Appendix-5

INFORMATION FROM PRIORITY CITIES

Appendix-5-1

MEETING MATERIAL FOR PRIORITY CITIES

DATA COLLECTION SURVEY ON DISASTER RISK REDUCTION SECTOR IN INDIA

February 2024

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)
Yachiyo Engineering Co., Ltd

1

Agenda of Meeting

1. Introduction of JICA Survey Team
2. Objectives of the Survey
3. Outline of the Survey
4. Implementation Schedule of the Survey
5. Longlisted/ Shortlisted Cities
6. Comprehensive Solutions for Urban flooding experienced in Japan
7. Outline of Proposed Project for Shortlisted Cities (tentative)
8. Required Information

2

2

1. Introduction of JICA Survey Team

Position	Name	Company
Team Leader/Formulation of disaster risk reduction	Takamasa NISHIKAWA	Nippon Koei (NK)
Deputy Team Leader/ Disaster risk assessment	Shoichiro MISAKI	Nippon Koei (NK)
Measures against flooding	Toru TAKAHASHI	Yachiyo Engineering (YEC)
Organization and legal structure/ formulation of flood management project	Yuichi YAMAGUCHI	Nippon Koei (NK)
Economic/ investment impact analysis	Uyu TANAKA	Yachiyo Engineering (YEC)
Supporting Staff	Mahmood Ahmad Mayank Agrawal Rishabh Chaudhary	Nippon Koei India (NKI)
	Kaori TANIMOTO	Nippon Koei (NK)

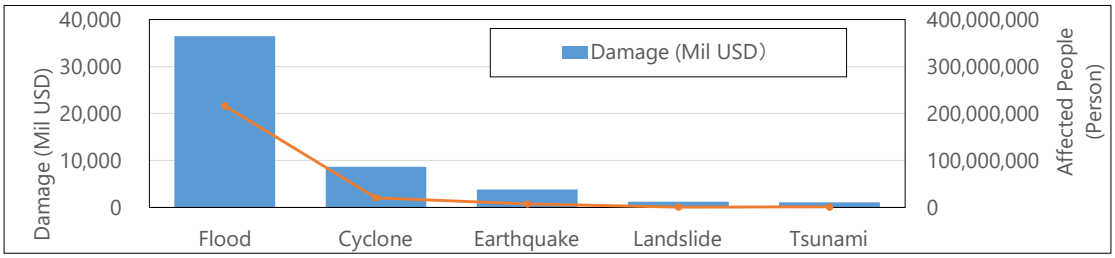
3

2. Objectives of the Survey

The objectives of this survey are:

- to collect and organize basic information on disaster risk reduction sector in India,
- to propose potential yen loan projects and technical cooperation by Japan International Cooperation Agency (JICA) to reduce or mitigate disaster risk especially for urban flood protection or management, and
- to prepare Preliminary Project Report (PPR) to promote the potential project.

If the needs of ODA and cooperation are confirmed in the sector, the JICA Survey Team will support approval procedure of the potential projects.



4

4

3. Outline of the Survey

Long-List of Candidate Cities for Yen Loans (10 cities)

▼

Online Interview with Longlisted Cities (10 cities)

▼

Selection of Priority Cities (6 cities)

▼

Site Survey for Priority Cities (6 cities)

▼

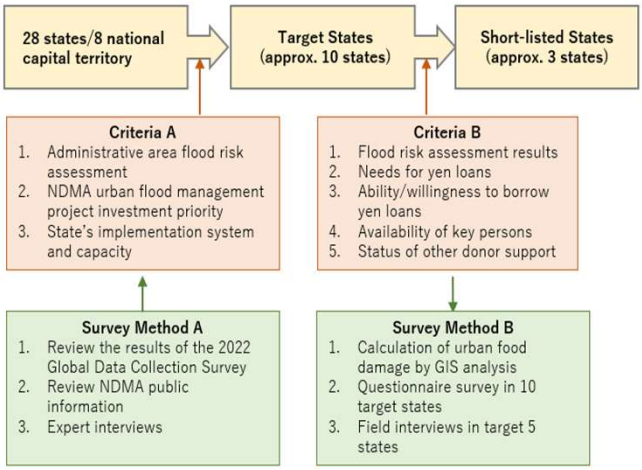
Selection of Shortlisted Cities (3 cities)

▼

Site Survey to formulate of potential project for Shortlisted Cities (tentative: 3 cities)

▼

Preparation of Preliminary Project Report of Shortlisted Cities and Chennai



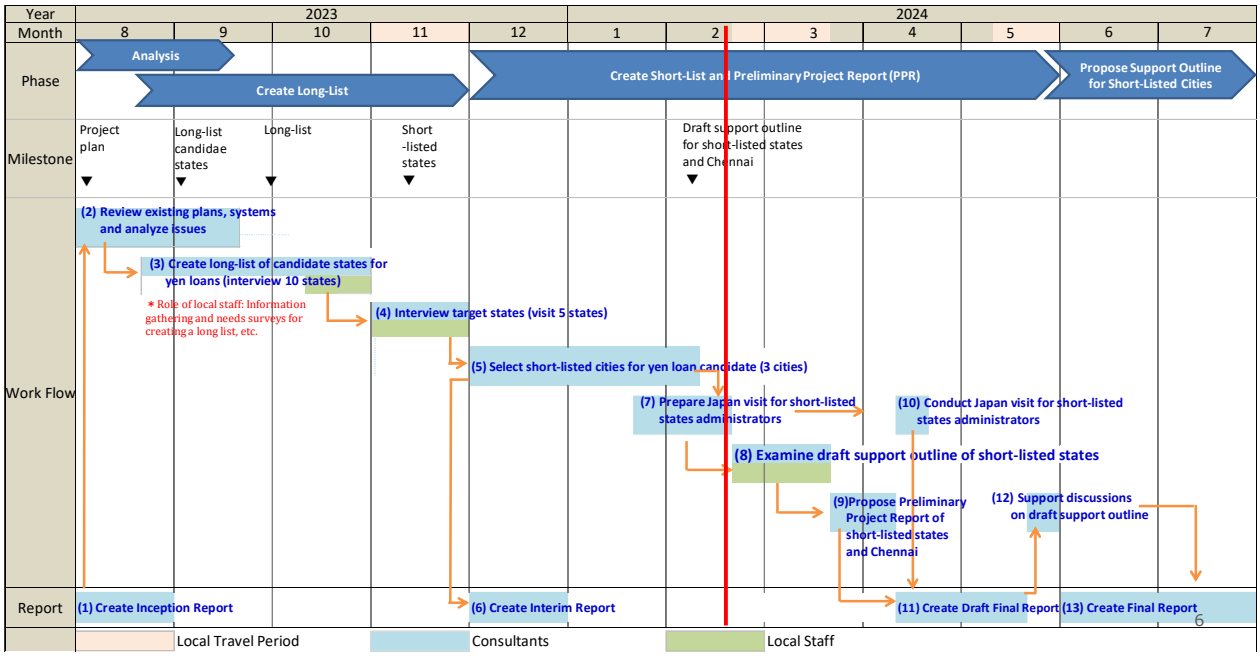
* **Target Disaster:** Urban Flood Mitigation/Management etc.

* **Type of Project:** ODA Loan Project, Sector Loan Project, Technical Assistance (Capacity Development)

5

5

4. Implementation Schedule of the Survey



6

6

5. Longlisted Cities/ Shortlisted Cities

Following states and 10 cities were proposed considering i) priority cities of NDMA's flood management activities, ii) asset in flooded area, iii) population of the city, and iv) vulnerability of the city.

As a result of interview and data collection, following three shortlisted cities were tentatively selected considering the request from the municipal corporations.

States	Longlisted Cities	Shortlisted Cities (tentative)
Gujarat	Ahmedabad, Surat	Ahmedabad,
Maharashtra	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay)
Andhra Pradesh and Telangana	Hyderabad	
Bihar	Patna	
Delhi	Delhi	
Odisha	Bhubaneswar	
Assam	Guwahati	Guwahati

* Cities in Red: Population in 2023 is more than 10million
Cities in Green: Population in 2023 is more than 5million

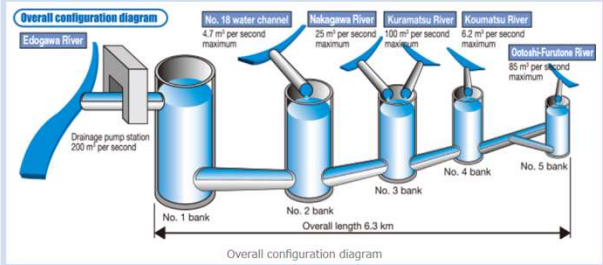
7

7

6. Comprehensive Solutions for Urban flooding experienced in Japan -1

JICA can propose comprehensive solutions including structural and non-structural measures.

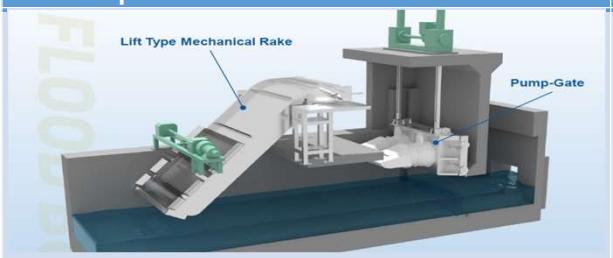
Underground discharge channel



Overall configuration diagram

Regulation Pond

Gate Pump

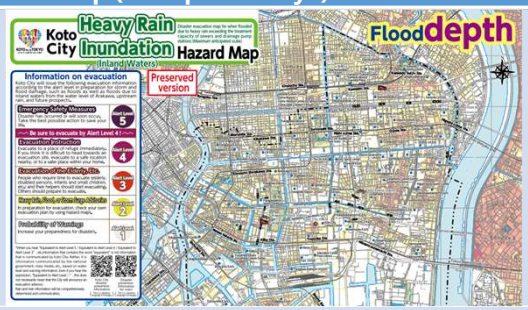


Plastic Storage Facility

8

6. Comprehensive Solutions for Urban flooding experienced in Japan -2

JICA can propose comprehensive solutions including structural and non-structural measures.

Hazard Map (example in Tokyo)	Solid-state Weather Rader
	
Evacuation Drill	**Water Shut-off Board at the Entrance**

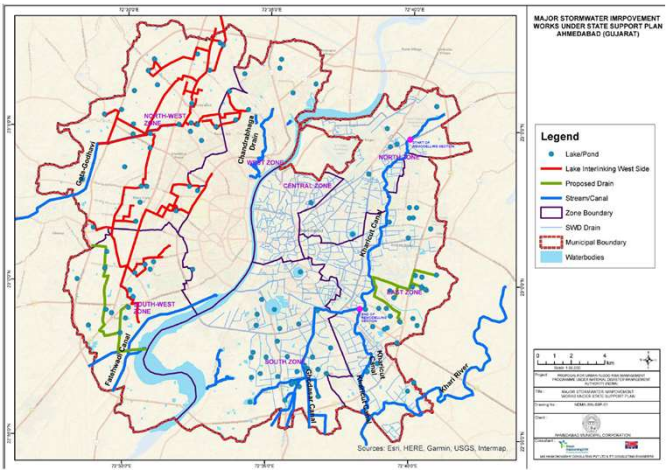
9

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Ahmedabad-1

- Flood spot was spread all over the cities.
- To improve the situation, AMC is implementing drainage projects:
  - Updating master plan(to be completed by the end of 2024)
  - Enhancing the drainage
  - Connection between Lake and Lake at western side of the Sabarmati River etc.

➢ Estimated required amount by the master plan: Rs. 8,271 Cr

➢ NDMA is supporting the implementation of the project with the amount of Rs. 250 Cr



➢ Implementation of the sub-projects

➡ JICA's ODA Loan

(AMC requested JICA for 2nd phase of project)

10

10

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Ahmedabad-2

Proposed project in the MP

Strom Water Drain TENTATIVE COST OF NEEDS (Rs in Crores) AMC Master Plan 2021-2051

CATCHMENT	Sabarati North East	Sabarati Central East	Sabarati South East / Kharicut	Sabarati West	New North & South West	TOTAL
RESECTION	55.79	159.92	1462.07	62.74	57.36	1797.88
INTER CONNECTIONS	0.48	15.83	18.75	23.64	0.92	59.62
RELIEF DRAIN	1.32	12.96	34.6	45.91	117.79	212.58
NEW NET WORK	159.43	163.72	1189.77	227.81	1213.73	2954.46
UNSERVED AREA PHASE 1	0.00	0.00	179.32	0.00	82.17	261.49
LID WORKS	23.42	79.81	297.56	102.27	338.23	841.30
NEW SWPS						28.55
DESILT & REHAB PHASE 1	102.18	404.67	69.89	245.85	186.8	1009.39
ELEC & MECH REHAB PHSE 1						65.14
DESILT & REHAB PHASE 2	87.18	391.35	71.66	257.87	166.73	974.79
ELEC & MECH REHAB PHSE 2						65.89
TOTAL	**429.80**	**1228.26**	**3323.62**	**966.09**	**2163.73**	**8271.09**

Proposed project in Phase I (NDMA)

Sr. No.	Component	Tentative cost in Cr (INR)
1	Improved ground infiltration mechanism using Eco Block	25.0
2	Flood water management by Detention Cum Infiltration Tank	25.0
3	Interlinking of water bodies - South West Zone	76.0
4	Interlinking of water bodies - East Zone	78.0
5	Sponge Park and Underground Water Storage Facility	15.0
6	Ahmedabad Flood Early Warning System including all sensors, software, hardware, establishment of control room etc	40
7	5% Fund for Studies Research, Innovation and Training	
7.1	Preparation of Detailed Drainage master plan including detailed design	12.0
7.2	Capacity Building including trainings, workshops etc	4.0
	Total	**275.0**

11

11

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Mumbai

- Mumbai is implementing the drainage improvement project such as:

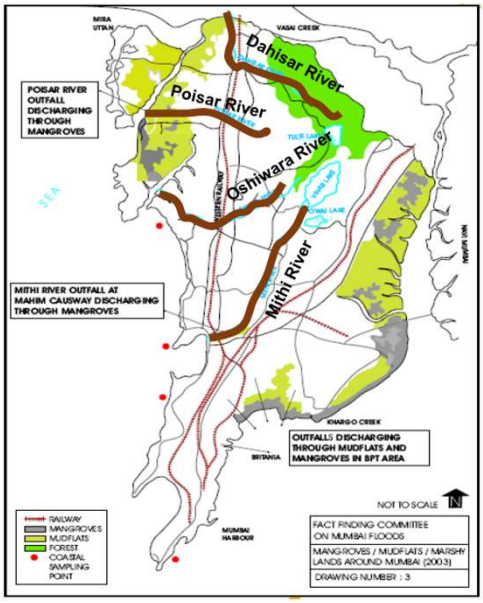
  - Mithi River improvement projects

  - Construction of pumping station, etc

Those improvements are carried out based on the BRIMSTOWAD (Stormwater Drainage Master Plan).

However, since, upon the publication of updated CPHEEO manual and the recent increasing of the rainfall intensity due to the climate change, the BRIMSTOWAD is required to be updated to meet the higher level of the planning requirements.

- ➢ Require to update a drainage Master Plan.
  - ➡ JICA's Technical Cooperation or Study Scheme to tackle with increasing flood risk by comprehensive solution applied in Japan
- ➢ Implementation of the prioritized projects based on the MP
  - ➡ JICA's ODA Loan



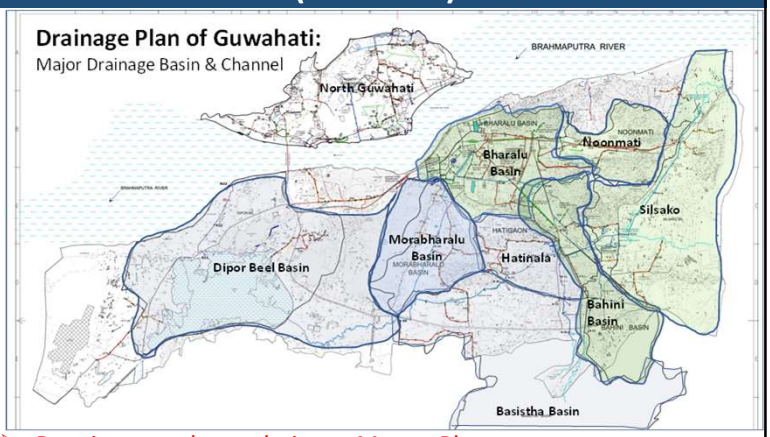
12

12

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Guwahati-1

- Guwahati is facing a flood problem during rainy season since it is difficult to drain the stormwater into the Brahmaputra River due to the high-water level of the river.
- Enhancement of existing drain, pumping station and retention pond is required.
- Available master plan was formulated in 2008 and the master plan was already outdated.

➢ ADB is ready to assist implement the project at Hatinala and Bahini Basins. (Rs 150 Cr)



➢ Require to update a drainage Master Plan.

➡ JICA's Technical Cooperation or Study Scheme to tackle with increasing flood risk by comprehensive solution applied in Japan, if the MP can be formulated soon

➢ Implementation of the projects for the other basins

➡ JICA's ODA Loan

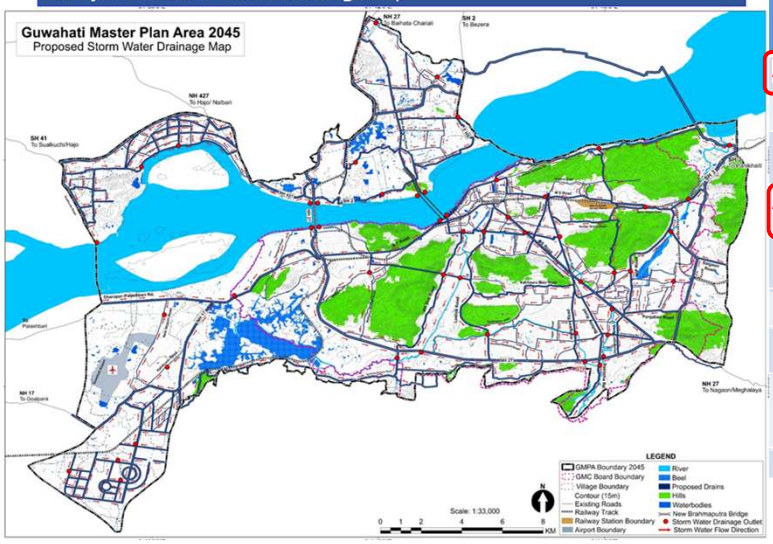
(Estimated amount for Baharalu basin: Rs. 450 Cr(2008 MP base))

13

13

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Guwahati-2

Proposed Storm Water Drainage Map



SN	Basin	Major Channel	Catchment Area (Km2)	Length (Km)	Design Discharge
ADB	Bahini basin	Bahini channel	16.83	8.5	48 m3/s
2	Bharalu basin	Bharalu river	19.36	4.8	83 m3/s
3	Morabharlu basin	Morabharlu channel	12.91	6.5	27 m3/s
ADB	Hatinala basin	Hatinala channel	11.9	5.1	24 m3/s
5	Basistha basin	Basistha channel	83.74	8.7	274 m3/s
6	Silsako Beel		50	5	75 m3/s
7	Noonmati basin	Noonmati drain	12.5	5.2	50 m3/s
8	Dipor beel basin	Dipor beel and Pamohi channel	46.24	Pamohi channel 7 km	66.3 m3/s
			253.49		

14

14

8. Required Information (from State Authorities)

(1) General information related to Disaster Risk Reduction in the State

- Priorities for action to mitigate disaster risk of the state
- Plan or strategy to mitigate/ reduce risk of urban flooding and other disaster
- Budget for the disaster risk reduction and budgetary arrangement for the states and mega-cities
- Status of other donors' supports for urban drainage projects
- Request for JICA (Necessity support from JICA in disaster risk reduction sector)
- Status and issues of urban drainage reduction projects

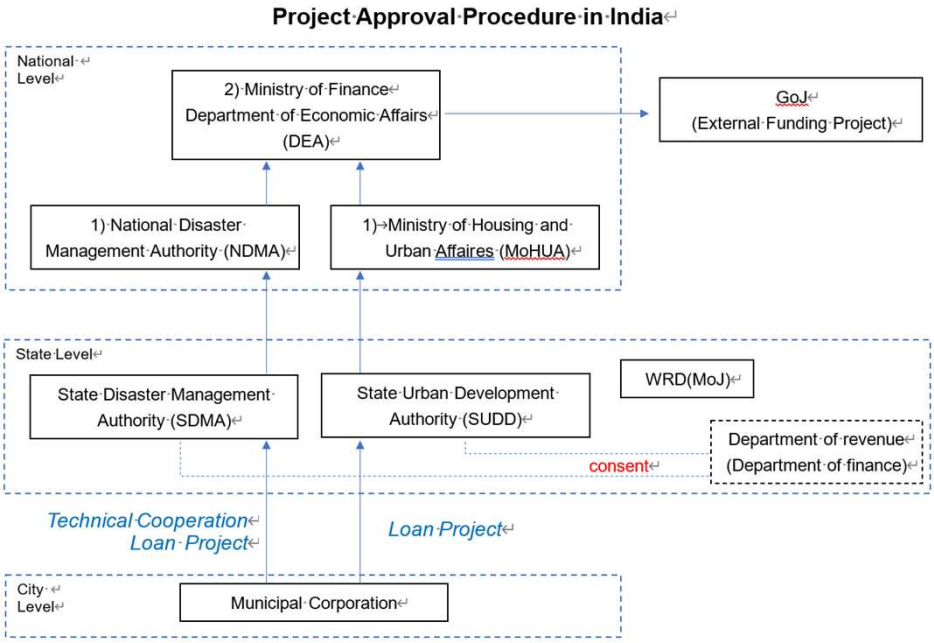
(2) Approval procedure and evaluation criteria for potential projects

- JICA would like to know approval procedure of the potential projects in Indian relevant authorities
  - Master plan➔ ODA Loan : Mumbai, Guwahati
  - ODA Loan: Ahmedabad (MP has been prepared)
- JICA would like to confirm the evaluation criteria and requirements for potential projects to be approved by relevant authorities in India.

15

15

8. Required Information (from State Authorities)



16

16

8. Required Information (from Municipal Corporation)

Following information will be needed to prepare Preliminary Project Report (PPR) for the formulation of the project after nominated to the shortlisted cities.

Main Items	Details
Existing drainage facilities and inundation data in the City	1) Available existing major drainage facilities such as primary drain, pump, gate, storage facilities etc. in the City. 2) Operation of those drainage facilities (regular maintenance, operation rules, condition of the facilities etc.) 3) Location map and information of inundation (frequency, area, period, flood scale, etc.) 4) Damage situation due to the inundation (damage types, population affected, total financial damage etc.) 5) Current general forecast and monitoring system (method) of rainfall and flood
Hydraulic related information	1) Precipitation record in the last 10 years (total mm, mm/hour) 2) Flood records in the last 10 years 3) Function and information (Storage volume, operation situation, regular maintenance etc.) of dam site upstream of the City, if any. 4) Water level of river, canal and sea, and tide level related with inundation area 5) Tendency and effect of recent climate change (reports, literatures etc.)
Other information	1) Current and future plan of annual budget allocation to drainage sector in the Municipal Corporation 2) Land use plan or city development master plan

17

8. Required Information (from Municipal Corporation)

Preliminary Project Report

1.	Name of the Project	
2.	Sectoral area	
3.	Total Financial Outlay	
4.	Details of the external development agencies (and the amount sought form each)	
5.	Financial arrangement	

Total external assistance	Counterpart funds being made available by				Total
	Implementing agency	State Government	Central Government	Others, if any	
	-	-	-	-	-

6.	Project duration (dates/months/years)	
7.	Location of project	
8.	Previous phases, if any	
9.	Statutory Clearances required	
10	Statutory clearance obtained	
11.	Details of Feasibility Studies done, if any	
12.	Implementing Agency	

18

18

8. Required Information (from Municipal Corporation)

13.	Basic design of the project	
-	Goals and Objectives	
-	Activities involved	
-	Outputs of the project	
-	Outcome of the project	
-	Foreign Component and Technical Coop. component	
14.	Target population/groups	
15.	Details Action Plan (Year wise)	

Year	Physical progress (%)	Financial Progress (Rs. in Crores)
2012-13	-	-
2013-14	-	-
2014-15 . .	-	-

16.	Quantitative and qualitative (verifiable) target indicators	-
17.	Environmental sustainability of the project	-
18.	Land acquisition/Resettlement and Rehabilitation involved	-
19.	Linkages with Similar Projects	
(i)	Information regarding projects in similar undertaken 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.	

