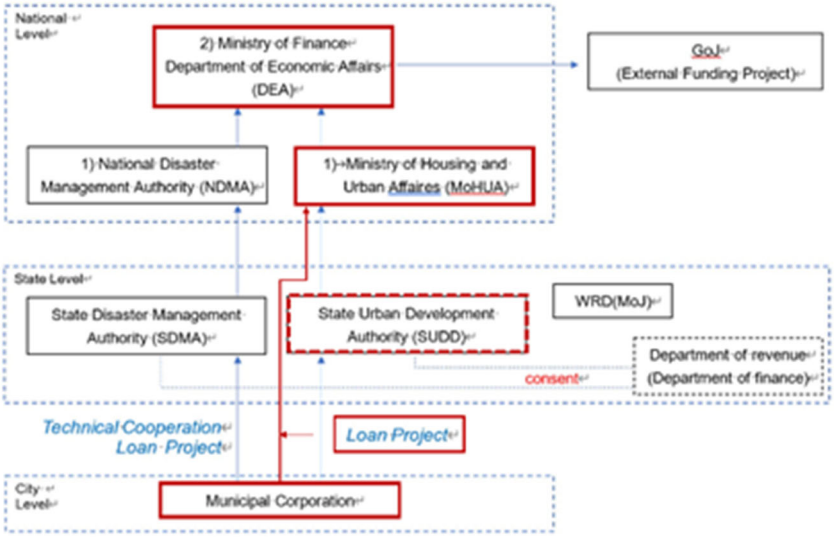
The current estimate population of Ahmedabad city in 2024 is 7,922,000, while Ahmedabad metro population is estimated at 9,035,000.
The current estimates of Ahmedabad city are based on past growth rate. As per provisional reports of Census India, population of Ahmedabad in 2011 is 5,577,940, while its urban / metropolitan population is 6,361,084.
Total no. of Slums in Ahmedabad city numbers 51,451 in which population of 250,681 resides. This is around 4.49% of total population of Ahmedabad city.

Table Ahmedabad Future Population 2021-2031

Ahmedabad	City	Metropolitan
2011	5,577,940	6,361,084
2021	7,251,000	8,269,000
2022	7,468,000	8,517,000
2023	7,692,000	8,772,000
2024	7,922,000	9,035,000
2025	8,159,000	9,306,000
2026	8,403,000	9,585,000
2027	8,655,000	9,872,000
2028	8,914,000	10,168,000
2029	9,181,000	10,473,000
2030	9,456,000	10,787,000
2031	9,739,000	11,110,000

Source:_Created by JICA Survey Team considering population and growth rate of census 2011

<table>
<tr><td rowspan="5">15</td><td>Details Action Plan (Year wise)</td><td colspan="2">Taking into consideration time required for all further steps to be taken, year wise action plans are summarized as follows:
FY 2025: Indian Approval of PPR
FY 2026: Preparation of DPR with Approval including Loan Agreement, ESIA including MP
FY 2027: Selection of the Consultant
FY 2028: Commencement of the Project
FY 2029 to 2032: Works implementation
Public consultations for dissemination of the project among the stakeholders shall be held at appropriate timings during the preparation of DPR</td></tr>
<tr><td>Year</td><td>Physical progress (%)</td><td>Financial Progress (Rs. in Crores)</td></tr>
<tr><td>2024-25</td><td></td><td>To be proposed in DPR</td></tr>
<tr><td>2025-26</td><td></td><td>To be proposed in DPR</td></tr>
<tr><td>2026-27</td><td></td><td>To be proposed in DPR</td></tr>
<tr><td>16</td><td>Quantitative and qualitative (verifiable) target indicators</td><td colspan="2">Following indicators are tentatively proposed for the project.
Operational indicator for the project target shall be followings;
- Annual maximum discharge volume (Stormwater drainage channel capacity m3/s)
This indicator confirms borrower’s operation of the facility maintained design value.
Outcome indicator for the project target shall be follows:
1) Main indicator
- Number of water logging victims,
- Amount of water logging damages,
- Reduction in number of water logging in the project area, and reduction in area in water logging area in the project area.
2) Sub indicator
- Water logging area (km2) due to targeted return period flood
- Number of flooded houses (households) due to targeted return period flood</td></tr>
<tr><td>17</td><td>Environmental sustainability of the project</td><td colspan="2">Negative environmental and social impact is expected during construction, however environmental impact will be monitored and controlled based on the recommendation in the ESIAMP.
After operation of the system, cleaning and maintenance of the systems (Pumping station, Urban drainage Tunnel) will contribute to reduce the negative environmental impact.</td></tr>
<tr><td>18</td><td>Land acquisition/Resettlement and Rehabilitation involved</td><td colspan="2">Land acquisition will be minimal, as the work will be performed on the existing Stormwater Drainage site.</td></tr>
<tr><td>19</td><td colspan="3">Linkages with Similar Projects</td></tr>
<tr><td>(i)</td><td>Information regarding projects in similar undertaken previously (add evaluation reports, if any)</td><td colspan="2">AMC's Stormwater Drainage project is currently in Phase-I implementation.
<u>Kharicut Canal Phase-I</u> is a project to construct an RCC Box in the existing Stormwater Drainage and is currently under implementation.
The Phase-II project is a continuation of this project and will be aligned with Phase-I and Phase-II.
<u>Remodelling of Chandrabhaga Drain</u> is Sabarmati River tributary.</td></tr>
<tr><td>(ii)</td><td>Does the project form part of the sectoral project? If yes, who are the other partners with details of the specific activities being undertaken by them.</td><td colspan="2">This project is not a sectoral project but an urban drainage project implemented by AMC.
However, since the urban drainage collecting shafts are planned within the public right-of-way, consultation with the park management department is required when the location of the collecting shafts are planned within the park during the planning feasibility study phase.</td></tr>
</table>

20	Approval Procedure	The Approval Procedure for project budget measures and loan measures is shown in the figure below. Approval of the plan by the State Urban Development Authority (SUDD) is required from the UDD within the AMC for approval of the detail design plan based on the plan preparatory study.  Figure Approval Process for Urban Drainage
21	Benefit of the Project	Following benefits are expected for a stormwater drainage project: - Reduced Flood Risk: the decrease in the area (hectares) or number of properties susceptible to flooding during a 5-year return period flood. - Improved stormwater drainage Efficiency: Decrease in time (hours) for floodwaters to recede after a rain event. - Enhanced Public Safety: Decrease in the number of evacuee, evacuation events during a storm event. - Protected Infrastructure: length and numbers of infrastructure (roads, bridges, school, hospital, governmental building, utilities) shielded from flood damage. - Protected Private Assets: numbers of assets (building, storage, store, houses) shielded from flood damage.

Appendix-7-2

PRELIMINARY PROJECT REPORT FOR PUNE

Preliminary Project Report (Pune)

<table>
<tr><td>1</td><td>Name of the Project</td><td colspan="5">Development of Stormwater Drainage and Sewerage Facility in PMC</td></tr>
<tr><td>2</td><td>Sectoral area</td><td colspan="5">Stormwater Drainage Development (Urban flood mitigation）
Sewerage Development (Sewage collection and treatment)</td></tr>
<tr><td>3</td><td>Total Financial Outlay</td><td colspan="5">INR 5,500 Cr., JPY 100billion in total (tentative)
(exchange rate:1Rp.=1.81JPY dated on July 30,2024)
1) Urban Drainage development
- Urban Flood Risk Management Program: INR2,800 Cr
- Expanded 11 villages: INR 1,200 Cr
- Expanded 23 villages: INR 1,500 Cr
2) Sewerage development
- Expanded 7/23 villages where is not covered by AMRUT 2.0: INR 900 Cr</td></tr>
<tr><td>4</td><td>Details of the external development agencies
(and the amount sought form each)</td><td colspan="5">Japan International Cooperation Agency （JICA）</td></tr>
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<tr><td></td><td>JICA</td><td>Pune Municipal Corporation (PMC)</td><td>UDD Maharashtra state government</td><td>MoHUA</td><td>DEA</td><td></td></tr>
<tr><td></td><td>INR 4,675 Cr
(85%)</td><td>INR 825 Cr
(15%)</td><td>(INR 4,675 Cr)
repayment</td><td>-
(-)</td><td>-
(-)</td><td>INR 5,500 Cr
(100%)</td></tr>
<tr><td>6</td><td>Project duration (dates/months/years)
Implementation Schedule</td><td colspan="5">Taking into consideration time required for all further steps to be taken, implementation plan is prepared as shown below:
For the period of construction works, the monsoon season is inclusive. Project duration is expected to be 96 months (8 years).</td></tr>
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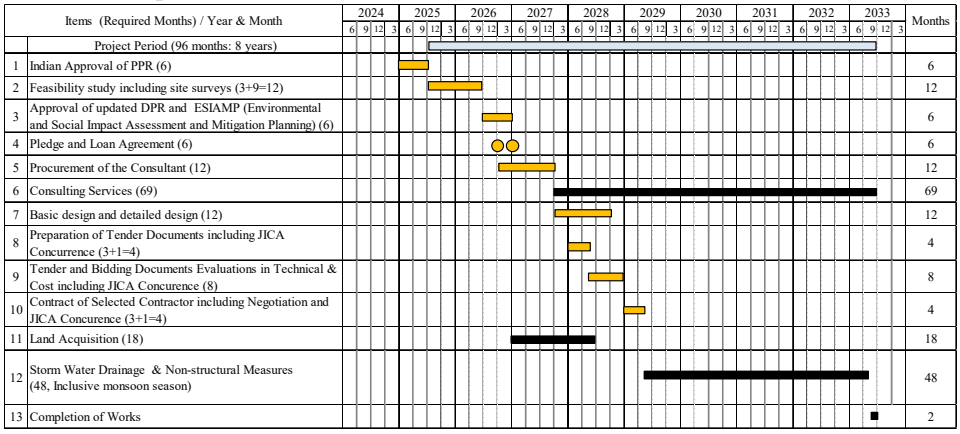
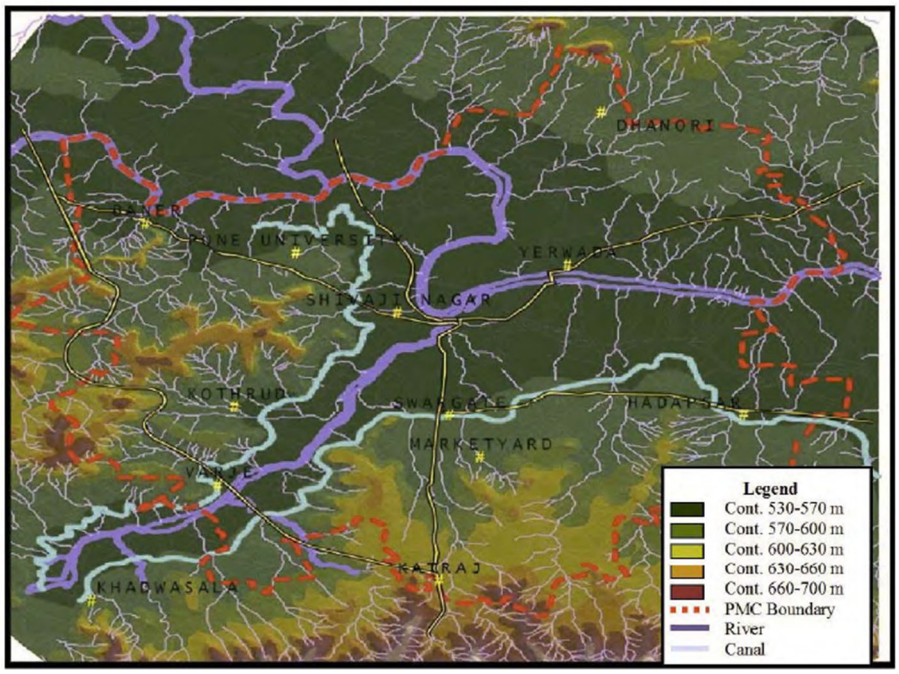


Tentative Schedule

- Approval of PPR by Indian authority: 0.5 years
- Feasibility Study including site survey and update DPR: 1 year
- Approval of Update DPR and ESIAMP (Environmental and Social Impact Assessment and Mitigation Planning) after submission of DPR: 0.5 years
- Procurement of Consultant: 1 year
- Design (Basic design and detailed design) and preparation of tender document: 1 year
- Procurement of contractor: 1.25 years (16months)
- Construction: 4 years (to be updated after determination of project scope)

7	Location of project	***Urban Drainage*** *Pu*ne is the 7th largest city in India, diverse and vibrant, famous for its climate and livability factors. The city is situated on the confluence of two rivers Mula and Mutha and at elevation of 560m (18 31'N, 7351'E) on leeward side of Western Ghats. The city is divided into 6 major sub-basins Nandoshi, Ram Nadi, Wagholi, AmbilOdha, BhairobaNala and Wadkinala. Since Pune is surrounded by hilly area for 20 km around the city, all the rainfall tends to go from hilly side into the center of the city. As a result, the city is vulnerable to riverine and urban flooding.  Figure Topographic Map of PMC The climate of the city is moderate with average rainfall of 722mm with wettest months being July and August with high to moderate rainfall in monsoon months. The temperatures range from 22 to 28 degrees with peak summers experiencing temperatures up to 42 degrees. Due to rapid urbanization and encroachments of natural streams (nallahs), frequent flooding occur in the city. There were serious floods as below: - In 2005 and 2006 with the rainfall of 1227.30mm and 1132.30mm. - In 2004 and 2009 with rainfall 63.50mm/hour and 64.50mm/hour - In Nov. with 2015 more than 90mm: Serious flooding at Kalas, Dhanori, Vimannagar, Vishrantwadi and Yerwada. - In 2019 with more than 180mm/hour rainfall - In 2019, 2021, and 2022 with more than 100mm/hour rainfall. In addition, the jurisdiction of Pune Municipal Corporation merged 11 villages in 2014 and 23 villages in 2021 and the drainage facility in the area is not well developed. In this regard, mitigation of flooding is required for entire Pune City. The target areas of the flood mitigation are flood prone point in PMC and expanded jurisdiction of PMC, namely 11 villages and 23 villages. **Sewerage Development** Pune City's population has been increased 8 times while city area has been expanded 2 times in the past 70 years.

Since the water pollution of Mula-Mutha River has been a major concern of the Pune City, “The Project for Pollution Abatement of Mula-Mutha River in Pune” was proposed in 2014 and it was implemented under Japanese ODA.

In addition, for the first expanded area (11 villages), “Master Plan for Sewerage Scheme for Pune City and Newly Merged 11 Villages" has prepared by PMC and sewerage development for the area is in progress.

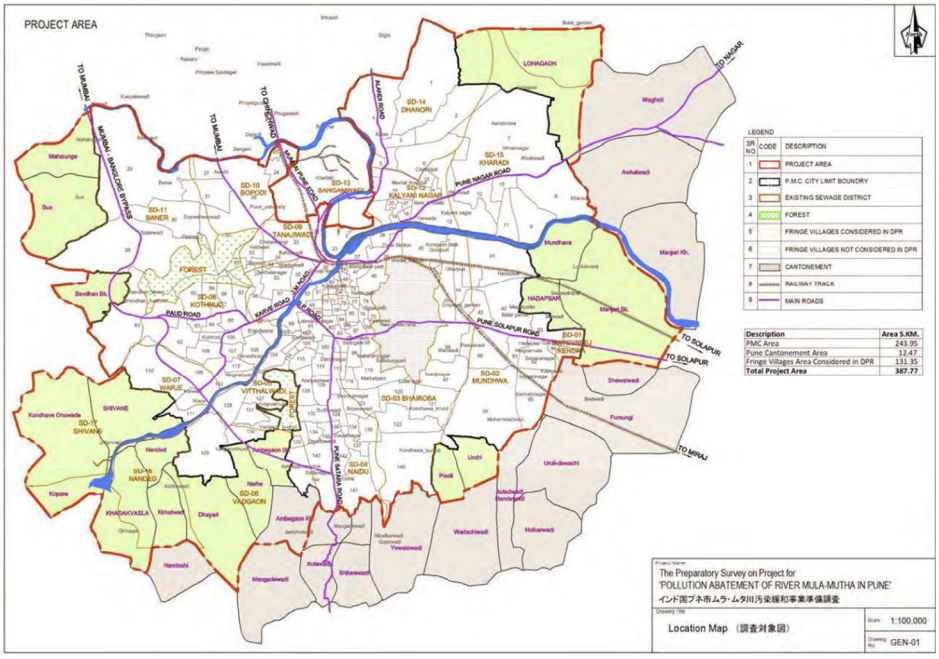
Moreover, targeting second expanded area (23 additional villages), the “Master Plan for Sewerage Scheme for Newly Merged 23 Village in Pune City” was prepared considering the necessity of sewerage development since sewage from this area is also flow into Mula and Mutha river.

Summary of Project Area

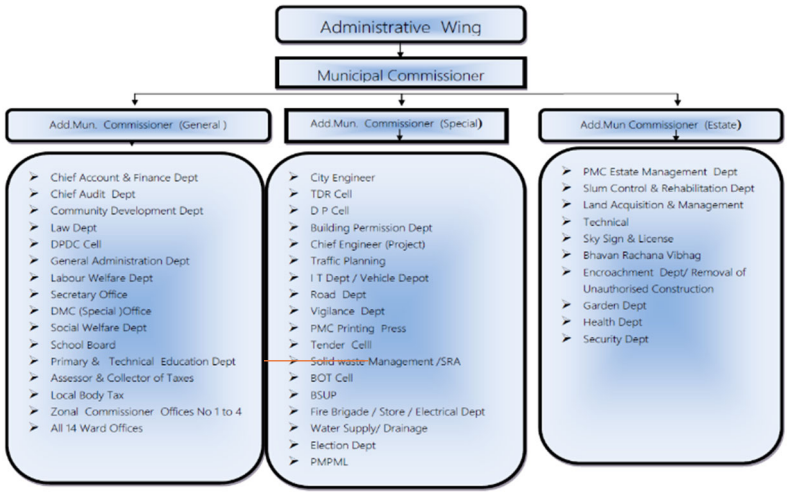
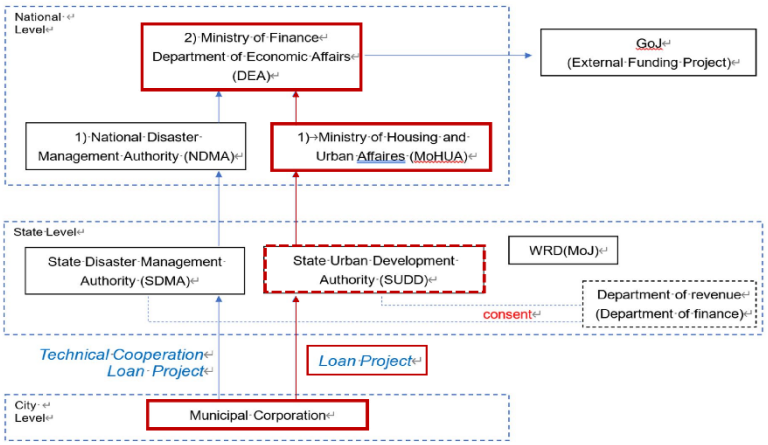
The project area of new sewerage and urban drainage development are as shown below.

Area	Urban Drainage	Sewerage
Original PMC Area	**Targeted** - NDMA project for 78 flood prone spots is under preparation with INR 286 Cr. - SWD developments based on updated SWD MP are requested to JICA.	Not targeted (JICA ODA is ongoing)
11 villages (merged in 2014)	**Targeted** - SWD developments based on updated SWD MP are requested to JICA.	Not targeted - Sewerage development under state budget is ongoing
23 villages (merged in 2021)	**Targeted** - SWD developments based on updated SWD MP are requested to JICA.	**Targeted** - Projects for 16villages will be under AMRUT 2.0 - Projects for remaining 7villages are requested to JICA

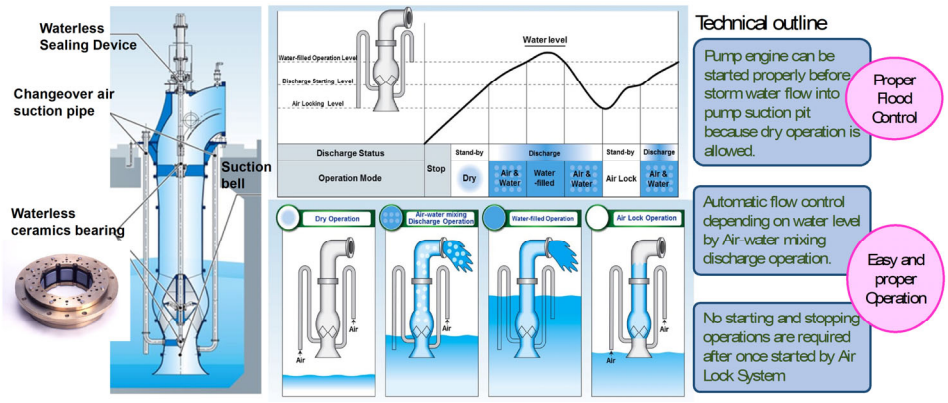
Project area is where highlighted in the drawing below.



8	Previous phases, if any	**1. Urban Drainage** 1) DPR of Phase I costing Rs.399,66.00 Lakhs was implemented in 4 basins (Baner (G), Wadgaon Sheri (M) Basin, Kharadi (N) Basin and Vadgaon (V) Basin) under JNNURM scheme. 2) DPR for storm water drainage works for frequently flooding areas in Pune city ➢ Phase 1- 162 flooding spots: done in 2016-17 ➢ Phase II- 110 flooding spots: done in 2018-19 ➢ Phase III- 80 frequently flooding Location: done in 2019-21 3) DPR for Urban Flood Management Program for City of Pune 2023 ➢ Phase I- 78 locations: will be financed by NDMA with INR 286 Cr. **2. Sewerage** 1) Pollution Abatement of Mula-Mutha River in Pune under JICA ODA including new installation, rehabilitation, update of sewer line, IPS, STP, Community toilet, GIS&MIS system, etc. The scope of project is attached in the Attachment-2. 2) Sewerage development in expanded 11 villages 3) Sewerage development in expanded 16/23 villages (AMRUT 2.0)	
9	Statutory Clearances required	The statutory Clearances are needed from the following Authorities: 1. Municipal Commission of Pune Municipal Corporation (PMC) 2. Pune Metropolitan Regional Development Authority (PMRDA) 3. Public Work Department (PWD) 4. National Highway Authority of India (NHAI) 5. State Highway Authority (SHA) 6. Forest Department (if any land comes under the department) 7. Transportation Department (for traffic diversion planning) 8. Environment Clearance 9. Gas Pipeline Authority (for LPG supply) 10. Water Department (if any pipeline is on the Right of Way during drain and sewer construction)	
10	Statutory clearance obtained	No statutory clearance has been obtained.	
11	Details of Feasibility Studies done, if any	**1. Urban Drainage** 1) DPR to improve 60 flood prone locations in PMC (prepared but not yet implemented) 2) DPR of drainage development for 11 villages (prepared but not yet approved) 3) DPR of drainage development for 23 villages (under preparation) **2. Sewerage** 1) DPR of sewerage development for 23 villages (under preparation)	
12	Implementing Agency	PMC	The PMC is the urban local body, tasked to provide the basic urban services to its area and populace. Through its City Development Plan (CDP), PMC reaffirmed its commitment to develop and implement strategies and programs with an aim to bring about focused development in infrastructure and provide its citizens a high quality of life and universal access to basic urban amenities while maintaining the rich cultural and heritage base of the city. In terms of management of urban drainage and sewerage facilities, PMC's mission is to provide residents (customers) with cost-effective and qualify services. Organization of PMC is as below.

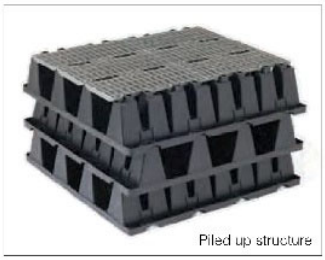
			 Figure Organization Chart of PMC
	・Central line ministry	MoHUA	The Ministry of Housing and Urban Affairs (MoHUA) is responsible for formulating policies, supporting and monitoring programmes and coordinating the activities of various Central Ministries, State Governments and other national authorities related to urban development, town and country planning besides addressing development issues. The MoHUA is implementing several funding scheme such as the Amrut scheme, the Jawarharlal Nehru National Urban Renewal Mission (JnNURM), etc. Once the project is officially approved by Maharashtra UDD, the official request is submitted to DEA through MoHUA as below.  Figure Project Approval Procedure
	・Administrative State Government	Maharashtra	In the state of Maharashtra, UDD is responsible for all matters relating to: - Administration of Municipal Council(s), Nagar Panchayat(s), and Small Town Committees; - Administration of the State Town and Country Planning Organization; - Control and supervision of the Planning and Development Authorities; and - Urban development including development controls, urban sanitation, urban drainage, urban sewerage and urban traffic,

			transportation etc. In this regard, once the project is formulated, UDD will authorize PMC to implement the project and arrange budgetary provision to the PMC.
13	Basic design of the project		
	Goals and Objectives		1. Urban Drainage To improve the current water logging situation in target area (city center and expanded 11+23 villages) according to the latest Central Public Health & Environmental Engineering Organization (CPHEEO) manual published in 2019, recommended design rainfall return period for urban drainage is a 5-year storm. 2. Sewerage To improve the water quality in the Mula, Mutha and Mula-Mutha rivers by augmenting sewage collection systems and sewage treatment facilities in expanded 23 villages of PMC. It also includes other countermeasures required for the pollution abatement and thereby improving the sanitation and living conditions of people who reside in Pune City and in the watershed of the downstream area.
	Activities involved		In accordance with the goals and objectives of the project, following activities are involved: 1) Consulting Services on survey, Feasibility Study, Detailed design/Basic design, Tendering Assistance, and Construction Supervision 2) Capacity Development to enhance ➢ operation and maintenance capacity of Urban drainage facility, Sewage treatment plant, Pumping station, and Johkasou (On-site treatment system) (tentative), etc. 3) Construction works for urban drainage facility 4) Construction works for sewerage facility 5) Environmental monitoring during construction 6) Public consultations for the dissemination of the project components among the stakeholders
	Outputs of the project (Project Scope)		1) SWD part Project scope of SWD works will be determined in the SWD master plans which are under preparation for 23 villages in 2023 and will be prepared for remaining area of PMC in 2026. Construction works for urban drainage facility: a. Remodeling of existing nallah (total length L=**m) b. Improvement and installation of drainage pipe/culverts (L=**m) c. Pumping Stations with related facilities (* sites) d. Underground tank (* sites) e. Filtration facility (* sites) 2) Sewerage Development for 7 villages Project scope will be confirmed once the target of AMRUT 2.0 is officially determined. Construction works for sewerage facility: a. Improvement and installation of sewerage collection pipe/culverts (L=**m) b. Intermediate Pumping Stations with related facilities (* sites) c. Sewage treatment plant (* site with **MLD) d. Household connection (* sites)

		Outcome of the project	By implementing the project, following outcomes are envisaged: **1. Urban Drainage component** 1) Minimizing impacts such as traffic disruption, general assets and infrastructures damages due to water logging 2) Minimizing water borne diseases and health risk with minimizing water logging 3) Minimizing losses of payment for the residents 4) Strengthen resilience on urban flooding by: a) Improved Drainage Facilities b) Interconnections of outfalls to avoid spillage c) Minimizing water logging d) Improving rain water conservation and its usage e) Prevention of Backflow from the Mula-Mutha River by providing Gates (tentative) f) Minimizing choking of drains with covers on the drains to avoid the intervention of solid waste 5) Improving living standards and business activities 6) Minimizing flood response activities 7) Minimizing costs for rehabilitation and reconstruction works due to urban flooding **2. Sewerage Component:** 1) Improving urban sanitation in the target area (23 villages) 2) Reducing pollution load to the Mula-Mutha River and their tributaries (nallahs), and improving their water environment 3) Minimizing water borne diseases and health risk by collecting and treating sewage by centralized or decentralized systems 4) Strengthen resilience on urban sanitation by: a) Installation and rehabilitation of STP and IPS b) Installation and rehabilitation of collection system 5) Improving living standards and business activities
		Foreign Component and Technical Coop. component *Note: Project scope and its applicable technologies are not yet determined. Therefore, variety of Japanese technologies applied for SWD and sewerage works are indicated.	**1. Foreign Component: Urban Drainage** <u>1) Drainage Pump (Stand-by Operation)</u> The features of this system is as follows: - Full speed operation is possible even no rainwater in a pump suction pit. → Suitable for discharging peak flow coming into downstream in a short time. - Simple steps to start and less time to re-start. → Easy to re-start and reduction of the number of backup pump. - Reduction of electric consumption (Air operation is 5～20% and air-water mixed operation is 20～100% compared with full operation (100%)). → Operation and maintenance cost is lower than normal type pump.  Figure Vertical mixed flow pomp not require pump suction pit

2) Underground Storage Tunk

"Plastic media for underground storage or filtration facilities" to mitigate flood damage from urban drainage, is developed by foreign companies as shown below.