Appendix-5-2

MINUTES OF MEETING WITH PRIORITY CITIES

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with National Disaster Management Authority (NDMA) Officials

---

Subject : **MOM of the Meeting Held with NDMA Officials**

Day, Date and Time : **Monday, 26th Feb 2024 3:00 PM – 4:00PM IST**

Place : **NDMA Office**

Attendance :

No.	Name	Position
National Disaster Management Authority (NDMA) Officials		
1.	Mr. Kamal Kishore	Member & Head of the Department
2.	Mr. Safi Ahsan Rizvi	Advisor (Mitigation)
3.	Mr. Rajendra Singh	Member
4.	Ms. Sumita Singh	Joint Secretary
JICA India		
1.	Mr. Vipul Mishra	Project Specialist
2.	Ms. Aaota Yuka	Project Formulation Advisor
3.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)
4.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)

1. During the meeting the points of discussion held are noted as mentioned below:

   a. Team Leader of JICA Survey team briefed NDMA about the project outline. It was also informed that out of 9 long listed cities, 3 cities- Mumbai, Ahmedabad and Guwahati have been nominated for JICA Yen loan project.

   b. Mumbai wants to update the already prepared master plan and want to execute underground discharge channel for mitigation of urban flood.

   c. Ahmedabad is in the process of finalization of Master Plan and have identified projects worth Rs 8,271 Cr for implementation.

   d. Guwahati Master Plan was prepared in 2008, based on which had identified 8 basins for mitigation of Urban Flooding. Out of these 8, 2 basins have been selected for funding through ADB loan. Guwahati wants JICA Technical Cooperation in updating master plan and DPRs for implementation.

   e. NDMA informed that the major focus for urban flood mitigation is on sustainable and economically viable solutions which can be adopted by States. NDMA has adopted nature-based solutions for the mitigation of urban flooding.

   f. NDMA informed that it can not take any loan from JICA or any other funding agency.

It was also informed that concerned States has to take the loan from JICA and shall route through concerned line ministry either MoHUA or MHA to DEA for funding.

g. It was also informed that JICA has to follow DEA updated guidelines for funding.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Online Meeting Held with Ministry of Housing and Urban Affairs (MoHUA) Officials

---

Subject : **MOM of the Online Meeting Held with MoHUA Officials**

Day, Date and Time : **Monday, 26th Feb 2024 10:00 AM – 11:00AM IST**

Place : **Online**

Attendance :

No.	Name	Position
Ministry of Housing and Urban Affairs (MoHUA) Officials		
1.	Mr. Lavanya Kumar	Director (International Cooperation & Central Vista)
2.	Ms. Tanvi Garg	Director (Central Vista)
JICA India		
1.	Mr. Vipul Mishra	Project Specialist
2.	Ms. Aaota Yuka	Project Formulation Advisor
3.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)
4.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)
5.	Mr. Mahmood Ahmad	Support Staff, JICA Survey Team (NKI)

1. During the meeting the points of discussion held are noted as mentioned below:

   a. Team Leader of JICA Survey team briefed MoHUA about the project outline. It was also informed that out of 9 long listed cities, 3 cities- Mumbai, Ahmedabad and Guwahati have been nominated for JICA Yen loan project.

   b. Mumbai wants to update the already prepared master plan and want to execute underground discharge channel for mitigation of urban flood.

   c. Ahmedabad is in the process of finalization of Master Plan and have identified projects worth Rs 8,271 Cr for implementation.

   d. Guwahati Master Plan was prepared in 2008, based on which had identified 8 basins for mitigation of Urban Flooding. Out of these 8, 2 basins have been selected for funding through ADB loan. Guwahati wants JICA Technical Cooperation in updating master plan and DPRs for implementation.

   e. Director (IC) informed that there in AMRUT there was a special assistance for urban reforms however, the ongoing AMRUT- 2.0 focuses mostly on reuse water, water body rejuvenation, parks etc.

   f. Director (IC) informed that State UDD department will be the main authority for approval and will do all necessary coordination and approvals with all the

stakeholders in State Department.

g. It was also informed that State Government can directly propose the project to DEA for JICA funding. DEA may ask MoHUA as line ministry for technical advice, and final approval of the DPR to DEA.

h. Team Leader requested MoHUA for cooperation with the survey in the Stae. Director (IC) suggested that a concept note for each shortlisted cities along with the cooperation required from State authority may be shared with MoHUA and assured of JICA Survey Team for all possible cooperation that can be done.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with Additional City Engineer (ACE) of Ahmedabad Municipal Corporation (AMC)

Subject : **MOM of the Meeting Held with ACE Drainage, AMC**

Day, Date and Time : **Tuesday, 11th Mar 2024 11:00 AM – 11:30 AM IST**

Place : **Additional City Engineer (ACE) Office**

Attendance :

No.	Name	Position
Ahmedabad Municipal Corporation (AMC)		
1.	Mr. Rakesh P Bodiwala	Additional City Engineer (ACE), AMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Yuichi Yamaguchi	Organization and legal structure, JICA Survey Team (NK)
4.	Mr. Toru Takahashi	Measures against flooding, JICA Survey Team (YEC)
5.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. ACE suggested that Kharikat canal phase-II project, Chandrabhaga canal phase-II and SWD network projects are the potential projects that can be taken up through JICA funding.
2. He informed that Chandrabhaga canal phase-I (downstream stretch) project has already been taken up under Gandhi Ashram Memorial and Precinct Development Project and is currently under execution. DPR for phase-II project of Chandrabhaga canal is already prepared.
3. The upstream of the Chandrabhaga canal passes through densely populated slum area. The canal crosses the railway track and below the Bullet train bridge. It is also informed that the catchment area of Chandrabhaga canal has combined sewer and storm water drain network.
4. The project for the development of Storm Water Drains for Northwest, Southwest and Eastern part of the city are yet to be prepared. It was also informed that these areas do not have SWD network and experience water logging problems during monsoon season.
5. ACE informed that no analysis/ reports for financial/ economic losses incurred in the city due to waterlogging is prepared by AMC. He further informed that in 2002 major water logging occurred in the city which caused huge financial losses in the city.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Ahmedabad Municipal Corporation (AMC) Officials

---

Subject : **MOM of the Meeting Held with AMC Officials**

Day, Date and Time : **Tuesday, 13th Mar 2024 16:30 PM – 17:30 PM IST**

Place : **Additional City Engineer (ACE) Office**

Attendance :

No.	Name	Position
Ahmedabad Municipal Corporation (AMC)		
1.	Mr. Rakesh P Bodiwala	Additional City Engineer (ACE), AMC
2.	Mr. Chirag K Brahmbatt	Deputy City Engineer Drainage, AMC
3.	Mr. Bimal	Deputy City Engineer Drainage, AMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Yuichi Yamaguchi	Organization and legal structure, JICA Survey Team (NK)
4.	Mr. Toru Takahashi	Measures against flooding, JICA Survey Team (YEC)
5.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. ACE, AMC asked JST Team Leader regarding the time usually taken in entire process of JICA loan sanction. Team Leader Informed that usually it takes about 1 year to get the loan sanctioned. Additionally, it also depends on the time taken by Indian Government in approving the PPR/ DPR and send it to JICA for consideration.
2. AMC officials informed that Development of Kharikat canal phase-II and Chandrabhaga canal phase-II projects are top priority projects for the AMC, and they are willing to take JICA loan for the project, however, they were skeptical whether AMC can wait for a year to get sanction from JICA. They also informed that if the State Govt provides the necessary funds for these projects, they will not wait for JICA funding and will move ahead with the State funding. AMC also informed that it is anticipated that the AMC may get the fund from State Govt by July'24.
3. AMC suggested that it can formulate projects related to Storm Water Drainage worth Rs 500-1000 Cr in the Northwest, Southwest and Eastern part of Ahmedabad city as currently these areas don't have SWD network. As JICA loan sanction process takes about minimum 1 year time within that duration AMC can

prepare the DPRs and other necessary documents required for getting sanctions.

4. AMC officials also suggested JST to meet Municipal Commissioner and apprise him of the findings of the survey and seek his suggestion on formulating potential project for JICA loan.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Deputy Municipal Commissioner (DyMC)

Ahmedabad Municipal Corporation (AMC)

Subject : **MOM of the Meeting Held with DyMC**

Day, Date and Time : **Wednesday, 29th Feb 2024 15:15 PM – 16:00 PM IST**

Place : **Deputy Municipal Commissioner Office**

Attendance :

No.	Name	Position
Ahmedabad Municipal Corporation (AMC) Officials		
1.	Mr. Mihir P Patel	Deputy Municipal Commissioner, Water and Drainage Projects
2.	Mr. Rakesh P Bodiwala	Additional City Engineer
JICA		
1.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed MoHUA about the project outline. It was also informed that out of 9 long listed cities, 3 cities- Mumbai, Ahmedabad and Guwahati have been nominated for JICA Yen loan project.

b. Ahmedabad is in the process of finalization of Master Plan and have identified projects worth Rs 8,271 Cr for implementation.

c. JICA HQ representative asked about the intention of AMC for JICA ODA loan. DyMC showed positive intention of taking JICA Technical Assistance and Yen Loan for development of urban storm infrastructure.

d. DyMC informed that the Master Plan is currently under updation and will be finalized in next 6months. He requested JICA support/ help in strengthening of the Master Plan by reviewing the final master plan.

e. DyMC informed based on the final approved Master Plan key projects will be identified for the mitigation of urban flooding for funding from JICA will be needed.

f. DyMC informed that AMC has approximately Rs 500 cr of own fund for sewerage infrastructure and storm water drainage. Out of this approximately Rs 100 cr is for storm water drainage.

g. DyMC informed that one project for the development of 4 new STP of capacities 375 MLD, 424 MLD, 240 MLD and 220 MLD are under execution under World Bank

funding.

h. DyMC further informed that AMC has already identified projects amounting to Rs 500-1,000 Cr for mitigation of Urban Flooding for which JICA Yen loan project can be formulated.

i. DyMC also informed that one project of redevelopment of Kharikut canal for the mitigation of Urban Flooding in the eastern part of Ahmedabad is currently under construction at an estimated cost of Rs 1,200 Cr. He further informed that JICA funding for the phase-II of redevelopment of Kharikut canal can be taken up through JICA funding for which the estimated cost is Rs 1,500 cr.

j. DyMC requested JICA representative to inform the basic conditions of JICA funding and approximate budgetary provision from JICA that can be expected under this study project for Ahmedabad.

k. Team Leader of JST informed DyMC that JST team will again visit Ahmedabad on 11th of March 2024 for the preparation of PPR and requested AMC support in this regard. Requirement of data has been communicated to the AMC officials that will be required for the preparation of PPR.

l. JICA survey team requested DyMC to help in arranging the meeting with SDMA officials.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

Kharikut Canal Storm Water Drainage Project Site Visit

Subject : **Site Visit Report**

Day, Date and Time : **Friday, 1st Mar 2024 10:00 AM – 12:00 PM IST**

Place : **Phase-I of Redevelopment of Kharikut Canal**

Attendance :

No.	Name	Position
Ahmedabad Municipal Corporation (AMC) Officials		
1.	Mr. Bimal	Deputy City Engineer, Ahmedabad Municipal Corporation
2.	Mr. Jitender	Engineer Incharge of RKC India Pvt. Ltd
JICA		
1.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)

During the site following points were noted:

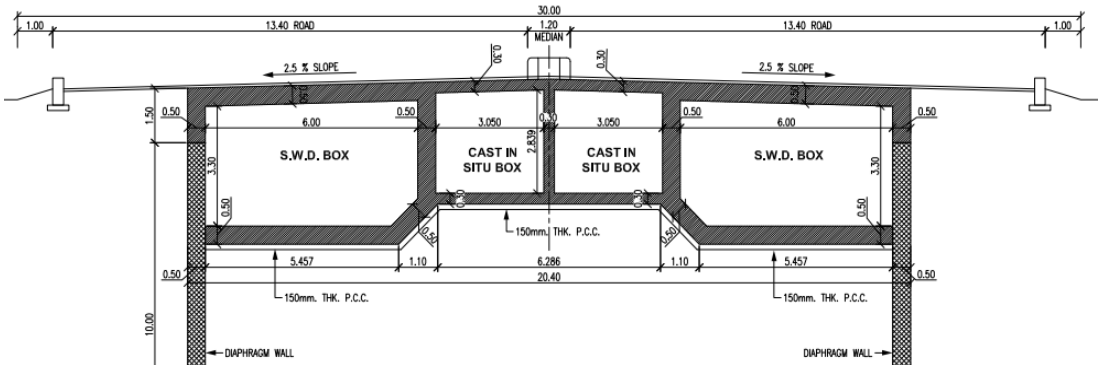
a. Brief description of the project: Kharikut is the irrigation canal which used to be outside Ahmedabad city limit. However, due to urbanization and expansion of Ahmedabad city, the canal does not pass through the city. The bottom level of canal was higher than the habitable areas which causes inundation during rainfall.

b. Thus, to prevent the inundation and to mitigate the flooding, AMC is executing a project of Redevelopment of Kharikut canal in phase wise manner. Currently phase-1 of the project is under execution while AMC is looking for funding for phase-2 of the project.

c. The total length of phase-1 of the project is 12.75 km which entirely lies within the heavily populated city part. The work was started in Nov-2022 and is scheduled to be completed by Dec'2024. Currently, 60% progress has been achieved.

d. The project has been divided into 5 packages which is executed by different contractors. Package- 1 & 4 by RKC India Pvt. Ltd, Package- 2 & 3 by Rail Vikas Nigam Limited and Package-5 by Kalathiya Engineering and Construction Ltd. HCP is the PMC consultant appointed by AMC.

e. The typical cross section of the SWD is shown below:



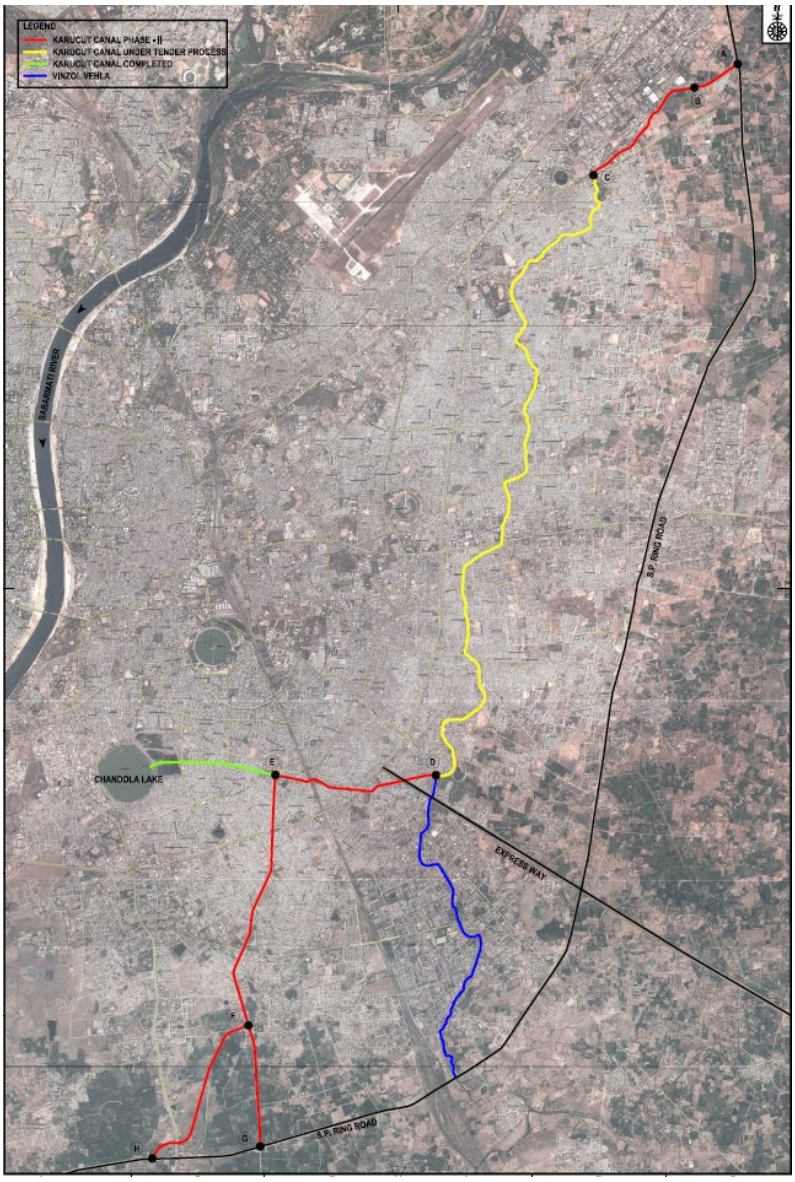
f. The longitudinal slope along the SWD Box and canal section is 1:1800, while the camber is 3% of the width of top slab.

g. There are total 83 outlets (collection chambers) in phase-1 of the project for taking stormwater from the neighboring areas. Out of these 53 are through gravity while 30 are having pumping stations. It was told that out of these 30 pumping stations modification is underway to convert them into gravity based collection chambers.

h. The estimated cost of phase-2 of project is Rs 1,500 Cr for which DPR has already been prepared by AMC. The total length of phase-2 project is 15.5 Km. AMC expects to execute phase-2 in EPC based PPP mode with provision for annuity.

i. Some part of the phase-2 work is in upstream side of phase-1 project and some part in downstream side.

j. The overall conceptualized project plan is shown below:



k. Yellow line in the above figure shows phase-1 project while red, green and blue line shows phase-2 scope of the project.

l. In phase-2, part of irrigation canal from point D shown in figure above, will be diverted through the canal shown in blue line. This canal will merge with Khari river.

m. The SWD water will flow through red line and from point E part of it will be diverted to Chandola lake for rejuvenation of the lake and remaining will be diverted to Fathewadi canal.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Municipal Corporation of Greater Mumbai (MCGM)

Subject : **MOM of the Meeting Held with officials of MCGM**

Day, Date and Time : **Wednesday, 6th March 2024 11:30 AM – 13:30 PM IST**

Place : **MCGM Main office, Worli, Mumbai**

Attendance :

No.	Name	Position
MCGM		
1.	Sh. Sanjay Jadhav	Dy. Chief Engineer – SWD Planning, MCGM
2.	Sh. Hingole	Executive Engineer – SWD, MCGM
3.	Sh. Dashaputre	Executive Engineer – SWD Planning Cell, MCGM
4.	Sh. Ramateke	Executive Engineer – SWD Planning, MCGM
5.	Ms. Samruddhi Nilawar	Sr. Consultant, MCGM
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misaki	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Toru TAKAHASHI	Measures against flooding, JICA Survey Team (YEC)
4.	Mr. Yuichi YAMAGUCHI	Organization and legal structure, JICA Survey Team (NK)
5.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed about the project outline and mentioned for JICA Yen loan project.

b. Information provided by MCGM SWD Department:

- In the last two years the intensity of rainfall is not too high in the season.
- Hindamata and Gol Deval area are the two major bottlenecks for urban flooding, for which the improvement works are under planning stage.
- NJSI is a consultant for the preparation of DPR for Hindamata and Gol Deval and Drainage project. The consultant scope is to prepare the DPR and the tender document for the procurement of the contractor.
- Gol Deval Project
  - The drain from Gol Deval is presently going to Haji Ali pumping station, from where the stormwater is pumped to the sea. The existing drain does not have enough capacity to cater the complete flow.
  - The diversion of the Gol Deval drain is planned from Doshi Mehta circle and from there to the proposed pumping station having 15 mtrs deep tunnels to transfer the water.

- The land for pumping station is not yet transferred to MCGM due to which the entire detailed engineering is pending.

- Mindamata Project
  - At Hindamata 3 Nos. of Holding ponds were constructed out of which 2 of capacity 16,200 m3 and 28,700 m3 is already completed and one no. pond with capacity 19,900 m3 is under construction.
  - Another holding pond at Milind subway is under construction with capacity of 20,000 m3 is completed by 60%.
- MCGM is very much interested in having the technology for the deep tunnels and pumping stations which is implemented in Tokyo. MGCM requested JST to provide the details for the deep tunnel project in Tokyo, like per meter cost of construction, land requirements and other technical details are required.
- BRIMSTOWD–3
  - For the master plan, BRIMSTOWD-1 and 2 need to be considered, and the updated version BRIMSTOWD–3 needs to be prepared for the new areas.
  - MCGM is taking assistance from IIT Mumbai to finalize the scope of work for the consultant, to be procured for the preparation of BRIMSTOWD–3.
- The present design is considered with 55mm/hr rainfall and design return period is considered as once in 10 years.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Disaster Management Department

Subject : **MOM of the Meeting Held with officials of Disaster Management**

Day, Date and Time : **Wednesday, 6th March 2024 14:00 PM – 15:30 PM IST**

Place : **Disaster Management office, CST, Mumbai**

Attendance :

No.	Name	Position
Disaster management		
1.	Sh. Mahesh Narvekar	Director - Disaster Management, BMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misaki	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Toru TAKAHASHI	Measures against flooding, JICA Survey Team (YEC)
4.	Mr. Yuichi YAMAGUCHI	Organization and legal structure, JICA Survey Team (NK)
5.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed about the project outline and mentioned for JICA Yen loan project.

b. Information provided by Disaster Management Department:

- Strengthening of soft components like communication system, early flood warning system is important.
- Disaster Management Department of BMMC request JICA to implement technology and knowledge sharing activities for Disaster Mitigation especially for earthquake.
- Assured for providing the KML files for the base map and flood prone areas.
- Milind subway, hindamata and parel are the major areas got flooded.
- Arrange the meeting with NCCR Chennai, for the discussion on the hydrodynamic model for sea level rise and hydrology study in line with the climate change report.
- No study is available for the assessment of direct and Indirect losses due to floods.
- Provide the report for Mumbai Climate Action Plan.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Pune Municipal Corporation (PMC)

Subject : MOM of the Meeting Held with SE PMC

Day, Date and Time : Thursday, 7th March 2024 11:00 AM – 12:00 Noon IST

Place : PMC Main office, Savarkar Bhawan, Pune

Attendance :

No.	Name	Position
MCGM		
1.	Sh. Jagdish Khanore	Superintending Engineer – Sewerage Unit. Pune Municipal Corporation (PMC)
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed the outline of the survey studies.

b. Information provided by MCGM SWD Department:

- Due to expansion of the municipal area, 23 villages are now added to the PMC jurisdiction.
- The masterplan for the new area is prepared by Primove consultant.
- Survey is completed for the 23 villages and the DPR preparation is underway by Primove Consultant.
- Provides the executive summary for the proposed sewerage system in 23 villages.
- The priority phase 1 is already mentioned in the executive summary.
- The total estimated cost of the project is INR 1200.00 Crore out of which phase 1 is INR 500 to 525 Crore is estimated.
- This projects 6 STPs and 275 KM (network), the pipeline sizes are 300- 1600 mm.
- The PMC- Sewerage division is very much willing to opt for JICA loan.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Urban Development Department (UDD), Maharashtra

---

Subject : MOM of the Meeting Held with Secretary UDD Div 1, Maharashtra

Day, Date and Time : Monday, 4th March 2024 3:00 PM – 4:00PM IST

Place : 4th Floor UDD office, Mantralaya, Mumbai

Attendance :

No.	Name	Position
Urban Development Department		
1.	Sh. Aseem Gupta	Principal Secretary, UDD Div 1
2.	Sh. Shridhar Chaudhary	Chief Engineer – SWD, MCGM (SE)
JICA HQ		
1.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misaki	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Toru TAKAHASHI	Measures against flooding, JICA Survey Team (YEC)
4.	Mr. Yuichi YAMAGUCHI	Organization and legal structure, JICA Survey Team (NK)
5.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed about the project outline and mentioned for JICA Yen loan project.

b. UUD Principal Secretary Div-1 informed followings:

- His division is responsible for Urban planning (spatial plan) only. For example, planning of utilities like schools, hospitals and infrastructure projects.
- Infrastructure development including urban flooding is looked after by Division 2.
- He advised that more focus should be on MCGM flood prone areas
  - The major reason for flooding in Mumbai are 1)high surface runoff due to urbanization (reduction of unpaved area), 2) illegal encroachment 3) high tides, and 4) unprecedented rainfall.
  - The cleaning of drain is concentrated from Feb. to May so as to increase the flow capacity and100 million Dollar is needed every year on cleaning process.
  - First rain is always difficult to handle in comparison to 2nd or 3rd rain.

- July last or august first week is chaos time when the heavy rain strikes.
- As a counter measure pumping stations and holding ponds are already in place and some are under execution.
- 8 pumping stations are in working with capacity of 6000 m3/sec water to pump out from each pump, and 2 pumping stations are proposed.