3) Compact pumping station by adopting Submergible Pumps for Pump Gate

The gate is installed in the drainage and is not integrated with the pump. In recent years, countries with advanced urban drainage technology have developed compact and highly economical equipment that integrates pumps and gates, eliminating the need for bypass channels for the purpose of drawing in storm water.
Consider introducing this latest equipment.

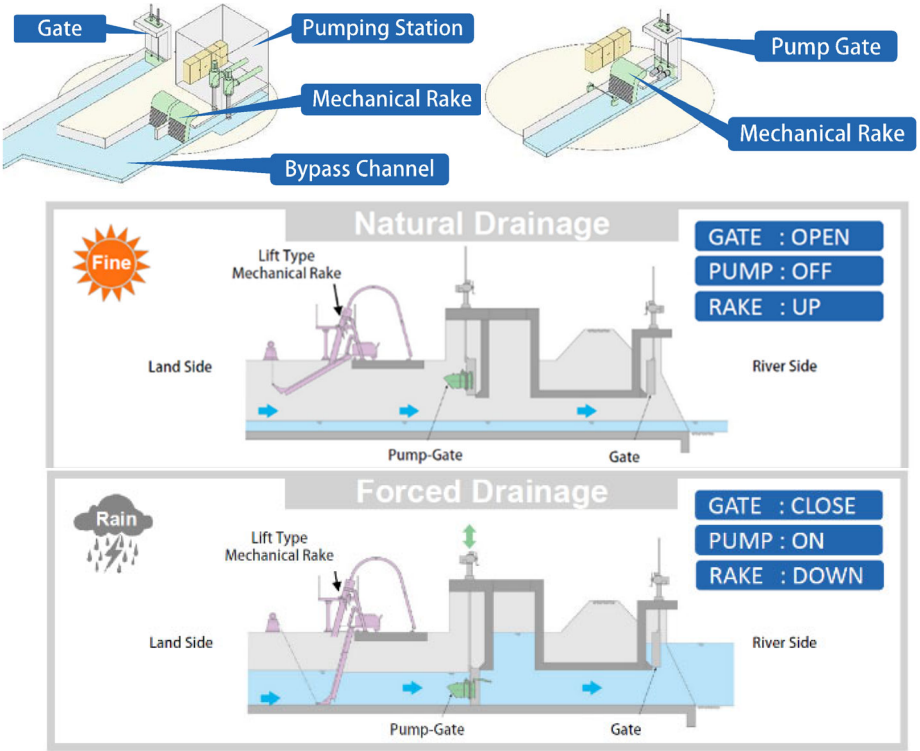


Figure Submergible Pumping system installing Pump Gate

4) Drainage Pump Vehicle

Pumping Station has a fixed drainage position. For this reason, pumps cannot be operated in limited flooded areas (subway station premises, underpass roads, etc.).
For this reason, we will consider introducing a drainage pump vehicle that can transport the pump and prime mover.

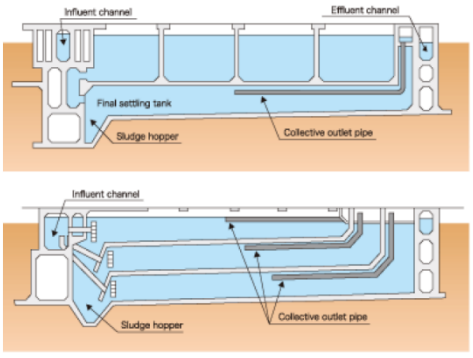
Figure Example of Drainage Pump Vehicle

2. Foreign Component: Sewage Treatment

1) (Compact type) Conventional Activated Sludge Process (CAS process)

Since available space is limited at the existing treatment plants and site acquisition which takes time should be avoided as much as possible, the facilities have been constructed utilizing various kinds of lands in some countries.
Therefore, one treatment plant is constructed above a retention pond and another treatment plant has all its water tanks in the underground with the administrative building on top of them.
The deep type conventional activated sludge process, which uses a multi-layered sedimentation tank and a deep layer reactor, is a method which has been developed and adopted in Osaka in the 1960s. It has been implemented already in the western part of the Manila Metropolitan area in the Philippines by a Japanese company and enjoyed a high evaluation.

Examples of Multi-story Wastewater Treatment Facilitie

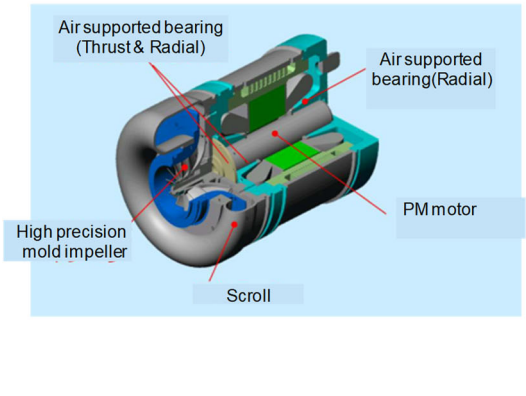


Area required for wastewater treatment (m^2/m^3)
Japanese Average : 0.8 (m^2/m^3) Osaka City : 0.27 (m^2/m^3)

2) Energy Saving Type Blower and Diffuser

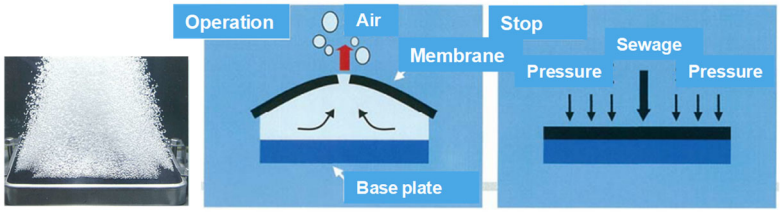
The power consumption of a blower used for a reactor is estimated to be about 20% of the total power consumption at a sewerage treatment plant. An energy-saving blower has achieved about 10% to 15% energy savings by adopting an air-supported

bearing with no mechanical loss and a permanent magnet (PM) motor suitable for an inverter control.

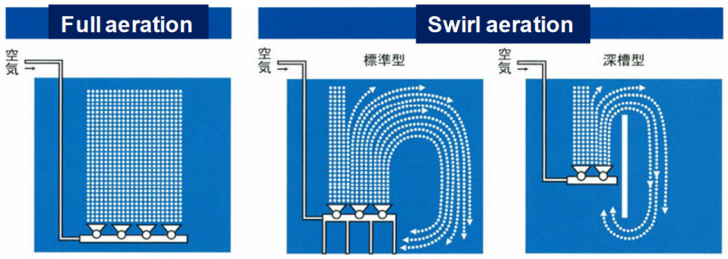


< Appearance of blower package >

The diffuser which generates ultra-fine air bubbles using special membrane materials has higher oxygen transfer efficiency and less pressure loss compared to the conventional diffusers. Therefore, it is effective for energy saving of a blower.
The power consumption of a blower is estimated to be about 20% lower by introducing an ultra-fine air bubble diffuser plate. The diffuser can support full aeration as well as swirl aeration.



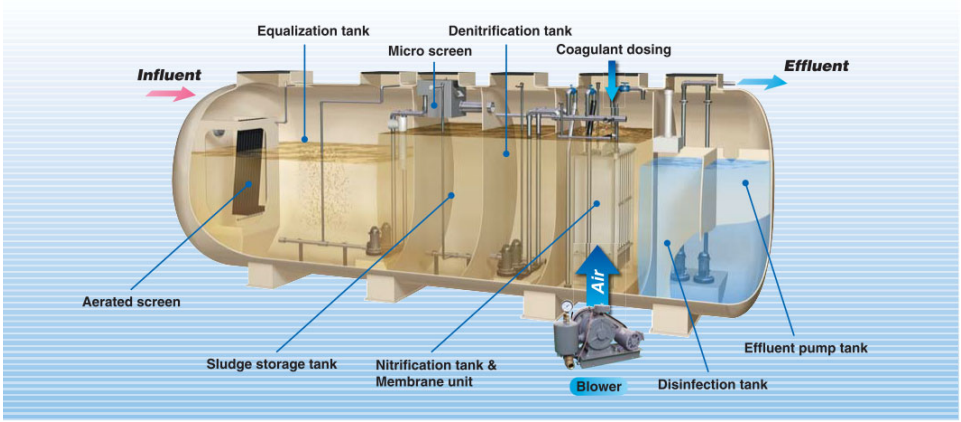
Ultra fine bubble　　Less clogging mechanism



Flow arrangement

3) Johkaso Technology for On-site Treatment Area

The on-site treatment for communities is effective and reasonable in the suburb areas to avoid the installation of too long pipelines and pumping stations to convey wastewater to the sole treatment plant in the large sewerage area. Johkaso technology is useful for the on-site treatment and the installation and O&M works are easy with the compact unit. After many experiences of installing Johkaso for a long time in Japan, the technologies were improved and the biological nutrient removal (BNR) to remove nitrogen and phosphorus can be achieved in some types. Depending on the discharged water body and the influent water quality, simpler type to treat BOD and nitrogen, or only BOD can be selected and the system gets simpler and more reasonable. In case of 200 m3/day unit, wastewater generated from 1,000 persons can be treated.



2. Technical Cooperation Comportment

1) Improve early warning system

a) Collection and organization of information
b) Issues with current Standard Operation Procedure
c) Formulate a plan for improvement of the early warning system based on actual wastewater operation results.
d) Measures to coordinate with the Control Operation Centre (improvement of DRR methods)
e) Consideration of means of communication (disaster prevention radio, flood level board, etc.)

2) Public awareness campaign to prevent dumping of solid waste into existing wastewater systems (improved solid waste management)

a) Organize issues such as the degree of impact on the environment and human health caused by the inflow of waste
b) Identification of beneficial targets/areas for awareness-raising activities in socio-economic activities.
c) Holding WS in mobile classrooms at elementary and junior high schools
d) Brainstorming with sewerage departments, holding workshops through VE, etc., and sharing soft measures

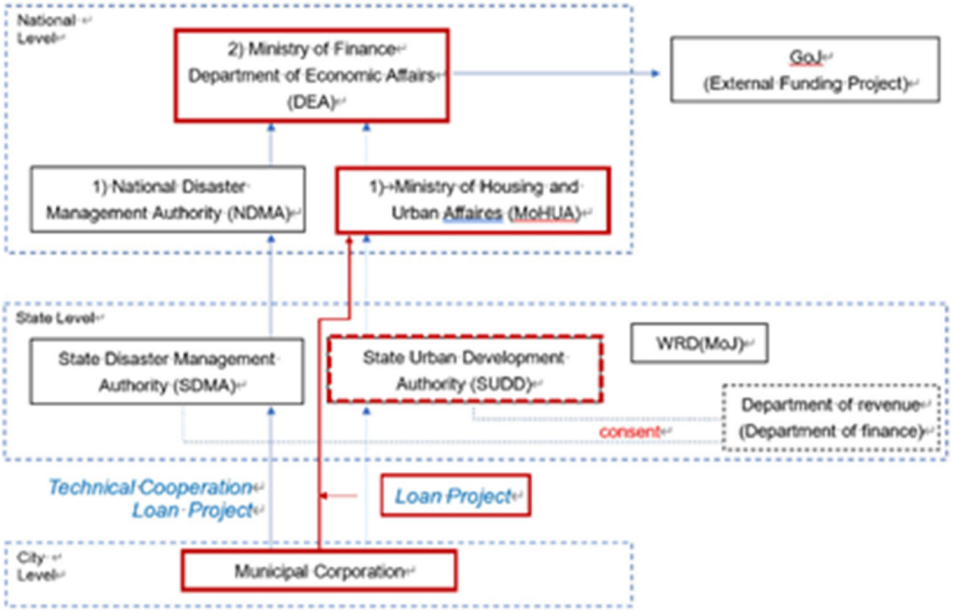
14	Target population/groups	1) Population in Pune City PMC is spread over an area of 500 sq. km. and has 3.4 million residents. 2) Population in 11 villages: PMC is spread over an area of 80.7 sq. km. and has 0.3 million residents. 4) Population in 23 villages were estimated as below: In the executive summary of "Preparation of Master Plan/Detailed Project Report of Sewerage Scheme for Newly Merged 23 Villages in Pune Municipal Corporation" the population in 23 villages were estimated as below:

Year	Population
2024	6,98,055 lakhs
2039 (15 years after)	11,34,288 lakhs
2054 (30 years after)	24,32,460 lakhs

Source: Preparation of Master Plan/Detailed Project Report of Sewerage Scheme for Newly Merged 23 Villages in Pune Municipal Corporation

<table>
<tr><td>15</td><td>Details Action Plan (Year wise)</td><td colspan="2">Taking into consideration time required for all further steps to be taken, year wise action plans are summarized as follows:
FY2024: Preparation of DPR
FY 2025: Indian Approval of PPR
FY 2026: Preparation of JICA FS including Loan Agreement, ESIA including MP
FY 2027: Selection of the Consultant
FY 2028: Commencement of the Project
FY 2029 to 2032: Works implementation
Public consultations for dissemination of the project among the stakeholders shall be held at appropriate timings during the preparation of DPR</td></tr>
<tr><td></td><td></td><td><table><tr><th>Year</th><th>Physical progress (%)</th><th>Financial Progress (Rs. in Crores)</th></tr><tr><td>2024-25</td><td></td><td>To be confirmed</td></tr><tr><td>2025-26</td><td></td><td>To be confirmed</td></tr><tr><td>2026-27</td><td></td><td>To be confirmed</td></tr></table></td></tr>
<tr><td>16</td><td>Quantitative and qualitative (verifiable) target indicators</td><td colspan="2">1. <u>Urban Drainage Component</u>
Following indicators are tentatively proposed for the project.
Operational indicator for the project target shall be followings;
- Annual maximum discharge volume (Drainage channel capacity m3/s)
This indicator confirms borrower’s operation of the facility maintained design value.
Outcome indicator for the project target shall be follows:
1) Main indicator
- Number of water logging victims,
- Amount of water logging damages,
- Reduction in number of water logging in the project area, and reduction in area in water logging area in the project area.
2) Sub indicator
- Water logging area (km2) due to targeted return period flood
Number of flooded houses (households) due to targeted return period flood
2. Sewerage Component
1) Main indicator
- Target sewage amount treated at STP (m3/day)
- Served population (capita)
- Effluent quality (mg/L-BOD and mg/L -SS)
2) Sub indicator
- Water quality of Mula-Muta River (mg/L-BOD and mg/L-DO)</td></tr>
<tr><td>17</td><td>Environmental sustainability of the project</td><td colspan="2">Negative environmental and social impact are expected during construction and operation of STP, however environmental impact will be monitored and controlled based on the recommendation in the ESIAMP.
After operation of the system, cleaning and maintenance of the systems (Pumping station, etc.) will contribute to reduce the negative environmental impact.</td></tr>
<tr><td>18</td><td>Land acquisition/Resettlement and Rehabilitation involved</td><td colspan="2">The following land acquisitions will be needed.
1) Urban Drainage
・New Pumping Station planned location
・Holding Tunk location

2) Sewerage Development
・New Sewage Treatment Plant
・New Pumping Station planned location</td></tr>
<tr><td>19</td><td colspan="3">Linkages with Similar Projects</td></tr>
<tr><td>(i)</td><td>Information regarding projects in similar undertaken</td><td colspan="2">1) Pollution Abatement of Mula-Mutha River in Pune under JICA ODA including new installation, rehabilitation, update of sewer line, IPS, STP, Community toilet, GIS&MIS system, etc.</td></tr>
</table>

	previously (add evaluation reports, if any)	
(ii)	Does the project form part of the sectoral project? If yes, who are the other partners with details of the specific activities being undertaken by them.	This project is not a sectoral project but an urban drainage and sewerage project implemented by PMC. However, consultation with the park management department is required when location of the facility such as STP or PS is planned within the park during the planning feasibility study phase.
20	Approval Procedure	The Approval Procedure for project budget measures and loan measures is shown in the figure below. Approval of the plan by the Urban Development Authority (SUDD) is required from the UDD within the PMC for approval of the detail design plan based on the plan preparatory study.  Figure Approval Process for Urban Drainage
21	Benefit of the Project	Following benefits are expected for a storm water drainage project: - Reduced Flood Risk: the decrease in the area (hectares) or number of properties susceptible to flooding during a 5-year return period flood. - Improved Drainage Efficiency: Decrease in time (hours) for floodwaters to recede after a rain event. - Enhanced Public Safety: Decrease in the number of evacuee, evacuation events during a storm event. - Protected Infrastructure: length and numbers of infrastructure (roads, bridges, school, hospital, governmental building, utilities) shielded from flood damage. - Protected Private Assets: numbers of assets (building, storage, store, houses) shielded from flood damage. Following benefits are expected for a sewerage project: - Improvement of quality of life in the target villages - Improvement of water quality of Mula-Muta River

Attachment-1: Scope of Potential Project

Drainage project

SR NO	SWD
1	Nandan Euphoria Society, Tingare nagar.
2	Laxmi nagar, Dhanori.
3	Patrakar nagar to sheti mahamandal chauk.
4	Kaikadi aali Bhawni Peth

SR NO	CULVERT
1	one-5-Runval Park Market
2	Zone-4-Khopade Nagar Gujarwadi
3	Zone-4-Kamthe Nagar Yewalewadi
4	Zone-4-Kondhwa Smashanbhumi
5	Zone-4-Sasane Nagar Rd, Ramtekdi Industrial
6	Zone-4-Universal Public School - Hadapsar
7	Zone-2-Mantri Park
8	Zone-1-(Behind Vitthal Mandir Dhanori
9	Zone-4-Jadhav Nagar Mangadewadi
10	Zone-1-Pansare Nagar Behind The Leaf Society
11	Zone-4-Hills Dales
12	Zone-4-Dobarwadi Wanvadi
13	Zone-4-Kalubai Mandir Wanowri
14	Zone-4-AIPT Depot Solapur Road Wanowri
15	Zone-4-Sinhagad College Campus
16	Zone-4-Govt Leprosy Hospital D/S
17	Zone-2-Jijai Chouk Kothrud
18	Zone-1-Banana Leaf Hotel Alandi Road
19	Zone-4-Lulla Nagar Kondwa Culvert
20	Zone-4-Takale Wasti
21	Zone-2-Shakuntala Udhyan
22	Zone-2-Gokhale Nagar
23	Zone-2-PVPIT College
24	Zone-1-Oasis Society Tithe Wasti Kharadi
25	Zone-4-Aabhuday Society Wanowri
26	Zone-4-Green Metro, Tilekar nagar Culvert

SR NO	BOX DRAIN
1	Adarsh Nagar Nalla to Saint Arnold School.
2	Maharashtra Housing board, yerwada.
3	DSK CHOWK BIKANER SWEETS DHAYARI
4	Dhor Galli Bhawani Peth
5	D- Mart To Kalepadal road
6	Ganraj Chowk Kalwad Wasti
7	Nivdungi vithoba Mandir Nana Peth
8	The Pentecostal church Ghorpadi (B.T. kawa
9	Airport road to 509 Chauk, Tingare nagar.
10	Dhankude plot culvert to Depot
11	Pasalkar Chowk +
12	Upper Indira nagar to VIT chowk
13	Commerce Zone – Mental Hospital, phule naga
14	Mogare vasti wanowri
15	Dagadushet mandir Shivaji Road
16	Hazrat Pathan Shah Dargah Aalandi Road.
17	Runval Park Market Yard
18	Wakhar mahamandal Neharu Road
19	Kalyan Bhel
20	Jay Bawani Hotel Satara Road
21	Bhandarkar Research Institute road
22	Hotel Blue Diamond to River Band Garden.
23	RAUT BAUG,3 HATTI CHOWK,DHANKWADI
24	Padmavati Satara Road
25	Training Batalian Aalandi Road.
26	Upper Indira nagar Upperotta
27	SP College to Alka Chowk Tilak Road
28	Shree hospital nala to Don Boscov school
29	D mart Punyadham aashram

Attachment-2: Scope of Water Pollution Abatement of Mula-Mutha River in Pune

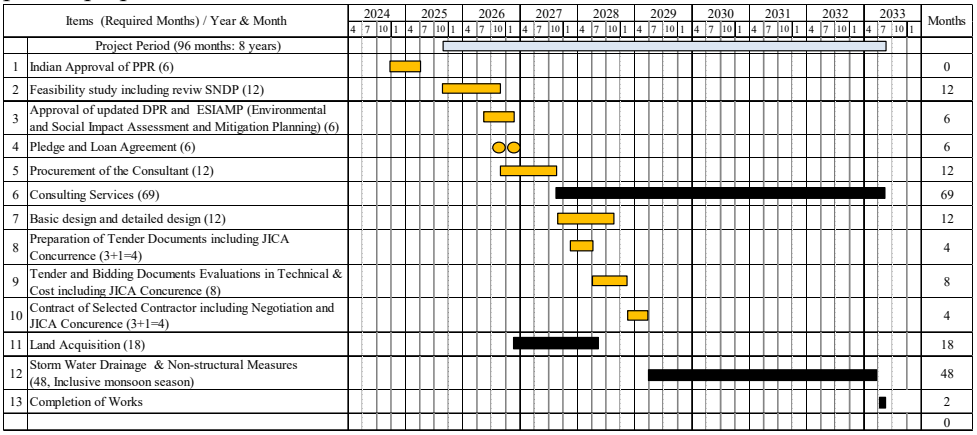
Category	Component	Details (Specifications)
A. Sewer	1. Construction of Main/Sub-main and Branch sewers in Baner area	43.0 Km
	2. Construction of Main sewers in the left bank area of Mutha River and Mula-Mutha River and Central area of PMC	33 Km: Sewer No. 1, 2, 6, 8a, 8b, 9, 10, 12, 13a, 13b, 14a, 14b, 15, 16, 17, 18, 19, 23
	3. Construction of Main sewers in the right bank area of Mutha River and Mula-Mutha River	37.6 Km: Sewer No. 3, 4, 5, 7, 20, 21, 22; Sewer No 5 is arranged to include in this group, though located in item 2
B. Intermediate Pump Station (IPS)	4. Rehabilitation of Kalyani Nagar IPS	
	5. Rehabilitation of New Kasba IPS	
	6. Rehabilitation of Old Kasba IPS	
	7. Rehabilitation of Topkhana IPS	
C. Sewage Treatment Plant (STP)	8. Construction of STP at Mastya Beij Kendra	Treatment capacity: 7 MLD, SBR
	9. Construction of STP at Mundhwa	Treatment capacity: 20 MLD; SBR
	10. Construction of STP at Bhairoba Nallah including Bio-gas power generation plant	Treatment capacity: 75 MLD; A_2O
	11. Construction of STP at Naidu including Bio-gas power generation plant	Treatment capacity: 127 MLD; A_2O
	12. Construction of STP at Vadgaon Bk	Treatment capacity: 26 MLD; EA
	13. Construction of STP at Warje	Treatment capacity: 28 MLD; EA
	14. Construction of STP at Botanical Garden	Treatment capacity: 10 MLD; EA
	15. Construction of STP at Tanajiwadi	Treatment capacity: 15 MLD; EA
	16. Construction of STP at Dhanori	Treatment capacity: 33 MLD; EA
	17. Construction of STP at Baner	Treatment capacity: 25 MLD; SBR
	18. Construction of STP at Kharadi	Treatment capacity:30 MLD; SBR
	19. Installation of Central SCADA System	Located at Naidu STP site
D. Community Toilet Facility	20. Construction of Community Toilet Facilities in the slum areas and fringe villages	24 units
E. GIS & MIS	Capacity Development for PMC in application of GIS and MIS for sewers and STPs/ISPs	
F. Public participation, Institutional Capacity & Environmental management	Strengthening in Public awareness/participation and institutional capacity, and facilitation of implementation of Environmental Management Plan (EMP), and Environmental Monitoring Plan (EMoP)	
G. Consulting Services	(1) Detailed Design, Bidding and construction for Sewers (2) Design Built: Basic Design, Bidding and Construction Supervision for IPS and STPs, Community Toilet Facility, and Central SCADA System	(1) Sewers: Detailed design, assistance for Bidding and construction supervision (2) IPSs & STPs, Community Toilet facilities and Central SCADA: Basic Design, assistance for Bidding and Construction Supervision (3) GIS& MIS and Public Part., Institutional Capacity & Environment: Supervise Contractors

Note: Sewer Numbers in item "A is refereed to those in sewerage DPR

Appendix-7-3

PRELIMINARY PROJECT REPORT FOR HYDERABAD

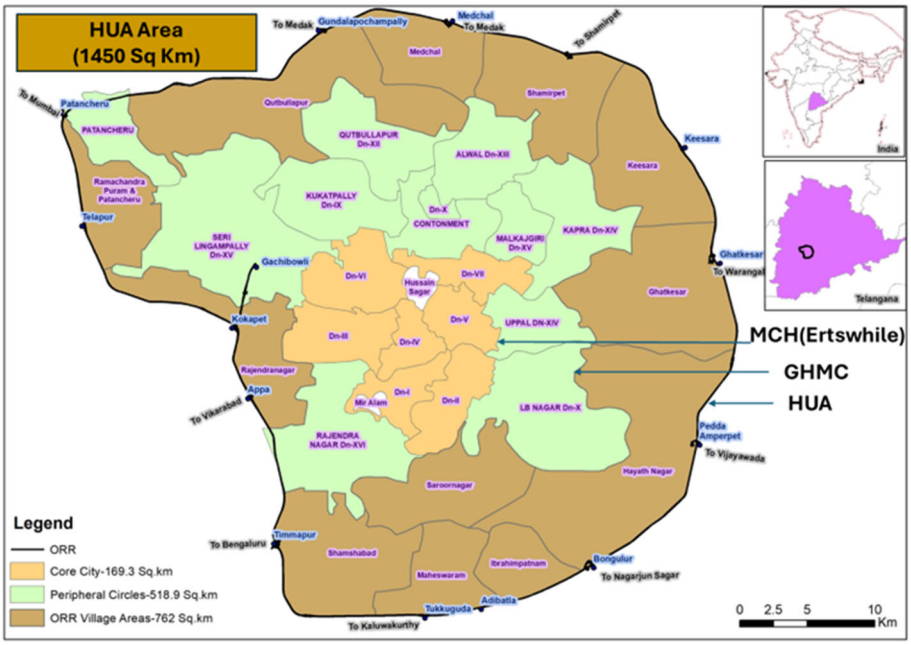
Preliminary Project Report (Hyderabad)

<table>
<tr><td>1</td><td>Name of the Project</td><td colspan="5">Remodelling Of Existing Drains & Construction of New Drains including Protection, Conservation & Beautification of Lakes in Hyderabad Urban Agglomeration</td></tr>
<tr><td>2</td><td>Sectoral area</td><td colspan="5">Storm Water Drainage (Urban flood mitigation)</td></tr>
<tr><td>3</td><td>Total Financial Outlay</td><td colspan="5">INR 5,135.15 Cr., [Based on SNDP Report, July 2022 (Feasibility Report)],)
JPY 92.9 billion (exchange rate:1Rp.=1.81JPY dated on July 30,2024)
Note: As of December 2024, 42 priority subprojects proposed in SNDP-II with the amount of INR 676.28 Cr. are planning to be implement in advance under Indian State budget.</td></tr>
<tr><td>4</td><td>Details of the external development agencies (and the amount sought form each)</td><td colspan="5">Japan International Cooperation Agency (JICA)</td></tr>
<tr><td>5</td><td colspan="6">Financial arrangement
<table>
<tr><td>Total external assistance</td><td colspan="4">Counterpart funds being made available by</td><td>Total</td></tr>
<tr><td>International Donor</td><td>Implementing Agency</td><td>State Government</td><td>Central Government</td><td>Others, if any</td><td rowspan="2"></td></tr>
<tr><td>JICA</td><td>GHMC</td><td>MAUD, Department Govt of Telangana</td><td>MoHUA</td><td>DEA</td></tr>
<tr><td>TBD
(85%)</td><td colspan="2">TBD
(15%)</td><td>(-)</td><td>(-)</td><td>TBD
(100%)</td></tr>
</table></td></tr>
<tr><td>6</td><td>Project duration (dates/months/years) Implementation Schedule</td><td colspan="5">Taking into consideration time required for all further steps to be taken, implementation plan is prepared as shown below:


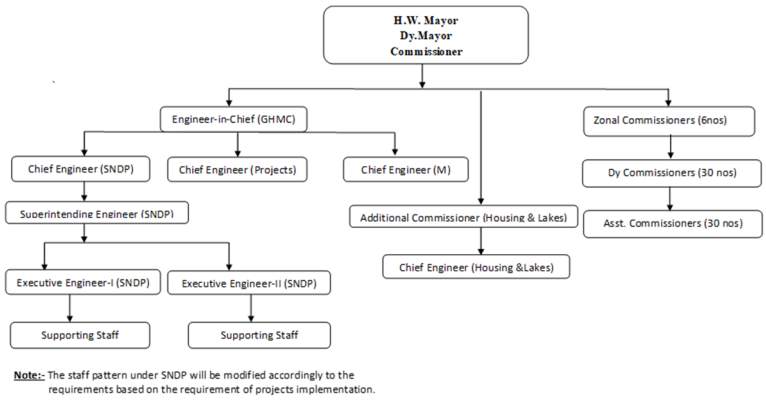
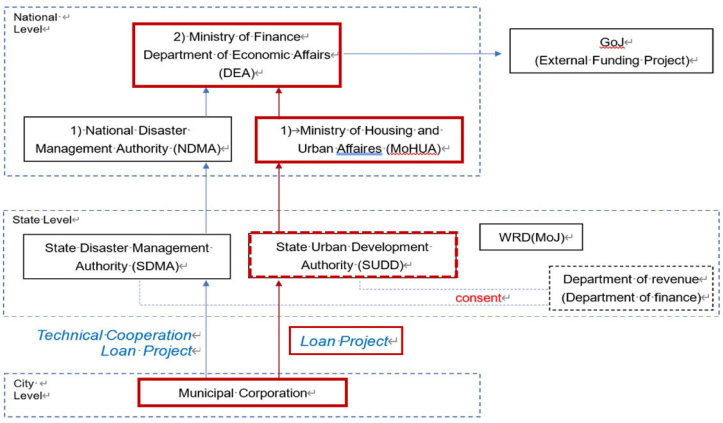
Note: For the period of construction works, the monsoon season is inclusive. Project duration is expected to be 93 months (7.8 years) after the commencement of the project.