- Planning>> Mitigation>> Response>> Reconstruction are the four steps against disaster.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Urban Development Department (UDD), Maharashtra

---

Subject : MOM of the Meeting Held with Secretary UDD Div 2, Maharashtra

Day, Date and Time : Monday, 4th March 2024 4:00 PM – 5:00PM IST

Place : 4th Floor UDD office, Mantralaya, Mumbai

Attendance :

No.	Name	Position
Urban Development Department		
1.	Dr. K. H. Govinda Raj	Principal Secretary, UDD Div 2
2.	Sh. Shridhar Chaudhary	Chief Engineer – SWD, MCGM (SE)
3.	Sh. Prashant	Assistant Engineer, MCGM cum Nodal officer Meethi River Development Project
JICA HQ		
1.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misaki	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Toru TAKAHASHI	Measures against flooding, JICA Survey Team (YEC)
4.	Mr. Yuichi YAMAGUCHI	Organization and legal structure, JICA Survey Team (NK)
5.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. JICA HQ gave the opening remarks for the project initiation.

b. Team Leader of JICA Survey team briefed about the project outline and mentioned for JICA Yen loan project and explained about training in Japan.

c. JICA shows the interest to prepare the new urban flood master plan which was requested by MITRA and MCGM in the previous meeting in Nov. 2023.

d. UUD Principal Secretary Div-2 informed:

- No consultant has been appointed yet for the updation of the Master plan.
- Complete support is assured by all concerned Authorities.
- Pune Municipal Corporation should also be considered as a candidate city and to be approached for the collection of DPRs and relevant reports.
- Proposal is to be initiated by JICA/ JST to UDD as a information for the proposed project formally, then UDD will issue letter to relevant authorities.
- No. of attendees for the training will be confirmed by the department.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with MD Guwahati Metropolitan Drinking Water & Sewerage Board (GMDWSB)

Subject : **MOM of the Meeting Held with MD GMDWSB**

Day, Date and Time : **Monday, 27th Feb 2024 11:00 AM – 11:30AM IST**

Place : **MD Office at GMDWSB**

Attendance :

No.	Name	Position
Guwahati Metropolitan Drinking Water & Sewerage Board (GMDWSB)		
1.	Mr. Pallav Gopal Jha	Managing Director (MD)
JICA		
1.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)
4.	Mr. Ajay Nath	Support Staff, JICA Survey Team (NKI)

1. During the meeting the points of discussion held are noted as mentioned below:

   a. Team Leader of JICA Survey team briefed MD, GMDWSB about the project outline. It was also informed that out of 9 long listed cities, 3 cities- Mumbai, Ahmedabad and Guwahati have been nominated for JICA Yen loan project.

   b. Guwahati Master Plan was prepared in 2008, based on which had identified 8 basins for mitigation of Urban Flooding. Out of these 8, 2 basins have been selected for funding through ADB loan. Guwahati wants JICA Technical Cooperation in updating master plan and DPRs for implementation.

   c. The team Leader informed that for JICA Yen Loan, JICA HQ and JICA Survey Team wants to understand the procedure and the approving authority for JICA funding.

   d. MD informed that Department of Housing & Urban Affairs (DoHUA) will be the approving authority for JICA funding.

   e. MD informed that mitigation of urban flooding is a priority for Guwahati city.

   f. MD also informed that DoHUA is the head of both Guwahati Metropolitan Development Authority (GMDA) and Guwahati Municipal Corporation (GMC) which are the responsible agencies for drainage works in Guwahati.

   g. MD also informed that small drains within the city are covered by GMC while major drains and drainage basins falls under the jurisdiction of GMDA. He also informed that GMDA is the responsible agency for Master Plan preparation in Guwahati.

h. MD informed that Assam State Disaster Management Authority (ASDMA) is responsible for disaster related issues for entire Assam state, however, he was skeptical whether ASDMA is authorized for taking external funding. He also informed that there is Externally Aided Projects (EAP) cell in State which is directly under Chief Minister's Office (CMO).

i. JICA survey team requested MD to help in arranging the meeting with DoHUA officials.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with Guwahati Metropolitan Development Authority (GMDA)

Subject : **MOM of the Meeting Held with GMDA Officials**

Day, Date and Time : **Monday, 27th Feb 2024 3:00 PM – 4:00PM IST**

Place : **GMDA Office**

Attendance :

No.	Name	Position
Guwahati Metropolitan Development Authority (GMDA)		
1.	Mr. Dhiraj Saikia	Chief Engineer (CE)
2.	Mr. Mantu Bohra	Superintending Engineer (SE)
3.	Ms. Seema	Engineer
JICA		
1.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)
4.	Mr. Ajay Nath	Support Staff, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed MD, GMDWSB about the project outline. It was also informed that out of 9 long listed cities, 3 cities- Mumbai, Ahmedabad and Guwahati have been nominated for JICA Yen loan project.

- Guwahati Master Plan was prepared in 2008, based on which had identified 8 basins for mitigation of Urban Flooding. Out of these 8, 2 basins have been selected for funding through ADB loan. Guwahati wants JICA Technical Cooperation in updating master plan and DPRs for implementation as was discussed during the last meeting held with GMDA and JICA Survey Team.

b. GMDA informed that it has already floated the RFP for updation of Master Plan and DPRs for all the 8 basins. It is expected that by Nov'24 Master Plan updation works can be completed. For the updation of DPRs, it is divided into two phases-

- Phase 1- updation of 2 DPRs for which ADB funding is already committed
- Phase 2- updation of remaining 6 DPRs

c. The PPR for 1st Phase has already prepared based on existing MP and PPR for 2nd Phase will be prepared by the procured consultant based on updated MP.

d. GMDA also informed that funding for the remaining 6 DPRs of second phase is yet to be discussed and finalized with DoHUA. Therefore, GMDA is willing to implement 2nd phase of the project under support of JICA.

e. GMDA also suggested that a project for the rejuvenation and beautification of Dipor Beel which is a Ramsar site may be taken up for JICA funding, on the similar lines as was done for the Bhopal Lake by JICA few years back.

f. JST requested GMDA to help in arranging the meeting with DoHUA officials.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Assam State Disaster Management Authority (ASDMA)

Subject : **MOM of the Meeting Held with ASDMA Officials**

Day, Date and Time : **Monday, 27th Feb 2024 12:30 PM – 1:30PM IST**

Place : **ASDMA Office**

Attendance :

No.	Name	Position
Assam State Disaster Management Authority (ASDMA)		
1.	Mr. Alakananda Medhi	ACS
2.	Mr. Biren Basky	GIS Expert
3.	Mr. Dloijean Das	RCIS, TSU, DRR
4.	Dr. Ananya Choudhary	P&BBBS, TSU
5.	Mr. Bibek Mahato	Resilient Cities & Town Specialist
6.	Mr. Rajesh Dutta	Engineering Consultant, Earthquake Risk Mitigation
7.	Mr. Mustak Ali	TA (GIS)
8.	Mr. Nava Deka	Engineering Consultant (FM)
JICA		
1.	Mr. Sagawa Rei	South Asia Division 1(India/ Bhutan), JICA HQ
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)
4.	Mr. Ajay Nath	Support Staff, JICA Survey Team (NKI)

1. During the meeting the points of discussion held are noted as mentioned below:

   a. Team Leader of JICA Survey Team (JST) briefed MD, GMDWSB about the project outline. It was also informed that out of 9 long listed cities, 3 cities- Mumbai, Ahmedabad and Guwahati have been nominated for JICA Yen loan project.

      i. Guwahati Master Plan was prepared in 2008, based on which had identified 8 basins for mitigation of Urban Flooding. Out of these 8, 2 basins have been selected for funding through ADB loan. Guwahati wants JICA Technical Cooperation in updating master plan and DPRs for implementation.

   b. The Team Leader informed that for JICA Yen Loan, JICA HQ and JST wants to understand the procedure and the role of ASDMA in the approving procedure.

      ➔ ASDMA officials informed that it has no role in the approving procedure for external funding to GMDA. In addition, ASDMA has no role in preparation of Guwahati Urban Drainage Master Plan. GMDA may ask for its input once the master plan is prepared.

   c. ASDMA informed related information in DRR sector as below:

i. ASDMA has prepared Disaster related master plans for the entire state, perspective plans, strategic plans related to storm flood, flood vulnerability, landslide vulnerability etc. These plans are available on ASDMA website.

ii. Columbia University studied the Guwahati Urban Flood situations and had given certain recommendations which are also available on website.

iii. Sediment yield study has been done for 107 watersheds of the state.

iv. Disaster Risk Reduction Road Map for the year 2030 is prepared by ASDMA and is available on the website.

v. Guwahati is located in seismic zone-5, so earthquakes are also one major disaster which can occur in Guwahati. The last major earthquake occurred in 1950.

vi. Urban Flood, Landslide caused by flooding, earthquake and Lightning& thunderstorm are the priority disasters of the State.

vii. ASDMA informed that State does not have Hydrological Metrological stations for early warning system for urban flooding although that for Brahmaputra River has been established.

Appendix-5-3

OUTLINE OF EXISTING STATUS AND PLAN OF PRIORITY CITIES

PRESENTATION
FOR
REMODELLING OF CHANDRABHAGA DRAIN FROM IOC ROAD TO KALI GARNALA TO 132 FEET RING ROAD NEAR PRABODH RAVAL BRIDGE IN AMC AREA

Ahmedabad Municipal Corporation
Drainage Project Department

February-2024

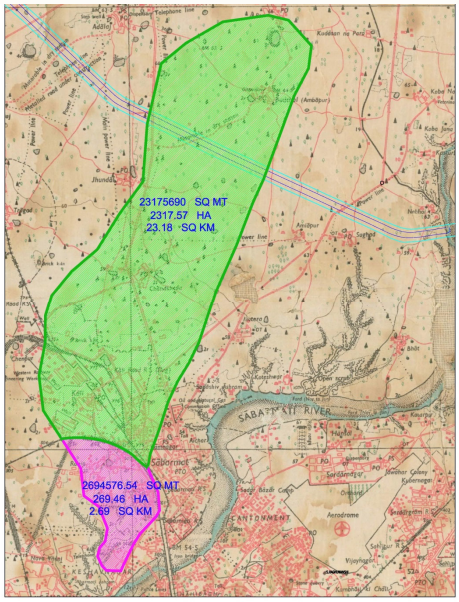
1

Project Description

- 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.
- There is no proper defined gorge/waterway of the stream and it works as a storm water Nala during monsoon.
- Ahmedabad Municipal Corporation proposes 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)
- The Drain development from Prabodh Raval Bridge to Sabarmati River has been considered in Gandhi Ashram Precinct Development Project

2

CATCHMENT AREA



3

LETTER FROM CDO

CENTRAL DESIGNS ORGANISATION

NARMADA, WATER RESOURCES, WATER SUPPLY AND KALPASAR DEPARTMENT

GOVERNMENT OF GUJARAT

H.J.PATEL

SUPERINTENDING ENGINEER

9/2, JIVRAJ MEHTA BHAVAN
GANDHINAGAR - 382010.
TELE : (079) 23253496, 23253497
FAX : (079) 23254173
SE (Dams) : (P) 23253487
E-mail : se-cdo-wr@gujarat.gov.in
SE (Hyd) : (P) 23253478
E-mail : se-hydcdo-wr@gujarat.gov.in
SE (Geo) : (P) 23253485
E-mail : se-geocdo-wr@gujarat.gov.in

જા.નં.મ.બા.તંત્ર/શહેરઝોન ૪૭ તા.૧૧/૮/૨૦૧૩

પ્રતિ,

મ્યુનિસિપલ કમિશ્નરશ્રી,
અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન,
અમદાવાદ

વિષય: અમદાવાદ શહેરમાં સાબરમતી નદીને મળતી ચંદ્રભાગા ફ્રેઈનના રીમોડ્લીંગ બાબત

અનુસંધાન: (૧) આપની કચેરીનો પત્ર ક્રમાંક નં ફ્રેનેજ પ્રોજેક્ટ/૪૨૫૦/તા.૧૫/૩/૨૦૧૩
(૨) અત્રેની કચેરીનો પત્ર નં મ.બા.તંત્ર/શહેરઝોન/ઈ/ચંદ્રભાગા ફ્રેઈન/૮૪/તા.૨૨/૫/૧૩
(૩) આપની કચેરીનો પત્ર ક્રમાંક નં ફ્રેનેજ પ્રોજેક્ટ/૧૪૪૪/તા.૨૦/૬/૨૦૧૩

ઉપરોક્ત વિષયે જણાવવાનુ કે, અનુસંધાનિત પત્ર(૧) થી રજુ કરેલ ચંદ્રભાગા ફ્રેઈનના રીમોડ્લીંગના રીપોર્ટ માં ચંદ્રભાગા ફ્રેઈનના રીમોડ્લીંગ માટે ત્રણ વિકલ્પ સુચવેલછે તેમાં અત્રેની કચેરીએ થી અનુસંધાનિત પત્ર (૨)થી ઉદભવેલ મુદ્દાઓ ની પૂર્તતા અનુસંધાનિત પત્ર(૩)થી આપના તરફથી મળેલ છે.

ચંદ્રભાગા ફ્રેઈનનો કુલ સ્યાવક્ષેત્ર ૨૫.૮૭ ચો.કીમી અને Equivelant slope ૨.૭૮૮ મી./કીમી દરમ્યાને હોતાં subzon કે પધ્ધતિથી જુદા-જુદા આવર્તકાળ માટે આલેખન પુરની ગણતરી નીચે મુજબ આવે છે.

અનુ.નં	આવર્તનકાળ	આલેખન પુર(ક્યુમેક્સ)
૧	૧ : ૨ વર્ષ	૧૫૩
૨	૧ : ૫ વર્ષ	૨૨૩
૩	૧ : ૧૦ વર્ષ	૨૮૦
૪	૧ : ૨૫ વર્ષ	૩૬૧
૫	૧ : ૫૦ વર્ષ	૪૦૭
૬	૧ : ૧૦૦ વર્ષ	૫૦૦

ચંદ્રભાગા ફ્રેઈનના સ્યાવક્ષેત્રો મોટાભાગને વિસ્તાર ગીચ વિસ્તાર તરીકે વિકસિત થયેલ છે. તથા આ વિસ્તારમાં સ્થેલક તેમજ ફ્રેમર્સિયલ મકાનો બંધાઇ ગયેલ છે તેથી સલામી સ્યાલ્મિતી નો વિગતવાર અભ્યાસ કરી કાંઠાગા ફ્રેઈનમાં આવતા પ્રવેશર આવરણને દયાને લેવા વિનંતી છે અને તે મુજબ આપની જરૂરિયાત મુજબ યોગ્ય આવર્તનકાળ પૂર ગણતરીમાં લેવુ જોઇએ તેવુ અત્રેથી માનવુ છે.

અધિક્ષક ઇજનેર(ડી.)
મધ્યસ્થ આલેખન તંત્ર
ગાંધીનગર

> નકલ સાદર રવાના પ્રતિ, મુખ્ય ઇજનેરશ્રી(ઈ.રૂ) અને અધિક સચિવશ્રી ન.જ.પા.પુ અને કલ્પસર વિભાગ ગાંધીનગર તરફે જાણ સારૂ

> નકલ જયભારત મઝ રવાના પ્રતિ અધિક્ષક ઇજનેરશ્રી(બંધો) મ.બા.તંત્ર ગાંધીનગર તરફે જાણ સારૂ

4

Hydraulic Design of Drain

- Flow = 271 cumec (At Confluence)
- Slope = 1 in 1250 (Upto Prabodh Raval Bridge)
- Design of drain is worked out with Manning's formulae.
- n value = 0.014 as per CPHEEO Manual for Concrete surface
- **Section of drain**

  13.2 mt. (Width) x 5.3 mt. (Depth) (Upto Prabodh Raval Bridge)

  For carrying flow of 271 mt3/sec for a slope of 1 in 1250, 40 Nos. of 2200 mm dia

  RCC NP4 Pipe will be required which is not feasible. Hence, RCC box is proposed.

5

Salient Features

- Detailed grid survey along alignment of drain is carried out at 30 mt. c/c and cross sections of existing drain and proposed box are prepared for structural design of box. Soil investigation is also carried out.
- Following major items are considered for Construction of RCC box type Channel.
- RCC box type Channel in M 30 grade concrete with rubble soling below
  - base slab
  - RCC Toe wall
  - Construction joint at 30 mt. c/c
  - 600 mm thick filter media at the back of wall
  - RCC crash barrier in M 40 grade concrete
  - Dry rubble stone pitching on side slope
  - Rubber moulded paver block on both side of RCC box type Channel
  - Dewatering during execution
  - 900 mm dia. Sewage pipe parallel to proposed box to carry sewage flow of surrounding area
  - 900 mm dia. RCC pipe is proposed to connect to RCC box at every 200 mt. C/C to carry storm water flow from surrounding area with manholes and flap gate
  - Shifting of Utilities
  - flow from nearby area Open Channel rubble pitching in River bed Nr. Prabodh Raval bridge approx. 100 m. length.

6

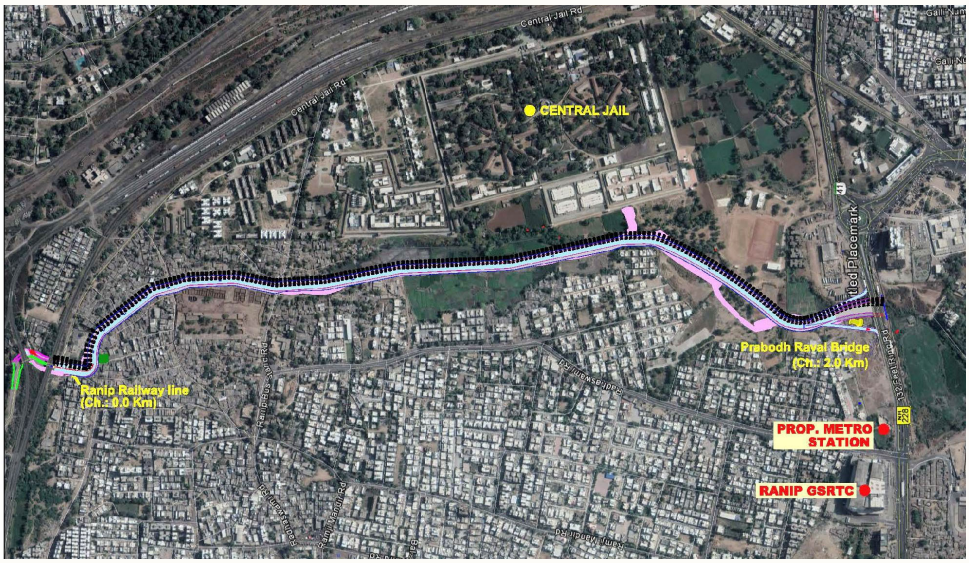
Cost Estimate for Remodelling of Chandrabhaga Drain from Kali Garnala to 132 Feet Ring Road Near Prabodh Raval Bridge

Cost Estimate is prepared As per GWSSB SOR 2022-23 & R&B SOR 2023-24 excluding GST.

Sr. No.	Description of component	Cost in Rs.		
		From Chainage 0-1400	From Chainage 1400-1985	Total
1	RCC Box Drain	64,68,61,714.00	30,53,29,838.00	95,21,91,552.00
2	Retaining Wall	6,33,96,451.00	34,44,00,897.00	40,77,97,348.00
3	900 mm dia Sewerage and Storm water disposal pipe	2,09,25,133.00	1,59,24,368.00	3,68,49,501.00
4	Shifting of Service lines and miscellaneous work	9,95,995.00	9,95,995.00	19,91,990.00
	Total	**73,21,79,293.00**	**66,66,51,098.00**	**139,88,30,391.00**

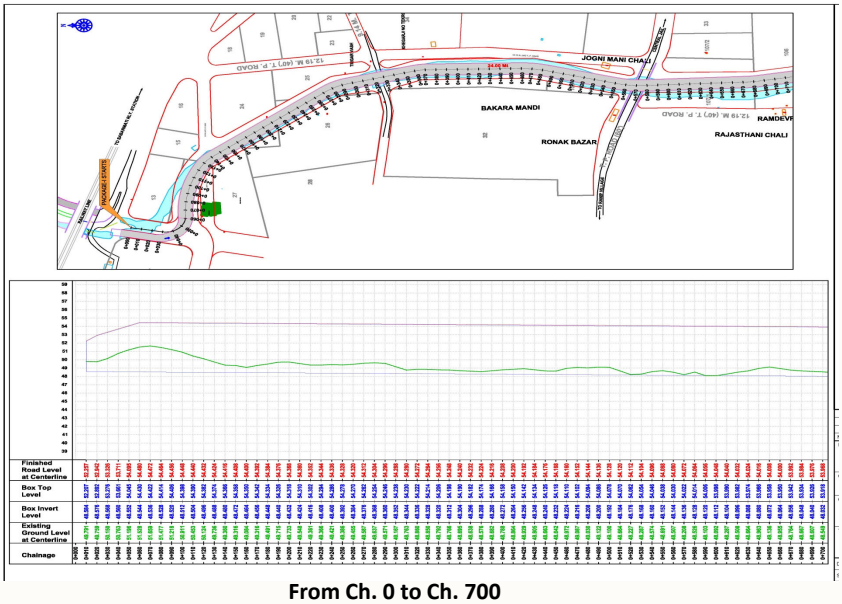
7

Alignment Plan from Kali Garnala to 132 Feet Ring Road Near Prabodh Raval Bridge



8

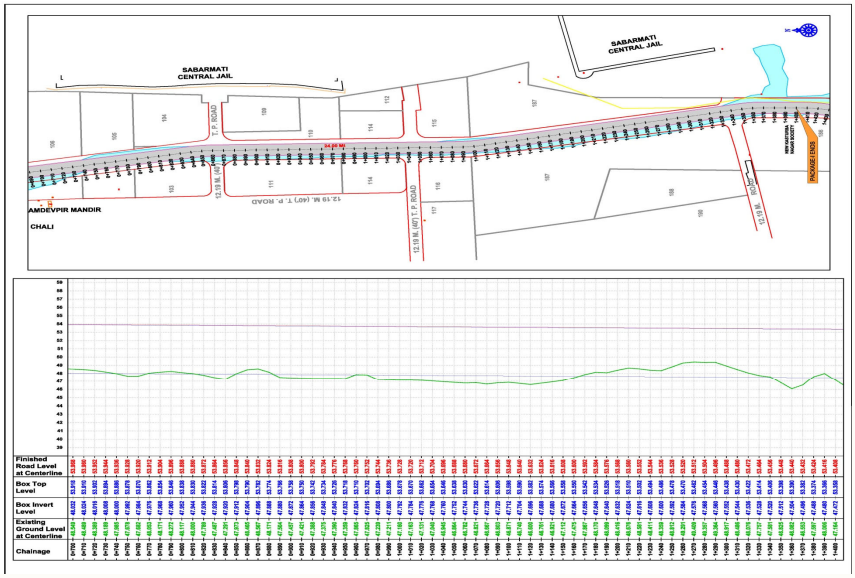
Plan and section of RCC box type Channel for Chandrabhaga Drain



From Ch. 0 to Ch. 700

9

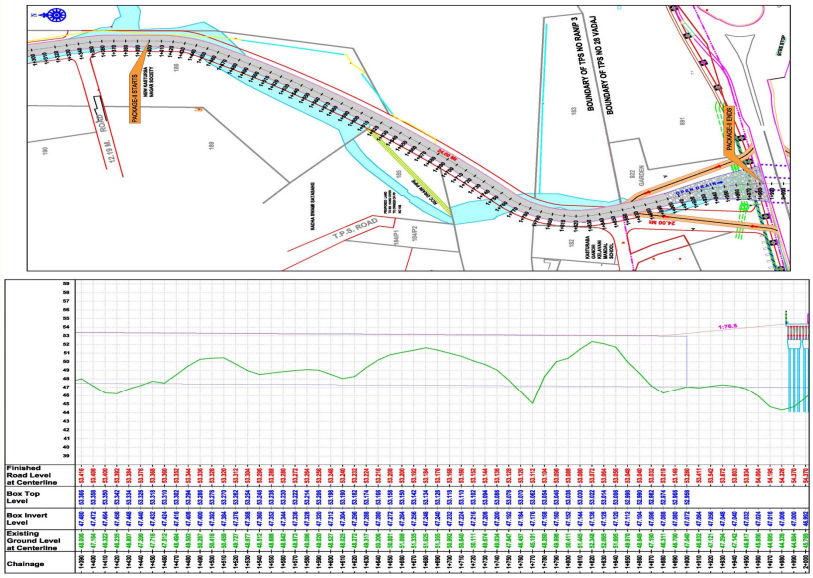
Plan and section of RCC box type Channel for Chandrabhaga Drain



From Ch. 700 to Ch. 1400

10

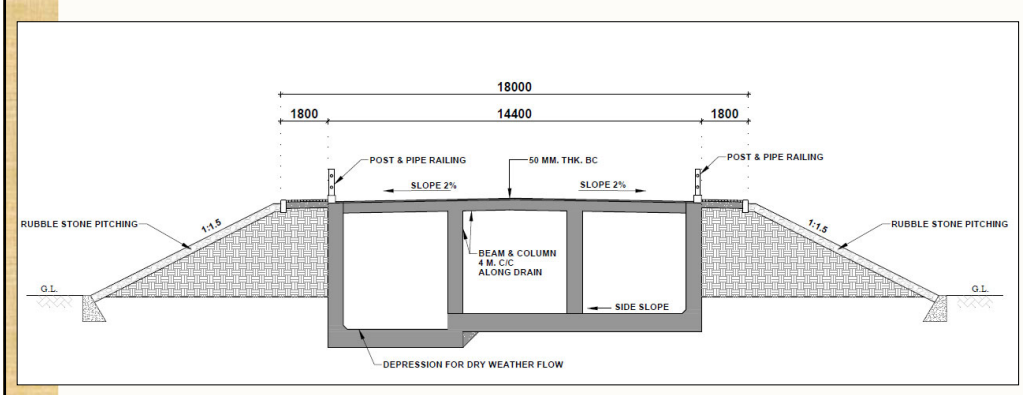
Plan and section of RCC box type Channel for Chandrabhaga Drain



From Ch. 1400 to Ch. 1985 Nr. Prabodh Raval bridge

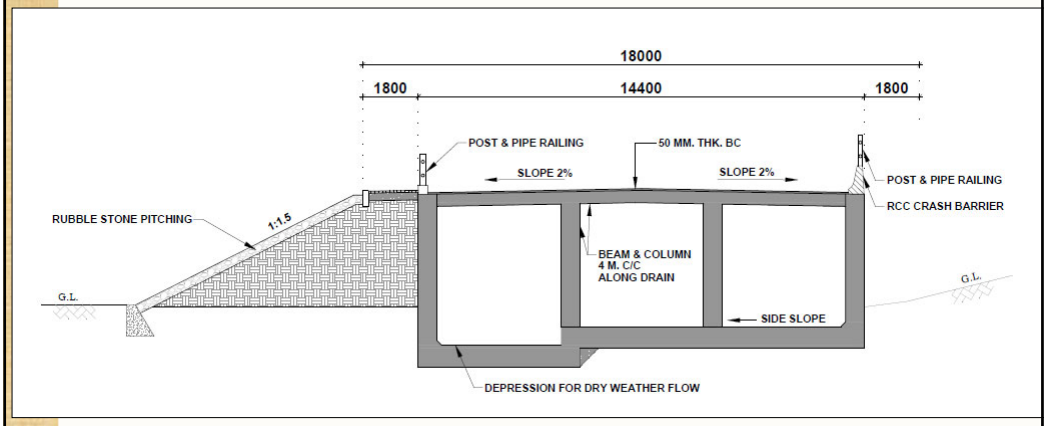
11

Typical Cross Section



12

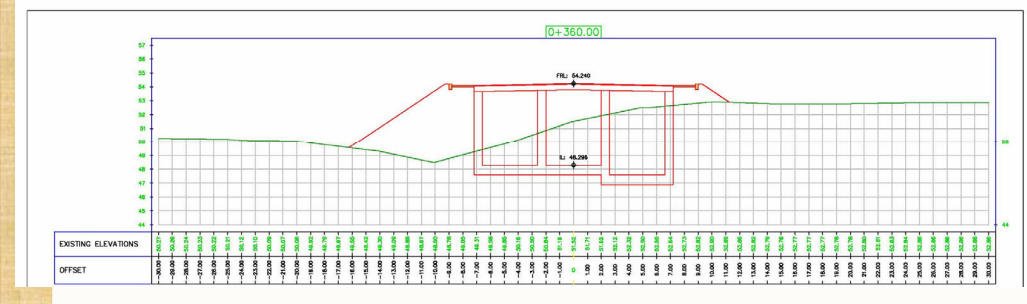
Typical Cross Section @ Central Jail



Approx. Length 550 mt

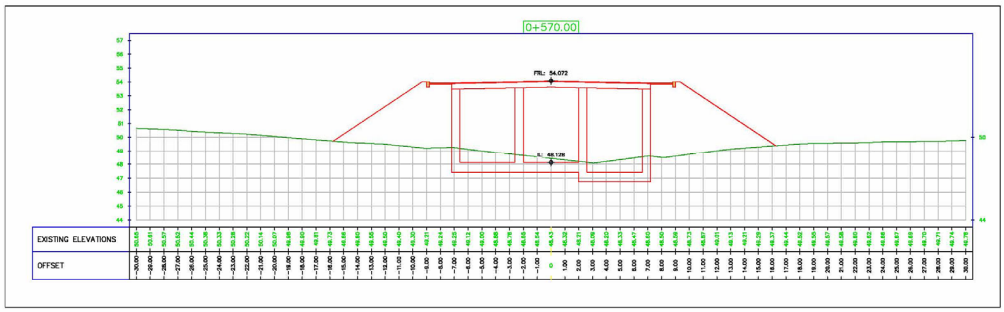
13

Cross section of RCC box



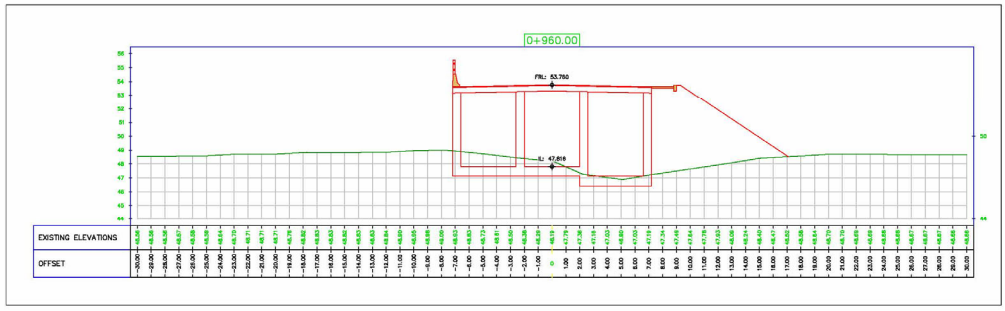
14

Cross section of RCC box



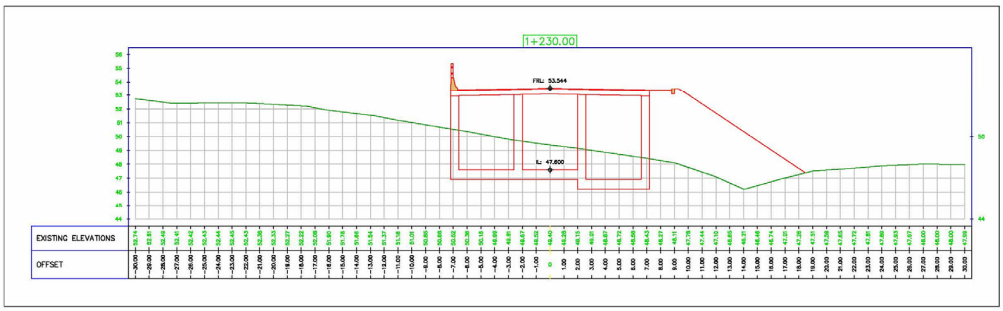
15

Cross section of RCC box



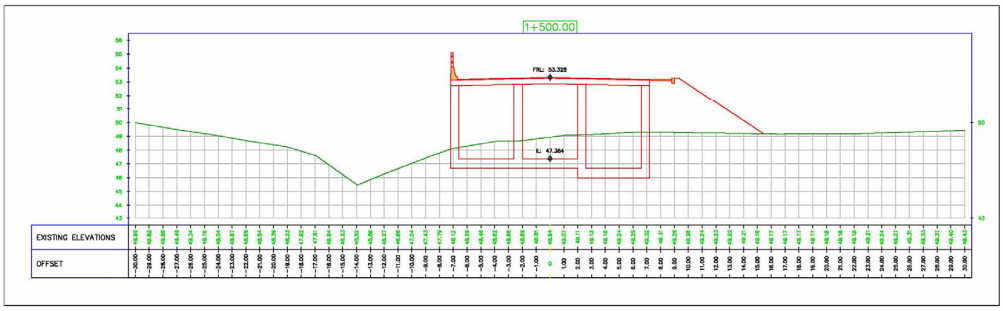
16

Cross section of RCC box



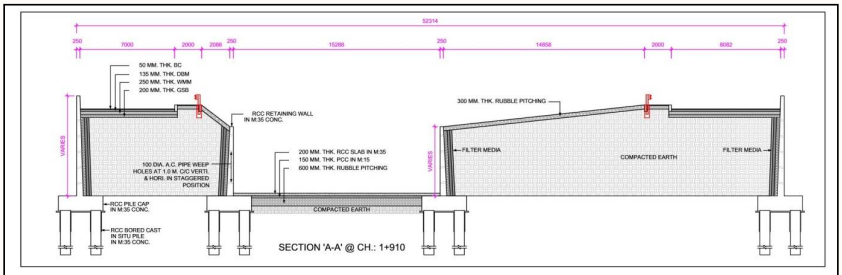
17

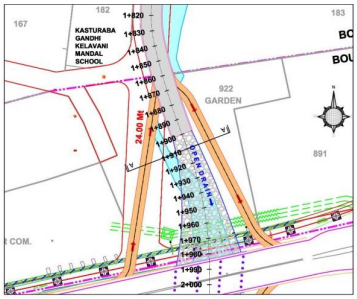
Cross section of RCC box



18

Typical cross section at Prabodh Raval Bridge at Ch. 1910





19

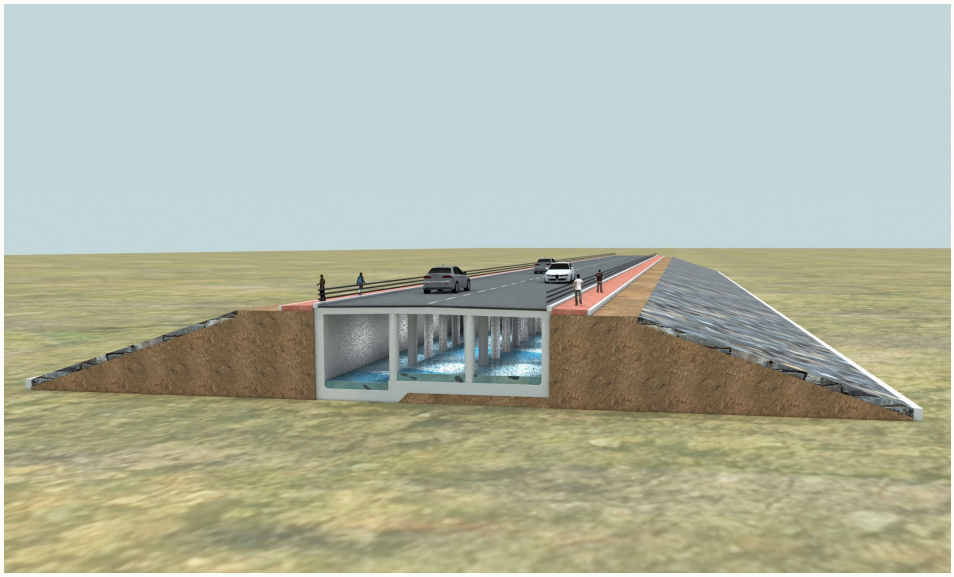
PHOTOGRAPH

20

PHOTOGRAPH

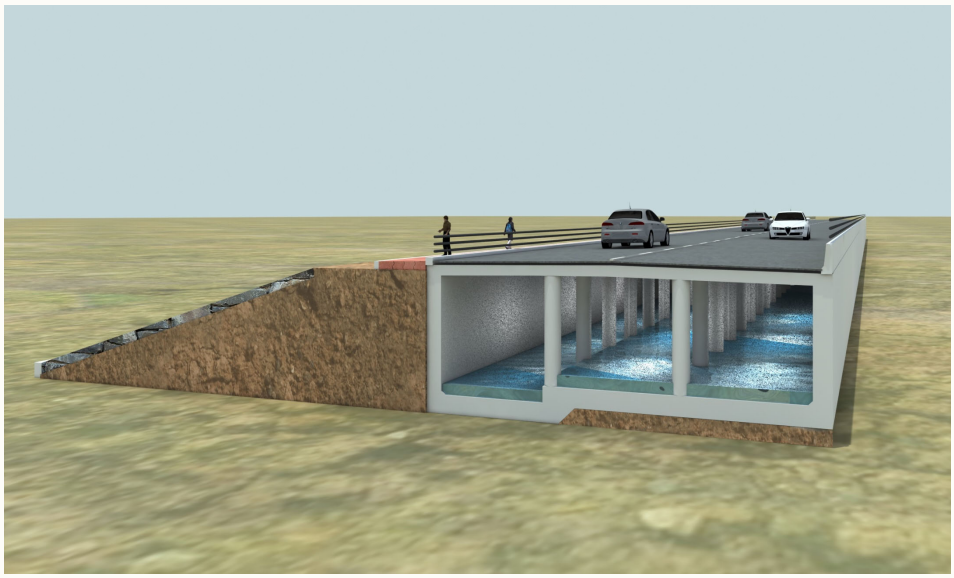
21

3D VIEW



22

3D VIEW

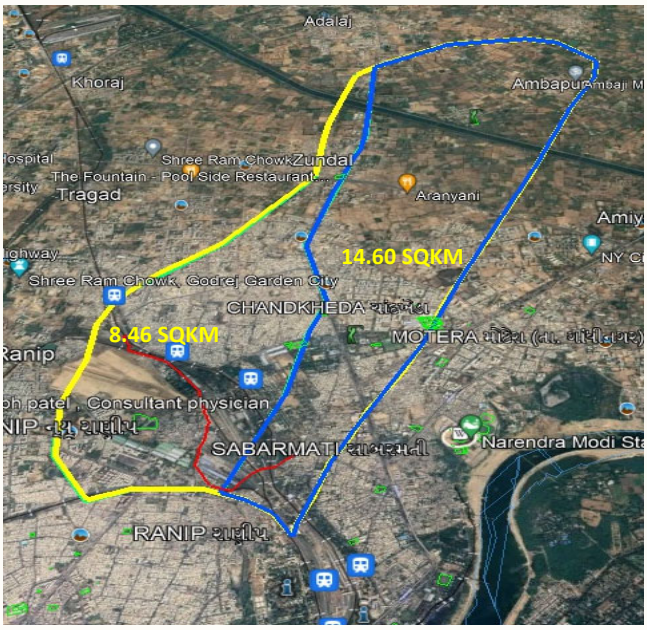


23

STORM WATER DRAIN FROM IOC ROAD TO KALI GARNALA AND FROM SEVEN GARNALA TO KALI GARNALA

24

CATCHMENT AREA



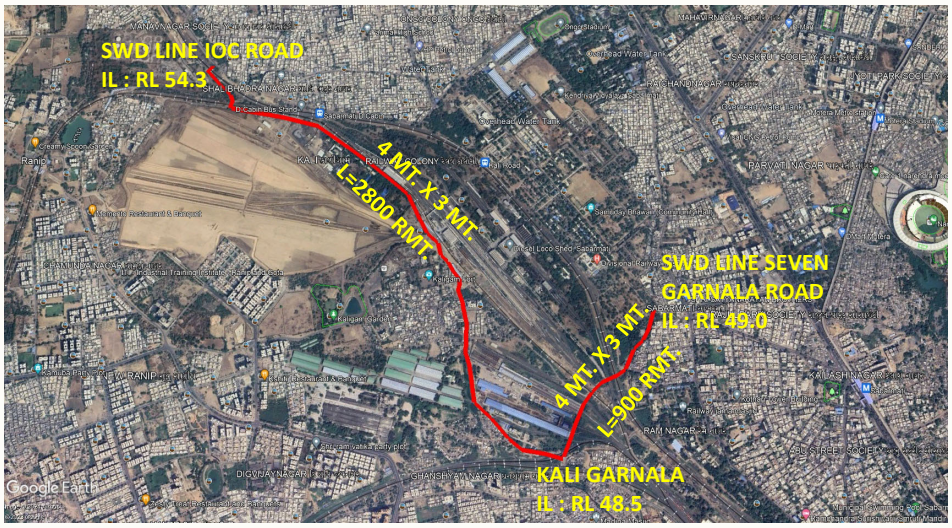
25

PROPOSAL

Sr. No.	Name of canal		Chainage of existing canal in m.		Proposed Length in m.
			From	to	
1	Design for RCC Box for IOC Road Drain	Chainage	0 m.	2806 m.	2806 m.
		Existing GL	57.300 m.	51.500 m.	
		Bed level	54.300 m.	48.500 m.	
		Side slope of Channel	1: 0		
		Bed Gradiant	1: 500		
		Size of Channel	4 X 2.85 + 0.15 m		
		Carrying Capacity (mt^3/sec)			40 mt3/sec
		Design Discharge (mt3/sec)			93 mt3/sec
2	Design for RCC Box for Garnala Drain	Chainage	0 m.	816 m.	816 m.
		Existing GL	52.000 m.	51.500 m.	
		Bed level	49.000 m.	48.500 m.	
		Side slope of Channel	1: 0		
		Bed Gradiant	1: 1700		
		Size of Channel	4 X 2.85 + 0.15 m		
		Carrying Capacity (mt^3/sec)			20 mt3/sec
		Design Discharge (mt3/sec)			161 mt3/sec

26

ALIGNMENT PLAN



THE BLOCK COST OF THIS PROJECT IS RS. 55 CRORE EXCLUDING GST.

27

Thank you

28

DATA COLLECTION SURVEY ON DISASTER RISK REDUCTION SECTOR IN INDIA

February 2024

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)
Yachiyo Engineering Co., Ltd

1

Agenda of Meeting

1. Introduction of JICA Survey Team
2. Objectives of the Survey
3. Outline of the Survey
4. Implementation Schedule of the Survey
5. Longlisted/ Shortlisted Cities
6. Comprehensive Solutions for Urban flooding experienced in Japan
7. Outline of Proposed Project for Shortlisted Cities (tentative)
8. Required Information

2

2

1. Introduction of JICA Survey Team

Position	Name	Company
Team Leader/Formulation of disaster risk reduction	Takamasa NISHIKAWA	Nippon Koei (NK)
Deputy Team Leader/ Disaster risk assessment	Shoichiro MISAKI	Nippon Koei (NK)
Measures against flooding	Toru TAKAHASHI	Yachiyo Engineering (YEC)
Organization and legal structure/ formulation of flood management project	Yuichi YAMAGUCHI	Nippon Koei (NK)
Economic/ investment impact analysis	Uyu TANAKA	Yachiyo Engineering (YEC)
Supporting Staff	Mahmood Ahmad Mayank Agrawal Rishabh Chaudhary	Nippon Koei India (NKI)
	Kaori TANIMOTO	Nippon Koei (NK)

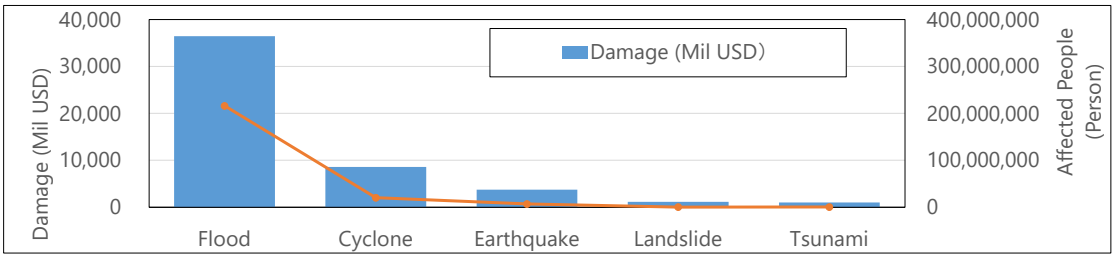
3

2. Objectives of the Survey

The objectives of this survey are:

- to collect and organize basic information on disaster risk reduction sector in India,
- to propose potential yen loan projects and technical cooperation by Japan International Cooperation Agency (JICA) to reduce or mitigate disaster risk especially for urban flood protection or management, and
- to prepare Preliminary Project Report (PPR) to promote the potential project.

If the needs of ODA and cooperation are confirmed in the sector, the JICA Survey Team will support approval procedure of the potential projects.



4

4

3. Outline of the Survey

Long-List of Candidate Cities for Yen Loans (10 cities)

▼

Online Interview with Longlisted Cities (10 cities)

▼

Selection of Priority Cities (6 cities)

▼

Site Survey for Priority Cities (6 cities)

▼

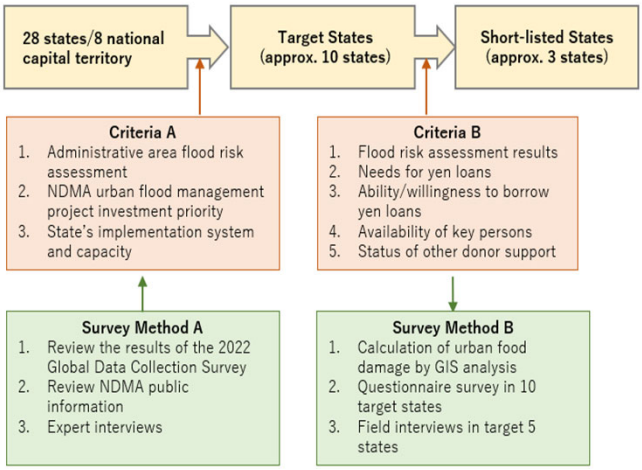
Selection of Shortlisted Cities (3 cities)

▼

Site Survey to formulate of potential project for Shortlisted Cities (tentative: 3 cities)

▼

Preparation of Preliminary Project Report of Shortlisted Cities and Chennai



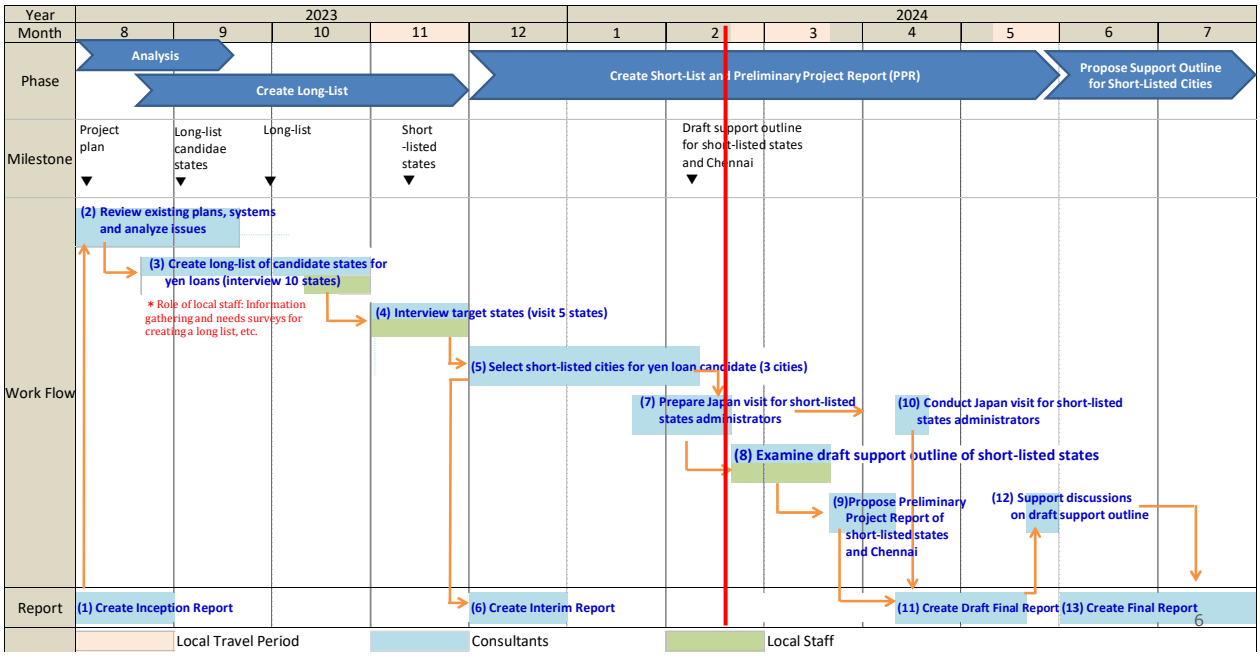
* **Target Disaster:** Urban Flood Mitigation/Management etc.

* **Type of Project:** ODA Loan Project, Sector Loan Project, Technical Assistance (Capacity Development)

5

5

4. Implementation Schedule of the Survey



6

6

5. Longlisted Cities/ Shortlisted Cities

Following states and 10 cities were proposed considering i) priority cities of NDMA's flood management activities, ii) asset in flooded area, iii) population of the city, and iv) vulnerability of the city.

As a result of interview and data collection, following three shortlisted cities were tentatively selected considering the request from the municipal corporations.