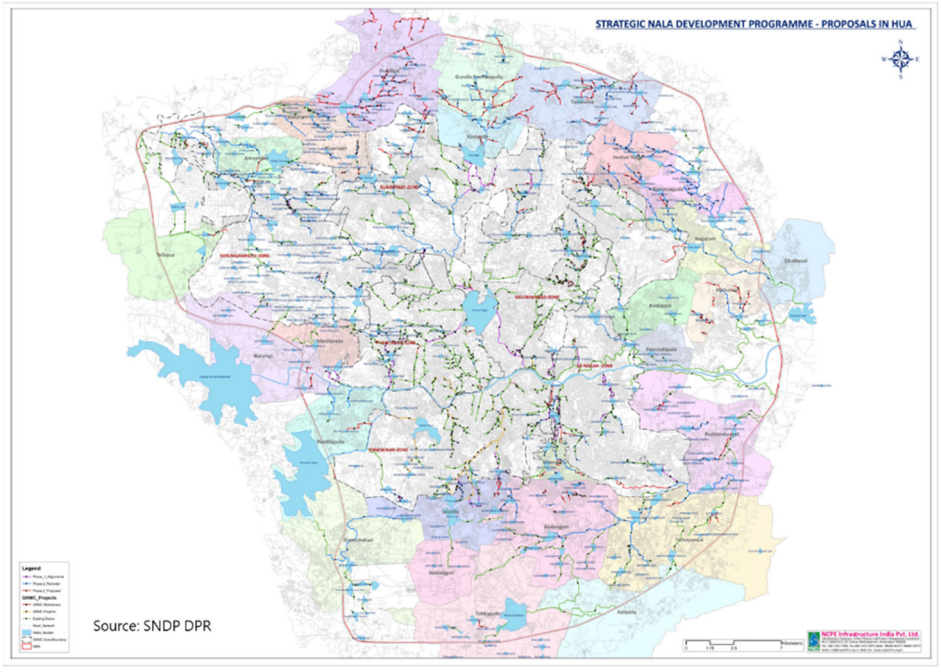
Note: The above implementation schedule is desirable proposal. There are risks of delay throughout the project by delay of approval procedures by both Indian and Japanese relevant authorities, land acquisition procedure, necessary action due to environmental and social clearance, etc.

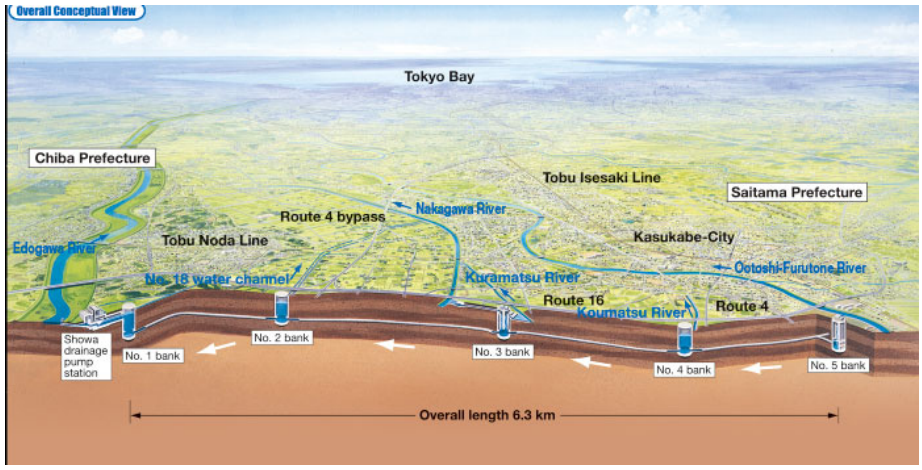
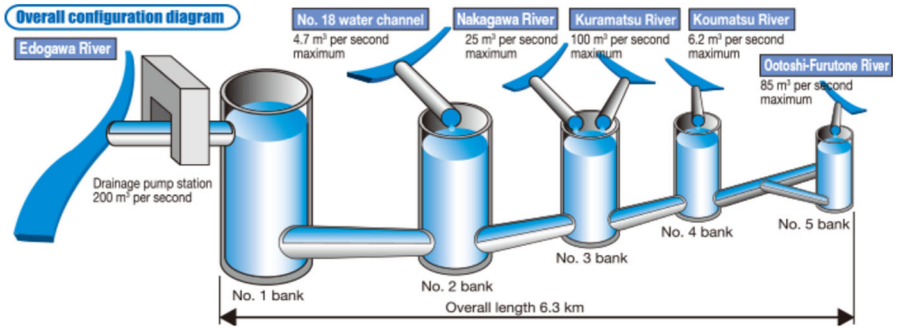
Tentative Schedule:
- JICA Feasibility Study and review SNDP: 12 months
- Pledge and Loan agreement: 3 months
- Procurement of consultant for the project by GHMC: 12 months
- Design works and preparation of tender document: 12 months
- Procurement of the contractor by GHMC: 12 months (PQ can be overlapped)
- Construction Period: 48 months.</td></tr>
</table>

7	Location of project	Hyderabad is the capital of Telangana State with the population of about 14 million and located in South India. The Area of Municipal corporation of Hyderabad was **169.3 Sq.km**. In April 2007 Amalgamation of 12 surrounding municipalities into MCH area and formed Greater Hyderabad Municipal Corporation (GHMC) with an area of **688.2 Sq.km**. Hyderabad's remarkable development trajectory over the past two decades can be attributed to a confluence of factors, including its thriving IT sector, renowned educational institutions, supportive government policies, and proactive administrative reforms, coupled with robust infrastructure and burgeoning housing projects  During 2008-2026, 158 Km long Outer Ring Road (ORR) is developed aligning along the outer periphery of the GHMC area. ORR connects with the Inner ring road through 29 radial roads. After the development of ORR. The City of Hyderabad has expanded to the ORR Limits. Now the area under ORR Limits is **1450 sq.km** which is Hyderabad Urban Agglomeration (HUA) Hyderabad is subjected to Major floods in the year 1908, 1954,1962,1970, 2000, 2008, and 2020. The recent unprecedented extreme rainfall event of October 2020 exposed not only the shortcomings in the storm water drainage system of Hyderabad, but it also showed how ill prepared the administration was in handling the problem. Despite having 13 major storm water drains, over 150 small medium lakes and 3 large lakes (Himayatsagar, Osmansagar and Hussainsagar) the rainfall created havoc in several parts of the city as the flood waters could not be absorbed by the existing system of tanks and drains. The estimated loss was about Rs.6000 Crore, over 3700 People were Evacuated to Safer Places. The State Govt. Compensated Rs.10,000 to the houses in which water had entered. About 33 Persons lost their Life. On Oct 14th, 2020, State Government has given 2 days holidays to nonessential workers and urged everyone to stay at home The state government took a serious note of the property destruction and loss of life due to the Flood in Oct -2020 and launched Strategic Nala Development Programme (SNDP) in Nov-2020 to Plan, develop and maintain comprehensive Storm water Drainage system in Hyderabad Urban Agglomeration (HUA). A dedicated new project wing under the GHMC to operate SNDP in mission mode with an allocated exclusive team, besides association with regular wings of Municipal Administration and Urban Development (MAUD) like O & M, Town Planning and projects wing of GHMC,

		Projects wing of HMWSSB, Irrigation Department, CDMA, and Surrounding ULBs within Outer Ring Road (ORR)	
8	Previous phases, if any	**Previous Studies** **(i) Kirloskar Consultant Study on Strom water Drainage for MCH area (175 Sq.km) in the Year 2002.** *Some of the Proposal Made in the Kirloskar Study Report are Implemented. Viz., Hussain Sagar Surplus Nala, Murki Nala, Gurram Chervu Nala, Chemical Nala (Except Some Portion due to Land constraints) with JNNURM Funds and GHMC Own Funds.* **(ii) Voyants Solution Pvt Ltd Prepared Master Plan for Storm water Drainage in in GHMC area (650 Sq.km) in 2010.** *Only Few Secondary Nalas are Implemented Based on Voyants Report* **(iii) Feasibility Study for Remodeling of Existing Drains & Construction of New Drains including Protection, Conservation & Beautification of Lakes in Hyderabad Urban Agglomeration.** *It includes an assessment of total project cost of the works (INR 6230.94 Crores which is based on Schedule of Rates 2020-21) identified for immediate implementation based on high deficiency / non availability of drain network, inundation points, number of properties effected etc.* *Proposed Works under Phase I – INR 1095.77 Crores (Under Implementation)* *Proposed Works under Phase II- INR-5135.15 Crores (Proposed to be taken up in Packages based on the availability of Funds)*	
9	Statutory Clearances required	The statutory Clearances are needed from the following Authorities: 1. Greater Hyderbad Municipal Corporation (GHMC) 2. Municipal Administration and Urban Development Department (MA&UD) 3. National Highway Authority of India (NHAI) 4. State Roads and Building Department 5. Traffic Police (For Traffic Diversion -if any) 6. Environmental Clerance 7. Forest Department 8. Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) for Shifting of Water/Sewer Lines (if any) 9. Telangana State Power Distribution Company Limited (TSPCDL) for Shifting of Transformers (if any) 10. Town Planning Department of GHMC for Removing of Encroachments/Compensation for acquiring of Private Land (if any)	
10	Statutory clearance obtained	GHMC will Coordinate with all Stake Holder and Obtain Necessary Clearances as required	
11	Details of Feasibility Studies done, if any	Feasibility Study/Preliminary Study for Remodeling of Identified Existing Drains & Construction of New Drains is prepared.	
12	Implementing Agency	GHMC	The main Implementing Agency for this project is the Greater Hyderabad Municipal corporation (GHMC). GHMC's Strategic Nala Development Program (SNDP), Division will be involved in all phases (planning, project preparation, financing, implementation, O&M, and evaluation) of urban drainage project in Hyderabad Urban Agglomeration (HUA).

			The organization chart of SNDP is shown in the figure below.  Figure Organogram of SNDP (Storm Water Department)
	・Central line ministry	MoHUA	The Ministry of Housing and Urban Affairs (MoHUA) is responsible for formulating policies, supporting and monitoring programs and coordinating the activities of various Central Ministries, State Governments and other national authorities related to urban development, town and country planning besides addressing development issues. MoHUA is undertaking schemes to create facilities to manage urban drainage and sewerage. MoHUA is implementing several funding schemes such as the Amrut scheme, the Jawarharlal Nehru National Urban Renewal Mission (JnNURM), etc. Once the project is officially approved by Telangana MA&UDD, the official request is submitted to DEA through MoHUA as below.  Figure Project Approval Procedure
	・Administrative State Government	MA&UDD Telangana	In the state of Telangana, MA&UDD is responsible for all matters relating to: - Administration of Municipal Corporation(s), Municipal Council(s), Nagar Panchayat(s); - Administration of the State Town and Country Planning Organization; - Control and supervision of the Planning and Development Authorities; and

			- Urban development including development controls, urban sanitation, urban drainage, urban sewerage and urban traffic, transportation etc. In this regard, once the project is formulated, MA&UDD will authorize GHMC to implement the project and arrange budgetary provision to the GHMC.
13	Basic design of the project		
	Goals and Objectives		Reduction of urban flooding up to the rainfall in case of climate change.
	Activities involved		In accordance with the goals and objectives of the project, following activities are involved: 1) Consulting Services on survey, Feasibility Study, Detailed Design, Tendering Assistance, and Construction Supervision 2) Capacity Development to enhance the operational capacity 3) Remodeling of Existing Drains and Construction of New Drains (Primary and Secondary Drains) for a length of about 451 Kms 4) Public consultations for the dissemination of the project components among the stakeholders
	Outputs of the project (Project Scope)		1) Project Components are consisting of the following works: a. Construction of new Storm water drains b. Construction of Box Drains c. Remodeling of Existing of Strom Water Drains 2) Location of Facilities The Location of the proposed Works is Spread across entire HUA Area as shown in Picture below.  3) Technical Information (i)The Proposal for augmentation on existing SWD system in Hyderabad, is made considering design rainfall intensity of 53 mm/hr which corresponds to 60 minutes duration of storm for a retune period of on once in a 5year Storm. (ii) IDF Curves following the CPHEEO Manual of Strom water Drainage System (2019) based on the past 30 Years rainfall Data (1990-2020) collected from IMD

		Outcome of the project	By implementing the project, following outcomes are envisaged: 1) Minimizing social impacts such as traffic disruption, and economic losses 2) Prevents Damage to the Public Infrastructure, general assets including Vehicles, Other Equipment and infrastructures damages due to water logging 3) Minimizing risk of water borne diseases and plays critical role in maintaining public health 4) Strengthen resilience on urban flooding by: a) Improved Drainage Facilities b) Interconnections of outfalls to avoid spillage c) Minimizing water logging d) Improving rainwater conservation and its usage e) Minimizing choking of drains with covers on the drains to avoid the intervention of solid waste 5) Improving living standards and business activities 6) Minimizing flood response activities 7) Minimizing costs for rehabilitation and reconstruction works due to urban flooding
		Foreign Component and Technical Coop. component *Note: Applicable technologies are not yet determined. Therefore, variety of Japanese technologies applied for SWD works are indicated.	**1. Foreign Component** <u>1) Underground Tunnel</u> There are multiple projects of this type of underground facility in Japan. One similar project with regards to urban drainage facilities is the "Underground Tunnel" (a massive underground discharge tunnel) technology applied in Tokyo Outer Underground Discharge Tunnel as shown in following figures.   Overall configuration diagram

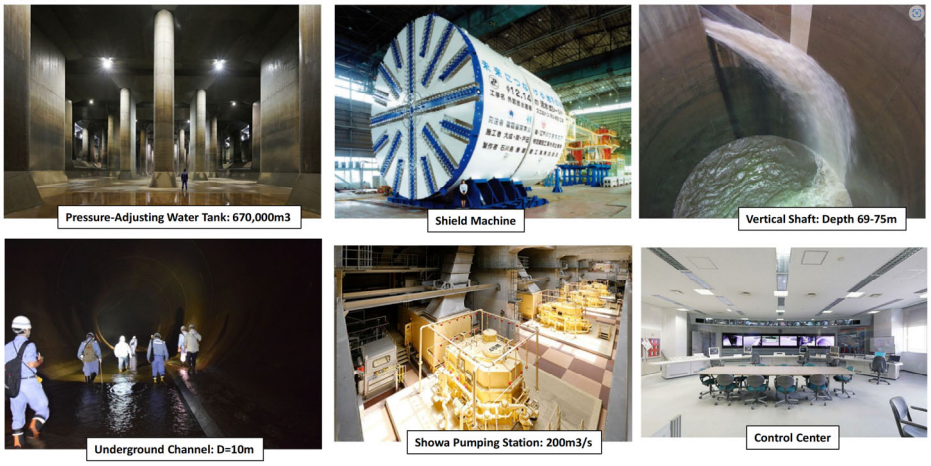


Figure: Example of Tokyo (Outer Underground Discharge Tunnel)

2) Regulation pond

When there is a limit to the flow capacity of the downstream river channel, regulation pond temporarily stores part of the floodwaters, and preventing flooding downstream. The stored water is discharged by pump after the downstream water level drops.

The below figure is an example of the Nogawa Osawa Regulation Pond. The regulation pond has two reservoirs, and floodwaters first flow into the first reservoir near the intake. If the capacity of the first reservoir is exceeded, it flows into the second reservoir. This structure takes into consideration maintenance aspects such as reducing the effort required for cleaning.

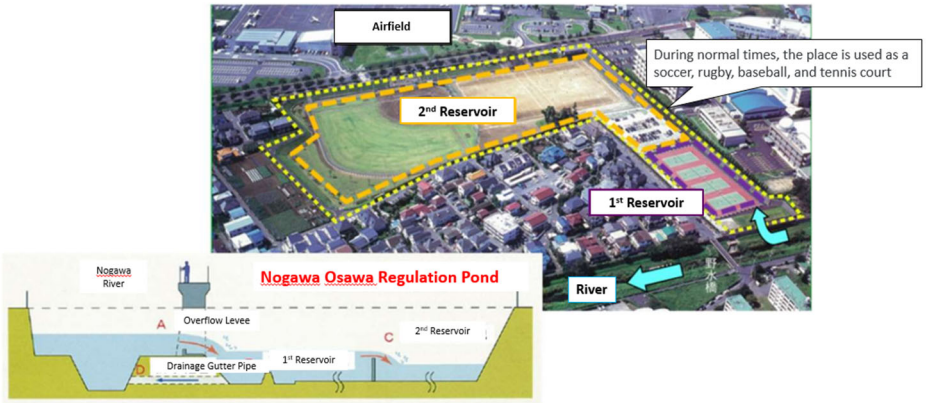


Figure: Example of Tokyo (Regulation pond)

3) River Retarding Basin

This is a method of developing part of the underground space in an urban area as an underground storage tank to prevent flooding. As an example, Yokohama City in Kanagawa Prefecture is utilizing the underground space of the Kawawa rail yard of the Yokohama Municipal Subway Green Line as an underground reservoir to achieve early flood control effects and minimize the impact on the river environment. This area is at high risk of flooding due to the nearby Tsurumi River and Kawawa River. The operation of underground storage during heavy rainfall is as follows.

- When the water level of the Tsurumi River rises due to heavy rainfall, water flows in through the “overflow dike,” which is one level lower than the dike upstream of the underground storage area.
- By storing water in underground reservoirs, the flow volume of the Tsurumi River is reduced, and the surrounding and downstream areas are protected from flood

risk.

- After rainfall, when the water level of the Tsurumi River drops, and there is no danger of it rising again, the gates of the drainage culverts downstream of the underground storage is opened and the water is gradually flow into the river.

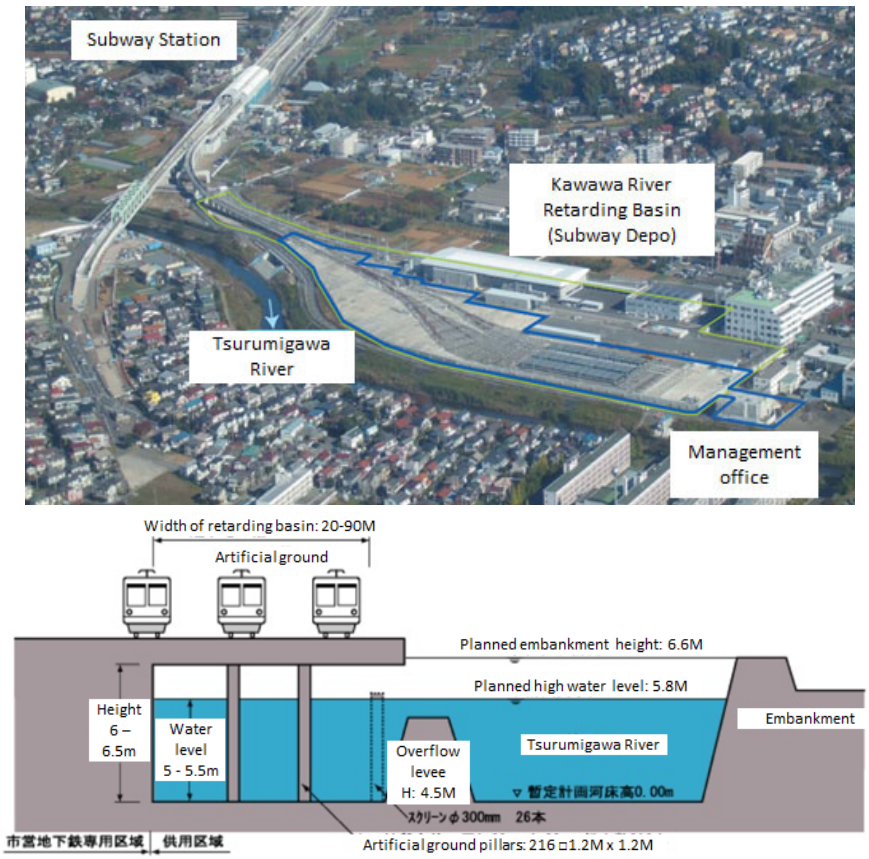


Figure: Example of Yokohama (River Retarding Basin)

4) Drainage Pump (Stand-by Operation)

The feature of this system is as follows:

- Full speed operation is possible even no rainwater in a pump suction pit. → Suitable for discharging peak flow coming into downstream in a short time.
- Simple steps to start and less time to re-start. → Easy to re-start and reduction of the number of backup pump.
- Reduction of electric consumption (Air operation is 5～20% and air-water mixed operation is 20～100% compared with full operation (100%)). → Operation and maintenance cost is lower than normal type pump.

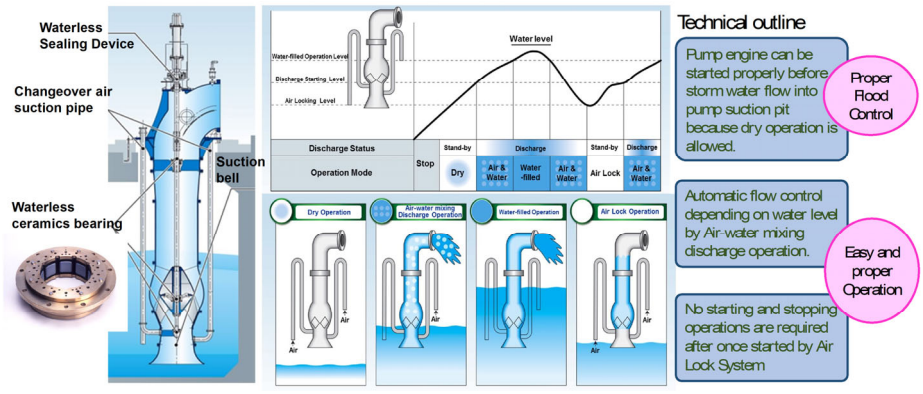


Figure Vertical mixed flow pump not require pump suction pit

5) Underground Storage Tunk

"Plastic media for underground storage or filtration facilities" to mitigate flood damage from urban drainage, is developed by foreign companies as shown below.

Figure Plastic Storage Tank

6) Compact pumping station by adopting Submergible Pumps for Pump Gate

Currently, the Haji Ali Pumping Station, which has started operation with BRIMSTONOWAD-II at MCGM, uses a submersible pump type.
However, the gate is installed in the drainage and is not integrated with the pump.
In recent years, countries with advanced urban drainage technology have developed compact and highly economical equipment that integrates pumps and gates, eliminating the need for bypass channels for the purpose of drawing in storm water.
Consider introducing this latest equipment.

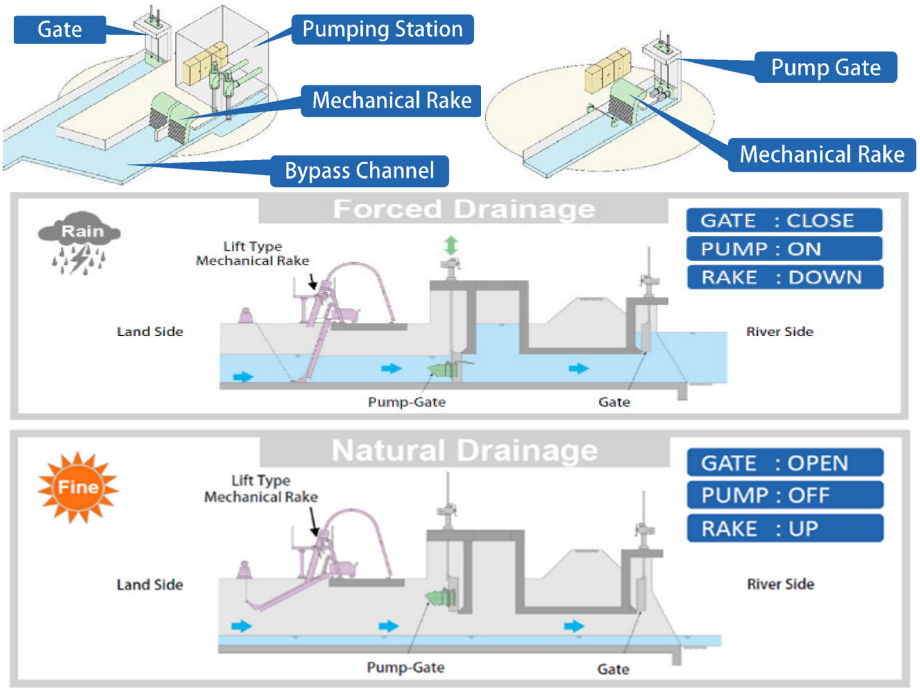


Figure Submergible Pumping system installing Pump Gate

			7) Drainage Pump Vehicle Pumping Station has a fixed drainage position. For this reason, pumps cannot be operated in limited flooded areas (subway station premises, underpass roads, etc.). For this reason, we will consider introducing a drainage pump vehicle that can transport the pump and prime mover.  Figure Example of Drainage Pump Vehicle
			2. Technical Cooperation Component 1) Improve early warning system a) Collection and organization of information b) Issues with current Standard Operation Procedure c) Formulate a plan for improvement of the early warning system based on actual wastewater operation results. d) Measures to coordinate with the Control Operation Centre (improvement of DRR methods) e) Consideration of means of communication (disaster prevention radio, flood level board, etc.) 2) Public awareness campaign to prevent dumping of solid waste into existing Storm/Sewer systems (improved solid waste management) a) Organize issues such as the degree of impact on the environment and human health caused by the inflow of waste b) Identification of beneficial targets/areas for awareness-raising activities in socio-economic activities. c) Holding WS in mobile classrooms at elementary and junior high schools d) Brainstorming with Drainage/sewerage departments, holding workshops through VE, etc., and sharing soft measures
14	Target population/groups		1. Characteristics of the City of Hyderabad Hyderabad lies along river Musi, which is one of the tributaries of river Krishna. The city was spread over 55-60 Km2 during the 1908 floods. Post-Independence, with its multiple advantages, Hyderabad grew rapidly as the home for public sector organisations, many national research institutes and pharmaceutical

companies. The inflow of foreign direct investment and coming in of global IT majors such as Microsoft, Apple, Google, Infosys and e-commerce giants such as Amazon, Walmart to IKEA have transformed Hyderabad. Consequently, now, Hyderabad transformed into a sprawling metropolis with an area of 1450 Sq.km population and Population of about 14 million.

2. Hyderabad Population and population growth rate in GHMC

According to the 2011 Census, GHMC covering an area of 688.2 Sq.km had a population of 7.6 million.

S.no	Name of Area	Census Population				
		1971	1981	1991	2001	2011
1	Hyderabad Core (169.3 Sq.km)	1607396	2545836	3058093	3655983	3718651
2	Peripheral Circles of Hyderabad Including OU & Contoment Area (518.9 Sq.km)	0	0	1252427	2028662	3886752
				4310520	**5684645**	**7605403**

The population density was estimated at approximately 21964, 7490 persons per square kilometer in MCH area and Peripheral Circles respectively. The average rate of growth between 1991-2001 is 3.19% and from 2001-2011 is 3.38%.