States	Longlisted Cities	Shortlisted Cities (tentative)
Gujarat	Ahmedabad, Surat	Ahmedabad,
Maharashtra	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay)
Andhra Pradesh and Telangana	Hyderabad	
Bihar	Patna	
Delhi	Delhi	
Odisha	Bhubaneswar	
Assam	Guwahati	Guwahati

* Cities in Red: Population in 2023 is more than 10million
Cities in Green: Population in 2023 is more than 5million

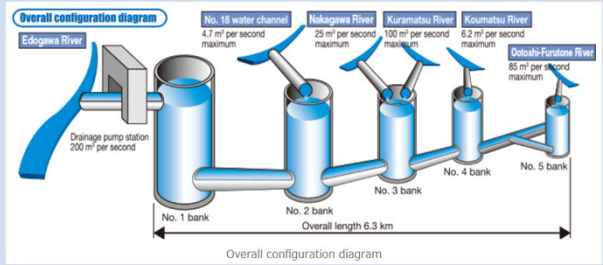
7

7

6. Comprehensive Solutions for Urban flooding experienced in Japan -1

JICA can propose comprehensive solutions including structural and non-structural measures.

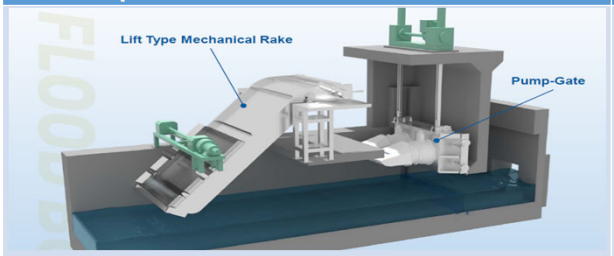
Underground discharge channel



Overall configuration diagram

Regulation Pond

Gate Pump



Plastic Storage Facility

8

6. Comprehensive Solutions for Urban flooding experienced in Japan -2

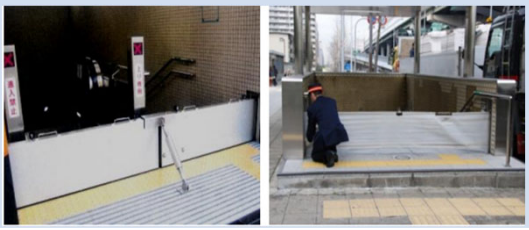
JICA can propose comprehensive solutions including structural and non-structural measures.

Hazard Map (example in Tokyo)

Solid-state Weather Rader

Evacuation Drill

Water Shut-off Board at the Entrance



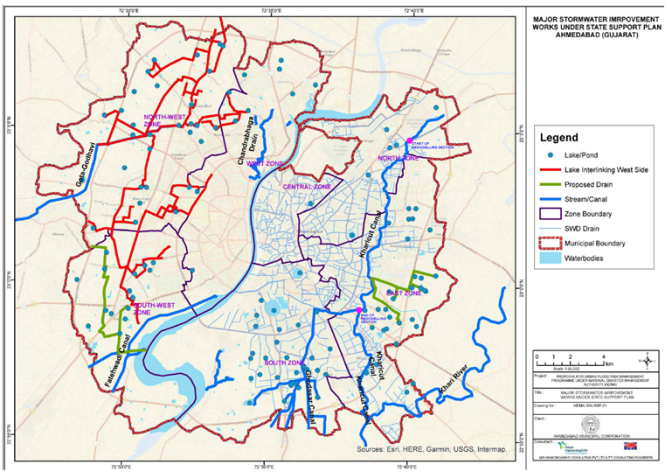
9

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Ahmedabad-1

- Flood spot was spread all over the cities.
- To improve the situation, AMC is implementing drainage projects:
  - Updating master plan(to be completed by the end of 2024)
  - Enhancing the drainage
  - Connection between Lake and Lake at western side of the Sabarmati River etc.

➢ Estimated required amount by the master plan: Rs. 8,271 Cr

➢ NDMA is supporting the implementation of the project with the amount of Rs. 250 Cr



➢ Implementation of the sub-projects

➡ JICA's ODA Loan

(AMC requested JICA for 2nd phase of project)

10

10

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Ahmedabad-2

Proposed project in the MP

Strom Water Drain TENTATIVE COST OF NEEDS (Rs in Crores) AMC Master Plan 2021-2051

CATCHMENT	Sabarati North East	Sabarati Central East	Sabarati South East / Kharicut	Sabarati West	New North & South West	TOTAL
RESECTION	55.79	159.92	1462.07	62.74	57.36	1797.88
INTER CONNECTIONS	0.48	15.83	18.75	23.64	0.92	59.62
RELIEF DRAIN	1.32	12.96	34.6	45.91	117.79	212.58
NEW NET WORK	159.43	163.72	1189.77	227.81	1213.73	2954.46
UNSERVED AREA PHASE 1	0.00	0.00	179.32	0.00	82.17	261.49
LID WORKS	23.42	79.81	297.56	102.27	338.23	841.30
NEW SWPS						28.55
DESILT & REHAB PHASE 1	102.18	404.67	69.89	245.85	186.8	1009.39
ELEC & MECH REHAB PHSE 1						65.14
DESILT & REHAB PHASE 2	87.18	391.35	71.66	257.87	166.73	974.79
ELEC & MECH REHAB PHSE 2						65.89
TOTAL	**429.80**	**1228.26**	**3323.62**	**966.09**	**2163.73**	**8271.09**

Proposed project in Phase I (NDMA)

Sr. No.	Component	Tentative cost in Cr (INR)
1	Improved ground infiltration mechanism using Eco Block	25.0
2	Flood water management by Detention Cum Infiltration Tank	25.0
3	Interlinking of water bodies - South West Zone	76.0
4	Interlinking of water bodies - East Zone	78.0
5	Sponge Park and Underground Water Storage Facility	15.0
6	Ahmedabad Flood Early Warning System including all sensors, software, hardware, establishment of control room etc	40
7	5% Fund for Studies Research, Innovation and Training	
7.1	Preparation of Detailed Drainage master plan including detailed design	12.0
7.2	Capacity Building including trainings, workshops etc	4.0
	Total	**275.0**

11

11

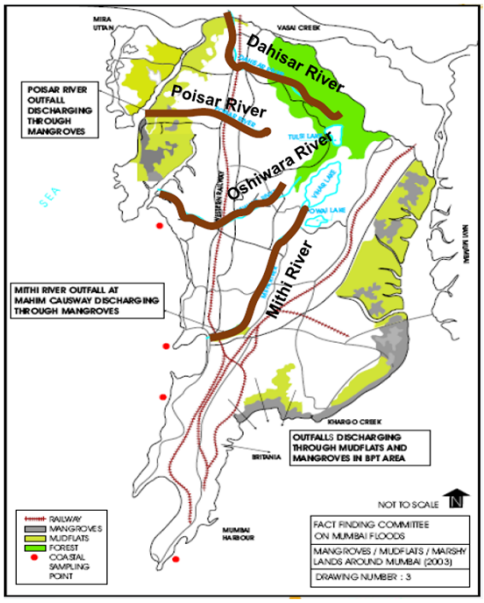
7. Outline of Proposed Project for Shortlisted Cities (tentative) - Mumbai

- Mumbai is implementing the drainage improvement project such as:
  - Mithi River improvement projects
  - Construction of pumping station, etc

Those improvements are carried out based on the BRIMSTOWAD (Stormwater Drainage Master Plan).

However, since, upon the publication of updated CPHEEO manual and the recent increasing of the rainfall intensity due to the climate change, the BRIMSTOWAD is required to be updated to meet the higher level of the planning requirements.

- ➢ Require to update a drainage Master Plan.
  - ➡ JICA's Technical Cooperation or Study Scheme to tackle with increasing flood risk by comprehensive solution applied in Japan
- ➢ Implementation of the prioritized projects based on the MP
  - ➡ JICA's ODA Loan



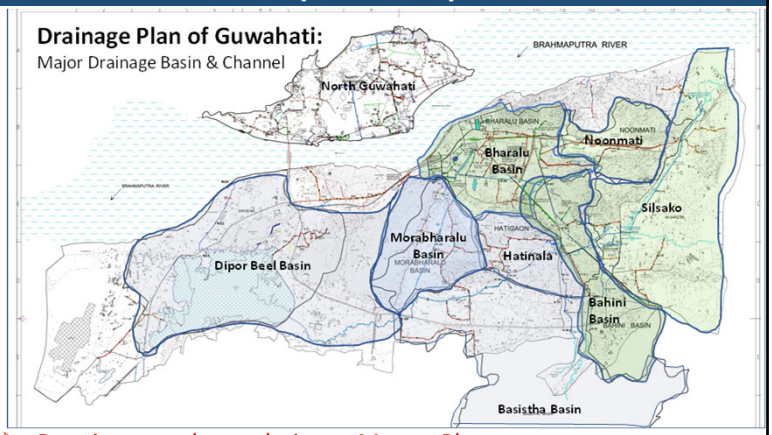
12

12

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Guwahati-1

- Guwahati is facing a flood problem during rainy season since it is difficult to drain the stormwater into the Brahmaputra River due to the high-water level of the river.
- Enhancement of existing drain, pumping station and retention pond is required.
- Available master plan was formulated in 2008 and the master plan was already outdated.

➢ ADB is ready to assist implement the project at Hatinala and Bahini Basins. (Rs 150 Cr)



➢ Require to update a drainage Master Plan.

➡ JICA's Technical Cooperation or Study Scheme to tackle with increasing flood risk by comprehensive solution applied in Japan, if the MP can be formulated soon

➢ Implementation of the projects for the other basins

➡ JICA's ODA Loan

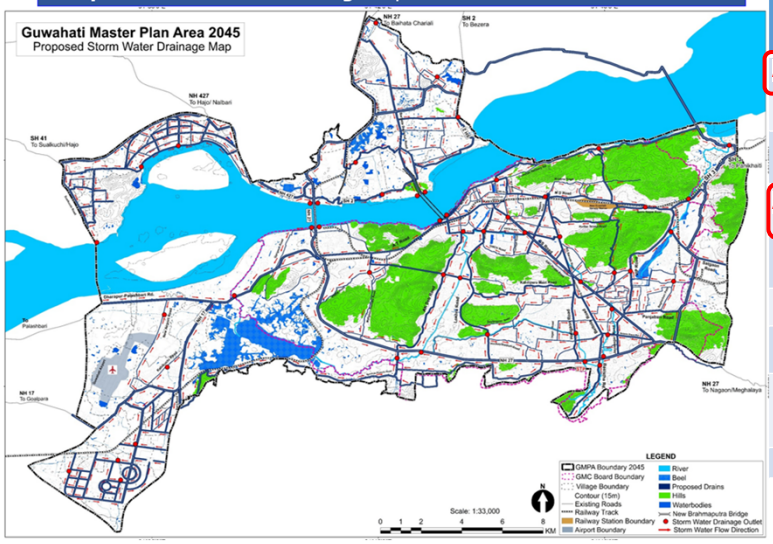
(Estimated amount for Baharalu basin: Rs. 450 Cr(2008 MP base))

13

13

7. Outline of Proposed Project for Shortlisted Cities (tentative) - Guwahati-2

Proposed Storm Water Drainage Map



SN	Basin	Major Channel	Catchment Area (Km2)	Length (Km)	Design Discharge
ADB	Bahini basin	Bahini channel	16.83	8.5	48 m3/s
2	Bharalu basin	Bharalu river	19.36	4.8	83 m3/s
3	Morabharlu basin	Morabharlu channel	12.91	6.5	27 m3/s
ADB	Hatinala basin	Hatinala channel	11.9	5.1	24 m3/s
5	Basistha basin	Basistha channel	83.74	8.7	274 m3/s
6	Silsako Beel		50	5	75 m3/s
7	Noonmati basin	Noonmati drain	12.5	5.2	50 m3/s
8	Dipor beel basin	Dipor beel and Pamohi channel	46.24	Pamohi channel 7 km	66.3 m3/s
			253.49		

14

14

8. Required Information (from State Authorities)

(1) General information related to Disaster Risk Reduction in the State

- Priorities for action to mitigate disaster risk of the state
- Plan or strategy to mitigate/ reduce risk of urban flooding and other disaster
- Budget for the disaster risk reduction and budgetary arrangement for the states and mega-cities
- Status of other donors' supports for urban drainage projects
- Request for JICA (Necessity support from JICA in disaster risk reduction sector)
- Status and issues of urban drainage reduction projects

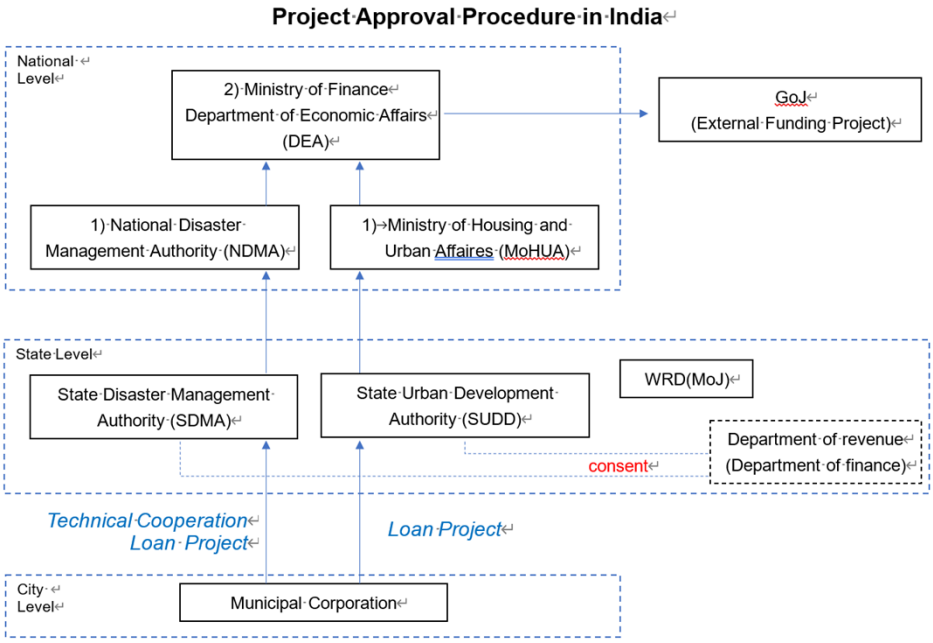
(2) Approval procedure and evaluation criteria for potential projects

- JICA would like to know approval procedure of the potential projects in Indian relevant authorities
  - Master plan➔ ODA Loan : Mumbai, Guwahati
  - ODA Loan: Ahmedabad (MP has been prepared)
- JICA would like to confirm the evaluation criteria and requirements for potential projects to be approved by relevant authorities in India.

15

15

8. Required Information (from State Authorities)



16

16

8. Required Information (from Municipal Corporation)

Following information will be needed to prepare Preliminary Project Report (PPR) for the formulation of the project after nominated to the shortlisted cities.

Main Items	Details
Existing drainage facilities and inundation data in the City	1) Available existing major drainage facilities such as primary drain, pump, gate, storage facilities etc. in the City. 2) Operation of those drainage facilities (regular maintenance, operation rules, condition of the facilities etc.) 3) Location map and information of inundation (frequency, area, period, flood scale, etc.) 4) Damage situation due to the inundation (damage types, population affected, total financial damage etc.) 5) Current general forecast and monitoring system (method) of rainfall and flood
Hydraulic related information	1) Precipitation record in the last 10 years (total mm, mm/hour) 2) Flood records in the last 10 years 3) Function and information (Storage volume, operation situation, regular maintenance etc.) of dam site upstream of the City, if any. 4) Water level of river, canal and sea, and tide level related with inundation area 5) Tendency and effect of recent climate change (reports, literatures etc.)
Other information	1) Current and future plan of annual budget allocation to drainage sector in the Municipal Corporation 2) Land use plan or city development master plan

17

8. Required Information (from Municipal Corporation)

Preliminary Project Report

1.	Name of the Project	
2.	Sectoral area	
3.	Total Financial Outlay	
4.	Details of the external development agencies (and the amount sought form each)	
5.	Financial arrangement	

Total external assistance	Counterpart funds being made available by				Total
	Implementing agency	State Government	Central Government	Others, if any	
	-	-	-	-	-

6.	Project duration (dates/months/years)	
7.	Location of project	
8.	Previous phases, if any	
9.	Statutory Clearances required	
10	Statutory clearance obtained	
11.	Details of Feasibility Studies done, if any	
12.	Implementing Agency	

18

18

8. Required Information (from Municipal Corporation)

13.	Basic design of the project	
-	Goals and Objectives	
-	Activities involved	
-	Outputs of the project	
-	Outcome of the project	
-	Foreign Component and Technical Coop. component	
14.	Target population/groups	
15.	Details Action Plan (Year wise)	

Year	Physical progress (%)	Financial Progress (Rs. in Crores)
2012-13	-	-
2013-14	-	-
2014-15 . .	-	-

16.	Quantitative and qualitative (verifiable) target indicators	-
17.	Environmental sustainability of the project	-
18.	Land acquisition/Resettlement and Rehabilitation involved	-
19.	Linkages with Similar Projects	
(i)	Information regarding projects in similar undertaken 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.	

インド国防災分野に係る
情報収集・確認調査

ムンバイ収集情報報告

2024.4.5

日本工営株式会社、八千代エンジニアリング

1

ムンバイー１

項目	内容
訪問日	2023/11/20-21
面談機関	MITRA MCGM：AMC、AMC、SWD、Disaster
要請内容	• 気候変動を考慮したマスタープランの策定 • 優先事業のFS
備考	• 既にMCGMの自己資金で事業実施 • 気候変動の影響により、海面水位上昇、降雨強度上昇が予測 • 既往の施設で対応できない範囲を事業化するための、「気候変動の影響を考慮した排水マスタープランの策定」を要望 • 外郭放水路と同様の地下河川がソリューション • 雨水再利用も積極的に進めたい • 地滑り対策の技術 • 耐震設計（Building Cordで対応済み） • 共同溝（スペースがないため）
確認事項	既往承認の扱い

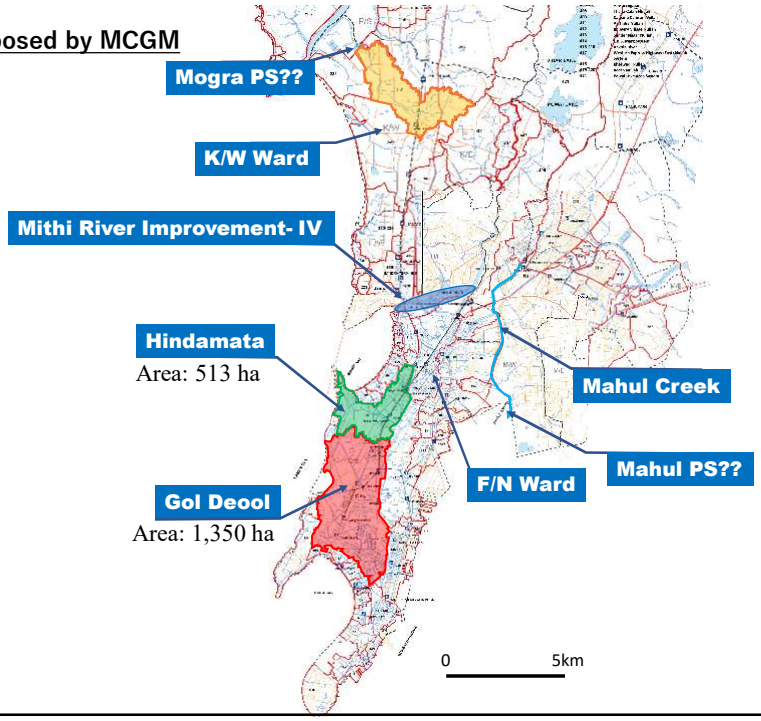
2

ムンバイ－2

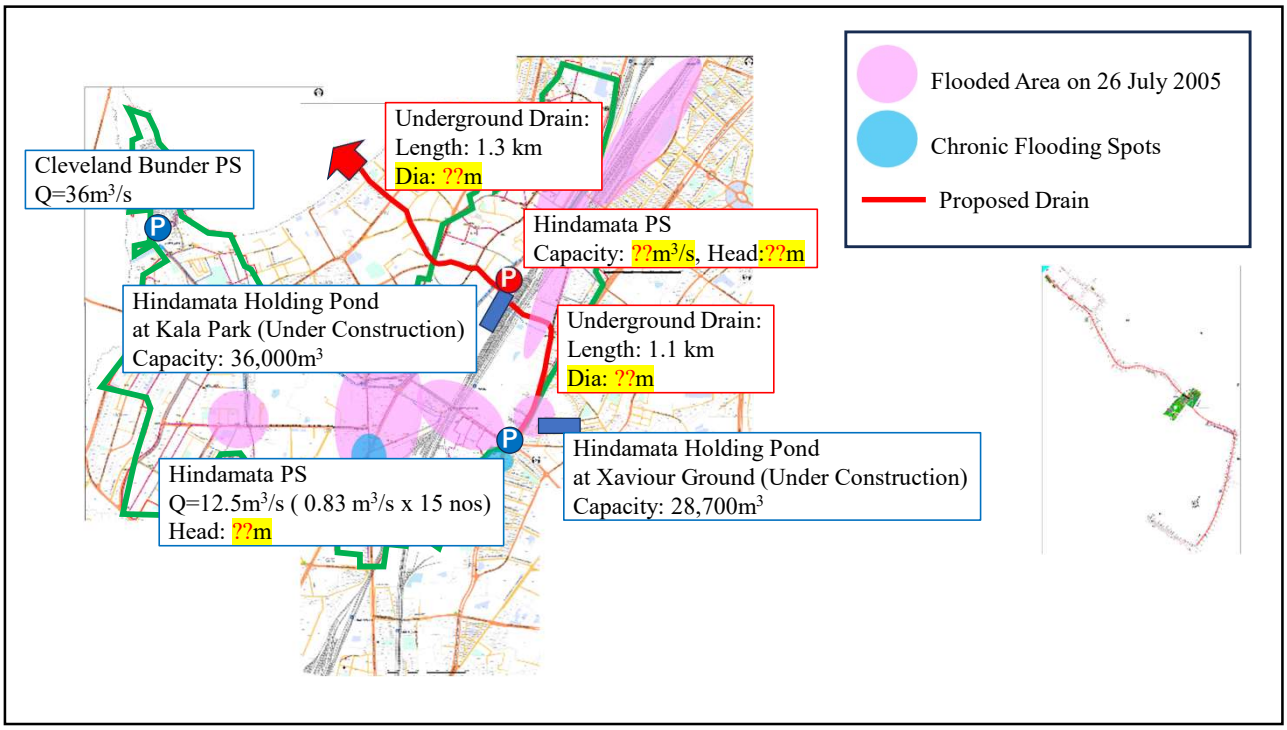
項目	内容
訪問日	2024/3/4-7
面談機関	SUDD MCGM：SWD、Disaster
提案内容	• マスタープランの改訂（BRIMSTOWAD-III） （気候変動の改訂＋区域拡張） • 雨水幹線＋ポンプ場（Hindamata、Gol Dewool）
備考	• SUDDは、MCGMが円借款事業を実施することに前向きだが、MCGMは1回目ほど前向きではない印象 （実施事業） • BRIMSTOWAD-IIに準じて多くのポンプ場整備などを実施済み • 残された事業の、Hindamata、Gol Dewool排水区の雨水幹線＋ポンプ場の整備を実施すべくコンサルタントを雇用済み。 ✓ Gol Dewoolに関しては、ポンプ場の用地確保の目途が付いたら事業を進める ✓ Hindamataは、具体的計画策定まで至っていない （マスタープラン改訂） • 既にMCGMの自己資金でマスタープラン改訂のための準備を進めており、IITムンバイからの条件提示を待つ状況であった
確認事項	MCGMはUDDからの指示を期待