3. Hyderabad Urban Agglomeration projected future population growth

Project population growth in HUA based on the Sewerage Master of Hyderabad prepared by Hyderabad HMWSSB in year 2020 is follows:

S.no	Name of Area	Area (Sq.km)	Census Population					Projected Population			
			1971	1981	1991	2001	2011	2018	2021	2036	2051
1	Hyderabad Core (169.3 Sq.km)	169.3	1607396	2545836	3058093	3655983	3718651	4429147	4659849	5790205	6920550
	Population Density		9494	15037	18063	21595	21965	26162	27524	34201	40877
2	Peripheral Circles of Hyderabad Including OU & Contoment Area (518.9 Sq.km)	518.9	0	0	1252427	2028662	3886752	5782868	6594175	10665694	14723169
	Population Density				2414	3910	7490	11144	12708	20554	28374
3	Area within ORR and Beyond GHMC (762 Sq.Km)	762						2375571	2520967	3392892	4566386
	Population Density							3118	3308	4453	5993
							7634858	**12624892**	**13815223**	**19903546**	**26279356**

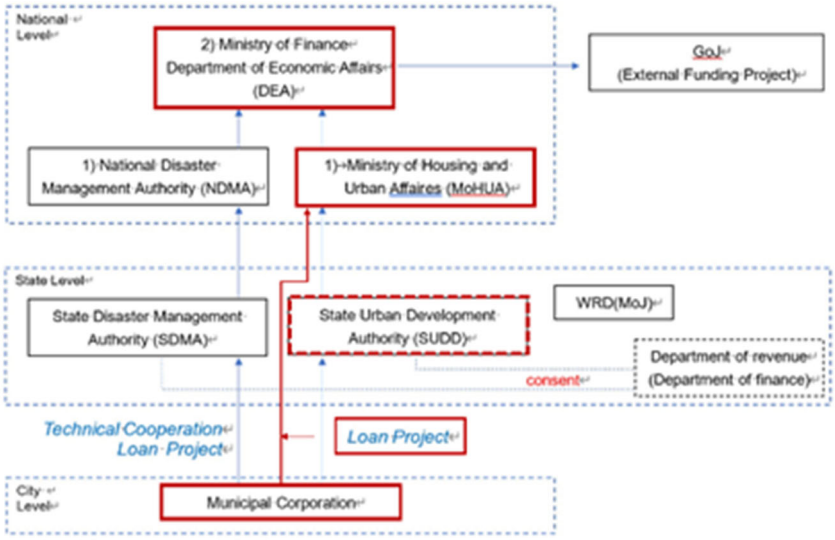
- The core city i.e., erstwhile MCH is not expected to experience a significant population growth rate as it is densely populated areas.
- The population growth rate is expected to be higher in the Peripheral area in GHMC
- The Present Population in HUA is about 14 million and it is expected to reach 20 million by 2036.

15	Details Action Plan (Year wise) (tentative)	Taking into consideration time required for all further steps to be taken, year wise action plans are summarized as follows: FY 2025-2026: JICA FS and update of DPR with Approval including Loan Agreement, ESIA including MP FY 2026: Procurement of Consultant FY 2027: Basic design FY 2027-2028: Selection of the Contractor FY 2028-32: Construction and Construction Supervision

Year	Physical progress (%)	Financial Progress (Rs. in Crores)
2024-25		To be proposed in DPR
2025-26		To be proposed in DPR
2026-27		To be proposed in DPR

16	Quantitative and qualitative (verifiable)	Outcome indicator for the project target shall be follows: - Aggregate number of incidents of waterlogging reported in a year

<table>
<tr><td></td><td>target indicators</td><td>- Coverage of Storm water Drainage Network</td></tr>
<tr><td>17</td><td>Environmental sustainability of the project</td><td>Negative environmental and social impact are expected during construction, however environmental impact will be monitored and controlled based on the recommendation in the ESIAMP.</td></tr>
<tr><td>18</td><td>Land acquisition/Resettlement and Rehabilitation involved</td><td>Yet to be Determined during the Detailed Project Report (DPR) Stage of the Project</td></tr>
<tr><td>19</td><td colspan="2">Linkages with Similar Projects</td></tr>
<tr><td>(i)</td><td>Information regarding projects in similar undertaken previously (add evaluation reports, if any)</td><td>Phase I of Immediate Priority Works (SNDP-I) are taken with a Project Cost of INR 1095.77 Crores with Financial support of 69% from State Bank India (Nationlised Bank) and Balance 31% from GHMC Own Funds. Status of Works being Implemented under SNDP- I as below:
<table>
<tr><th rowspan="2">Sl. No</th><th rowspan="2">Area</th><th rowspan="2">Project Cost (INR Cr)</th><th rowspan="2">Length (km)</th><th colspan="3">No of works</th></tr>
<tr><th>Sanctioned</th><th>Completed</th><th>Under Progress</th></tr>
<tr><td>1</td><td>GHMC</td><td>747.45</td><td>50.54</td><td>37</td><td>29</td><td>8</td></tr>
<tr><td>2</td><td>Surrounding ULBs</td><td>238.00</td><td>18.95</td><td>21</td><td>9</td><td>12</td></tr>
<tr><td></td><td>Total</td><td>985.45</td><td>69.49</td><td>58</td><td>38</td><td>20</td></tr>
</table>
There are 58 works in Phase-I out of which 38 works are completed and 20 work are under progress. The scope of the SNDP-1 project is as under:
1. Rehabilitation and augmentation of existing Drains.
2. Construction of new drains in RCC using M30 Ready Mix Concrete.
3. Construction of RCC Box Drain (M30 Ready Mix Concrete) along the alternate Alignments</td></tr>
<tr><td>(ii)</td><td>Does the project form part of the sectoral project? If yes, who are the other partners with details of the specific activities being undertaken by them.</td><td>This project is not a sectoral project, but an urban drainage project implemented by GHMC.
During the Planning and development of storm water drainage the Sewer Lines which are connected to the Existing Storm water drains (if any) need to be disconnected from Storm/diverted to nearby Sewer Lines, in this regard close coordination with Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) the Organization which is responsible for Water Supply and Sewerage System in Hyderabad.</td></tr>
<tr><td>20</td><td>Approval Procedure</td><td>The Approval Procedure for project budget measures and loan measures is shown in the figure below.
Approval of the plan/Proposals by the SNDP/GHMC and MAUD is required.</td></tr>
</table>

		 Figure Approval Process for Urban Drainage
21	Benefit of the Project	Following benefits are expected for a storm water drainage project: - Reduced Flood Risk: the decrease in the area (hectares) or number of properties susceptible to flooding during a 5-year return period flood. - Improved Drainage Efficiency: Decrease in time (hours) for floodwaters to recede after a rain event. - Enhanced Public Safety: Decrease in the number of evacuees, evacuation events during a storm event. - Protected Infrastructure: length and numbers of infrastructure (roads, bridges, school, hospital, governmental building, utilities) shielded from flood damage. - Protected Private Assets: numbers of assets (building, storage, store, houses, vehicles) shielded from flood damage.

GOVERNMENT OF TELANGANA
ABSTRACT

MUNICIPAL ADMINISTRATION & URBAN DEVELOPMENT DEPARTMENT – Greater Hyderabad Municipal Corporation – Strategic Nala Development Progamme(SNDP) - Improvement of Storm Water Drainage System in Hyderabad Urban Agglomeration (HUA) under Strategic Nala Development Programme in Phase-II- Administrative Sanction for an amount of Rs.2141.22 Crores for GHMC and Rs.2993.93 Crores for ULBs (within ORR excluding GHMC) separately – Accorded – Orders – Issued.

MUNICIPAL ADMINISTRATION & URBAN DEVELOPMENT (GHMC.II) DEPARTMENT

G.O.Rt.No.760 Dated: 27.09.2023

Read:

From the Commissioner, Greater Hyderabad Municipal Corporation, Hyd., Lr.No.286/ENC/GHMC/SNDP/Phase-II/2022-23,/137, dated: 13.07.2022.

@@@

ORDER:

In the reference read above, the Commissioner, Greater Hyderabad Municipal Corporation, Hyderabad has reported that the sudden spell of heavy downpour and flash floods over a week during October-2020 caused intensive flooding and inundated many low lying areas duly affecting about 40,000 families due to the deficiencies in the existing Storm Water Drainage System. In order to prevent and mitigate the consequences of floods in future and minimize the damages, Government have established a Strategic Nala Development Progamme(SNDP) which is a dedicated project wing in Hyderabad to plan, develop and maintain comprehensive Storm Water Drainage System in Hyderabad. The overall objective of SNDP is to mitigate the adversities on account of heavy rains in future. Accordingly, the SNDP had carried out detailed study of the existing Storm Water Drainage System and has identified critical points, encroachments on Nalas, trunk mains, feeder nalas and a detailed report is submitted to take up all works in Mission mode. Accordingly, Government vide G.O.Rt.No.286, MA&UD (GHMC.II) Dept., dt:06.04.2021have accorded Administrative sanction for an amount of Rs.858.00 Crores for the improvement of Storm Water Drainage system in Greater Hyderabad Municipal Corporation and surrounding municipalities to avoid flooding and consequent loss of life and property as a part of Phase I.

2. The Commissioner, GHMC, Hyderabad has further reported that, the works sanctioned in Phase-I are being implemented and meanwhile, vide G.O.Rt.No.13, MA&UD (GHMC.II) Dept., dt:12.01.2022a revised administrative sanction of Rs.985.45 Crores as against Rs.858.00 Cr. Have accorded, keeping in view the functionality aspects. Accordingly, GHMC has taken up 39 works costing Rs.739.07 Crores in GHMC area and 23 works costing Rs.238.00 Crores in surrounding ULBs. The works sanctioned in phase-I are being implemented and are in advanced stage of completion. It is evident from the opinion of citizens and stakeholders that the projects are really helpful in reducing inundation. Certain requests receive from citizens to the SNDP authorities/ State Government to implement more projects of this kind to ensure that no inundation takes place in Hyderabad, even when it rains heavily.

3. The projects under SNDP Phase-II are to be prioritized and taken up in packages, subject to availability of financial resources to make Hyderabad inundation free. The details of the consolidated proposals of SNDP in GHMC area are as follows:-

S. No	Project Area (GHMC)	No. of Works	Length in 'Km'	Cost (Rs. In Crores)
1	GREATER HYDERABAD MUNICIPAL CORPORATION	148	175.831	2141.22
	Sub-total (GHMC)	**148**	**175.831**	**2141.22**

P.T.O.

4. The details of the consolidated proposals for Phase-II works submitted by the respective ULBs as follows:-

Sl. No	Project Area (ULBs within ORR excluding GHMC)	No. of Works	Length in 'Km'	Cost (Rs. in Crores)
i	Priority-I	68	94.812	1366.13
ii	Priority-II	39	50.275	635.92
iii	Priority-III	34	34.119	338.6
iv	Priority-IV	126	96.195	653.28
	Sub-total (ULBs within ORR excluding GHMC)	**267**	**275.401**	**2993.93**

5. The Commissioner, Greater Hyderabad Municipal Corporation, Hyderabad has therefore requested the Government to accord Administrative Sanction for an amount of Rs.2141.22 Crores for GHMC and Rs.2993.93 Crores for ULBs within ORR, excluding GHMC for works, for improvement of Storm Water Drainage System in Hyderabad Urban Agglomeration (HUA) under Phase-II of Strategic Nala Development Programme.

6. Government after careful examination of the matter hereby accords Administrative Sanction for an amount of Rs.2141.22 Crores for GHMC and Rs.2993.93 Crores for ULBs within ORR, excluding GHMC for the works of improvement of Storm Water Drainage System in Hyderabad Urban Agglomeration (HUA) under Phase-II of Strategic Nala Development Programme.

7. The list of works to be takenup in GHMC and ULB's within ORR excluding GHMC are appended to this G.O. in Annexure-I & II respectively.

8. The Commissioner, Greater Hyderabad Municipal Corporation, Hyderabad shall take necessary action accordingly.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF TELANGANA)

ARVIND KUMAR
SPECIAL CHIEF SECRETARY TO GOVERNMENT

To
The Commissioner,
Greater Hyderabad Municipal Corporation, Hyderabad
Copy to:
PS to Principal Secretary to Hon'ble Chief Minister.
OSD to Hon'ble Minister for MA&UD.
OSD to Special Chief Secretary to Government, MA & UD Department.
P.A. to Secretary to Government, MA&UD Department.
Sf/Sc.

// FORWARDED :: BY ORDER//

SECTION OFFICER

ANNEXURE-I

(G.O.Rt.No.760, MA&UD (GHMC.II) Dept., Dated: 27.09.2023)

PHASE II PROPOSALS Of SNDP in GHMC AREA			
Sl. No.	**Zone**	**Length in 'm'**	**Cost in Rs. Lakhs**
	L.B NAGAR ZONE		
1	Construction of Box Drain from VIP godown, Krishna Nagar to Saket Adarsh nagar Culvert via Ekalavya nagar, in ward No. 01 Kapra of Kapra Circle 01, GHMC	2146	2946
2	Construction of Box Drain from Sai nagar Kamman (H.No.1-10-1/3) to Shiva Sai nagar open Nala at Kushaiguda in Ward No.3 Cherlapally of kapra cirlce-01, GHMC	831	658
3	Construction of Box Drain from EC nagar kamman to Rampally lake via Cherlapally Village in Ward no: 03 Cherlapally of Kapra circle-01, GHMC	3127	3707
4	Construction of Box Drain from krishna nagar Railway Track to Rama cheruvu IALA limits, Mallapur in Ward no. 05 Mallapur of Kapra circle-01, GHMC	2985	3539
5	Pedda cheruvu (Nacharam) to Nalla Cheruvu (Uppal)	3324	2238
6	Osmania University to Ramanthapuram Cheruvu	657	1261
7	Irrigation Canal to Musi River	340	693
8	Construction of Box Drain from Sahara Compound wall backside to existing pipe culvert at 2BHK, GSI Road (Via South end park Colony)Dwaraka Nagar and Himapuri Colony I	1649	1271
9	Sri Ramana Colony to Devaki Enclave via Barathi nagar Park	634	1217
10	KK Gardens to Vandhanapuri Colony	385	749
11	Tirumala Hospital to Sagar RingRoad Junction	1007	1294
12	Construction of Box Drain from Apex Hospital to Tapovan Colony via karmankhat X Road in LB Nagar Circle-4, GHMC	1639	1755
13	Tirumala Timber Depot to Karmanghat X Road	1319	1791
14	Remodelling of Existing Drain in Reddy Colony from D-mart to J.S Reddy Swimming pool	927	966
15	Saroor Nagar Outlet to DSNR Bus depot VIA Dilsukhnagar Metro Station	2138	3858
16	Saroornagar outlet to NH-65 via St.Donald's School and Sai Baba Temple road	1185	2102
17	Saroornagar outlet to NH-65 via Shiva Ganga Theatre, New Gaddiannaram Community Hall, St. Donald's School and Sai Baba Temple road	1115	3003
18	Construction of Box Drain from Kaprai Cheruvu to Injapur Nala via Papireddy Colony	5033	7112
19	Dilawar Khan Lake to Suryavamshi Garden city	2574	1871
20	Nagaram Lake to Rampally Lake	1270	1547
21	Construction of SWD from Sesha Sai Nagar Road No.3 to Nalla Cheruvu (Uppal)	600	605
	Sub Total	**34885**	**44183**

	CHARMINAR ZONE		
1	Construction of SWD from Dabeerpura Darwaza to Farhathnagar Nala	536	1155
2	Construction of SWD from NH 44 to Mulgund Lake	650	2079
3	Construction of SWD from Behind Aurora College to Manmani Kunta	546	462
4	Balance work of existing open drain from Moula-ka-Chilla to Hyderabad Islamic School via Ganga Nagar	418	260
5	Tunneling from Chota Bridge at Yakhutpura to H.No.18-7-423/1/9/2, Aman Nagar Talabkatta.		347
6	Construction of SWD from Ram Reddy Guda to SK Garden	322	462
7	Construction of Box type Drain at Manmani Kunta to Millat Nagar under Barkas Division.	340	156
8	Construction of Box type Drain at Millat Nagar to Bismaillah Kirana Store.	555	254
9	Construction of Box type Drain at Bismillah Kirana Store to Ali Hotel at Ghouse Nagar	350	161
10	Construction of Box type Drain from Ghouse Nagar Culvert to Masjid-e-Noor	385	179
11	Construction of Box type Drain from Patel Nagar Kaman to Mubarak Function Hall	610	279
	Sub Total	**4712**	**5794**
	KHAIRATHABAD ZONE		
1	Construction of Box Drain from CIB Quarters to NTR Ghat Via Secretariat	699	728
2	Construction of SWD from Adarsh Nagar to Old/New MLA Quarters	945	462
3	Construction of SWD from Shop No. 11.5.439, Opp. New Pragathi Press,Lakdikapul to Nampally Exhibition Grounds	2550	1793
4	Construction of Box Drain from Osmania Gen Hospital to Musi River	502	428
5	Western Plaza to Limra Café	3905	4708
6	Construction of SWD from Brindavan Colony Road to Shah Hatim Talab	2190	352
7	Construction of SWD from Military Area (Balkapur Nala) to Rethi Bowli	700	1284
	Sub Total	**11491**	**9755**
	SERILINGAMPALLY ZONE		
1	Construction of RCC Box drain from Trishul grand hotel, Madhapur to Durgam Cheruvu (Nector garden)	972	462

2	Construction of RCC Box drain from Gaffoor nagar junction to Durgam cheruvu entry plaza	574	1155
3	Construction of RCC Box drain from Siddiq Nagar outlet to Meenakshi Trident Towers via Patel constructions, Kondapur	616	809
4	Construction of RCC Box drain from Radisson hotel back side, APHB colony to Indiranagar	809	578
5	Construction of RCC Box drain from Q-mart to Gachibowli road No.1	623	1040
6	Construction of RCC Box drain from Indian Bank line, Indranagar to Road no.1, Babukhan Ln	867	462
7	Janardhan Hills to Euro Kids School/ Khajaguda Pedda Cheruvu	1396	1386
8	Construction of RCC Box drain from Sai vaibhav colony, Kajaguda to Yellamma cheruvu	501	578
9	Construction of RCC Box drain from Golden Tulip outlet to Prem Nagar B Block	1228	1040
10	Construction of RCC Box drain from Prem nagar road no.1 to Prem nagar B Block	1163	1098
11A	Construction of Nalas from Nagulamma temple to Pedakudi Cheruvu in Division No.21	881	942
11B	Construction of Nalas from Dawa Colony to Mellennium grand Hotel in Division No.21	517	532
12	Construction of RCC Box drain from Nayanamakunta to Gurunath Cheruvu via Rama Samudram Kunta	851	876
13	Construction of RCC Box drain from Gurunath Cheruvu to Patel Cheruvu	605	680
14	Construction of Open drain from Patel Cheruvu to Gangaram Cheruvu	1878	1892
15	Construction of Open drain from Gangaram Surplus to backside of Sri Venkata Posavi Engineering Works (Nakkavagu)	12687	15935
16	Construction of Open drain with RCC Bed and Side walls Nallagandla Surplus to Netaji Nagar	2824	2845
17	Construction of Open drain with RCC Bed and Side walls Gopi cheruvu to Chakalavani Kunta	646	651
18	Construction of Open drain with RCC Bed and Side walls from Chakalavani Kunta to Nallagandla surplus Nala at Sai Baba temple Kaman	977	985
19	Construction of Bridge at Sridevi theater	215	2195
20	Construction of Open drain with RCC Bed and Side walls from Rajendra reddy nagar (Baxikunta) to Ameenpur road	1038	550
21	Raisamudram Surplus Wier to Nakkavagu at Jayalaxmi Nagar via NH-65	848	1220
22	Construction of Strom Water Drain from Bandlaguda Cheruvu to Timmakka Cheruvu	2199	1725
23	Construction of Strom Water Drain from Ambedkar Colony to Shishumandir area Timmakka Cheruvu	1149	606

24	Remodelling of Drain from AG colony to lakshmi complex crossing NH-65 at Erragadda metro station in ward 101. Erragaddda division	801	410
25	Construction of Box Drain from oultet of Peddakudi Cheruvu to Ameenpur Lake, Miyapur ward, Chandanagar Circle	821	1013
26	Construction of Box Drain from Surplus nala culvert at Kailash nagar to STP in Reddy colony, Chandanagar ward 110, Chandanagar circle	383	413
27	Constuction of Bhavanipuram kaman to Bhavanipuram, Chandanagar ward 110, Chandanagr circle	140	61
	Sub Total	**38209**	**42139**
	KUKATPALLY ZONE		
1	Construction of SWD from IDL Surplus to Kukatpally Nala at Kukatpally Bus Depot	1725	1737
2	Construction of SWD from Kukatpally Depot to Gautham Nagar	4527	8833
3	Construction of SWD from Mudla Katwa to Kamuni Cheruvu	1632	1643
4	Construction of SWD from Sunnam Cheruvu to Maisamma Cheruvu (including Kamuni cheruvu surplus nala)	2897	2918
5	Construction of SWD from Maisamma Cheruvu to Deendayal Nagar	3157	3180
6(a)	Construction of SWD from Lingam Cheruvu to Pedda Cheruvu	938	947
6(b)	Construction of SWD from Pedda Cheruvu to Chitaramma Temple	2078	11169
7	Remodelling of Nala from Parki Cheruvu (Dharani nagar) to Kukatpally Nala at Prem Sarovar Apartments	941	876
8	Restoration of Chemical Nala from Venkateshwara nagar to Gowtham nagar	6087	11876
9(a)	Construction of SWD from Hakeempet Airforce Station to Maa Santhosh Colony Phase 1	404	437
9(b)	Construction of SWD from Risala Bazaar, Bolarum to Kotha Cheruvu	2245	2262
10	Remodelling of Nala from Manasarover Boin Cheruvu (Hasmathpet lake)	582	710
11	Amber Cheruvu to Yellamma Kunta	1009	1299
12	Construction of retaining wall and widening of Chemical Nala from Gampalla Basthi to ram Reddy Nagar Industrial area.	655	1277
13	Construction of Box Drain from Spring Field Colony to Sarojini gardens Function Hall	740	444
14	Construction of Storm water drain from Kotha Cheruvu to Pedda Cheruvu.	983	1012
15	Construction of Storm water drain from Forest Land to Sri ram nagar GHMC Park.	1017	447

16	Construction of Storm water drain from seesala basthi Darga in HMT Open Land to Fish Market Chintal	2916	2937
17	Construction of Storm water drain from Mathrubhoomi appartments to Parki Cheruvu	269	486
18	Construction of RCC box drain from Bandham Cheruvu to Balaji Layout Gas Godown	750	862
19	Construction of RCC box drain from Kaiser Nagar to Ravi Narayana Reddy Nagar Phase II	1589	974
20	Construction of RCC box drain from Seesala Basthi Dargha to HMT Lake	351	155
21	Construction of RCC box drain from Nagarjuna School to HMT Lake	1261	553
22	Construction of RCC box drain from Roda Mistri Nagar to HMT Lake	1600	909
23	Construction of RCC box drain from Sri Sai Puja Theatre to Pedda Cheruvu Culvert	793	470
24	Construction of RCC box drain from BHEL Colony railway gate LC4 to Existing Box Drain beside Saisaptagiri residency, Venkata Ramana Colony	702	789
25	Construction of RCC box drain from Gangaputra colony on IG statue road to sree bakery road	562	297
26	Construction of RCC Retaining wall from Joshi Nagar to Manasarover	2629	3203
27	Construction of RCC box drain from Maruthi Nagar Railway track to Shiva Nagar	975	1096
28	Construction of RCC box drain from Maruthi Nagar Railway track to RBI Colony	947	1068
	Sub Total	**46961**	**64866**
	SECUNDERABAD ZONE		
1	Providing of Storm Water drain from Prakash nagar near Ramalingeshwara swamy temple via Achiaha Layout, Prakash Nagar extention to Arka Masjid connecting to Kukatpally Nala	818	484
2	Construction of Box drain at employee colony to Sai enclave current office in ward 136, Neredmet Malkajgiri circle 28	1057	626
3	Construction of Storm Water Drain from Road No7 to Deendayal Nagar Community Hall at Vinayak Nagar, Division no 137 in GHMC, Malkajgiri Circle	461	767
4	Construction of Storm Water Drain from Deendayal Nagar Community Hall to Santoshimatha Temple at Vinayak Nagar, Division no 137 in GHMC, Malkajgiri Circle	611	901
5	Construction of RCC drain from Nallapochamma temple (Kakatiya Nagar) to Sumedha poind in Vinayak Nagar in ward no 137 Malkajgiri circle 28	426	711

6	Construction of RCC drain from Simhadri Nagar to Bandacheruvu Lake in Vinayak Nagar in ward no 137 Malkajgiri circle 28	360	1940
7	Construction of Box drain from Goutham Model School to Rajiv Gandhi Nagar RUB in Ward no 140 Malkajgiri, Circle 28, Malkajgiri, GHMC	362	416
8	Construction of Storm Water Drain along railway track from Vandemataram building to SP nagar RUB Malkajgiri, Ward no 140, Malkajgiri Circle - 28, GHMC	547	1022
9	Construction of Storm Water Drain from Jaya Ranga Towers to Railway culvert (Pump House) in New Mirzala guda at Goutham Nagar in Ward no 141, Malkajgiri Circle	94	162
10	Construction of Storm Water Drain duly demolishing damaged old RR drain from Anand Villa (phase-1) to H.No.14-137/4/1/10/1 in Goutham Nagar, Division No 141, Malkajgiri Circle	190	213
11	Remodeling of SW drain by laying NP3 pipeline from Sundarayya Vignana Kendram to Narayanaguda Bridge for Removal of Water Stagnation infront of Sundarayya Vignana Kendram in Ram nagar Ward No 87, Musheerabad Circle, Secunderabad Zone	319	161
12	Construction of Box Drain from defence colony to renuka nagar in ward 136, Neredmet, Circle 28, Malkajgiri, SBZ,GHMC	980	944
13	Construction of Box Drain from Mathrupuri Colony to RK Puram Village in ward 136, Nredmet, Circle 28, Malkajgiri,SBZ, GHMC	845	869
14	Construction of Box Drain from Officers Colony to 4th Main road Santosh Nagar	385	176
15	Construction of Extension of Box drain from existing box drain to park in Andal Homes in Yapral in ward 136, neredmet Malakajgiri circle 28	876	900
16	Construction of Box drain from Bandacheruvu to main road in RTC Colony in ward no 138, Moulaali, Malakajgiri circle 28	293	174
17	Remodelling of Strom water drain from Prakruthi Vihar to Andal Homes in Yapral in ward 136, Neredmet Malkajgiri circle 28	533	502
18	Construction of Box drain from Registration Colony to Jupally Homes	500	904
	Sub Total	**9657**	**11872**
	Total	**145915**	**178609**
WORKS TAKENUP UNDER GHMC PROJECTS DIVISION			
	L.B NAGAR ZONE		
1	Construction of RCC Storm water Drain (Box Drain) from Sushma Theatre Vanasthalipuram 'X' road to Mansoorabad Pedda Cheruvu, Hayathnagar circle,GHMC	1259	1155

2	Construction of Storm water Drain from Bairamalguda Cheruvu to Saroornagar Cheruvu in B.Nagar Circle,East Zone, GHMC	1877	715
	Sub Total	**3136**	**1870**
	CHARMINAR ZONE		
3	Remodelling of Murkhi nala (P9) from pallecheruvu to Ali nagar on either sides	1530	2200
4	Remodelling of Murkhi nala (P9) from Ch:3100 to ch:4200 from Falaknuma railway station to nimrah colony (gap portions)	584	669
5	Construction of Retaining wall from Chota Bridge to Talab Katta Bridge(RHS)	464	813
6	Construction of RCC Retaining wall from Bandlaguda Place view colony to downstream of Tiny Scientists School Alinagar	240	278
7	Constriction of RCC retaining wall (P9) in gap portion of murki nala at Aljubail colony from H.No.19-4-7/A/121 to falaknuma flyover (LHS)	419	190
8	"Construction of 3Nos of Road crossing culverts on Murkinala from Bandlaguda palace view colony to downstream of Tiny scientists school Alinagar"	0	204
9	Construction of RCC Retaining wall (P9) in gap portion of murkinala at Aljubail Colony from Amina Masjid to H.No.19-4-7/A/219 near to 19-4-7/A/121 at Hashmabad and Aljubail Colony Falaknuma near Flyover (RHS)-	476	191
10	Construction of RCC box drain from D/s of Road crossing culvert till Ranjan colony main road on Indranagar nala, Nawabsab kunta	471	219
11	Construction of Road crossing culvert on Indranagarnala at Iqramission High School, Nawabsabkunta.	21	219
12	Construction of RCC box drain from Mohammadia Colony, Mustafa nagar to Phonenix International School on Indranagar Nala, Nawabsab Kunta(Reach-I)	262	219
13	Construction of RCC box drain from Phonenix International School to Afzal General Store via Jama Masjid Mustafa nagar on Indranagar Nala, Nawabsab Kunta(Reach-II)	67	219
14	Construction of RCC box drain from Afzal General Store via Teegalkunta road crossing till Gulzar nagar, Mustafanagar on Indranagar Nala, Nawabsab Kunta (Reach-III)	285	219
15	Construction of Retaining wall on Murki nala at Bandlaguda Kings Avenue, Hyderabad	411	484
16	Construction of box drain for Murkinala (P9) near high tension tower at Hashamabad.	795	325
17	Remodelling of existing open drain to Twin box drain from Moula-ka- Chilla to Hyderabad Islamic School via Ganga nagar	545	655
18	Construction of retaining wall from Kishanbagh road crossing at Majid Kirana Stores to Musi River as a part of Kishan bagh nala II	1412	847
19	Remodeling of Construction of Retaining Wall on either side of Murki nala(P8) from Sunny Garden to Shivajinagar	1051	2750