3

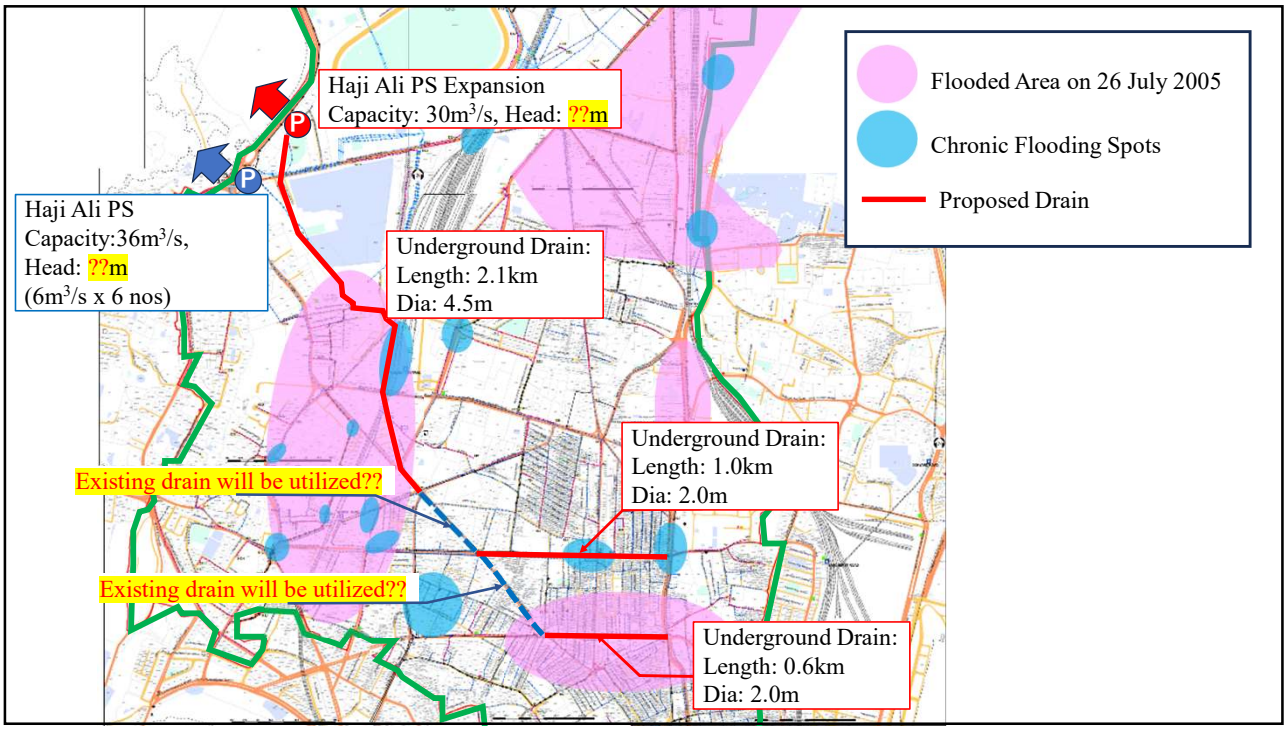
2 Catchments proposed by MCGM



4


Flooded Area on 26 July 2005
Chronic Flooding Spots
Proposed Drain
Underground Drain:
Length: 1.3 km
Dia: ??m
Cleveland Bunder PS
Q=36m³/s
Hindamata PS
Capacity: ??m³/s, Head:??m
Hindamata Holding Pond
at Kala Park (Under Construction)
Capacity: 36,000m³
Underground Drain:
Length: 1.1 km
Dia: ??m
Hindamata Holding Pond
at Xaviour Ground (Under Construction)
Capacity: 28,700m³
Hindamata PS
Q=12.5m³/s (0.83 m³/s x 15 nos)
Head: ??m

5


Flooded Area on 26 July 2005
Chronic Flooding Spots
Proposed Drain
Haji Ali PS Expansion
Capacity: 30m³/s, Head: ??m
Haji Ali PS
Capacity:36m³/s,
Head: ??m
(6m³/s x 6 nos)
Underground Drain:
Length: 2.1km
Dia: 4.5m
Underground Drain:
Length: 1.0km
Dia: 2.0m
Existing drain will be utilized??
Existing drain will be utilized??
Underground Drain:
Length: 0.6km
Dia: 2.0m

6

ムンバイ収集情報報告

1）地形・標高

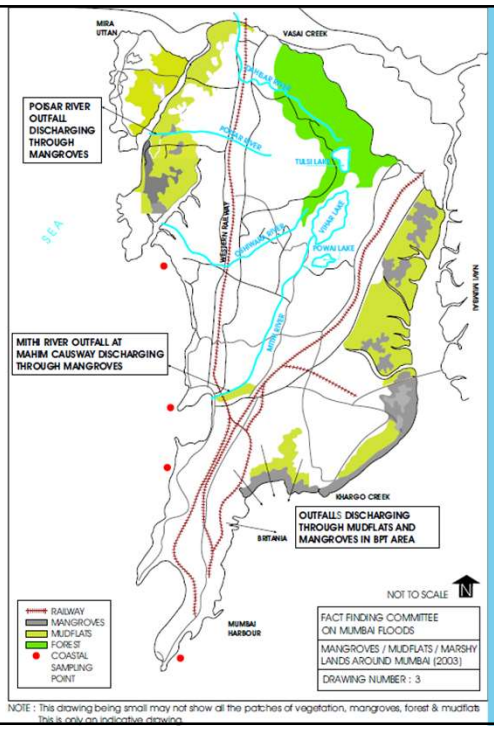
2）降雨

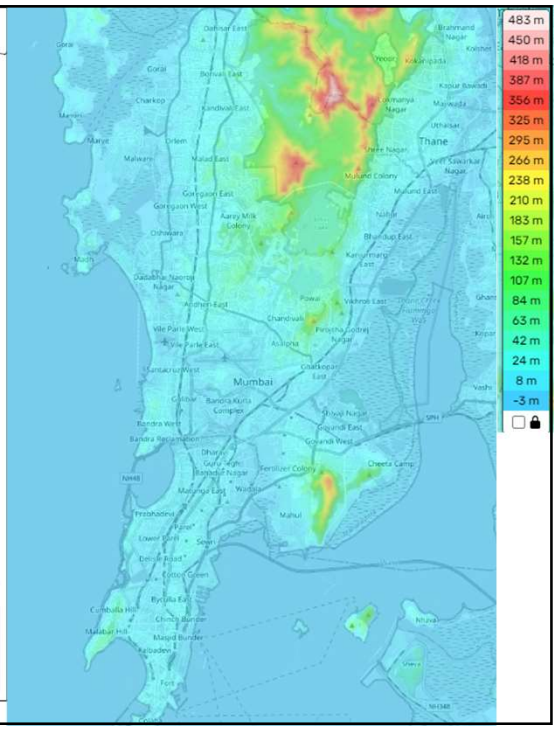
3）浸水

4）現有施設・対策規模

7

1）地形・標高





8

1）地形・標高

- **Extreme Rainfall** Events
- **Coastal Inundation** due to tides and increasing sea level
- Topography with **population within low-lying areas** along the natural flow of water
- **35-40% of the annual rainfall** occurs in just **2-3 events**
- Heavy rainfall coincides with high tides - Severe Flooding
- Average occurrence of such an event: **3 to 4 per monsoon**

4

9

3）降雨・浸水被害 （**Mumbai Climate Action Plan 2022**）

1．降雨

Decadal data (2011-2020) accessed from 37 weather stations show that Mumbai experiences an average of 6 heavy, 5 very heavy and 4 extremely heavy 6 rain events per year. Between 2017 and 2020, there has been a steady increase in extremely heavy rainfall events. Spatially, most EREs tend to occur as localized clusters in western and central areas, such as Worli-Dadar, Kurla and Andheri. The analysis also shows that most EREs tend to last only a single day while 17% of very heavy and 21% of extremely heavy EREs last more than a day. Between 2004 and 2007, Mumbai experienced flooding annually causing heavy losses and damages (Kuruppu et al., 2018). The worst flooding in the city's history took place in July 2005 (Gupta, 2007), causing huge damages of over INR 450 crores and more than 900 deaths (TERI, 2014) (Hallegatte et al., 2010).

2．浸水被害

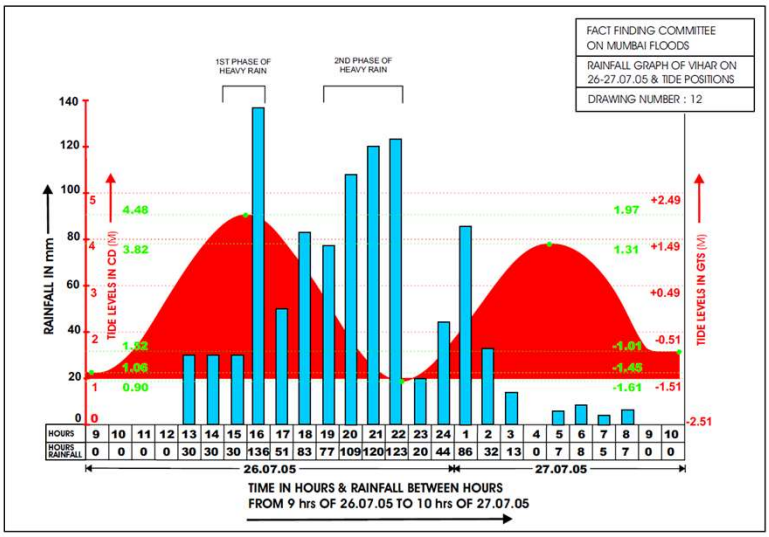
Based on our analysis using DoE data (Source: MOSPI, 2013) and using a 500m buffer around flooding hotspots, every year, in Mumbai, 73% of small and large industrial and commercial establishments are affected during floods. Of the employees who work at these establishments, 69% experience limited access.

Mumbai ranks 5th among the world's cities most at risk of flooding, recording annual losses amounting to USD 284 million (Hallegatte et al., 2013). The catastrophic flood events of 2005 killed around 5,000 people and caused economic damages of up to USD 690 million (Nagendra, 2017). Several studies have projected that by 2050, such annual losses from flooding and heavy rain events will increase up to USD 6.1 billion per year (Picciariello et al., 2021). Most of these losses are uninsured and borne by individuals or small businesses (Patankar & Patwardhan, 2016), leading to devastating impacts on livelihoods and household incomes

10

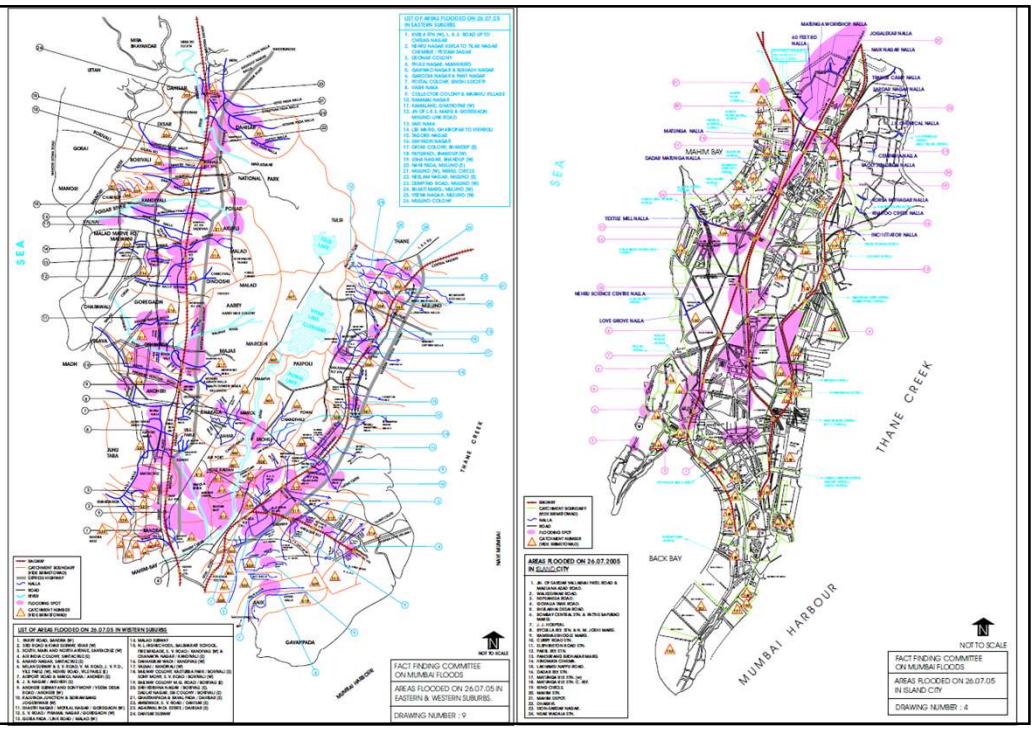
2）降雨(2005)

Vihar Lake received maximum rainfall of 1011 mm rainfall as per the data of MCGM rain gauge records. The hourly sequential precipitation at Vihar from 12.00 Hrs on 26th July to 12.00 Hrs of 27th July, was as below.

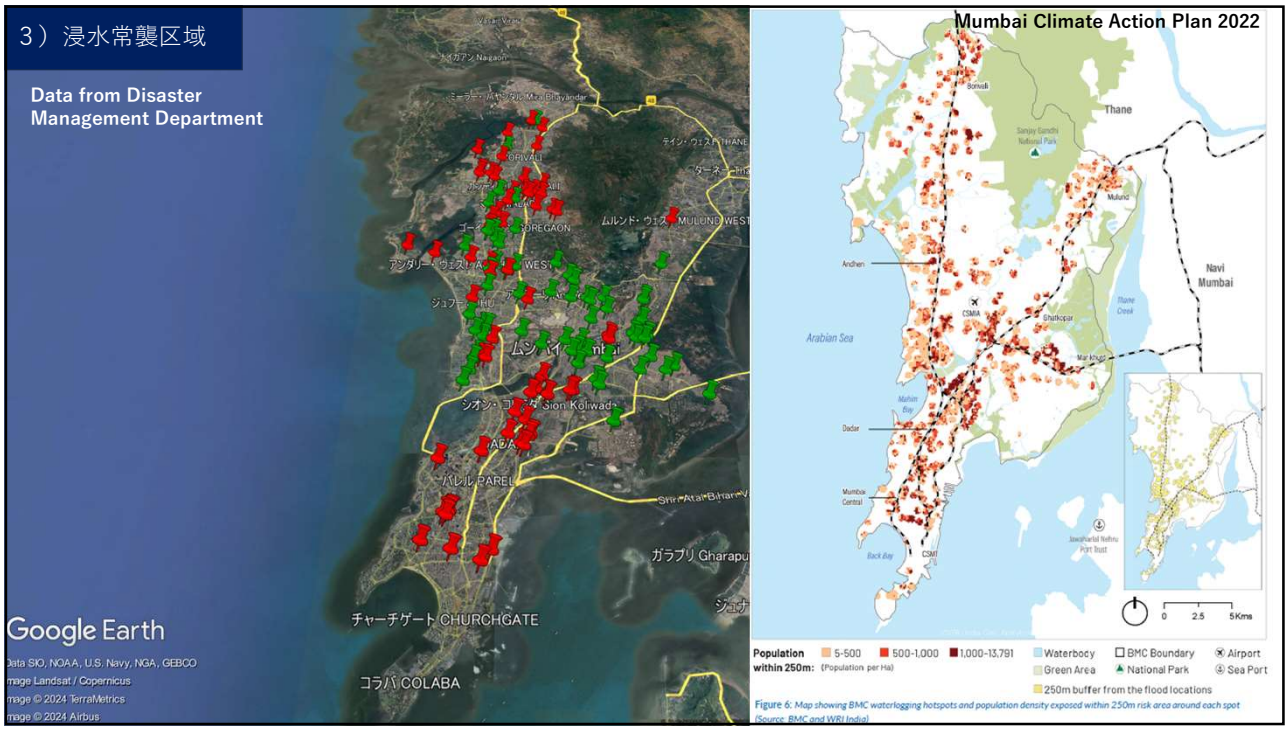


11

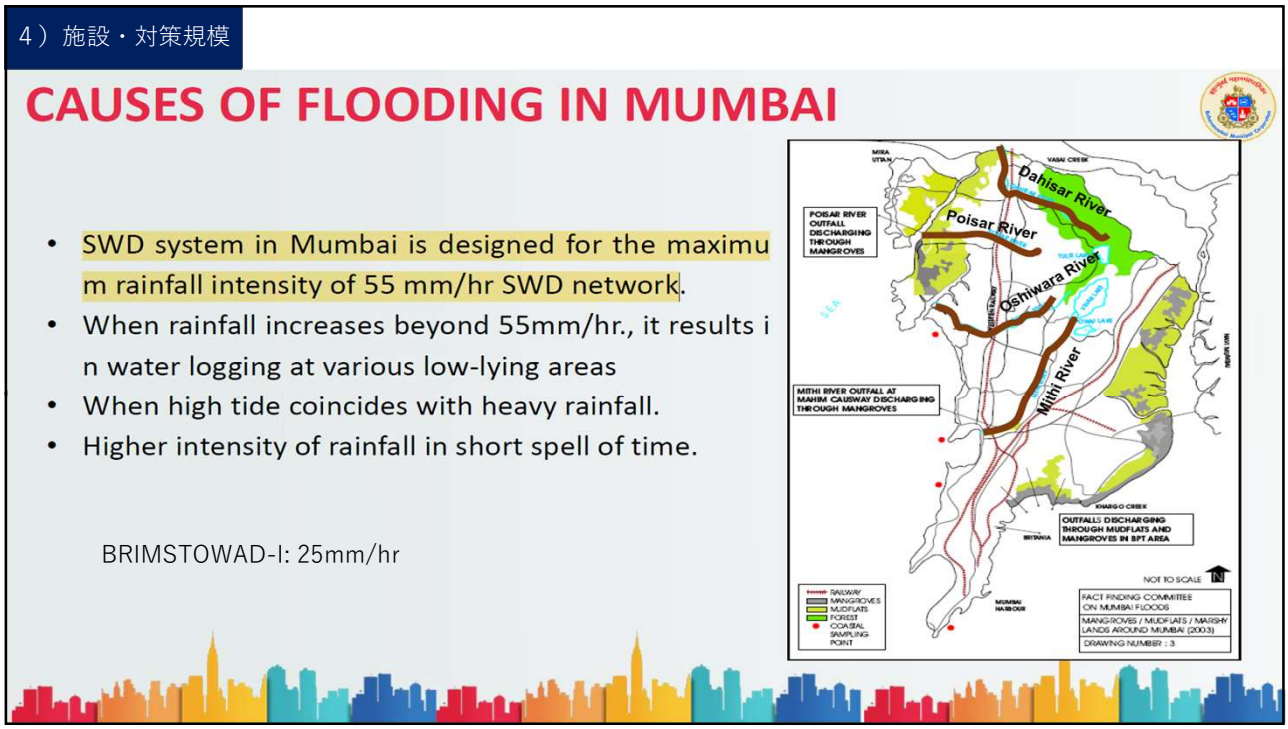
3）浸水(2005)



12


3）浸水常襲区域
Data from Disaster Management Department
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Image © 2024 TerraMetrics
Image © 2024 Airbus
チャーチゲート CHURCHGATE
コラバ COLABA
Mumbai Climate Action Plan 2022
Thane
Navi Mumbai
Arabian Sea
Population within 250m:
5-500
500-1,000
1,000-13,791
(Population per Ha)
Waterbody
Green Area
250m buffer from the flood locations
BMC Boundary
National Park
Airport
Sea Port
Figure 6: Map showing BMC waterlogging hotspots and population density exposed within 250m risk area around each spot (Source: BMC and WRI India)

13


4）施設・対策規模
CAUSES OF FLOODING IN MUMBAI
• SWD system in Mumbai is designed for the maximum rainfall intensity of 55 mm/hr SWD network.
• When rainfall increases beyond 55mm/hr., it results in water logging at various low-lying areas
• When high tide coincides with heavy rainfall.
• Higher intensity of rainfall in short spell of time.
BRIMSTOWAD-I: 25mm/hr
Dahisar River
Poisar River
Oshiwara River
Mithi River
POISAR RIVER OUTFALL DISCHARGING THROUGH MANGROVES
MITHI RIVER OUTFALL AT MAHIM CAUSWAY DISCHARGING THROUGH MANGROVES
OUTFALLS DISCHARGING THROUGH MUDFLATS AND MANGROVES IN BPT AREA
NOT TO SCALE
FACT FINDING COMMITTEE ON MUMBAI FLOODS
MANGROVES / MUDFLATS / MARSHY LANDS AROUND MUMBAI (2003)
DRAWING NUMBER : 3

14

4）施設・対策規模

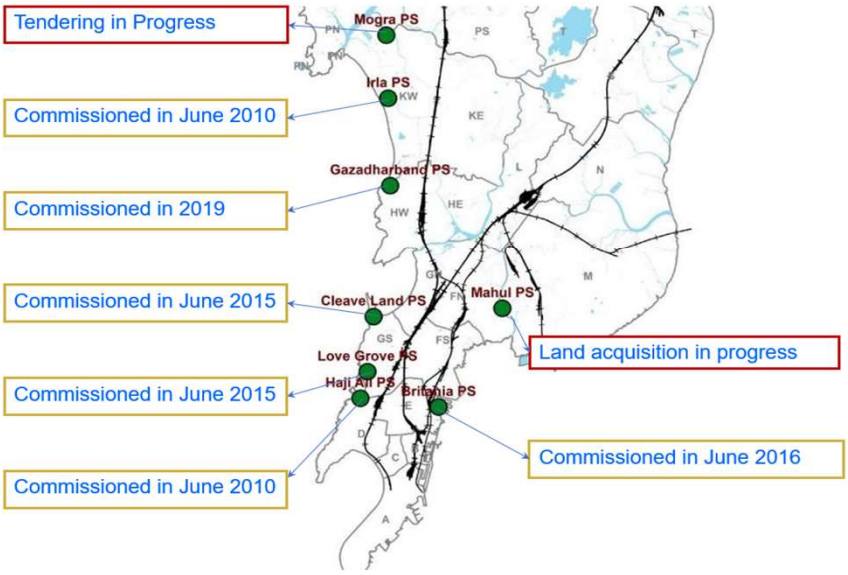
STATUS OF AUGMENTATION / CONSTRUCTION OF SWD AS PER BRIMSTOWAD REPORT AS ON 28.02.2023

Priority Works under BRIMSTOWAD Project				
	City	W.S.	E.S.	Total
No. of the works	20	17	20	**57**
No. of Completed works	19	10	14	**43**
No. of the works in progress	1	6	5	**12**
Tenders allotted, preliminary work is in progress	0	1	0	**1**
Tenders invited	0	0	1	**1**

15

4）施設・対策規模

Construction of Major Storm Water Pumping Stations



8 Storm Water Pumping Stations were recommended as per BRIMSTOWAD Master Plan to reduce flooding during high tide coupled with heavy rains

During the 2019 monsoon, the 6 pumps:

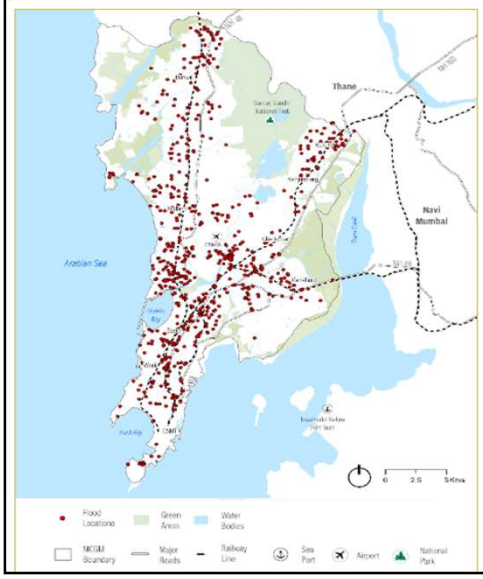
- Operated for **3000+ hours**
- Discharged **70000 MLD** of flood water

8

16

3）浸水常襲区域

Flooding Spots in Mumbai



ORIGINAL Flooding Spots : 386
Already Tackled : 280
Balance to be tackled : 106

Summary of Flooding Spots					
Zone	Total Flood spots	Already Tackled	To be tackled in 2022	To be tackled before 2023	Others (Planning/ Ext. Agency/ Pvt. Property)
City	137	113	6	15	5
WS	159	161	24	6	39
ES	90	86	5	1	5
Total	386	280	35	22	49

12

17

2）降雨（気候変動）

As described in the climate risks assessment, the recent IPCC AR6 report (2021) points out that the precipitation is expected to increase and become more extreme. The city's storm water drainage network consists of a dense network in the island city and sparsely spread in the suburbs. Considering this, the city is cautioned by the future possibilities of routine inundation or partial submergence if actions towards increasing the city's flood resilience are not taken up. Several habitations within the city are either just above mean sea level or located on hill slopes. This makes these habitations most vulnerable to the compounded impacts of waterlogging, flooding and landslides resulting from the simultaneous occurrence of extreme climatic events. Fishing communities and other informal settlements along the coasts are at the risk of inundation and storm events. However, this is not the only risk these communities face.

The IPCC AR6 predicts that South Asia will witness increased annual and summer monsoon precipitation during the 21st century, with enhanced inter-annual variability. Climate projections for Mumbai estimate that by 2080, the likelihood of a 2005-like event will more than double, under an "upper bound"8 climate scenario (Ranger et al., 2010).

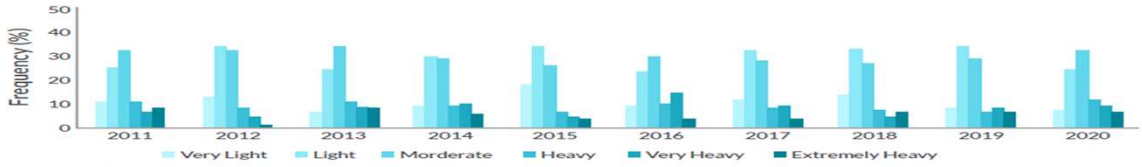


Figure 38: Frequency of heavy rainfall events in Mumbai during 2011-2020

18

ムンバイ提案

① Gol Dewool、Hindamata：55㎜/hour
② Gol Dewool、Hindamata：気候変動対応
③ 大規模地下放水路：気候変動対応

＜案件について＞

１）MP改訂を技プロで実施：ムンバイ側が1.5年待てるか否かがカギ。日本の技術者の知見が反映される/グラントで実施できる等のメリットもある。（③）

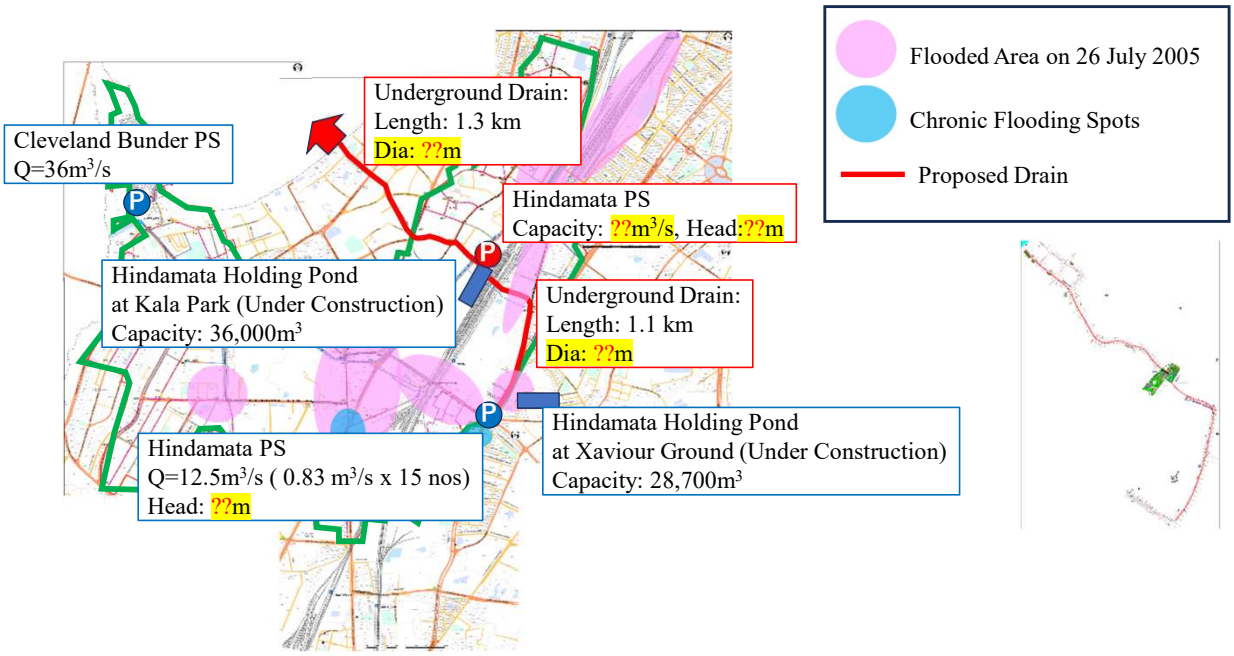
２）MP改訂を基礎調査で実施：予算枠次第だが、MP改訂を実施するのは予算的に困難？（③）

３）地下排水路を対象とした協力準備調査の中で、MP改訂：約3億円程度あれば当該流域のMP改訂＋準備調査程度は実施可能と思われる（②or③）

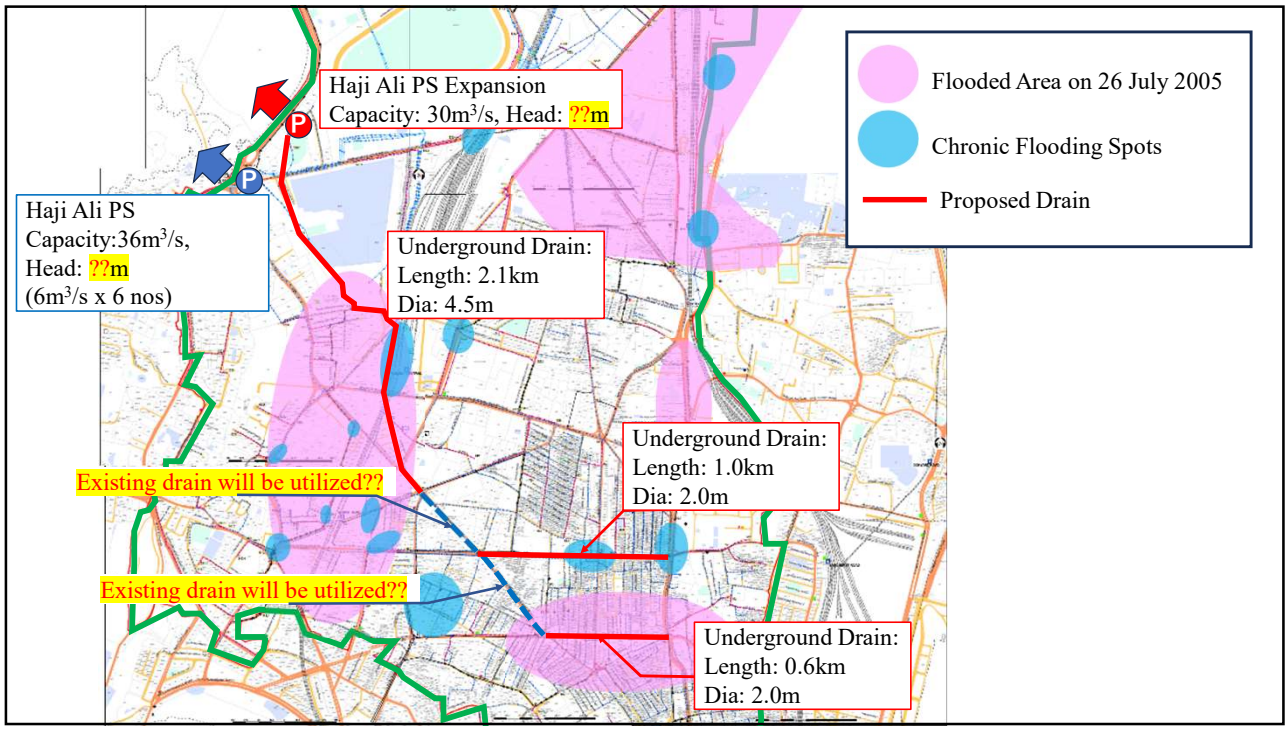
（ただし予算枠の中でどこまで何を優先してMP改訂を実施するのか、MCGM側と調整が必要）

４）MP改訂を行わず地下排水路を対象とした協力準備調査：新MPと同様の設計条件（降雨等）に現施設計画を見直すことも可（①or②）

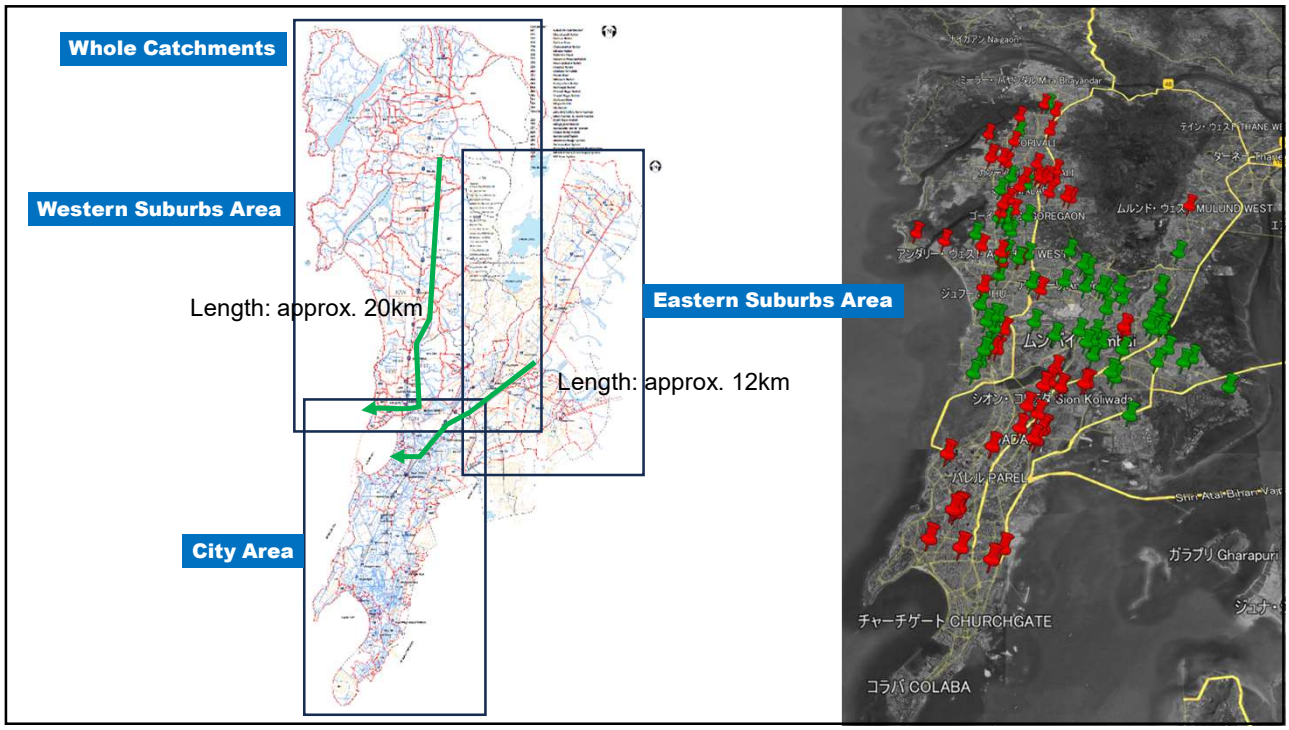
19



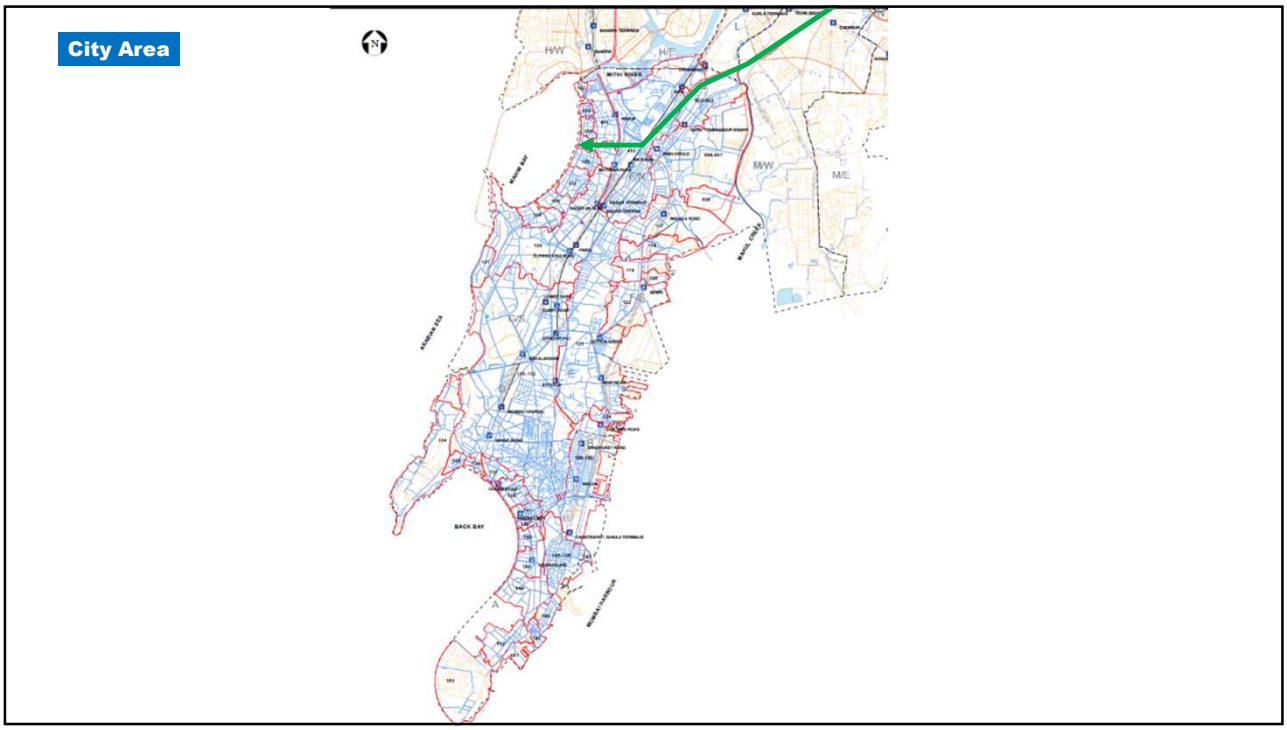
20


Haji Ali PS Expansion
Capacity: 30m³/s, Head: ??m
Haji Ali PS
Capacity:36m³/s,
Head: ??m
(6m³/s x 6 nos)
Underground Drain:
Length: 2.1km
Dia: 4.5m
Underground Drain:
Length: 1.0km
Dia: 2.0m
Underground Drain:
Length: 0.6km
Dia: 2.0m
Existing drain will be utilized??
Existing drain will be utilized??
Flooded Area on 26 July 2005
Chronic Flooding Spots
Proposed Drain

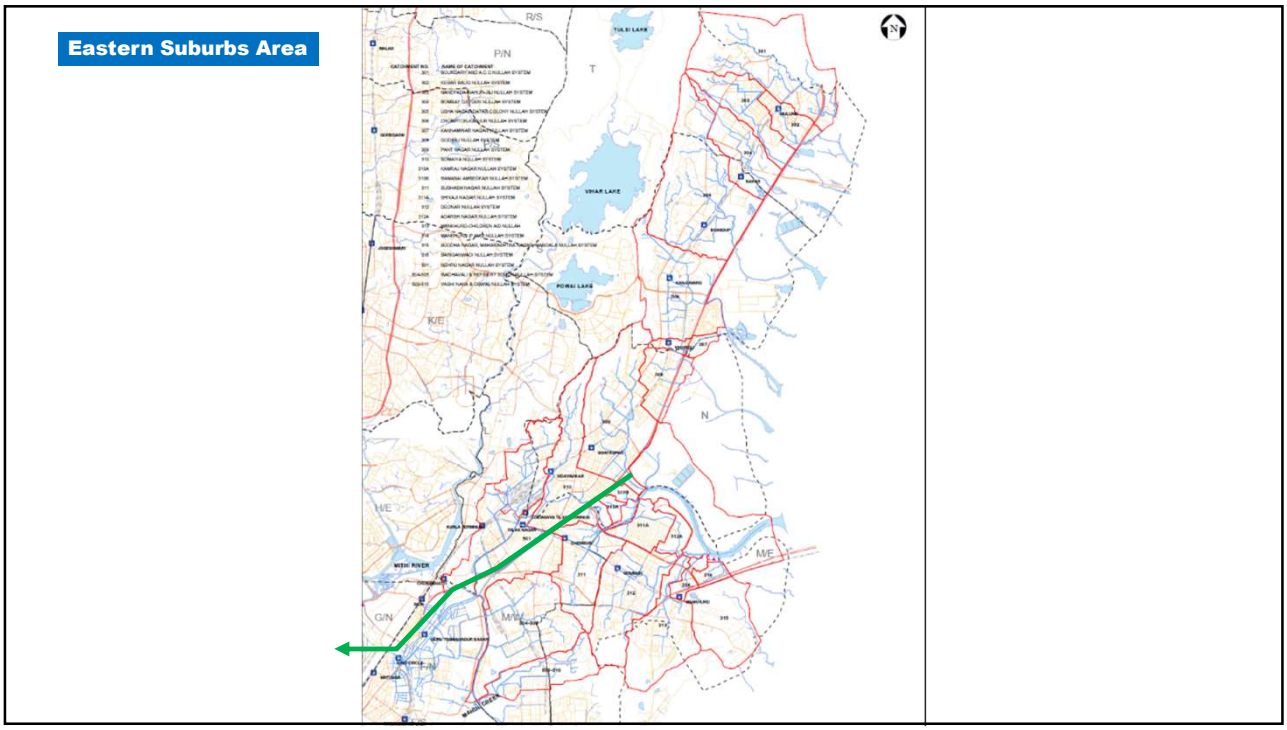
21


Whole Catchments
Western Suburbs Area
Length: approx. 20km
Eastern Suburbs Area
Length: approx. 12km
City Area
チャーチゲート CHURCHGATE
コラバ COLABA

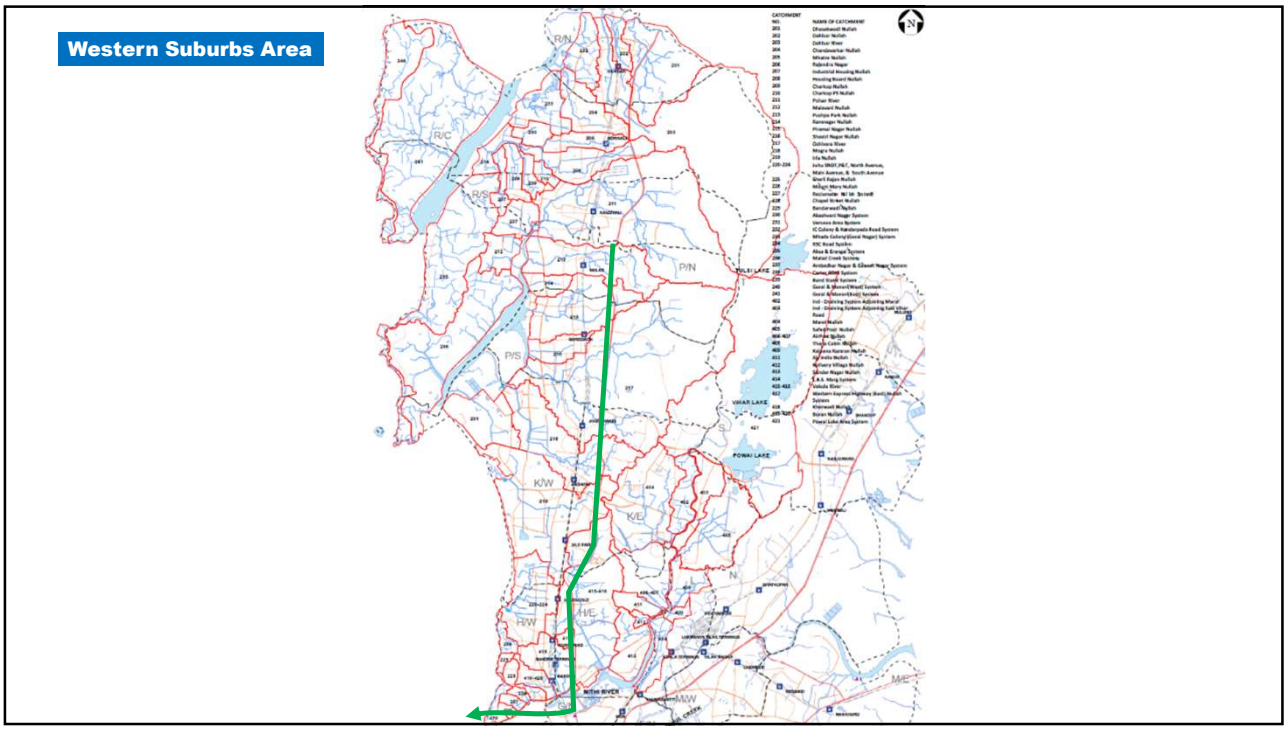
22


City Area
H/W
H/E
M/W
M/E
BACK BAY

23


Eastern Suburbs Area
R/S
P/N
T
K/E
N
H/E
M/E
G/N
M/W

24



25

Appendix-6

INFORMATION FROM SHORTLISTED CITIES

Appendix-6-1

MEETING MATERIAL FOR SHORTLISTED CITIES

UDD Maharashtra

(Explanation of MCGM and PMC's Potential Projects)

Data Collection Survey on Disaster Risk Reduction Sector in India
Agenda of UDD Meeting (June 20, 2024)

1. Japan Visit

- As requested by DEA, we would like to request UDD to nominate your participant.
- Already participants from MCGM(Mumbai) and PMC(Pune) have been nominated. Please submit their application form and passport copy to DEA. The participants are as below:

Authority	Participant	Position
MGGM	Mr. N.G.Patil	Executive Engineer
PMC	Mr. Gojare	Superintending Engineer

- When UDD send email to DEA, please consider followings:
  - To : Ms. Anisha Stella Xaxa, Under Secretary, DEA, MOF, the Government of India (Anisha.xaxa@nic.in)
  - Email Title : [Nomination] JICA technical visit from 20th to 27th July
  - Please attach OM from DEA, Application form, and Passport copies of participants

2. Request of New Project from Municipal Corporations

JICA study aiming for formulating Japan ODA project in Disaster Risk Reduction sector, especially for Stormwater Drainage (SWD) sector, is ongoing. JICA and JICA Survey Team (JST) has nominated MCGM and PMC as shortlisted cities to formulate the project. JST has had meetings with UDD, MCGM and PMC in Nov.2023, Mar.2024, and Jun.2024 and has identified their roposed projects as below:

(1) Proposed Projects for MCGM

MCGM has updated SWD Master Plan twice to tackle with flood and inundation. Design rainfall intensity for SWD facilities in MCGM has been updated from 25mm/hr ➔ 55mm/hr in the revision of SWD-MP. MCGM is planning to update SWD master plan considering the impact of climate change such as change of rainfall intensity/pattern and tidal level. In this regard, MCGM would like to request JICA following study and project:

- To update SWD Master Plan (BRIMSTOWAD-III) and select priority project
- To prepare DPR for priority project
- To implement the priority project under Japanese ODA.

(2) Proposed Projects for PMC

PMC has increased their jurisdiction: 11 villages in 2018 and 23 villages in 2021. To develop sufficient SWD and sewerage facilities, PCM would like to propose following projects:

- To improve SWD facilities for entire city according to updated SWD MP and DPR for 23 villages which will be prepared by Oct.2024 and Mar.2026, respectively.
- To develop sewerage facility for expanded 23 villages. Development in 16 villages will be implemented under AMRUT 2.0 and remaining 7 villages under JICA ODA.

JST would like to know opinion from UDD for the above potential projects, and if UDD has no objection, we would like to confirm financial arrangement for them.

DATA COLLECTION SURVEY ON DISASTER RISK REDUCTION SECTOR IN INDIA

June 2024

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)
Yachiyo Engineering Co., Ltd

Agenda of Meeting

1. Objectives of the Survey
2. Outline of the Survey
3. Implementation Schedule of the Survey
4. Longlisted/ Shortlisted Cities
5. Comprehensive Solutions for Urban flooding experienced in Japan
6. Outline of Proposed Project for Shortlisted Cities (tentative)
7. Required Information

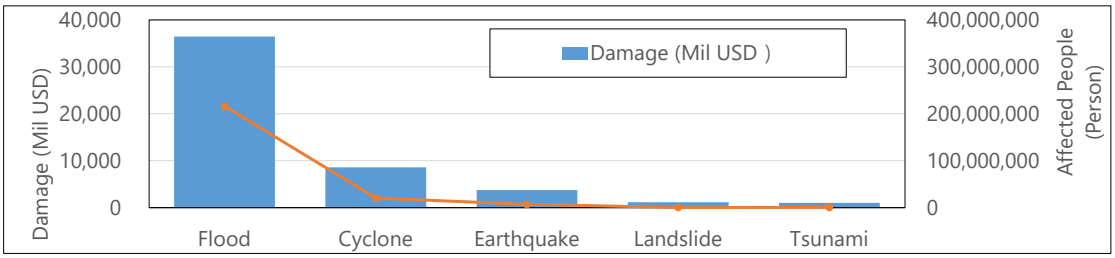
2

1. Objectives of the Survey

The objectives of this survey are:

- to collect and organize basic information on disaster risk reduction sector in India,
- to propose potential yen loan projects and technical cooperation by Japan International Cooperation Agency (JICA) to reduce or mitigate disaster risk especially for urban flood protection or management, and
- to prepare Preliminary Project Report (PPR) to promote the potential project.

If the needs of ODA and cooperation are confirmed in the sector, the JICA Survey Team will support approval procedure of the potential projects.