20	Construction of retaining wall and culverts from Nooramma cheruvu to Miralam Tank via Shivarampally Cheruvu Ura cheruvu via Prabhakarji Colony	2973	5335
21	Construction of retaining wall from Umdasagar to Pallecheruvu	1195	3680
22	Construction of retaining wall in Murkinala (P9) in gap portions from Arundathi nagar to upstream of Akbarnagar	3696	990
23	Construction of retaining wall and culvert from Qayamnagar dargah to miralam tank	1414	770
24	Construction of box drain from Bandlaguda JNNURM Housing colony to Errakunta	3327	3300
	Sub Total	**21638**	**24776**
	KHAIRATABAD ZONE		
25	My Choice Hotel	510	1120
26	Ruhi Hotel	545	977
27	Jhirra Nala	787	1588
28	Chunni ki batti	1318	1397
	Sub Total	**3160**	**5082**
	SERILINGAMPALLY ZONE		
29	Remodelling and Improvement of storm water Drain from Saki Cheruvu to Gangaram cheruvu Surplus Drain for the balance length of 300m (Ch:1419 to Ch:1719)	301	468
30	Construction of Twin Cell box culvert (2 nos) of each vent 6m x 2.8m at BR Gas Godown road in place of existing old and narrow pipe culvert near BHEL circle on Nallagandla surplus nala in Chandanagar, GHMC	0	187
31	Balance work of remodelling and improvement of storm water drain from saki cheruvu to gangaram cheruvu surplus drain from CH:1719 to CH:1939/2001 m in patancheruvu, circle - 22, GHMC	250	649
	Sub Total	**551**	**1304**
	KUKATPALLY ZONE		
32	Construction of CC Retaining wall on one side (Ramky Pearl side) of the Nala from Amber Cheruvu to Yellamakunta from Node N129 to O2(Yellamakunta) in circle 244, kukatpally,GHMC	71	660
33	Remodelling and improvement of Storm water drain from Ambedkar nagar to Alwal Cheruvu Circle No.27	30	165
34	Improvement of Storm Water Drain on Pariki Cheruvu from Mythri Nagar old Bridge to Nissan Service center at Rajiv Gandhi Nagar in Circle 14B , Kukatpally, GHMC.	207	660
	Sub Total	**308**	**1485**
	SECUNDERABAD ZONE		
35	Construction of storm water drain from Bathukamma kunta to 6 No. Junction	472	572
36	Construction Storm Water Drain from 6 No Junction to Kala Bridge	651	424
	Sub Total	**1123**	**996**
	Total	**29916**	**35513**
	GRAND TOTAL (GHMC)	**175831**	**214122**

ARVIND KUMAR
SPECIAL CHIEF SECRETARY TO GOVERNMENT

ANNEXURE-II

(G.O.Rt.No.760, MA&UD (GHMC.II) Dept., dt: 27.09.2023)

DETAILS OF SWD ALIGNMENTS OF ULBs (WITHIN ORR) UNDER PHASE-II			
Sl. No	**ALIGNMENT NAME**	**Length in 'm'**	**Cost in Rs. Lakhs**
Priority-I			
1. Narsingi Municipality			
1	Balaji Nagar Culvert to Manchirevula Bridge	684	768.9
	Total Narsingi Municipality Priority-I	**684**	**768.9**
2. Dundigal Municipality			
1	Katwa Cheruvu(Mallampet Cheruvu) to Pond Near Narayana Junior College via Ap incubator Factory	2085	2099.9
	Total Dundigal Municipality Priority-I	**2085**	**2099.9**
3. Manikonda Municipality			
1	From Yellamma Cheruvu to Mushki Cheruvu	3112	3367.1
	Total Manikonda Municipality Priority-I	**3112**	**3367.1**
4. Meerpet Municipal Corporation			
1	From Sai Nagar to Lenin Colony	779	821.7
2	From Pedda cheruvu (Meerpet Cheruvu) to TSR Nagar	406	426.8
3	From Mithila Nagar to New Vivek Nagar Colony	664	1534.5
4	Teachers Colony Road No.15 to Gayatri Nagar (Via Nandhi Hills and TKR South Gate)-3 Alignments	4020	2770.9
	Total Meerpet Municipal Corporation Priority-I	**5869**	**5553.9**
5. Bandlaguda Jagir Municipal Corporation			
1	Bairagiguda Lake to Musi River	1060	3495.8
2	Lipdum Villas Back side Lake to Musi River	1760	2022.9
	Total Bandlaguda Jagir Municipal Corporation Priority-I	**2820**	**5518.7**
6. Kompally Municipality			
1	Sumar Kunta to Lingai Kunta	534	1295.8
2	Lingai Kunta to Confluence Point at Dhoolapally Road	1073	1081.3
3	Oora Cheruvu to Confluence Point	1415	4415.4
	Total Kompally Municipality Priority-I	**3022**	**6792.5**

7. Nizampet Municipal Corporation			
1	Papaiah kunta to Sri Balaji towers	435	942.7
2	Sri Balaji colony to Bata Junction	670	396
3	Mithila Nagar Arch to Amber Cheruvu	775	1401.4
4	Telugu University to Turka Cheruvu	1320	1135.2
5	Patti Kunta to Medi Kunta	692	712.8
	Total Nizampet Municipal Corporation Priority-I	**3892**	**4588.1**
8. Jalpally Municipality			
1	Arfat Colony to Gurram Cheruvu	2489	2335.3
	Total Jalpally Municipality Priority-I	**2489**	**2335.3**
9. Peddamberpet Municipality			
1	From Shiva Shankar Nagar to Boodhan Colony	1955	7334.8
2	Oora Cheruvu to Thatikhana Lake	1080	2909.5
3	Edubhai Kunta to Karkhana Kunta	830	1555.4
4	Karkhana Kunta to Pochamma Kunta	3031	8750.5
	Total Peddamberpet Municipality Priority-I	**6896**	**20550.2**
10. Ameenpur Municipality			
1	Narregudem Junction to Narendra Nagar Colony (via Shambi Cheruvu inlet)	3350	3843.4
2	Hanuman Temple at Bandhamkommu main road to Dinesh Homes in Bhavanipuram	645	724.9
	Total Ameenpur Municipality Priority-I	**3995**	**4568.3**
11. Bollarum Municipality			
1	Reddy Laboratories to Asani Kunta	2996	2493.7
	Total Bollarum Municipality Priority-I	**2996**	**2493.7**
12. Dammaiguda Municipality			
1	Nasin Cheruvu to Komativani Kunta	1560	1571.9
2	Ahmedguda Weaker Section Colony to Lead India Bharath School backside Nala	1267	578.6
3	Vikalangula Colony to Cheriyal Canal	1174	894.3
	Total Dammaiguda Municipality Priority-I	**4001**	**3044.8**
13. Nagaram Municipality			
1	Koppula Kunta to Dhayar Kunta	591	2011.9
2	Dhayar Kunta to Cherlapally Tank	1360	4629.9
3	Annarayani Cheruvu to Cherlapally Tank	2203	2684
	Total Nagaram Municipality Priority-I	**4154**	**9325.8**

14. Tellapur Municipality			
1	Urjith Vision to Tellapur Lake	952	959.2
	Total Tellapur Municipality Priority-I	**952**	**959.2**
15. Badangpet Municipal Corporation			
1	Suma Paradise to Roma Enclave III	350	184.8
2	Sri Maruthi Nagar to Roma colony Ph-I	570	301.4
3	Greenrich Avenue to Sri Laxmi Nagar colony	500	562.1
4	Burhan Khan Lake to Balapur Pedda Cheruvu	1180	952.6
5	Suddavani Kunta to Balapur Pedda Cheruvu	1580	3099.8
6	MCR Colony to Badangpet Graveyard	629	510.4
	Total Badangpet Municipal Corporation Priority-I	**4809**	**5611.1**
16. Gundla Pochampally Municipality			
1	Narayana Cheruvu to Gundla Kunta	1330	4858.7
2	Prestige Park entrance to Narayana Cheruvu	984	1988.8
3	Gundla Kunta to Lingai Kunta	736	742.5
4	Confluence point near Malla Reddy College to Sumaar Kunta	2683	2702.7
5	Komai Kunta to Confluence point near Malla Reddy College	258	259.6
	Total Gundla Pochampally Municipality Priority-I	**5991**	**10552.3**
17. Jawahar Nagar Municipal Corporation			
1	Malkaram cheruvu outlet to Confluence point	591	595.1
2	Chennapuram cheruvu to Police patel's villa	1247	2758.8
3	Ambedkarnagar Main road to Old Gabbilapet Road	1049	620.4
4	N.G Enterprises to Indiramma cheruvu	2166	2228.6
5	Confluence point to Eedula kunta cheruvu - Stretch 2	136	110
	Total Jawahar Nagar Municipal Corporation Priority-I	**5189**	**6312.9**
18. Pocharam Municipality			
1	Raa Cheruvu (Pedda Cheruvu) to Narapally Kunta	837	606.1
2	Thummalakunta Cheruvu to Mc Donalds near Highway	1137	1708.3
	Total Pocharam Municipality Priority-I	**1974**	**2314.4**
19. Thumkunta Municipality			
1	Hakimpet Airstrip to Devarayamjal Cheruvu	1613	1941.5
2	Turkavani Kunta yo Chennarayudu Cheruvu	1628	1075.8

3	Srinivasa Nursery to Danube home warehouse	1171	1204.5
4	D Mart Warehouse to Devarayamjal Cheruvu	1497	1863.4
	Total Thumkunta Municipality Priority-I	**5909**	**6085.2**
	20. Turkayamjal Municipality		
1	Sri Balaji Homes to Aditya Nagar	2097	1918.4
2	Aditya Nagar Ph-IV to Masab Cheruvu	1890	2302.3
3	Masab Cheruvu Sluice-1 to 2BHK	1719	2094.4
4	Masab Cheruvu Sluice-2 to Junction-1	470	573.1
5	Masab Cheruvu Weir to Junction-1	260	316.8
6	Junction-1 to 2BHK	756	920.7
7	2BHK to Dilawar Khan Lake	250	304.7
8	Sub Station Road to Sai Brindhavan Colony	1049	1057.1
9	Manneguda Lake to Sai Brindhavan Colony	2558	5157.9
10	Sai Brindhavan Colony to Masab Cheruvu	927	932.8
11	Vijaya College of Pharmacy to Edula Cheruvu Via Mythri Nagar Culvert	2570	2516.8
12	Thorrur Road to Koheda Lake	927	932.8
13	Umarkhanguda manasa nagar		6199.6
	Total Turkayamjal Municipality Priority-I	**15473**	**25227.4**
	21. Shamshabad Municipality		
1	Restoration of Phirangi Nala from Kamuni to Brahmana Cheruvu	8500	8543.1
	Total Shamshabad Municipality Priority-I	**8500**	**8543.1**
	Total Priority-I	**94812**	**136612.8**
	Priority-II		
	1. Narsingi Municipality		
1	Mantri Villas to River Musi	1244	1767.7
	Total Narsingi Municipality Priority-II	**1244**	**1767.7**
	2. Dundigal Municipality		
1	Pedda Cheruvu to Katwa Cheruvu(Mallampet Cheruvu)	1289	1298
	Total Dundigal Municipality Priority-II	**1289**	**1298**

3. Manikonda Municipality			
1	From Malkam Cheruvu to Ibrahim Cheruvu	1300	1612.6
	Total Manikonda Municipality Priority-II	**1300**	**1612.6**
4. Meerpet Municipal Corporation			
1	Meerpet Buruju to Gowthami Nagar minor Nala	666	304.7
2	Meerpet Buruju to Vekatagiri Colony	362	165
	Total Meerpet Municipal Corporation Priority-II	**1028**	**469.7**
5. Bandlaguda Jagir Municipal Corporation			
1	Vaishnavi Oasis to Eesa River	1188	2745.6
2	Erra Kunta, Kismatpur to Vaishnavi Oasis	1300	1337.6
3	Peeran Cheruvu To Bairagiguda Lake	1147	990
	Total Bandlaguda Jagir Municipal Corporation Priority-II	**3635**	**5073.2**
6. Kompally Municipality			
1	Mogulla Kunta to Oora Cheruvu	1000	2039.4
2	Splendid Aparna Palm Avenues to Safgh Road	1106	506
3	Forest Academy Boundary to Fox Sagar	440	1016.4
	Total Kompally Municipality Priority-II	**2546**	**3561.8**
7. Nizampet Municipal Corporation			
1	Sree Homes to Katta Maisamma Temple	414	189.2
2	Katta Maisamma Temple to Prime Package	965	1807.3
	Total Nizampet Municipal Corporation Priority-II	**1379**	**1996.5**
8. Jalpally Municipality			
1	Kummari Kunta to Masjid	247	113.3
	Total Jalpally Municipality Priority-II	**247**	**113.3**
9. Peddamberpet Municipality			
1	Pochamma Kunta to Pasumamula Lake	480	484
	Total Peddamberpet Municipality Priority-II	**480**	**484**
10. Ameenpur Municipality			
1	Ameenpur Pedda cheruvu weir to Major Nala via Bandhamkommu surplus	3080	3256
	Total Ameenpur Municipality Priority-II	**3080**	**3256**

12. Dammaiguda Municipality			
1	Integrated Market to Cheriyal Canal	1143	614.9
2	Narasiah Colony to Annarayan Cheruvu	1879	2158.2
3	Sri Ram Nagar Colony Via Prajasai Garden to Kundanpally Nala	1577	2450.8
	Total Dammaiguda Municipality Priority-II	**4599**	**5223.9**
13. Nagaram Municipality			
1	Suryanarayana Cheruvu to Yamnampet	5725	6974
2	Medubai Kunta to Jalbai Kunta	541	320.1
3	Cherlapally Tank to Rampally Cheruvu	586	713.9
	Total Nagaram Municipality Priority-II	**6852**	**8008**
14. Tellapur Municipality			
1	Bonsai Homes to Vanam Cheruvu via Indira nagar	1722	1676.4
	Total Tellapur Municipality Priority-II	**1722**	**1676.4**
15. Badangpet Municipal Corporation			
1	Sunnam Cheruvu to MLR College via Green Homes & Postal Colony	5090	6199.6
	Total Badangpet Municipal Corporation Priority-II	**5090**	**6199.6**
16. Gundla Pochampally Municipality			
1	Neela Cheruvu to Gundla Kunta	585	589.6
2	Sokaya Kunta to Neela Cheruvu	923	3142.7
3	Back side of Indiramma (H) to Komati Kunta	596	630.3
4	Kompally Bridge to Gundla Kunta	1692	1705
	Total Gundla Pochampally Municipality Priority-II	**3796**	**6067.6**
17. Jawahar Nagar Municipal Corporation			
1	Ramreddy chicken mart to Confluence Point	771	793.1
2	Sri Lakshmi Narasimha Swamy temple to Confluence Point	638	656.7
3	Chandrapuri Colony to Chennapuram cheruvu	232	200.2
4	Beside Nandanavanam Park to Vaishali Meadows Apartments	1420	840.4
5	Bank of India BC to Near Nava Youtha Youth Association	594	314.6
6	Near Nava Youtha Youth Association to Back side of Anganwadi school	653	673.2
	Total Jawahar Nagar Municipal Corporation Priority-II	**4308**	**3478.2**

18. Pocharam Municipality			
1	Perumandla Kunta to NH-163 Highway	2669	5179.9
	Total Pocharam Municipality Priority-II	**2669**	**5179.9**
19. Thumkunta Municipality			
1	Thumkunta to shamirpet	1780	5159
2	Kamman Kunta to Overhead tank	446	166.1
	Total Thumkunta Municipality Priority-II	**2226**	**5325.1**
20. Turkayamjal Municipality			
1	Koheda Village to Koheda Lake	905	906.4
	Total Turkayamjal Municipality Priority-II	**905**	**906.4**
21. Shamshabad Municipality			
1	Restoration of Joshi Kunta Nala from Kamuni Cheruvu to Himayath Sagar Lake	1880	1894.2
	Total Shamshabad Municipality Priority-II	**1880**	**1894.2**
	Total Priority-II	**50275**	**63592.1**
Priority-III			
1. Dundigal Municipality			
1	Kotha Cheruvu to Chenna Cheruvu	268	306.9
2	Chenna Cheruvu to Rela Kunta	459	860.2
3	Mondi Kunta to Kotha Cheruvu	400	176
4	Lake beside Lakeridge Homes to Pond near Narayana Junior College	1085	2734.6
5	Errakunta to Katwa Cheruvu(Mallampet Cheruvu)	1255	742.5
	Total Dundigal Municipality Priority-III	**3467**	**4820.2**
2. Kompally Municipality			
1	Signature Apartments to Datta Sai Towers	927	1064.8
2	Near Green County to NAR Engineering and Agro Industries	676	308
	Total Kompally Municipality Priority-III	**1603**	**1372.8**
3. Nizampet Municipal Corporation			
1	Medi Kunta to Junction-1	676	548.9
2	**Total Nizampet Municipal Corporation Priority-III**	**676**	**548.9**
4. Jalpally Municipality			
1	Kothapet Main Road to Nabeel Colony	686	313.5
	Total Jalpally Municipality Priority-III	**686**	**313.5**

5. Peddamberpet Municipality			
1	Suryavamshi to Edula Cheruvu	1468	1787.5
2	Edula Cheruvu to ORR	2679	3264.8
	Total Peddamberpet Municipality Priority-III	**4147**	**5052.3**
6. Ameenpur Municipality			
1	Backside of Shiridi sai temple (Ameenpur Pedda cheruvu) to Major Nala in Sai Colony	421	192.5
	Total Ameenpur Municipality Priority-III	**421**	**192.5**
7. Dammaiguda Municipality			
1	Near Kundanpally Community hall to Kundanpally Nala	3479	3536.5
2	RGK Colony to RGK Y-Junction (Cheriyal Canal)	1439	1274.9
	Total Dammaiguda Municipality Priority-III	**4918**	**4811.4**
8. Nagaram Municipality			
1	Rampally Cheruvu to Ismailkhanguda Nagaram Limits	810	986.7
2	Jalbai Kunta to Suryanarayana Cheruvu	711	1184.7
	Total Nagaram Municipality Priority-III	**1521**	**2171.4**
9. Badangpet Municipal Corporation			
1	Balapur Pedda Cheruvu to Kothamoni Kunta	1147	742.5
2	Swetcha Nivas Arch to Errakunta	681	701.8
	Total Badangpet Municipal Corporation Priority-III	**1828**	**1444.3**
10. Gundla Pochampally Municipality			
1	Polkamma Kunta to Suthariguda Cheruvu	1822	1841.4
2	Kotha Kunta to Confluence point near Komati Kunta	146	146.3
3	Bethlehem Church to Komati Kunta	915	418
	Total Gundla Pochampally Municipality Priority-III	**2883**	**2405.7**
11. Jawahar Nagar Municipal Corporation			
1	Masjid-E-Haleemabee sheba to Indiramma cheruvu	890	526.9
2	Confluence point Via Rajiv Swagruha Abhimaan Project to Gundla cheruvu	302	303.6
3	Mothkula Kunta Outlet to confluence point	902	642.4
4	Gundla cheruvu to Eedula kunta cheruvu	701	706.2
5	Eedula kunta cheruvu outlet to Pedda cheruvu - Stretch 1	1220	1228.7
	Total Jawahar Nagar Municipal Corporation Priority-III	**4015**	**3407.8**
12. Pocharam Municipality			
1	Annojiguda Lake to Confluence point near shankar Indane Gas Godown	773	743.6
2	Bandamkunta Lake to Confluence point near shankar Indane Gas Godown	986	700.7

3	Bapist Church Annojiguda to Bandamkunta Culvert	683	312.4
	Total Pocharam Municipality Priority-III	**2442**	**1756.7**
	13. Thumkunta Municipality		
1	Palle Cheruvu to confluence point	1686	1717.1
2	Suchir India Layout to Nalla Kunta	839	752.4
3	Livspace ware house to Prestige park	1589	1826
4	Duke Vistas to CVR Friendly Dhaba	968	572
	Total Thumkunta Municipality Priority-III	**5082**	**4867.5**
	14. Thukkuguda Municipality		
1	Surram cheruvu to Opposite Canara Bank ATM	430	695.2
	Total Thukkuguda Municipality Priority-III	**430**	**695.2**
	Total Priority-III	**34119**	33860.2
	Priority-IV		
	1. Dundigal Municipality		
1	Chintala kunta to Narla kunta	453	21576.5
2	Kambala kunta to Eerla kunta	235	
3	Eerla kunta to Narla kunta	289	
4	Narla kunta to confluence point at culvert	740	
5	Kudi kunta to confluence point at culvert	893	
6	From confluence point at culvert to Chinna cheruvu	247	
7	From Pond near Mallanna Temple to Chinna cheruvu	315	
8	From Chinna cheruvu to Outlet of Pedda Cheruvu	1443	
9	Dundigal Airforce Academy to Pedda Cheruvu	1862	
10	Shaa Beauty Parlour to Pedda Cheruvu - Stretch 1	550	
11	Shaa Beauty Parlour to Pedda Cheruvu - Stretch 2	735	
12	Pond near Sevalal Jagadamba Temple to Gagilapur Cheruvu	812	
13	Gaggilapur cheruvu to Pedda cheruvu	920	
14	Pedda cheruvu to Medchal Cheruvu - Stretch 1	2213	
15	Pedda cheruvu to Medchal Cheruvu - Stretch 2	120	
16	Pedda cheruvu to Medchal Cheruvu - Stretch 3	1080	

17	Peram City to Outlet of Pedda cheruvu	1150
18	Pedda cheruvu to Medchal Cheruvu - Stretch 4	320
19	Pedda Ganganna Kunta to Naria Kunta - Stretch 1	372
20	Pedda Ganganna Kunta to Naria Kunta - Stretch 2	67
21	Pedda Ganganna Kunta to Naria Kunta - Stretch 3	248
22	Pedda Ganganna Kunta to Naria Kunta - Stretch 4	383
23	Golla Kunta to Confluence Point	422
24	Pedda Ganganna Kunta to Naria Kunta - Stretch 5	107
25	Padaga samudram cheruvu to Komati kunta	584
26	Sri Sloka School to Confluence point	565
27	Confluence point to Mondi kunta	364
28	Mondi kunta to Komati kunta	340
29	Komati kunta to Naria kunta	313
30	Naria Kunta to Pedda Cheruvu - Stretch 1	927
31	Inlet of Kamalla kunta	527
32	From Kamalla Kunta to Kamini Kunta - Stretch 1	310
33	From Kamalla Kunta to Kamini Kunta - Stretch 2	67
34	Inlet of Ramanna kunta	833
35	Ramanna kunta to Confluence point	244
36	From Kamalla Kunta to Kamini Kunta - Stretch 3	62
37	Kamini Kunta to confluence point	632
38	Naria Kunta to Pedda Cheruvu - Stretch 2	863
39	Drain beside The Creek Planet School to Pedda Cheruvu	1204
40	Mallanna Kunta to Confluence point	184
41	Chintavani kunta to Confluence point	156
42	Confluence point to Markamma kunta	389
43	From Markamma kunta to Confluence point at Delhi public school	665
44	Saravani Kunta to Confluence point behind Delhi public school	612
45	From Confluence point behind Delhi public school to Outlet drain of Pedda Cheruvu	809
46	From Gokul brindavanam to Balijavani kunta	569
47	Balijavanikunta to Ramji kunta	319
48	Ramaji kunta to Katwa kunta	1007
49	Sambipur Cheruvu to Lake beside Lakeridge Homes	248
50	Inlet of Sandi Kunta	962
51	Sandi Kunta to Babakhan Kunta	502

52	Babakhan Kunta to Lingam Cheruvu Stretch 1	1684	
53	Peerzadi Kunta to Neerla Kunta	281	
54	Neerla Kunta to Confluence Point	424	
55	Babakhan Kunta to Lingam Cheruvu Stretch 2	40	
56	Pond beside Golla Kunta to Confluence Point	132	
	Total Dundigal Municipality Priority-IV	**32794**	**21576.5**
	2. Kompally Municipality		
1	Ashoka Ala Maison Villas to Fox sagar	1011	2964.5
	Total Kompally Municipality Priority-IV	**1011**	**2964.5**
	3. Jalpally Municipality		
1	Royal Colony to Gurram Cheruvu	705	724.9
	Total Jalpally Municipality Priority-IV	**705**	**724.9**
	5. Dammaiguda Municipality		
1	Ambedkarnagar to Indiramma Cheruvu	602	
2	Thanuja slab cutting services to Indiramma Cheruvu	414	
3	Indramma Cheruvu to Nasin Cheruvu	1220	
4	Open Drain from Pond near CRPF cross road to Pond near Aramaisamma temple	701	
5	From Outlet drain of Pond beside Malkaram 400KV Sub station	303	
6	Aramaisamma temple to Pedda cheruvu - Stretch 1	2677	11202.4
7	Amma bhagwan clothes center to Moses International School	580	
8	Nagamma temple, Karmika nagar to Indiramma Cheruvu	316	
9	Pedda cheruvu to Suryanaryana Cheruvu - Stretch 4	1425	
10	Kavya beauty parlour to Conluence point	1017	
11	Construction of RCC M25 Open Drain from Pedda cheruvu to Suryanaryana Cheruvu	5065	
	Total Dammaiguda Municipality Priority-IV	**14320**	**11202.4**

6. Nagaram Municipality			
1	St. Peter School to Lokspor Singhs Cricket Ground	1480	3078.9
2	FCI Godown Road of Size Cherlapalli to Confluence Point Near Haven Colony - Stretch 1	430	
3	FCI Godown Road of Size Cherlapalli to Confluence Point Near Haven Colony - Stretch 2	1010	
4	FCI Godown Road of Size Cherlapalli to Confluence Point Near Haven Colony - Stretch 3	1281	
5	Sed Axis Advanced Material Pvt Ltd To Rampally Cheruvu	1023	
6	Judar Cheruvu Outfall Drain from Durgamata & Maisamma Temple To Annarayani Cheruvu	609	
	Total Nagaram Municipality Priority-IV	**5833**	**3078.9**
7. Badangpet Municipal Corporation			
1	Thirumala Nagar to Komati Kunta	1090	646.8
2	Rajiv Gruha Kalpa to Komati Kunta	793	363
	Total Badangpet Municipal Corporation Priority-IV	**1883**	**1009.8**
8. Gundla Pochampally Municipality			
1	Gollonikunta To Confluence Point Near Mallareddy College	578	1438.8
2	Pokarna Limited To Neela Cheruvu of size 1.00m x 1.00m	1195	
3	Dodoni Kunta To Sokaya Kunta	419	
4	Narlegoni Kunta To Sokaya Kunta	593	
5	Erra Kunta To Polkamma Kunta	406	
6	Sterling Hights To Narlegoni Kunta	1163	
7	L &T ware house to Prestige park entrance	822	
	Total Gundla Pochampally Municipality Priority-IV	**5176**	**1438.8**
9. Jawahar Nagar Municipal Corporation			
1	From RAF masjid to Confluence Point	1271	2737.9
2	From Children's park to Confluence Point	537	
3	From Confluence Point to CRPF road	583	
4	From CRPF road to Bhakwan cheruvu	144	

5	From Bhakwan cheruvu to Confluence Point at Botanical park road	280	
6	From BITS Pilani to Confluence Point at Botanical park	1473	
7	from Confluence Point at Botanical park road to Malkaram cheruvu Jawahar Nagar	470	
	Total Jawahar Nagar Municipal Corporation Priority-IV	**4758**	**2737.9**
	10. Pocharam Municipality		
1	Mandadi Surendar Reddy Nagar to Raa Cheruvu	446	10668.9
2	Construction of SWD from HLM Global Prayer Tower to near Tractor godown	506	
3	Construction of SWD from Near Jerusalem Church to MLR Residency Colony	954	
4	Construction of SWD from Singapore Township to Sanskriti Play Ground.	791	
5	Construction of SWD from Indian Post office near Singapore Township to Sanskriti Play Ground	853	
6	Construction of SWD from Sanskriti Play Ground to Annojiguda lake	759	
7	Infosys to Perumalla kunta	1399	
8	From Hanuman Temple to KLR Road	3746	
9	From culvet near highway to near Nagadevatha temple	520	
	Total Pocharam Municipality Priority-IV	**9974**	**10668.9**
	11. Thumkunta Municipality		
1	Sanjay shop to confluence point near Dwaraka sai crafts	1402	8684.5
2	From Vatson foam Pvt ltd to Confluence point near Dwaraka Sai Crafts	1680	
3	From Dwaraka Sai Crafts to Mogulla Kunta	398	
4	From SVR Garden function hall to Turkavani kunta	448	
5	Pothayapalli lake to confluence point at Mandaipalli cheruvu	1635	
6	Mothukula Kunta to Nalla kunta lake	731	
7	From Hyd- Medchal road to Confluence point at culvert	118	
8	From Confluence point at culvert to Singaraypalli cheruvu	143	
9	From Singaraypalli cheruvu to Ramreddy kunta	1342	
10	From Ramreddy kunta to Banthi kunta	326	
11	From Banthi kunta to Thumkunta lake	589	
12	From Chintalayyaguda kunta to ORR	263	
13	From Bandamkunta to New Collectorate office	388	

14	From Anthayyapalli junction to Anthayyapalli Cheruvu	449	
15	From Anthayyapalli Cheruvu to New Collectorate office	640	
16	From New Collectorate office to Palle cheruvu	415	
17	Inlet drain to Banamma cheruvu	822	
18	SNR Projects to Palle cheruvu	777	
19	From Confluence point at ORR to Futnani Steel Factory	764	
20	Mogulla Mohan Reddy Gardens to Nalla kunta lake	1550	
21	From Chennarayudu cheruvu to Mandaipalli cheruvu	1352	
22	Nalla kunta to confluence point	806	
23	Thettakunta to confluence point	810	
24	Confluence point to Outfall drain of Thummakunta Peddacheruvu	424	
25	From Ammabandam kunta to Confluence point at ORR	787	
	Total Thumkunta Municipality Priority-IV	**19059**	**8684.5**
	12. Thukkuguda Municipality		
1	Opposite Canara Bank ATM to Bhommalkunta cheruvu	682	1240.8
	Total Thukkuguda Municipality Priority-IV	**682**	**1240.8**
	Total Priority-IV	**96195**	**65327.9**
	Grand Total ULBs (WITHIN ORR) UNDER PHASE II	**275401**	**299393**

ARVIND KUMAR
SPECIAL CHIEF SECRETARY TO GOVERNMENT

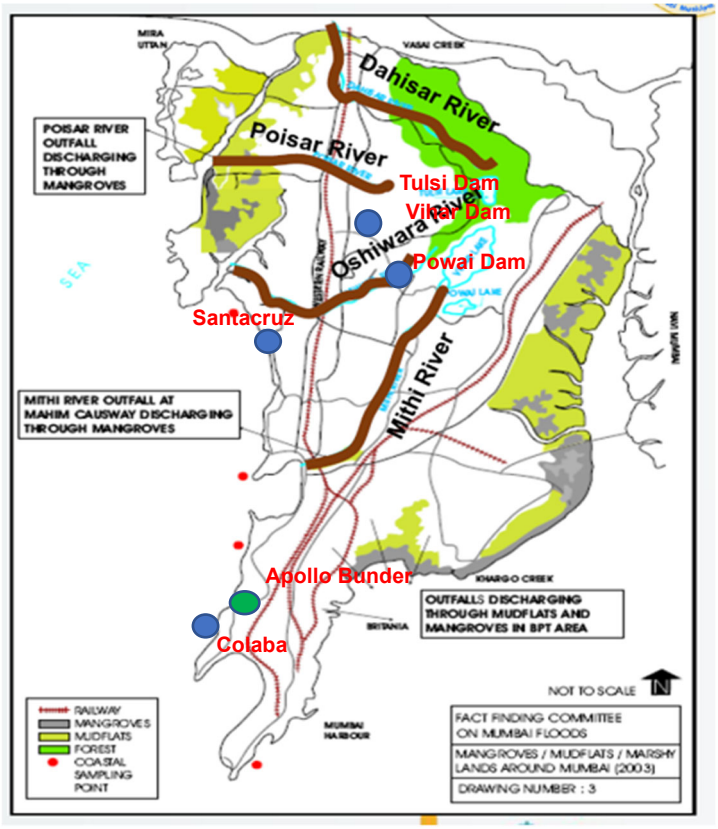
Appendix-8

OVERVIEW OF FLOODS IN MUMBAI AND THE MITHI RIVER IMPROVEMENT PROJECT

ムンバイにおける洪水の概況および Mithi 川改修事業

1. 主要河川とダムの概要

対象流域内の河川は、Mithi 川ほか、Dahisar 川, Poisar 川, Oshiwara 川の 4 河川である。これらの位置は、以下の図に示すとおりである。雨量観測所は、Santacruz と Colaba の 2 観測所のほかに、ダムサイトにおいても観測されている。雨量解析では、主に、Santacruz が採用されている。



凡例： 雨量観測所 潮位観測所

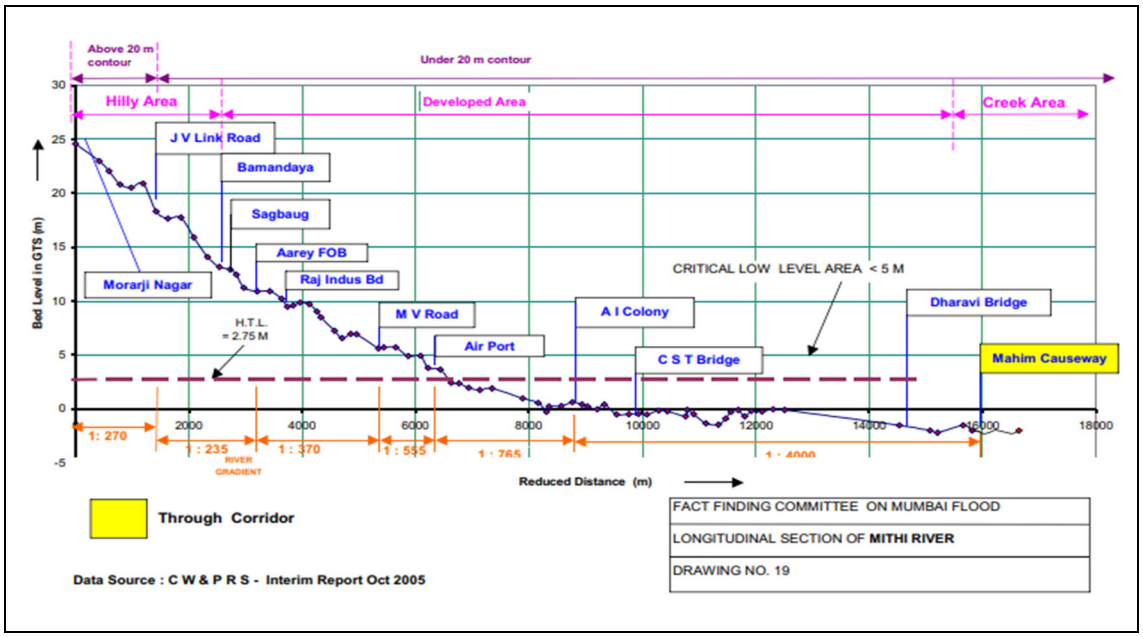
図 1.1 4 河川の概要と水文観測所の位置

4 河川の概要は、以下のとおりである。

表 1.1 4 河川の概要

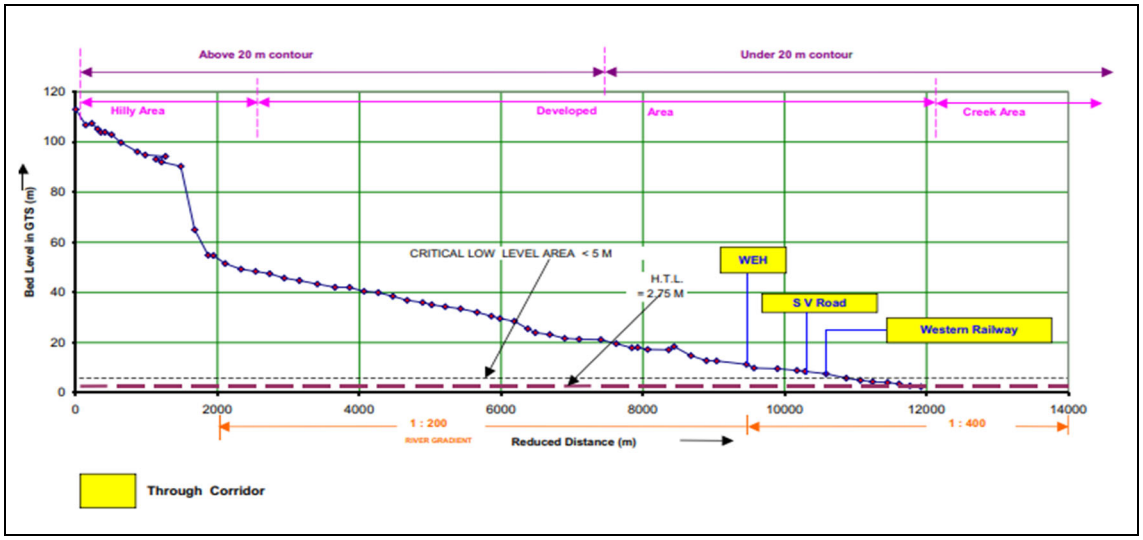
項目	Mithi 川	Dahisar 川	Poisar 川	Oshiwara 川
1)延長(km)	17.9	12.0	7.0	7.0
2)流域面積(km2)	72.95	34.88	20.95	29.38
3)源流場所	Vihar Dam	Tulsi Lake	Sanjay Gandhi National Park	Aarey Milk Colony
4)下流接続 Creek	Mahim Creek	Bhayander Creek	Manori Creek	Malad Creek

各河川の縦断図は、以下に示すとおりである。



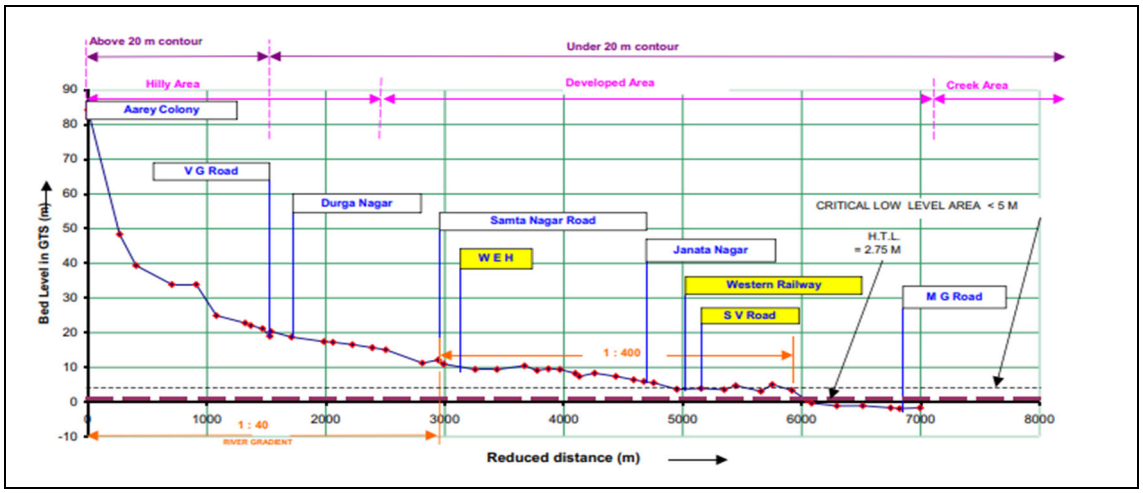
出典：「CWRPS 2006 Report」 Drawing No.19

図 1.2 Mithi 川の縦断図



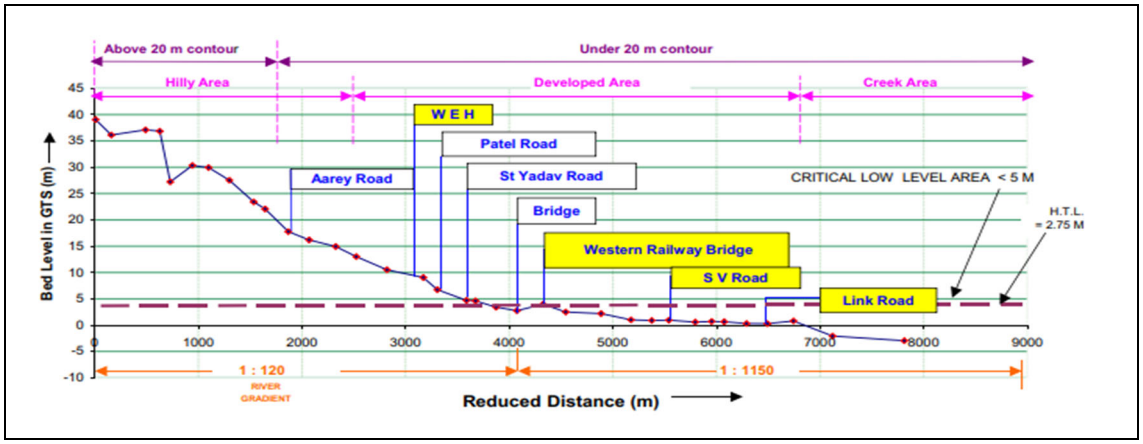
出典：「CWRPS 2006 Report」 Drawing No.25

図 1.3 Dahisar 川の縦断図



出典：「CWRPS 2006 Report」 Drawing No.23

図 1.4 Poisar 川の縦断図



出典：「CWRPS 2006 Report」 Drawing No.21

図 1.5 Oshiwara 川の縦断図

Mithi 川と Oshiwara 川の上流に位置するダムの概要は、以下のとおりである。ダムの目的は、上水供給である。

表 1.2 3ダムの概要

項目	Vihar Dam (Lake)	Powai Dam (Lake)	Tulsi Dam (Lake)
1)流域面積(km2)	18.96	6.61	6.76
2)河川名	Mithi	Mithi	Oshiwara
3)満水位(FSL,GTS)	56.21	94.97	114.74
4)貯水量(万 m3)	4,176	545	1,043

2. 2005年洪水の概要

2.1 降雨の概要

Central Water and Power Research Station(CWPRS) (2006)：1-D Mathematical Model and Desk Studies for Mitigation Flood of Mithi River in Mumbai (以下,「CWPRS 2006 Report」と称する) レポートに記載される 流域内の観測所のハイエトグラフ(Santacruz は３時間雨量)を以下に示す。Powai の最大時間雨量は、136mm となっている。

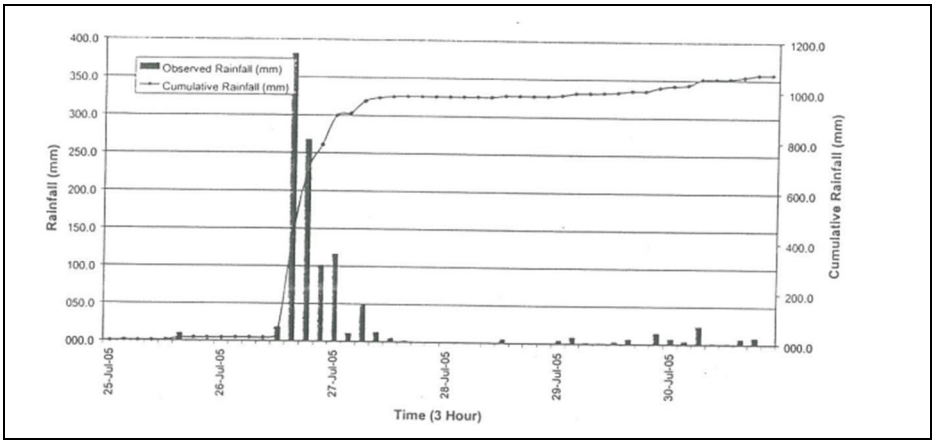


図 2.1 Santacruz 3時間雨量のハイエトグラフと累加雨量

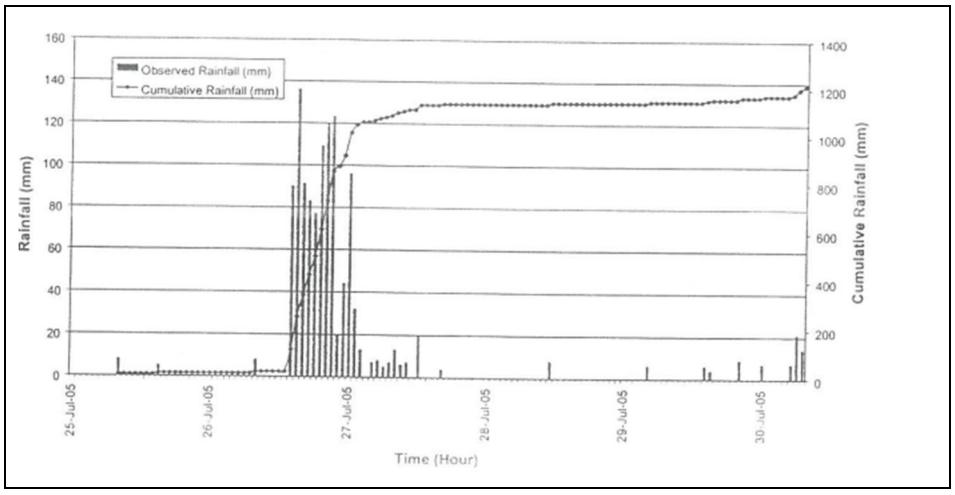


図 2.2 Powai 時間雨量のハイエオトグラフと累加雨量

「CWPRS 2006 Report」に記載される洪水時の雨量、河川の推定流量、潮位等を整理したものを示すと以下の通りとなる。1 日に満たない期間内に 944.2mm の降雨が生起している。算定された Santacruz と Colaba 観測所の確率日雨量と時間雨量をもとに、生起した降雨の規模を評価すると以下の通りとなる。

表 2.1 確率日雨量算定結果に基づく実績日雨量の規模の評価

観測所	日雨量(mm)	評価規模	備考
Santacruz	944	10,000 年以上	CWPRS 2006 Report を適用した場合
	944	200 年以上	CWPRS 2013 Report を LP-III 分布適用結果を適用した場合
Colaba	73.4	2 年以下	

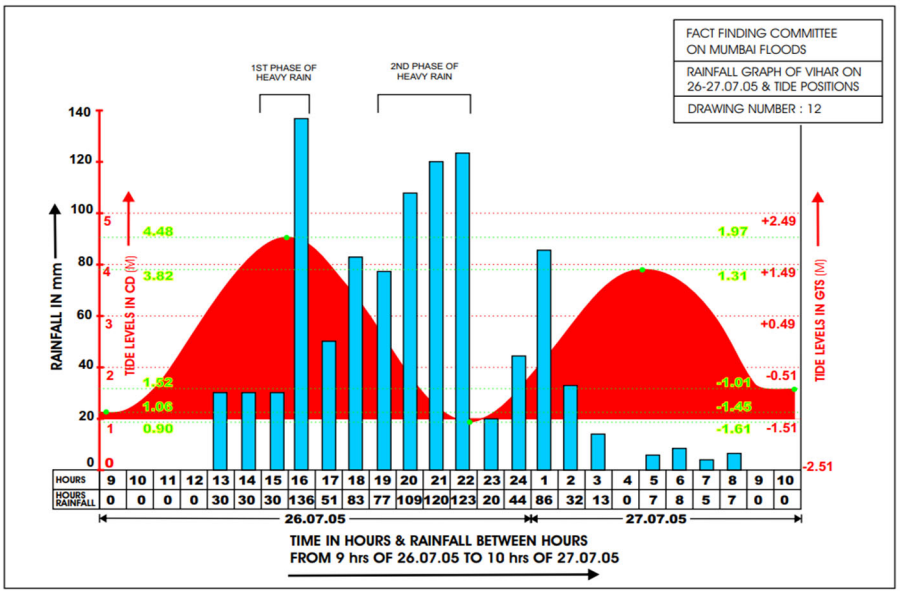
表 2.2. 2005 年7月洪水時の降雨、流量、潮位

Date	Time		Rainfall in mm	Discharges in cumecs		Powai Overflow in cumecs	Tide at Apollo Bundar	
	From	To		Mithi	Vakola			
26.07.2005	0830	1130	0.9	5	1	---	0908	1.06
	1130	1430	18.4	112	14	---		
	1430	1730	380.8	2315	288	---	1550	4.48
	1730	2030	267.6	1627	202	---		
	2030	2330	101.1	615	76	166	2213	0.90
	2330	0230	116.2	706	88	---		
27.07.2005	0230	0530	11.0	67	8	---	0422	3.82
	0530	0830	48.2	293	36	---		
							0955	1.57
		Total	944.2					

出典：「CWPRS 2006 Report」Annexure III

2005 年 7 月の洪水生起時は、Mithi 川での水位・流量観測は、実施されていないことから、上記の流量は、推定の流量(Desk Studies)であるが、Mithi 川のピーク流量は、2,315m^3/s、右支川の Vakola Nalla では、288m^3/s となっている。水位のピークは、時刻 1550 に生起しており、4.48m となっている。なお、潮位の単位は、CD(Chart Datum であり、GTS(Great Turbidometrically Survey)単位との標高差は、「+2.51m」となっている。 (CWPRS 2006 Report. 9.2.3 参照)

Fact Finding Committee on Mumbai Flood (2006) (以下、「FFC 2006 Report」と称する)で整理されたハイエトグラフと潮位との関係を示した図を以下に示す。時間雨量は、Vihar Lake での観測となるが、136 mm/hr となっている。降雨の特徴としては、短時間(1600-2300)に降雨強度の大きい雨(51mm/hr-136mm/hr)が集中していること、潮位との特徴としては、大潮（朔望）平均高潮面(Mean High Water Spring)である 4.42m CD を超える潮位が生起(4.48m CD)していることが挙げられる。



出典：「FFC 2006 Report」Drawing No.12

図 2.3 Vihar Lake ハイエトグラフと潮位の経時的変化

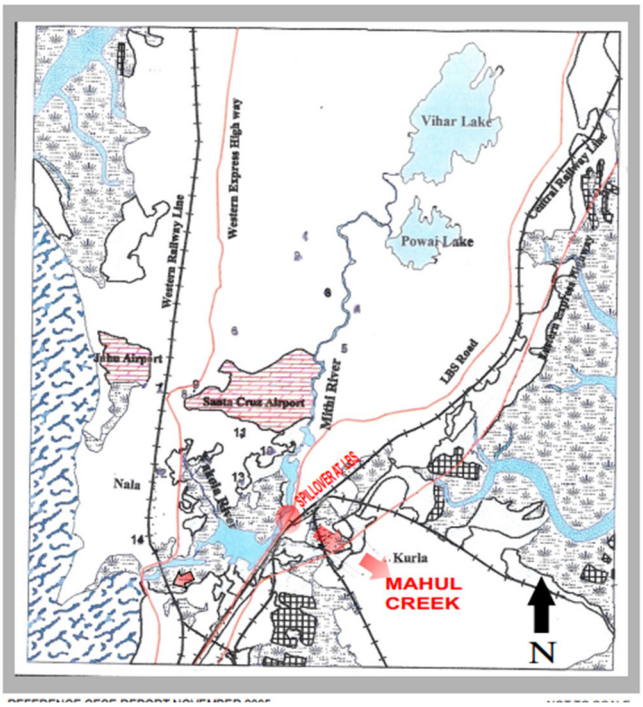
2.2 2005 年洪水による各河川の浸水状況

「FFC 2006 Report」に基づく、各河川の洪水時の状況を示す。

2.2.1 Mithi 川

Mithi(ミティ)川流域の東側の尾根は、以下の図に示すように、ジャリマリ(Jarimari)付近に 2 km の低地鞍部(Low level saddle)があるため、洪水の危険度が非常に高い区域である。

7 月 26 日洪水時には、この鞍部を越えたミティ川の越水により、マフル川流域に流れ込む Mithi 川の東側に位置する水路(Nalla)では、前例のない極端な洪水が発生した。

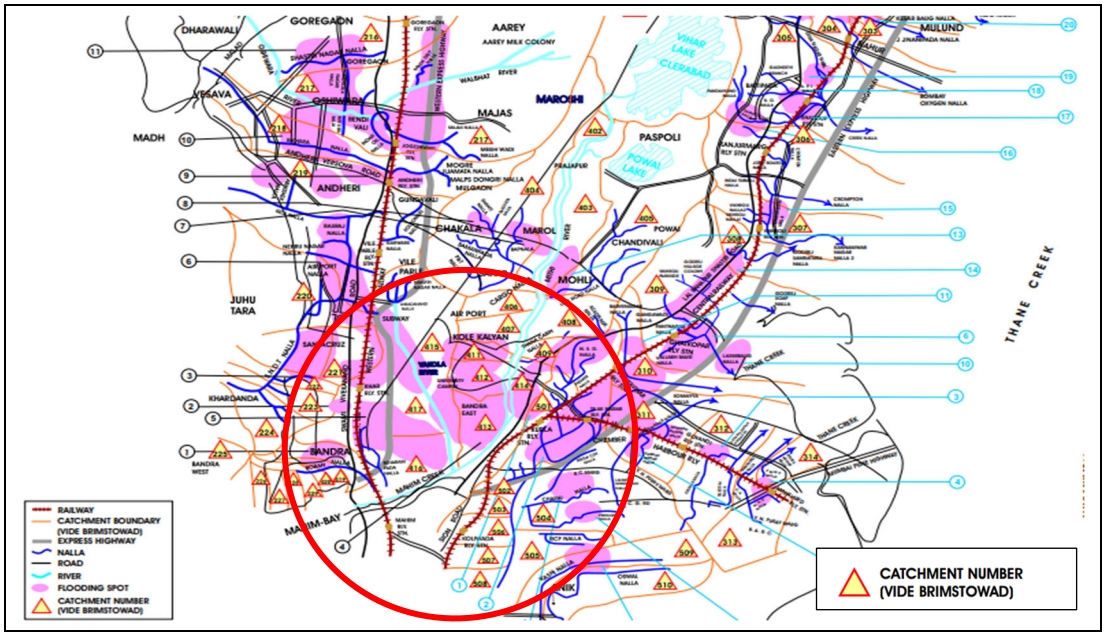


出典：「FFC 2006 Report」Drawing No.12

図 2.4 Mithi 川から Mahul Creek への越水地点（Jarimari 地点付近）

Mithi 川の氾濫区域を以下の図に示す。対象地域の全体が浸水した。被害は郊外（Suburb）が最も大きく、この地域は低地となってる地域が多いことから、ここに住んでいる貧困層世帯は大きな被害を受けた。

被害が集中した地点は、潮位の影響のある下流区間である。特に、空港近くでは、浸水した流水は、ラル バハドゥル シャーストリ マーグ(Lal Bahadhur Shastri Marg)を横切り、CST 道路と鉄道線路を越えてマフル(Mahul)水路に流れ込んだ。氾濫水は最終的にソマイヤ(Somaiya)システムに流れ込み、浸水したと報告されている。氾濫水は最終的にレティ バンダー (Reti Bunder)排水口(Outfall)から排水された。

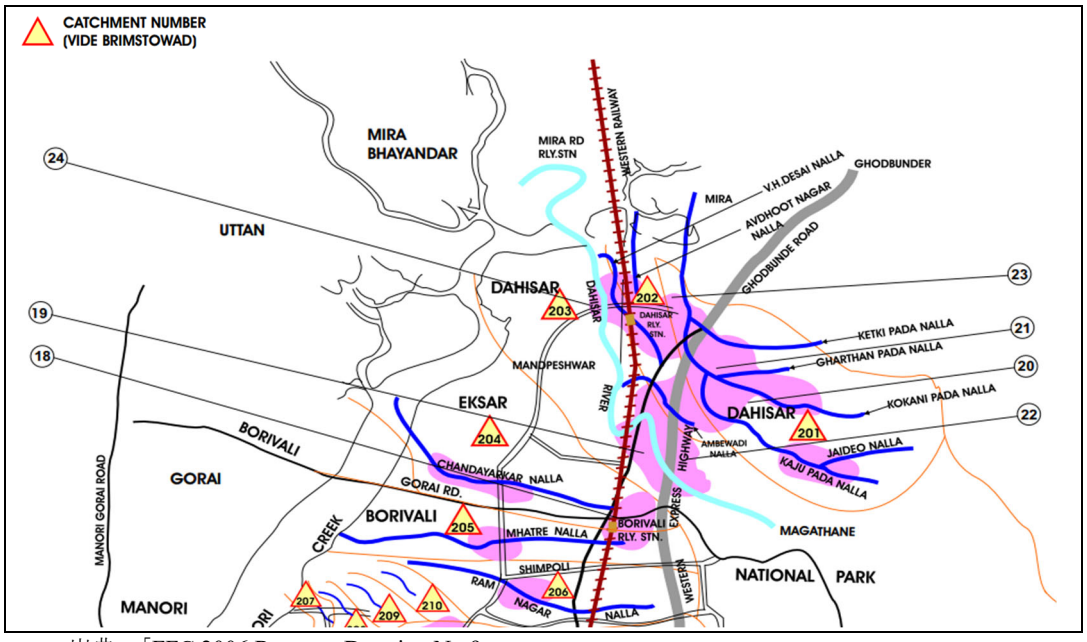


出典：「FFC 2006 Report」 Drawing No.9

図　2.5　Mithi 川における浸水区域と被害集中区域

2.2.2 Dahisar 川

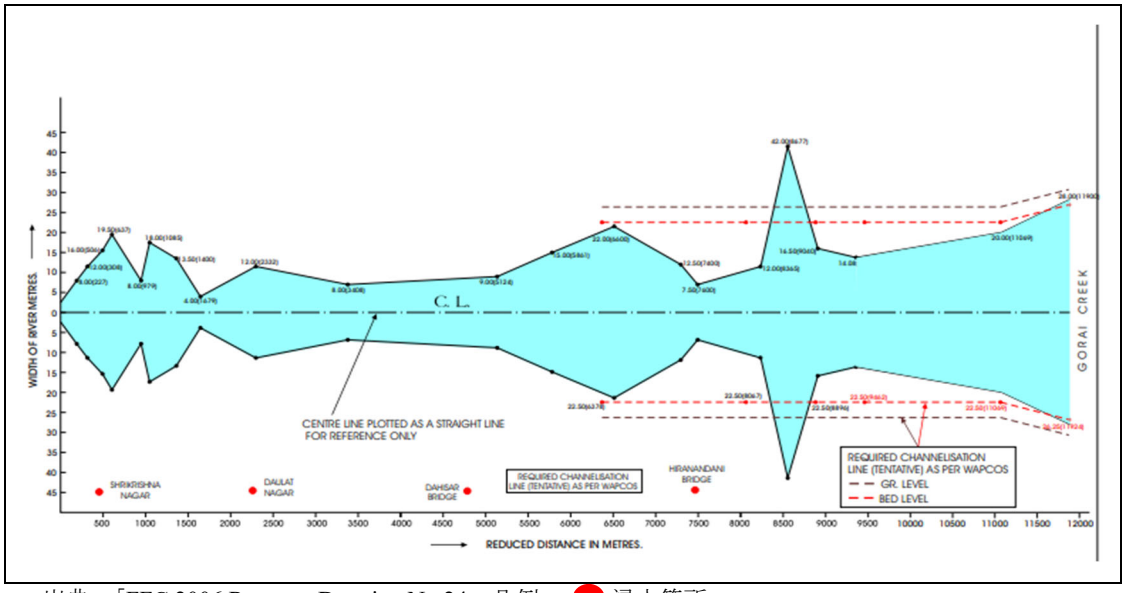
洪水により、ラワルパダ(Rawal Pada)、ガルタンパダ(Ghartan Pada)、スリクリシュナ ナガル(Sri Krishna Nagar)の約 10,000 戸の家屋、商店が浸水した。この地域の水位は約 2.5 メートルである。ダウラト ナガル(Daulat Nagar)、ハンセン病コロニー、マハトレ ワディ(Mhatre Wadi)、カンダル パダ(Kandar Pada)などの区域が完全に水没した。 高潮が発生したことも浸水に影響しており、これらの地域では浸水位が 3 メートルまで上昇した。



出典：「FFC 2006 Report」 Drawing No.9

図　2.6　Dahisar 川における浸水区域

Dahisar 川における浸水位置は、下記の平面図上でその位置が示されている。

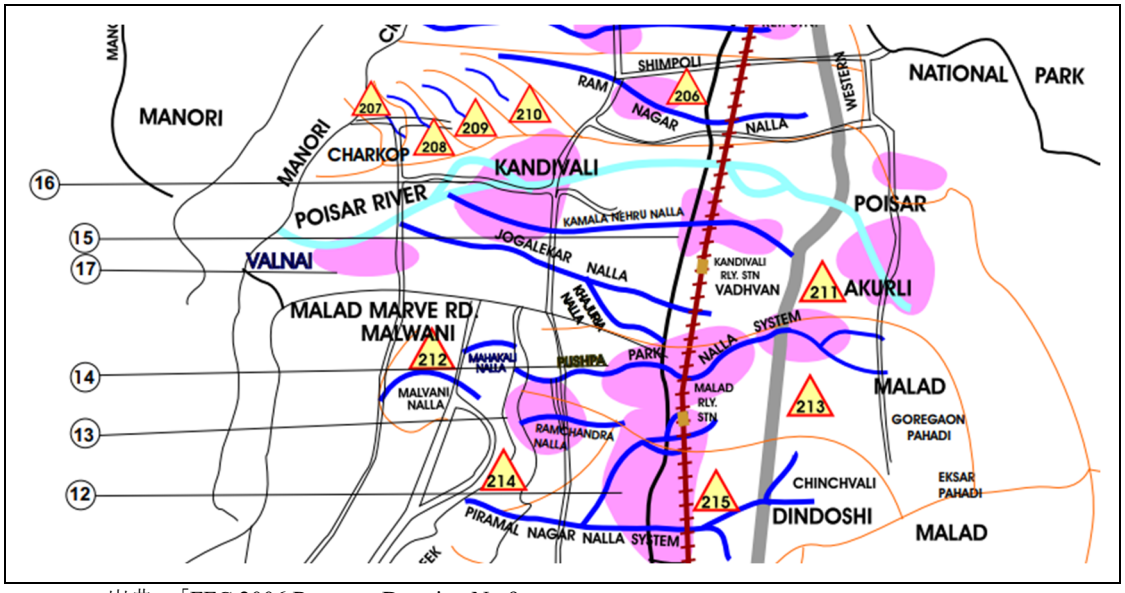


出典：「FFC 2006 Report」Drawing No.24　凡例：● 浸水箇所

図　2.7　Dahisar 川の河川平面幅員と浸水箇所

2.2.3 Poisar 川

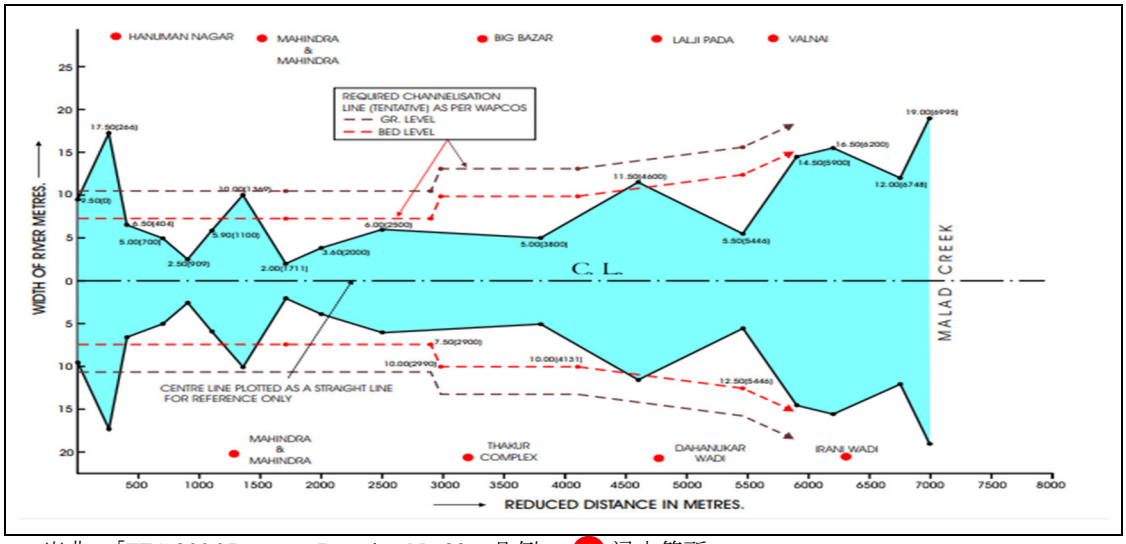
ハヌマン ナガル(Hanuman Nagar)、クランティ ナガル(Kranti Nagar)、アッパパダ(Appa Pada)、クラー村(Kurar Village)の一部、ポイサール村(Poisar)、ダハヌカルワディ(Dahanukar Wadi)、イラニ ワディ(Irani Wadi)、アビラク ナガル(Abhilakh Nagar)、エクタナガル(Ekta Nagar)、ラルジ パダ(Lalji Pad)、ヴァルナイ(Balnai)などの区域が深刻な浸水被害を受けた。35,000 戸以上の家屋が 2 日以上に渡り浸水した。被災人口は、5,000 世帯以上 (20,000 人以上)と推定される。流域内の大手産業の マヒンドラ アンド マヒンドラ(Mahindra and Mahindra)は、洪水の浸水により生産を数週間、停止した。



出典：「FFC 2006 Report」Drawing No.9

図　2.8　Poisar 川における浸水区域

Poisar 川における浸水位置は、下記の平面図上でその位置が示されている。

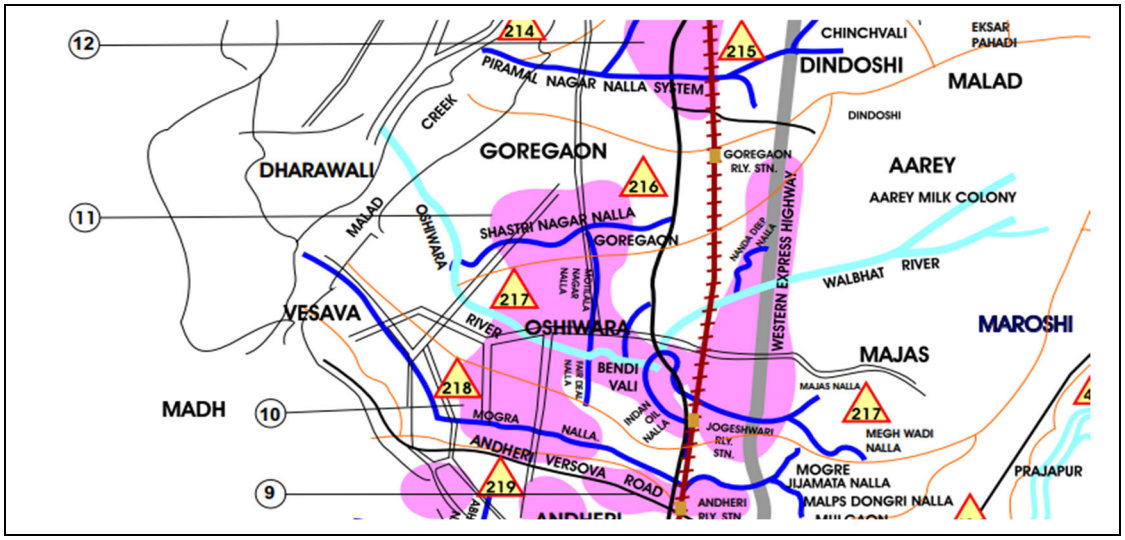


出典：「FFC 2006 Report」 Drawing No.22　凡例：● 浸水箇所

図　2.9　Poisar 川の河川平面幅員と浸水箇所

2.2.4 Oshiwara 川

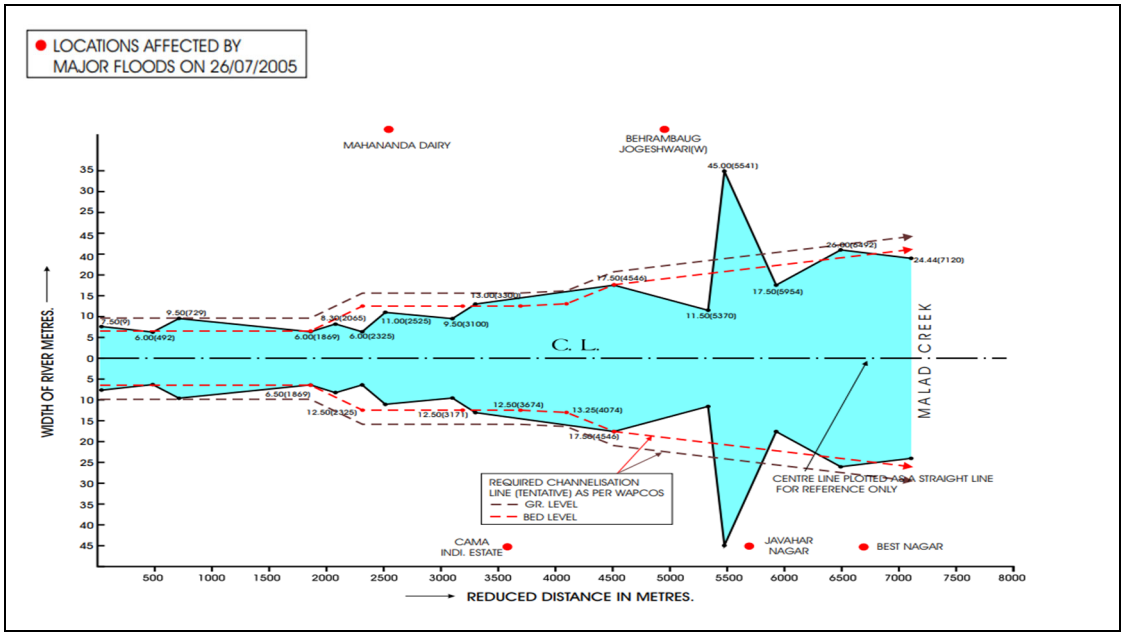
氾濫水がジャワハル・ナガル(Jawahar Nagar)、シッダールタ ナガル(Siddhartha Nagar)、BEST コロニー、モティラル・ナガル(Matilal Nagar)、バガット・シン・ナガル(Bhagat Singh Nagar)などの住宅地に流入し、大規模な浸水となった。ウォルバート・ロード(Walbhat Road)地域（ゴレガオン(Goregaon)東部）とラム・マンディル・ロード（Ram Mandir Road ゴレガオン Goregaon 西部）の小規模事業所等も浸水した。



出典：「FFC 2006 Report」 Drawing No.9

図　2.10　Oshiwara 川における浸水区域

Oshiwara 川における洪水の浸水箇所は、以下の通りである。



出典：「FFC 2006 Report」 Drawing No.20

図　2.11　Oshiwara 川の河川幅員と浸水箇所

2.2.5 2005 年洪水による浸水被害の原因の推定

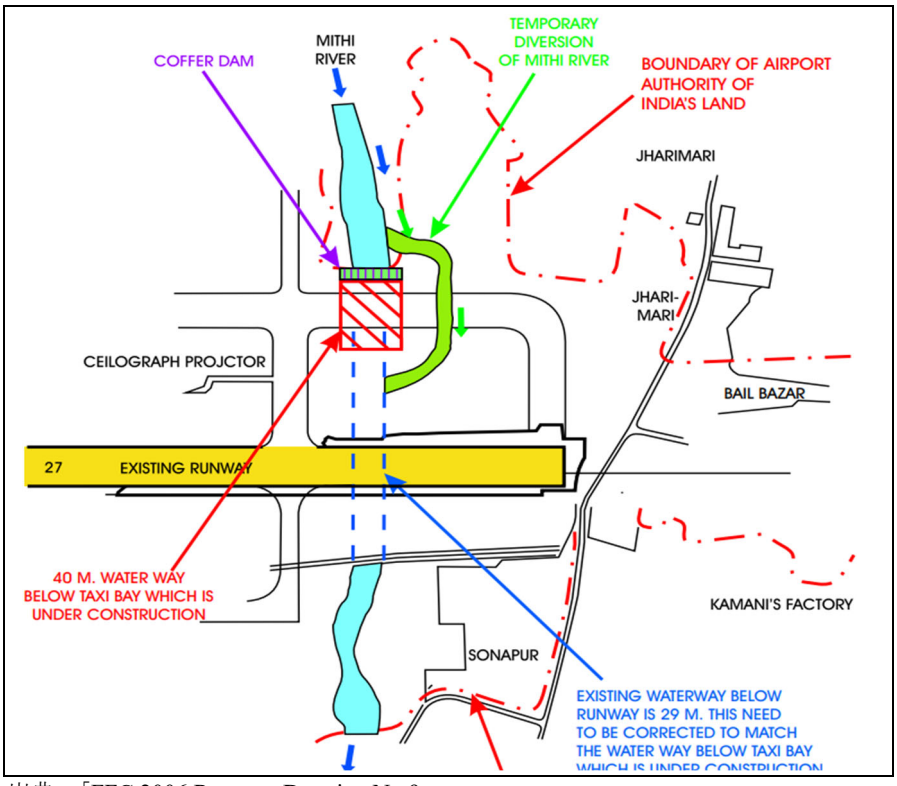
「FFC 2006 Report」によると、ムンバイとその周辺の水文、気象、水理条件、７つの島(Seven Islands)）を埋めるため干拓地した低平地が多くを占める地形条件、多くの区域が潮位よりも低い区域があることを考慮すると、その流域を考慮した洪水対策を「パッケージ」として計画することが必要であった。この観点から、BRIMSTOWAD は主に、当初、毎年の暴風雨による水の流れをコントロールし、スムーズに流すことを目指していたが、結果的に、規模の大きい降雨や洪水の影響については対応していなかった。

都市の 2/3 と郊外のかなりの居住可能部分は、ほぼ平坦な埋立て地にあり、正確な集水域を特定することは困難である。尾根の近くや鞍部にある道路脇の排水溝は、流れを反対側の流域に転流する可能性がある。埋立て地の地表レベルは 5.25 ～ 6.25 m CD の範囲に対して、満潮レベルは 5.26 m CD となっている。地上の排水溝(Creek)から水が越水した場合、これらの流域は相互に接続され、複合システムのように水路となる。従って、このような流域を完全に分離して検討することはできないことが排水計画上の課題となっている。

MCGM スタッフと近隣住民が観察した現地の浸水調査から、Mithi 川を除く３河川は 26 日と 27 日に 「2 山波形の洪水波形」となった。一山目は、26 日の 16-17 時前後であったが、この流量波形（ハイドログラフ）は、潮位が低下したために低下した。その後 26 日の深夜(23-24 時)に再び洪水が生起した。この洪水は夕方に生起した洪水よりも大きな洪水となったが、26 日の真夜中以降には潮位の低下する期間が続いたため、雨が止んでから数時間以内には、流量が減少した。

上記の３河川の現象とは異なり、Mithi 川の下流部では、空港付近で午後 14 時半から 15

時までに浸水が始まり、この浸水は広がり続け、36 時間経っても完全には低下しなかった。最初に豪雨の際に、空港近くに設置されている IMD 雨量計局ステーションが、午後 14 時半前後に水没した。この原因としては、タクシー ベイ(Taxi Bay)の下の橋のためにミティ川に架けられた Coffer Dam が、起因したとしている。



出典：「FFC 2006 Report」 Drawing No.9

図 2.12 Mith 川における浸水を生起した空港付近 Coffer ダムの位置

空港近くで浸水が発生した Mithi 川の洪水は、ラル バハドゥル シャーストリ マーグ(Lal Bahadhur Shastri Marg)を横切り、CST 道路と鉄道線路を越えてマフル(Mahul)水路に流れ込んだ。この Mahul 水路も流れに対応できず、EEH 暗渠のすぐ下流では、自らの流れを排水ができなかった。氾濫水は最終的にソマイヤ (Somaiya)システムに流れ込み、浸水したと報告されている。氾濫水は最終的にレティ バンダー (Reti Bunder)排水口(Outfall)から排水された。洪水発生直後のミティの洪水レベルは測定も記録もされていないが、当時の情報によると、City 南部でもこの逆流が起こり、7 月 26 日と 27 日に洪水が発生した。

浸水原因の最も大きな原因は、ビハール付近の以上な降雨量（1 時間あたり 136mm）であること、Mithi 川の河川幅が小さいこと（流下能力不足）による越水、さらに、生起した潮位の高さの影響により、洪水の流れが制限され上流に向かって流れたこと等が挙げられる。

浸水した原因となるボトルネックは、空港ならびに MMRDA 管理区域にある排水口付近である。具体的なボトルネックの区域は、下流部の左岸に位置するクルラ(Kurla)とチェンブル(Chembur)地域であり、さらに、最下流部のマヒム(Mahim)付近である。

Mithi 川とは対照的に、Dahisar 川では下流域（距離標 Ch. At 300）に古代の歩行者用アーチ橋というボトルネックがあったが、洪水は、未開発の低湿地帯に広がり、クリークに向かって流れることができたため、河川水位はそれほど上昇していない。Mithi 川と Mahul 川の場合、このような低地の下流部はほとんど埋立てられているため、このような現象とはならなかった。

3. Mithi 川の河川改修

以下に MCGM における河川改修計画の経緯を示す。

表 3.1 MCGM における河川改修計画の検討経緯

No.	資料略称	検討年	検討内容
1	CWPRS 2006 Report	2006	現況河道の改修検討、断面は台形
2	FFC 2007 Report	2007	2006 年検討を踏まえた改修断面の検討
3	MMRDA Possible Top Width 検討	2008	台形断面から矩形断面への変更、 全区間の可能河川幅を提案
4	CWPRS 2013 Report	2013	2008 検討を踏まえた空港付近橋梁 Bridge No.1 設置と分流トンネル(Additional Waterway Channel)の検討
5	CWPRS 2016 Report	2016	Flyover Bridge 仮設橋梁パイル(Temporary Bridge Pile)の影響検討

注. CWPRS: Central Water and Power Research Station
FFC: Fact Finding Committee

この成果図で提案された河川幅を区間別に示すと以下のとおりとなる。

表 3.2 2010 年 5 月に整理された平面図に示されるレポートで提案された河川幅

区間	起点	終点	CWPRS 提案幅	FFC 提案幅	MMRDA 提案幅
M1	CH 3500	CH 5900	200 m	200 m	70-200 m
M2	CH 5900	CH 7815	100	100	100
M3	CH 7815	CH 10500	100	30	30-35
M4	CH 10500	CH 12200	100	25	30
M5	CH 12200	CH 13700	60	25	25
M6	CH 13700	CH 17000	40	16-20	16-20

出典: Drawing showing Widening of Mithi River and Vakola Nala (2010.5)

各区間の平面図と提案された河川幅を以下に示す。本資料の概要は、以下のとおりである。

1) 実施機関と実施年：MMRDA（2017 年 11 月）
2) 実施区間: 0000 Nityanand Nagar-19147 Vihar Lake
3) 平面縮尺:S=1:2,000
4) 縮尺:H=1:1,000, V=1:100
5) 横断ピッチと縮尺:100m、H=1:2,000, V=1:200

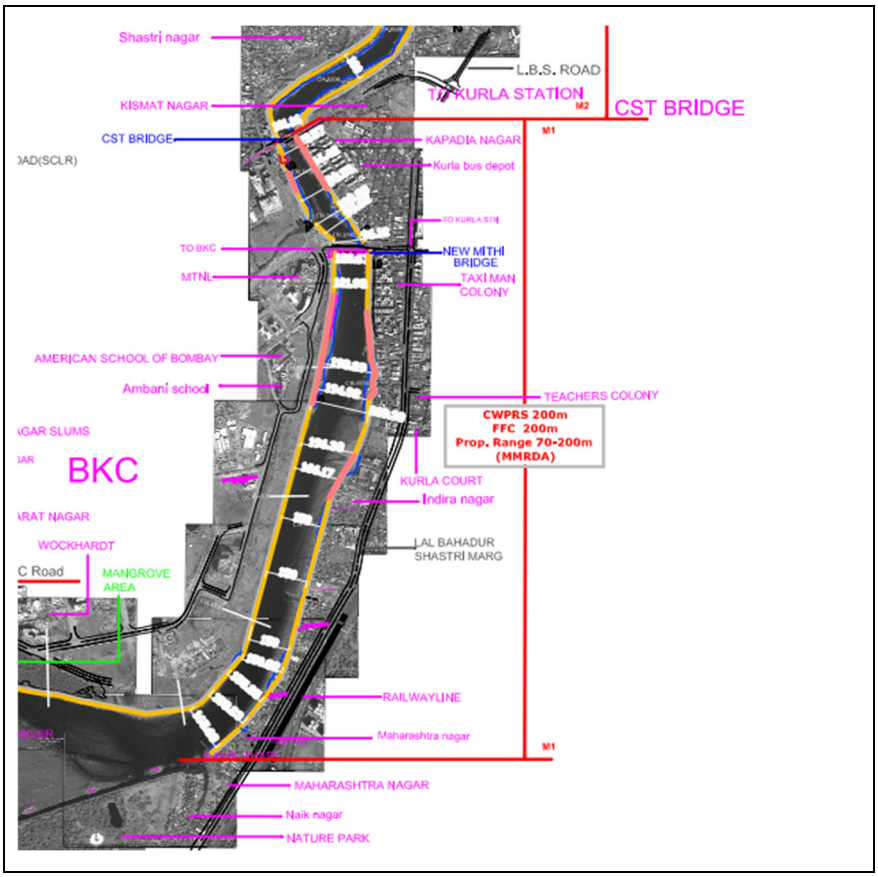


図 3.1 提案された河川幅（M1 区間）

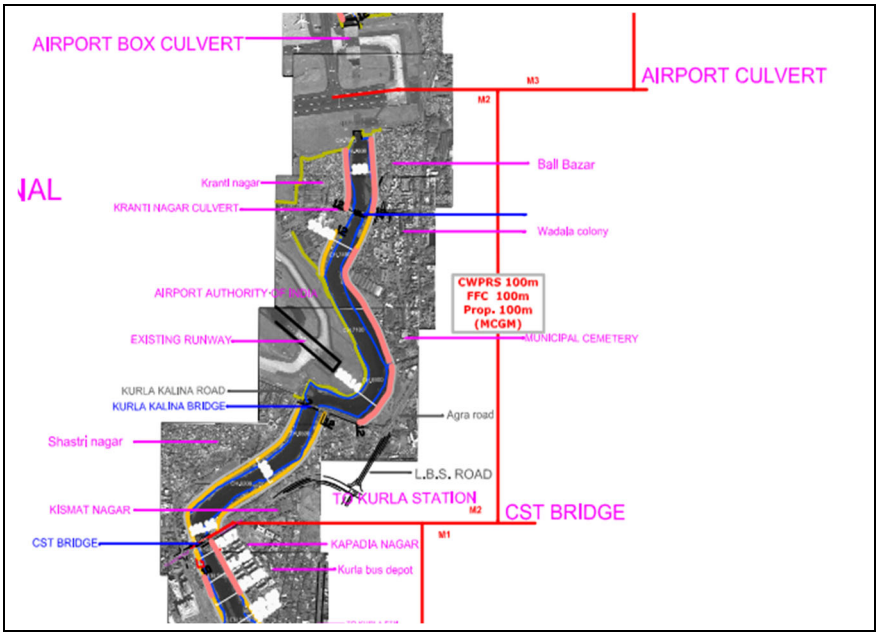


図 3.2 提案された河川幅（M2 区間）

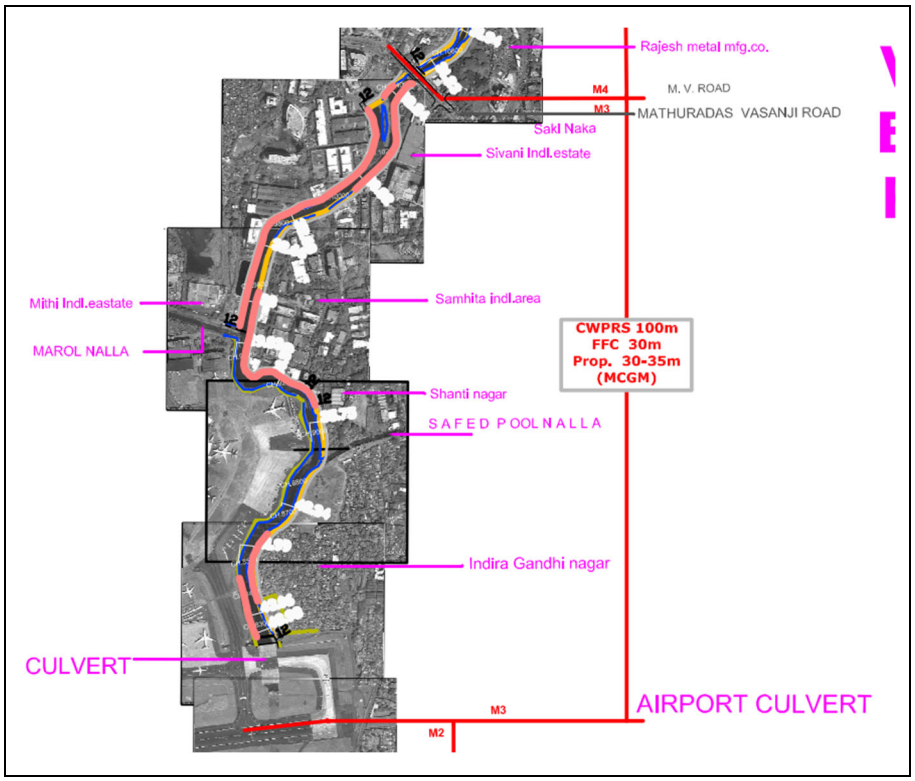


図 3.3 提案された河川幅（M3 区間）

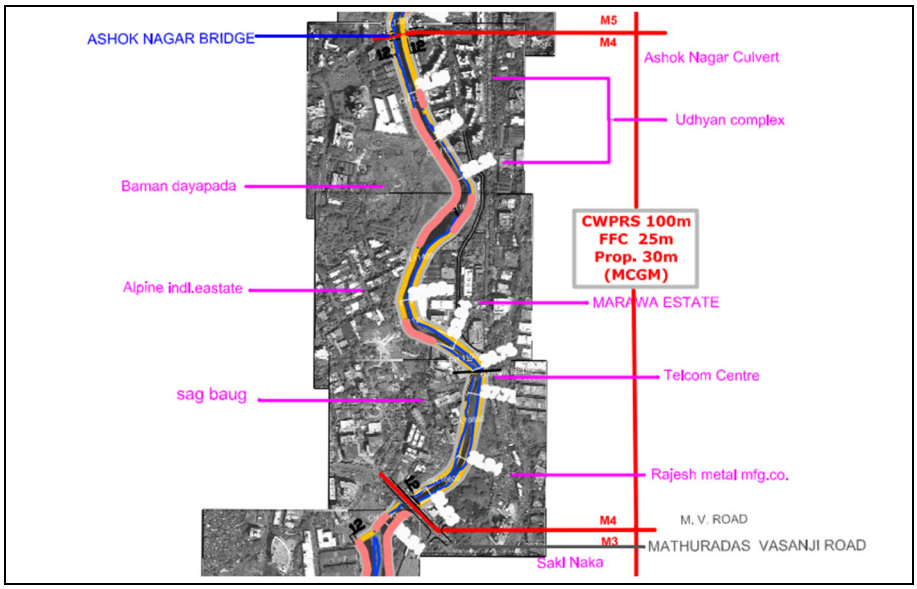


図 3.4 提案された河川幅（M4 区間）

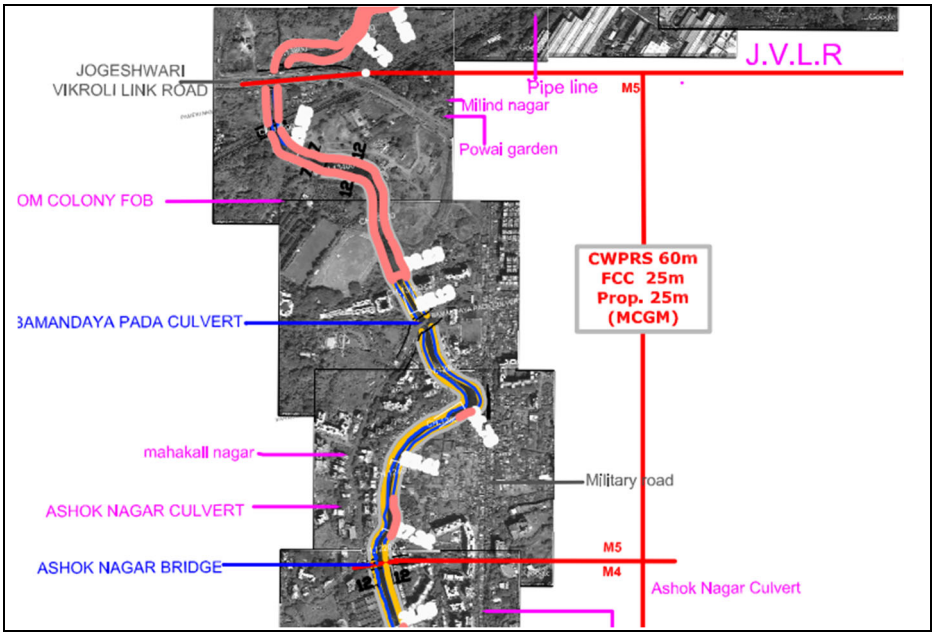


図 3.5 提案された河川幅（M5 区間）

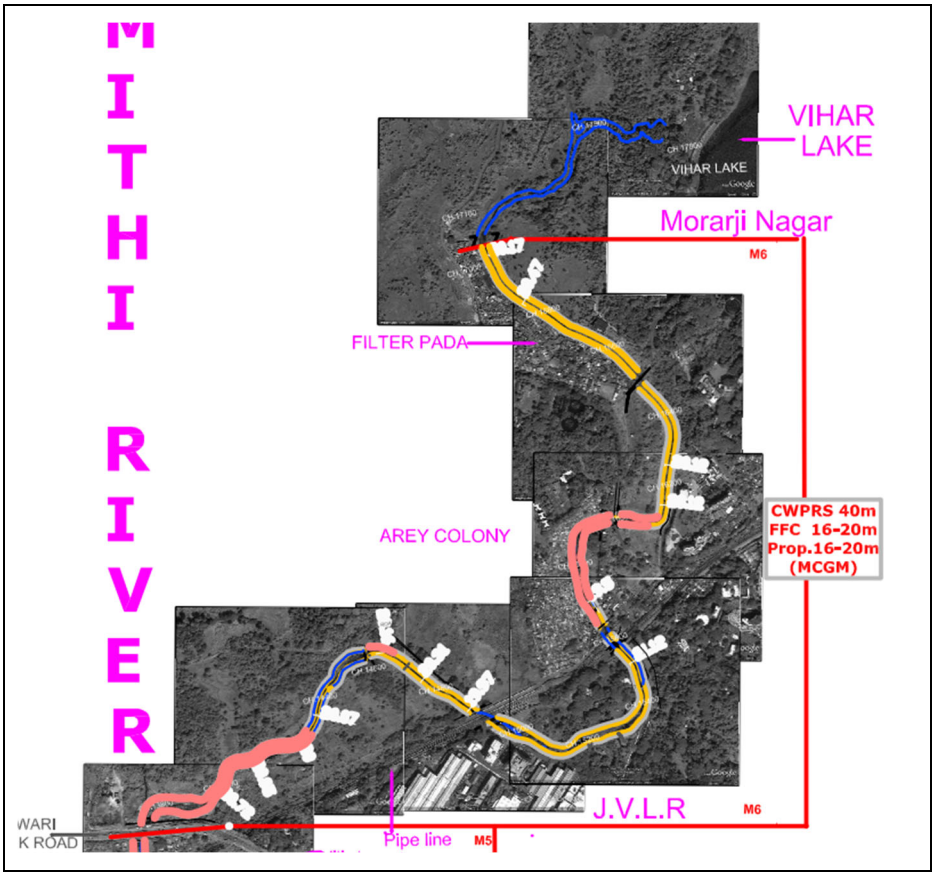


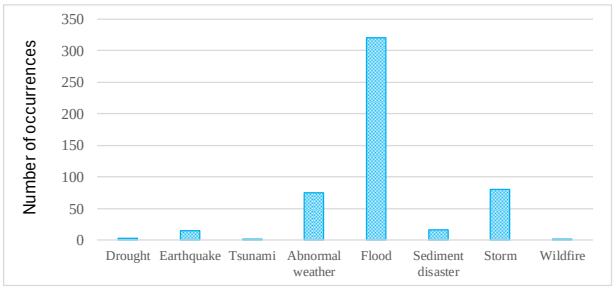
図 3.6 提案された河川幅（M6 区間）

Appendix-9

THE STATUS OF THE NUMBER OF NATURAL DISASTERS AND THE DAMAGE COSTS IN INDIA FROM 2002 TO 2022

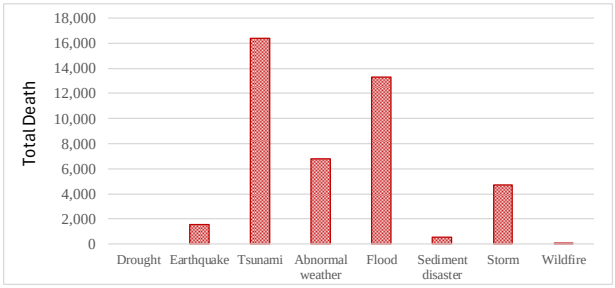
Appendix-9-1: Number of Occurrences, Death and Total Damages between 2002 and 2022

a. Number of Occurrences (2002-2022)



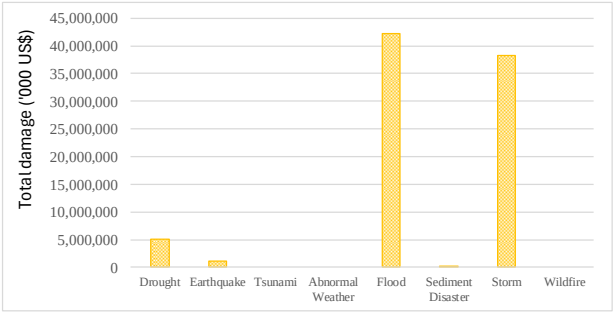
Disaster Type	Total Occurrences
Drought	3
Earthquake	15
Tsunami	1
Abnormal weather	75
Flood	320
Sediment disaster	16
Storm	81
Wildfire	2

b. Number of Death (2002-2022)



Disaster Type	Total Deaths
Drought	0
Earthquake	1,537
Tsunami	16,389
Abnormal weather	6,815
Flood	13,274
Sediment disaster	572
Storm	4,719
Wildfire	24

c. Total Damages (2002-2022)



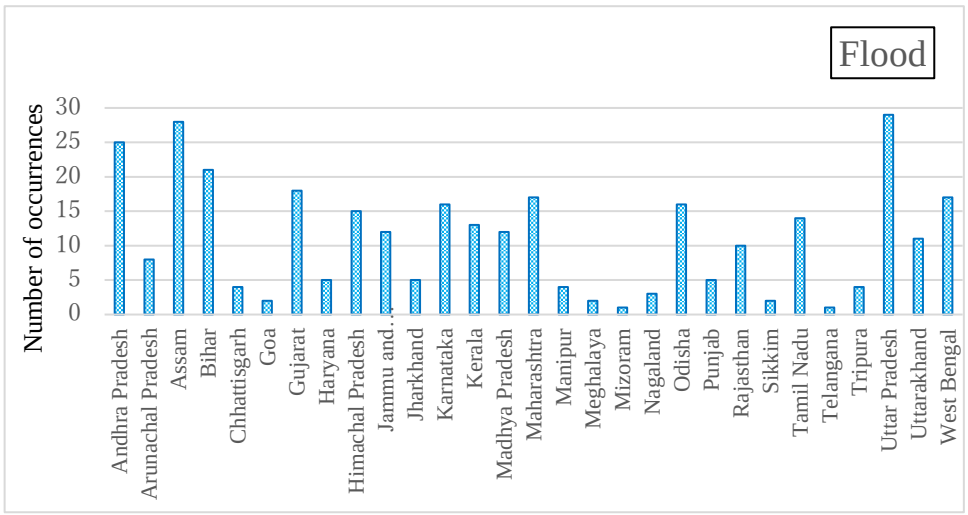
Disaster Type	Total Damages ('000 US$)
Drought	5,010,722
Earthquake	1,195,000
Tsunami	0
Abnormal Weather	0
Flood	42,227,403
Sediment Disaster	260,000
Storm	38,187,512
Wildfire	0

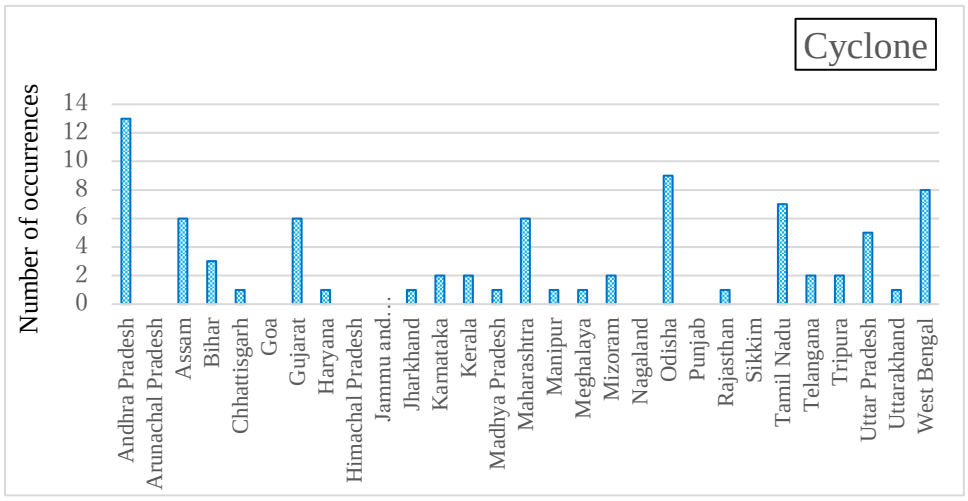
Appendix-9-2: Frequency, Average Number of Deaths, and Economic Damage by Disaster Type

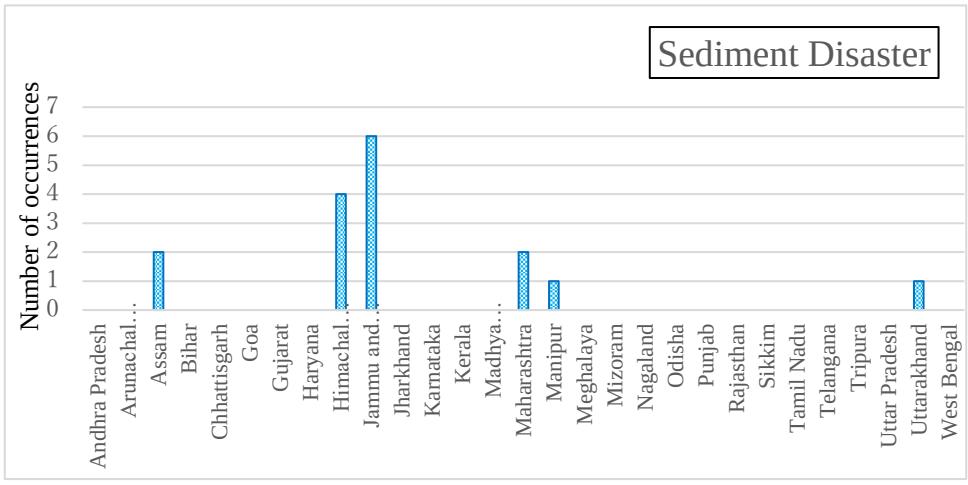
Type of Disaster	Frequency (times/year)	Average Number of Deaths (Persons/year)	Average Economic Damage (Thousand US$/year)
Drought	0.2	0.0	250,536
Earthquake	0.8	76.9	59,750
Tsunami	0.1	819.5	51,140
Abnormal Weather	3.8	340.8	20,000
Flood	16.0	663.7	2,111,370
Sediment Disaster	0.8	28.6	13,000
Storm	4.1	236.0	1,909,376
Wildfire	0.1	1.2	0

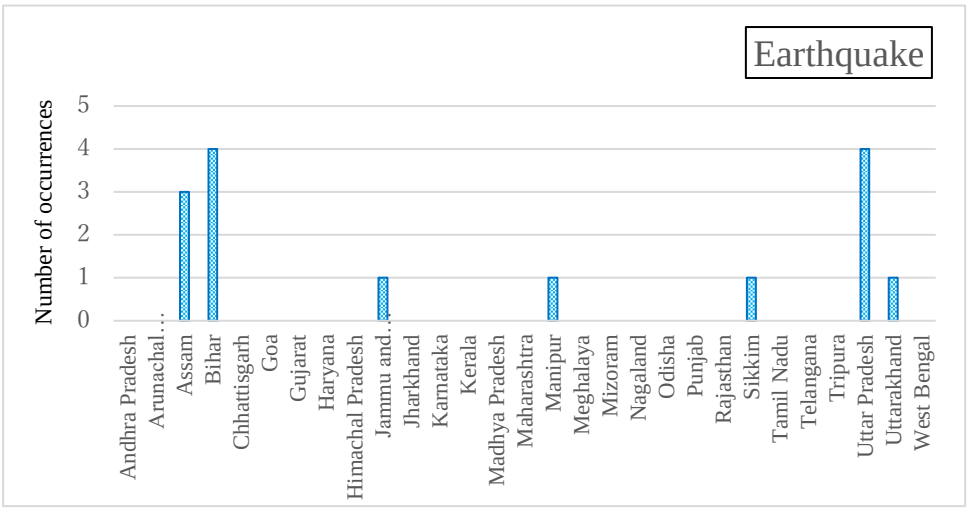
Appendix-9-3: Disaster Occurrences by State (2002-2022)

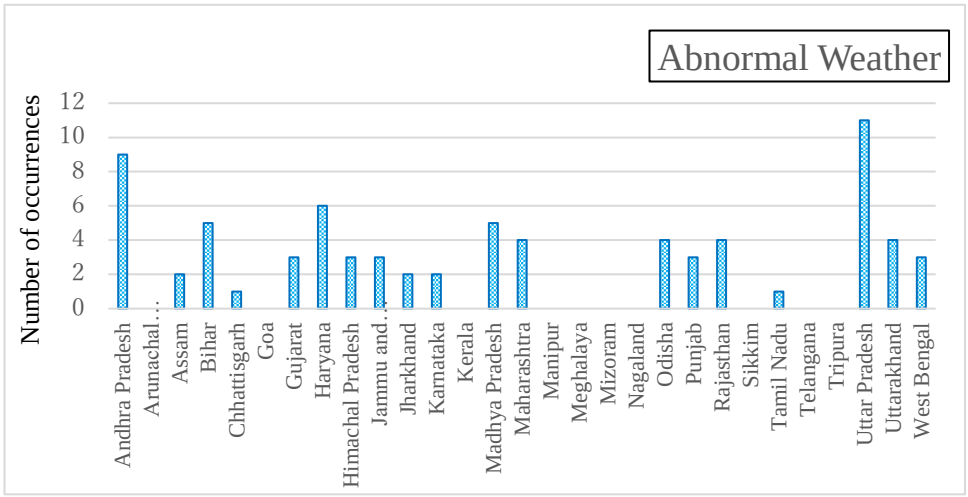
States	Flood	Cyclone	Sediment Disaster	Earthquake	Abnormal Weather
Andhra Pradesh	25	13	0	0	9
Arunachal Pradesh	8	0	0	0	0
Assam	28	6	2	3	2
Bihar	21	3	0	4	5
Chhattisgarh	4	1	0	0	1
Goa	2	0	0	0	0
Gujarat	18	6	0	0	3
Haryana	5	1	0	0	6
Himachal Pradesh	15	0	4	0	3
Jammu and Kashmir	12	0	6	1	3
Jharkhand	5	1	0	0	2
Karnataka	16	2	0	0	2
Kerala	13	2	0	0	0
Madhya Pradesh	12	1	0	0	5
Maharashtra	17	6	2	0	4
Manipur	4	1	1	1	0
Meghalaya	2	1	0	0	0
Mizoram	1	2	0	0	0
Nagaland	3	0	0	0	0
Odisha	16	9	0	0	4
Punjab	5	0	0	0	3
Rajasthan	10	1	0	0	4
Sikkim	2	0	0	1	0
Tamil Nadu	14	7	0	0	1
Telangana	1	2	0	0	0
Tripura	4	2	0	0	0
Uttar Pradesh	29	5	0	4	11
Uttarakhand	11	1	1	1	4
West Bengal	17	8	0	0	3


Flood
Number of occurrences
30
25
20
15
10
5
0
Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chhattisgarh
Goa
Gujarat
Haryana
Himachal Pradesh
Jammu and...
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Meghalaya
Mizoram
Nagaland
Odisha
Punjab
Rajasthan
Sikkim
Tamil Nadu
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal


Cyclone
Number of occurrences
14
12
10
8
6
4
2
0
Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chhattisgarh
Goa
Gujarat
Haryana
Himachal Pradesh
Jammu and...
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Meghalaya
Mizoram
Nagaland
Odisha
Punjab
Rajasthan
Sikkim
Tamil Nadu
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal


Sediment Disaster
Number of occurrences
7
6
5
4
3
2
1
0
Andhra Pradesh
Arunachal...
Assam
Bihar
Chhattisgarh
Goa
Gujarat
Haryana
Himachal...
Jammu and...
Jharkhand
Karnataka
Kerala
Madhya...
Maharashtra
Manipur
Meghalaya
Mizoram
Nagaland
Odisha
Punjab
Rajasthan
Sikkim
Tamil Nadu
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal


Earthquake
Number of occurrences
0
1
2
3
4
5
Andhra Pradesh
Arunachal…
Assam
Bihar
Chhattisgarh
Goa
Gujarat
Haryana
Himachal Pradesh
Jammu and…
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Meghalaya
Mizoram
Nagaland
Odisha
Punjab
Rajasthan
Sikkim
Tamil Nadu
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal

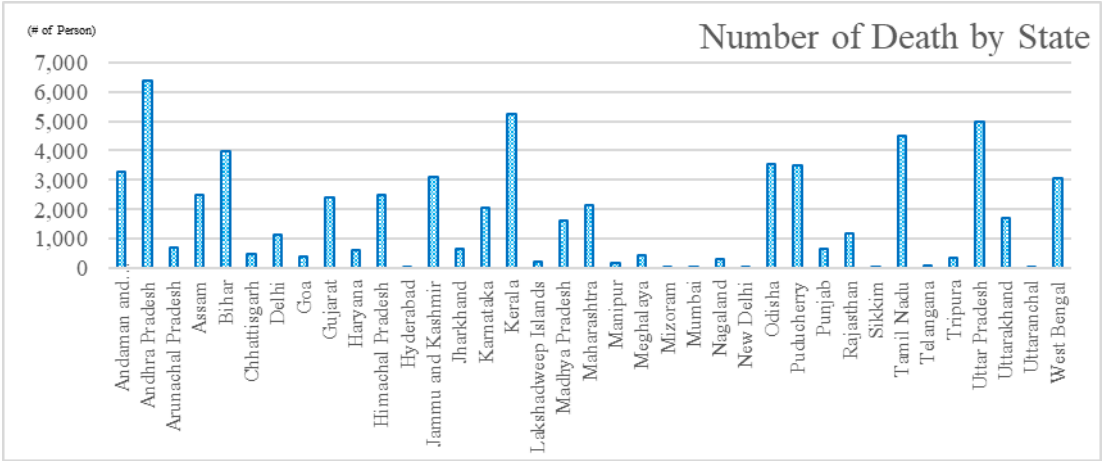

Abnormal Weather
Number of occurrences
0
2
4
6
8
10
12
Andhra Pradesh
Arunachal…
Assam
Bihar
Chhattisgarh
Goa
Gujarat
Haryana
Himachal Pradesh
Jammu and…
Jharkhand
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Meghalaya
Mizoram
Nagaland
Odisha
Punjab
Rajasthan
Sikkim
Tamil Nadu
Telangana
Tripura
Uttar Pradesh
Uttarakhand
West Bengal

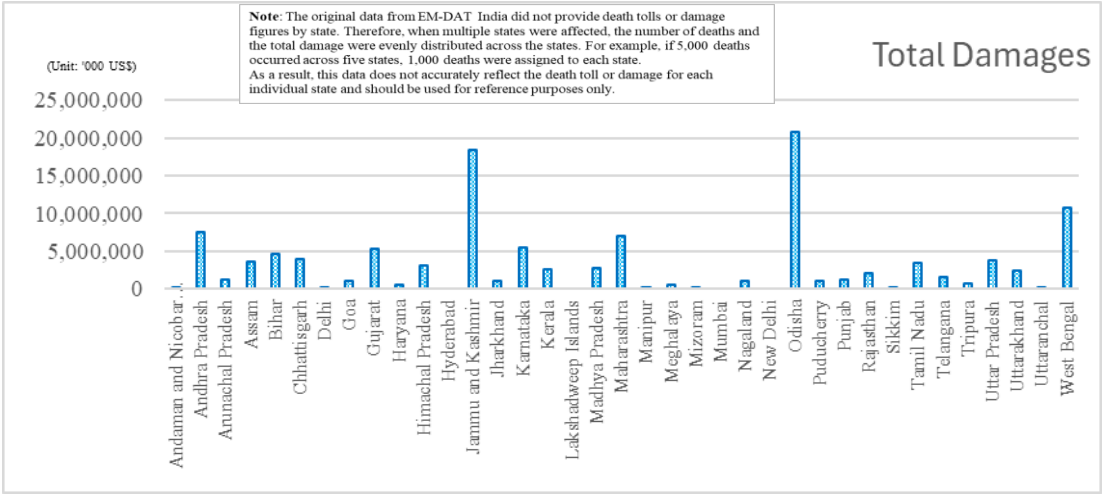
Appendix-9-4: Trends in the Number of Victims and Economic Damage by Disaster Type for Each of the Past 15 Years

	Number of Affected			Total Damages ('000 US$)		
	2006-2010	2011-2015	2016-2020	2006-2010	2011-2015	2016-2020
Earthquake	-	635,110	10,808	-	120,000	75,000
Tsunami	-	-	-	-	-	-
Riverine flood	53,505,869	36,605,289	1,735,000	8,049,151	20,332,000	-
Flash flood	8,931,465	2,322	25,235,740	123,000	76,000	3,412,480
Coastal flood	7,200,000	-	-	275,000	-	-
Sediment disaster	-	9,210	155,955	-	-	-
Cyclone	5,750,300	14,470,004	39,009,670	300,000	8,271,096	19,525,000

Appendix-9-5: The Number of Death and Damages by State (2002-2022)

State	Death	Damages (in'000 USD)
Andaman and Nicobar Islands	3,301	204,926
Andhra Pradesh	6,391	7,541,749
Arunachal Pradesh	698	1,200,175
Assam	2,482	3,575,844
Bihar	3,959	4,653,621
Chhattisgarh	482	3,937,385
Delhi	1,148	197,273
Goa	415	1,007,741
Gujarat	2,406	5,232,728
Haryana	639	475,102
Himachal Pradesh	2,479	3,090,576
Hyderabad	5	-
Jammu and Kashmir	3,125	18,423,162
Jharkhand	655	1,081,907
Karnataka	2,061	5,401,188
Kerala	5,248	2,659,235
Lakshadweep Islands	222	
Madhya Pradesh	1,611	2,713,735
Maharashtra	2,149	6,963,360
Manipur	204	53,126
Meghalaya	428	551,350
Mizoram	21	8,348
Mumbai	24	-
Nagaland	313	1,047,403
New Delhi	44	-
Odisha	3,542	20,785,556
Puducherry	3,500	1,127,720
Punjab	656	1,169,676
Rajasthan	1,202	2,002,016
Sikkim	46	14,025
Tamil Nadu	4,501	3,428,353
Telangana	91	1,527,999
Tripura	359	676,406
Uttar Pradesh	4,961	3,730,311
Uttarakhand	1,713	2,349,252
Uttaranchal	18	5,009
West Bengal	3,083	10,714,680

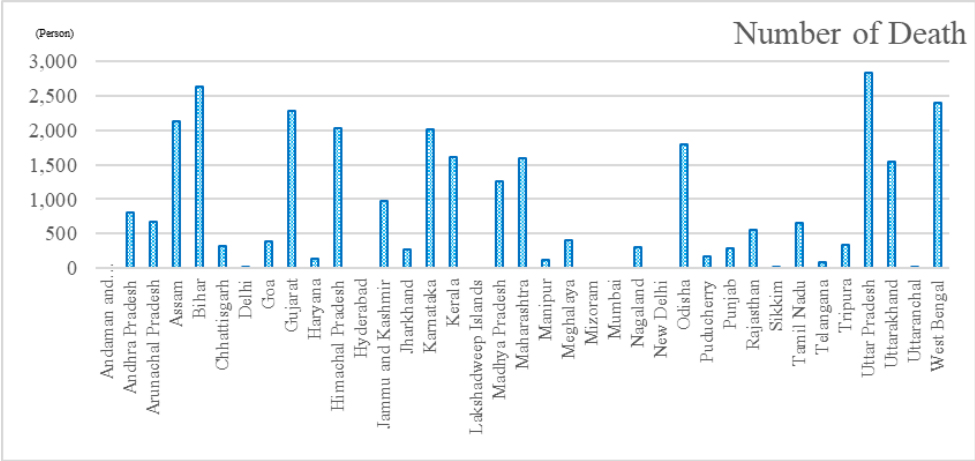


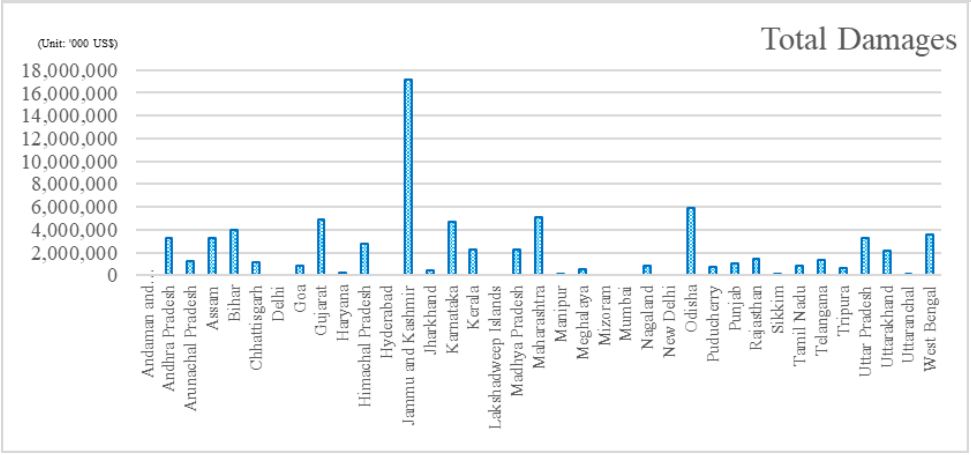


Appendix-9-6: The Number of Death and Damages by State (2002-2022)

State	Death	Damages (in'000 USD)
Andaman and Nicobar Islands	-	-
Andhra Pradesh	812	3,257,115
Arunachal Pradesh	671	1,198,031
Assam	2,122	3,292,853
Bihar	2,635	4,025,127
Chhattisgarh	323	1,163,750
Delhi	22	-
Goa	392	865,940
Gujarat	2,280	4,850,960
Haryana	130	201,833
Himachal Pradesh	2,025	2,721,865
Hyderabad	-	-
Jammu and Kashmir	979	17,144,750
Jharkhand	272	464,524
Karnataka	2,006	4,644,619
Kerala	1,617	2,253,004
Lakshadweep Islands	-	-
Madhya Pradesh	1,254	2,205,698
Maharashtra	1,594	5,053,115
Manipur	122	7,198
Meghalaya	400	550,365
Mizoram	-	-
Mumbai	-	-
Nagaland	311	873,227
New Delhi	-	-
Odisha	1,787	5,911,822
Puducherry	176	733,333
Punjab	288	1,035,167
Rajasthan	558	1,393,250
Sikkim	4	14,000
Tamil Nadu	661	827,167
Telangana	89	1,294,500
Tripura	331	647,198
Uttar Pradesh	2,835	3,290,893
Uttarakhand	1,539	2,129,555
Uttaranchal	8	5,000
West Bengal	2,388	3,623,044

*This data does not reflect the exact number of deaths or damage caused by floods for each state. It should be used for reference purposes only.





Memo: From 2002 to 2022, the total number of deaths in India due to all disasters was 64,178, with 30,631 of these fatalities attributed to floods, representing approximately 47.7% of the total. The overall damage amounted to 117.6 billion USD, with flood-related losses accounting for 75.6 billion USD, or about 64.4% of the total damage. These statistics underscore the urgent need for flood mitigation efforts.