3

2. Outline of the Survey

Long-List of Candidate Cities for Yen Loans (10 cities)

↓

Online Interview with Longlisted Cities (10 cities)

↓

Selection of Priority Cities (6 cities)

↓

Site Survey for Priority Cities (6 cities)

↓

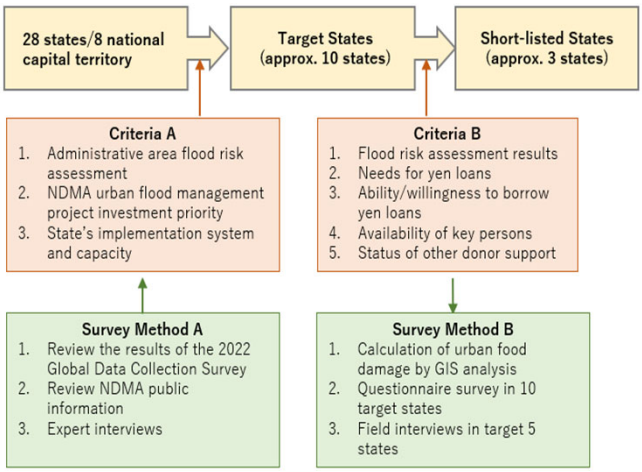
Selection of Shortlisted Cities (3 cities)

↓

Site Survey to formulate of potential project for Shortlisted Cities (tentative: 3 cities)

↓

Preparation of Preliminary Project Report of Shortlisted Cities

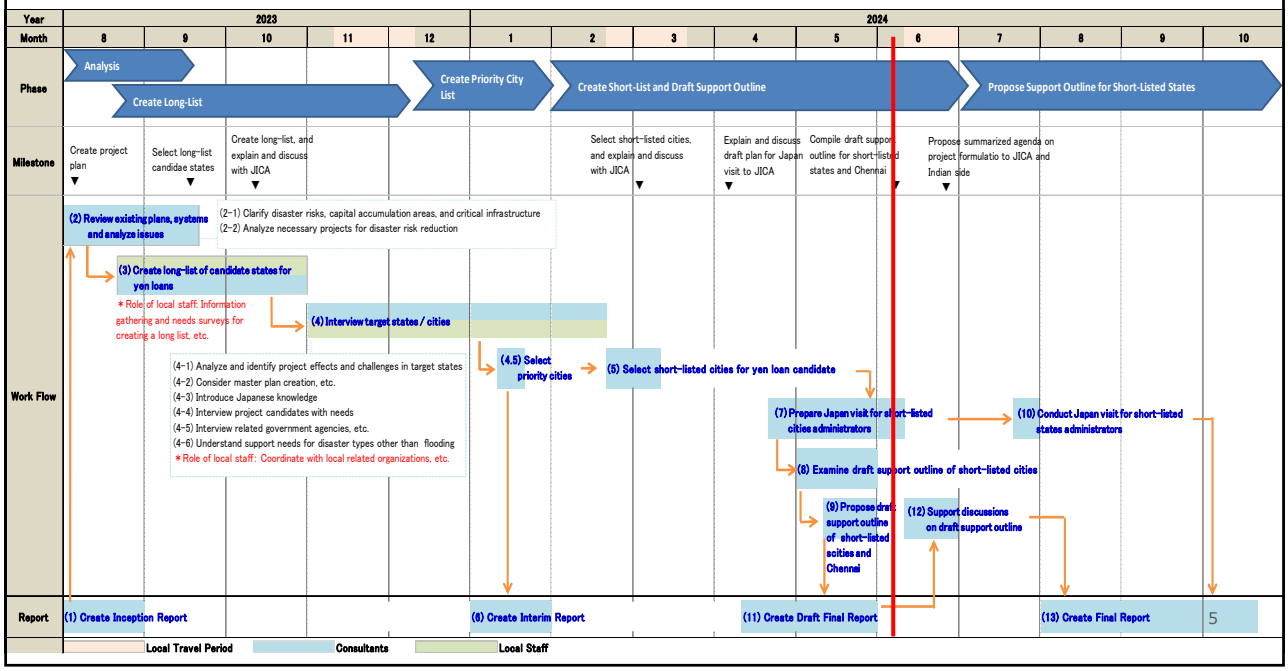


* **Target Disaster:** Urban Flood Mitigation/Management etc.

* **Type of Project:** ODA Loan Project, Sector Loan Project, Technical Assistance (Capacity Development)

4

3. Implementation Schedule of the Survey



4. Longlisted Cities/ Shortlisted Cities

Following states and 10 cities were proposed considering i) priority cities of NDMA's flood management activities, ii) asset in flooded area, iii) population of the city, and iv) vulnerability of the city.

As a result of interview and data collection, following three shortlisted cities were tentatively selected considering the request from the municipal corporations.

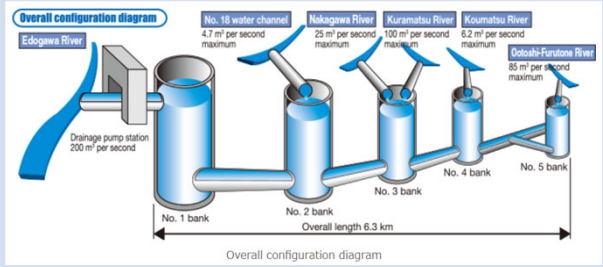
States	Longlisted Cities	Shortlisted Cities
Gujarat	Ahmedabad, Surat	Ahmedabad,
Maharashtra	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay), Pune (Poona)
Andhra Pradesh and Telangana	Hyderabad	
Bihar	Patna	
Delhi	Delhi	
Odisha	Bhubaneswar	
Assam	Guwahati	

* Cities in Red: Population in 2023 is more than 10million
Cities in Green: Population in 2023 is more than 5million

5. Comprehensive Solutions for Urban flooding experienced in Japan

JICA can propose comprehensive solutions including structural and non-structural measures.

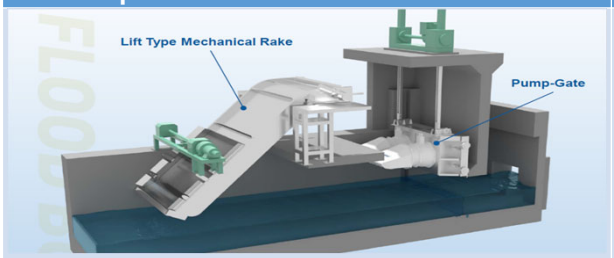
Underground discharge channel



Overall configuration diagram

Regulation Pond

Gate Pump



Plastic Storage Facility

6. Required Information (from Municipal Corporation)

Following information will be needed to prepare Preliminary Project Report (PPR) for the formulation of the project after nominated to the shortlisted cities.

Main Items	Details
Existing drainage facilities and inundation data in the City	1) Available existing major drainage facilities such as primary drain, pump, gate, storage facilities etc. in the City. 2) Operation of those drainage facilities (regular maintenance, operation rules, condition of the facilities etc.) 3) Location map and information of inundation (frequency, area, period, flood scale, etc.) 4) Damage situation due to the inundation (damage types, population affected, total financial damage etc.) 5) Current general forecast and monitoring system (method) of rainfall and flood
Hydraulic related information	1) Precipitation record in the last 10 years (total mm, mm/hour) 2) Flood records in the last 10 years 3) Function and information (Storage volume, operation situation, regular maintenance etc.) of dam site upstream of the City, if any. 4) Water level of river, canal and sea, and tide level related with inundation area 5) Tendency and effect of recent climate change (reports, literatures etc.)
Other information	1) Current and future plan of annual budget allocation to drainage sector in the Municipal Corporation 2) Land use plan or city development master plan

7. Training Overview

(1) Objective

Giving an opportunity for the participants lean about the followings and reflect them into their future Disaster Risk Reduction (DRR) countermeasures.

1) Urban drainage countermeasures

2) Japan's advanced technologies regarding the major projects of each city

(2) Target participants

Ministry, each shortlisted city and state authority (total 7 persons)

Tentative candidates: Mumbai (MCGM), Ahmedabad (AMC), Pune (PMC)

(3) Duration and Timing of training

Jul.20- Jul.27, 2024

9

7. Training Schedule (tentative)

Preliminary schedule

Day	Training Contents	Relevant Japanese Technology・Remarks	Accommodation
—	Morning: Arrival in Tokyo Evening: Briefing when arrival		Tokyo
1	Orientation Courtesy visit to JICA Courtesy visit to Ministry of Land, Infrastructure, Transport and Tourism Water Reclamation Center at Tokyo Metropolitan Government	Waterproofing of STPs, Upgrading of existing drainage against urban drainage	Tokyo
2	Metropolitan outer area underground discharge channel Ayase-gawa Drain and regulation pond	Large scale/deep depth storage pond (suburban area) Large scale underground pond	Tokyo
3	Tokyo Nogawa Osawa Regulation Pond/ Tatsumi Tide Embankment/ Flood Gate	Storm surge and tsunami countermeasures for rivers and canals	Tokyo
4	Tsurumi River - Kawawa River Retarding Basin - Multipurpose Retarding Basin Project Shibukawa underground storage tank (Kawasaki city)	Urban reservoir/diversion channel/multipurpose usage	Tokyo
5	Presentation of technologies by Japanese company		Tokyo
—	Depart from Tokyo to Delhi		

MCGM

(Draft PPR for discussion)

Preliminary Project Report

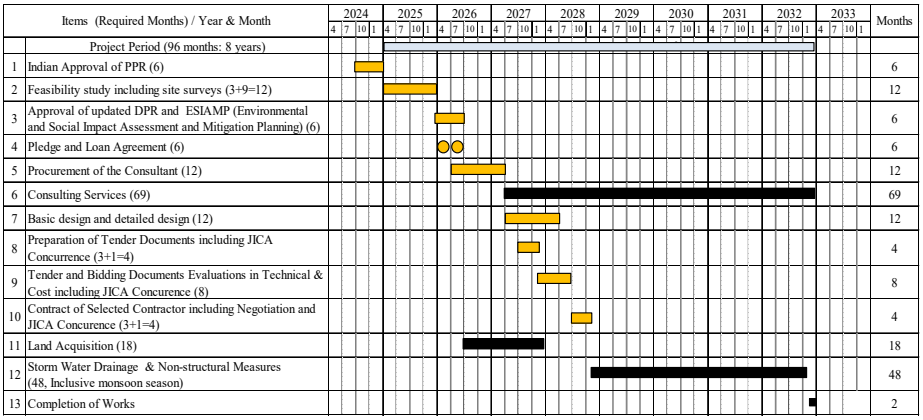
1	Name of the Project	Stormwater Drainage Project with Underground Tunnel in Mumbai
2	Sectoral area	Storm Water Drainage (Urban flood mitigation)
3	Total Financial Outlay	*TBD* *Rs ** Cr., JPY** million (exchange rate)*
4	Details of the external development agencies (and the amount sought form each)	Japan International Cooperation Agency (JICA)

5 Financial arrangement

Total external assistance	Counterpart funds being made available by				Total
International Donor	Implementing Agency	State Government	Central Government	Others, if any	
JICA	MCGM	UDD division 1 and 2, State government of Maharashtra	MoHUA	DEA	
TBD (85%)	(-)	TBD (15%)	(-)	(-)	TBD (100%)

6 Project duration (dates/months/years) Implementation Schedule

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).

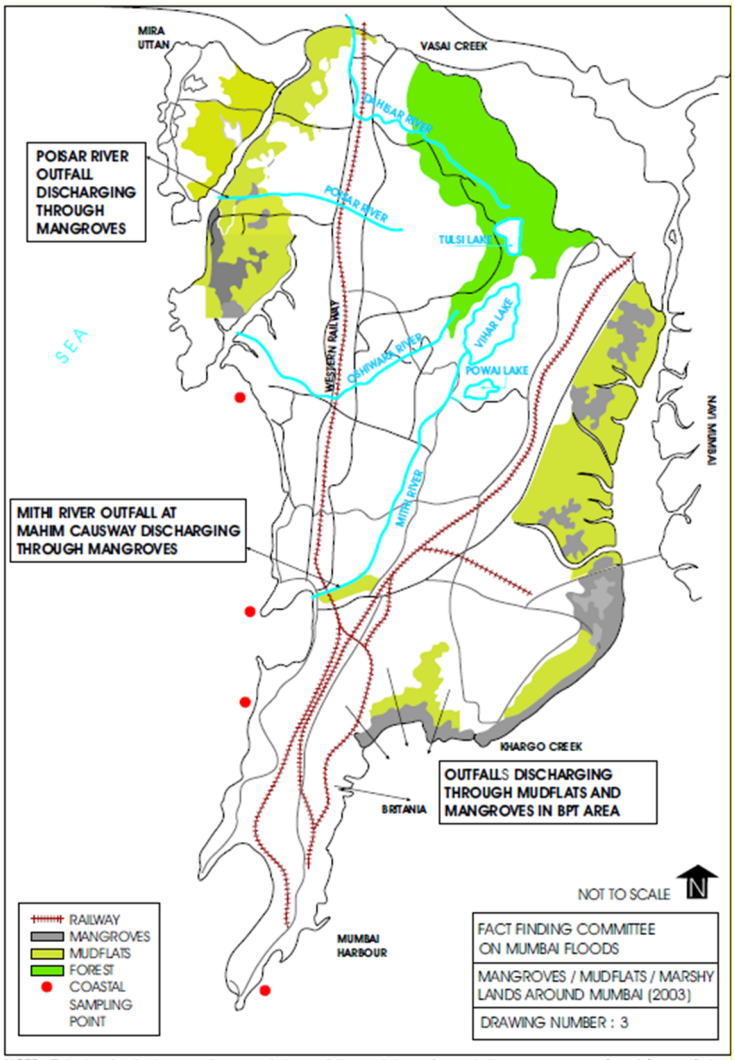


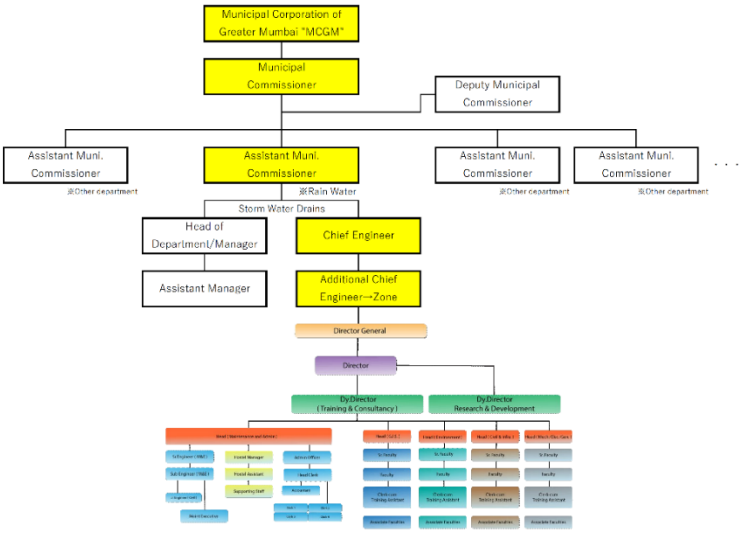
Tentative Schedule

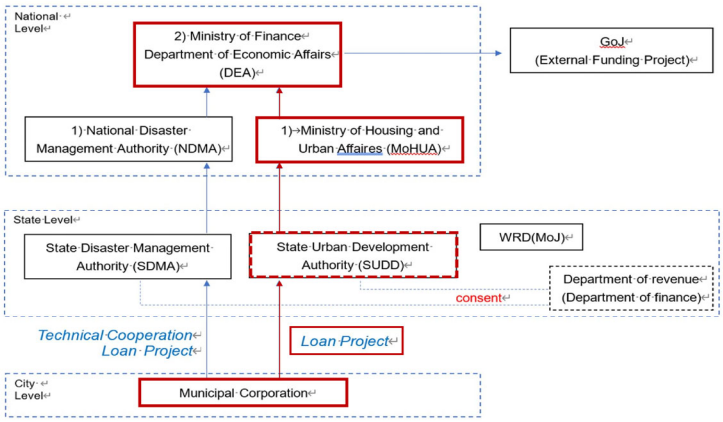
- Approval of PPR by Indian authority: 0.5 years
- Feasibility Study including site survey and update DPR: 1 year
- Approval of Update DPR and ESIAMP (Environmental and Social Impact Assessment and Mitigation Planning) after submission of DPR: 0.5 years
- Procurement of Consultant: 1 year
- Design (Basic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

7 Location of project

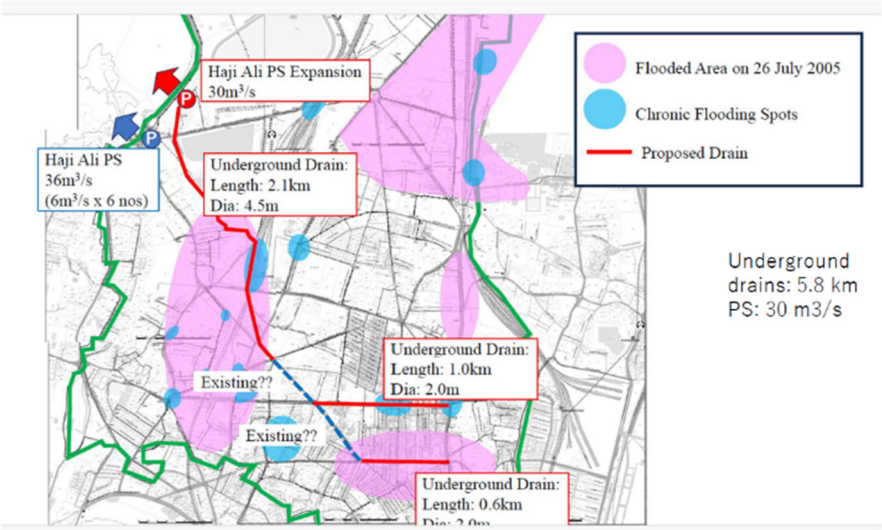
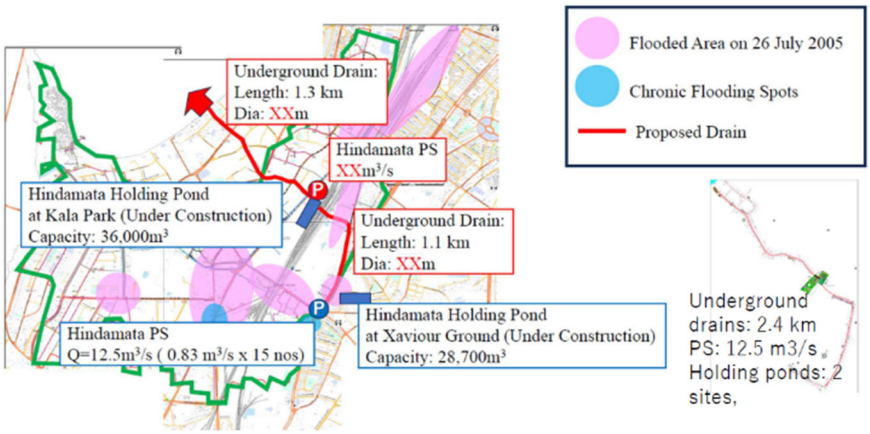
Located in the southwestern part of India, Mumbai is the state capital of Maharashtra and the financial capital of the country with the population more than 18million. Seven independent islands were reclaimed to be one peninsula and it is now become city area of Mumbai. Since most of the reclamation is to the levels little over high spring tide levels, Mumbai is the cities most vulnerable to climate change induced hazards, such as sea level rise, storm surge and urban flooding.

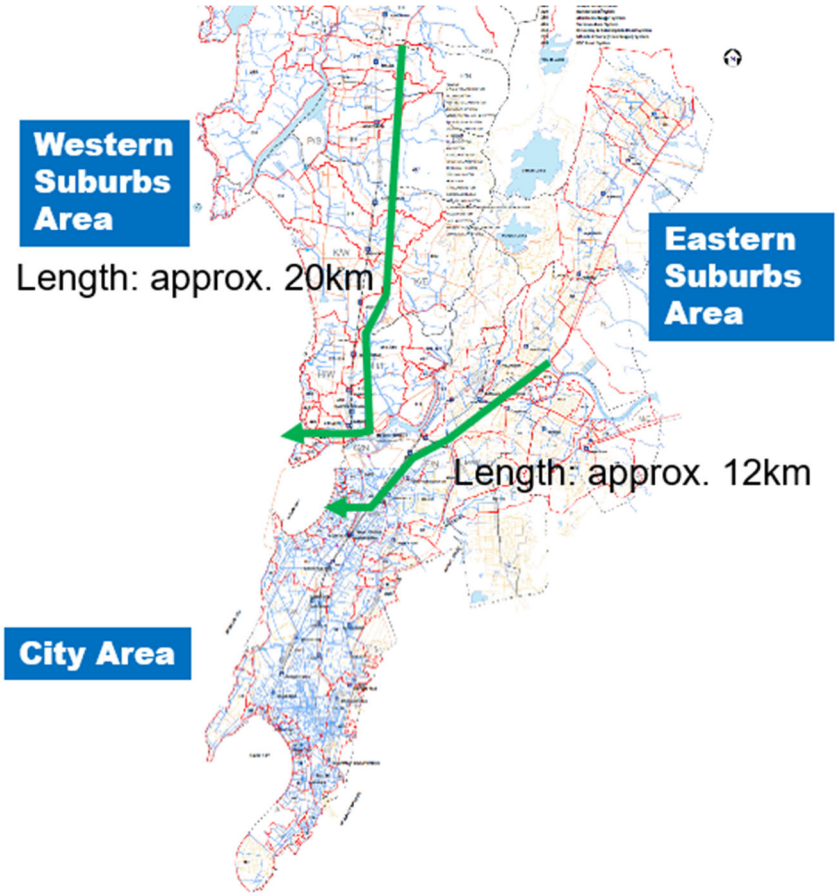
		Decadal data (2011-2020) accessed from 37 weather stations show that Mumbai experiences an average of 6 heavy, 5 very heavy and 4 extremely heavy 6 rain events per year. Between 2017 and 2020, there has been a steady increase in extremely heavy rainfall events. Spatially, most extreme rainfall events (EREs) tend to occur as localized clusters in western and central areas, such as Worli-Dadar, Kurla and Andheri. The analysis also shows that most EREs tend to last only a single day while 17% of very heavy and 21% of extremely heavy EREs last more than a day. Between 2004 and 2007, Mumbai experienced flooding annually causing heavy losses and damages (Kuruppu et al., 2018). The worst flooding in the city's history took place in July 2005 (Gupta, 2007), causing huge damages of over INR 450 crores and more than 900 deaths (TERI, 2014) (Hallegatte et al., 2010). After the serious flooding in 2005, MCGM has developed urban drainage facilities in and around Mumbai and further development considering the climate change is expected.  NOTE : This drawing being small may not show all the patches of vegetation, mangroves, forest & mudflats This is only an indicative drawing.
8	Previous phases, if any	MCGM has prepared urban drainage master plan named "BRIMSTOWAD-I (Brihan Mumbai Stormwater Drainage)" in 1993 and "BRIMSTOWAD-II" in 2007 respectively. The urban drainage facilities based on BRIMSTOWADs have been developed and urban drainage system in Mumbai is now designed for the maximum rainfall intensity of 55mm/hr. Since the risk of urban flooding is increasing due to climate change, the proposed

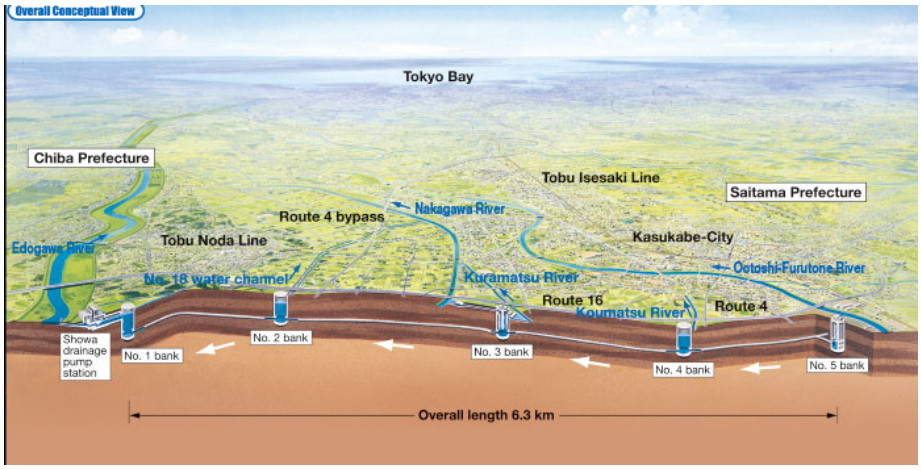
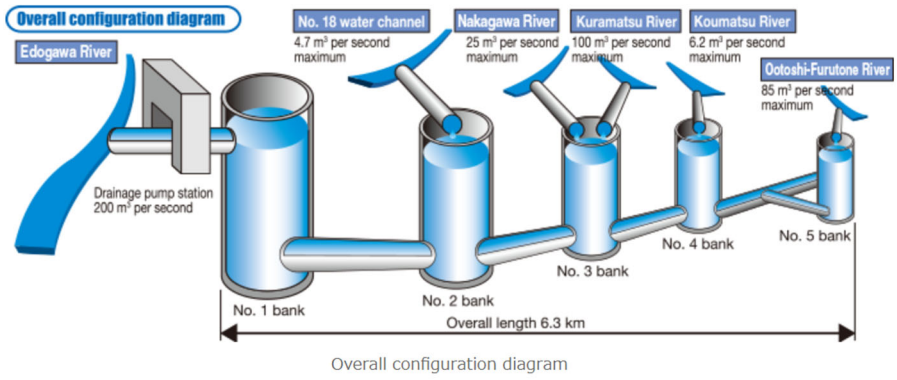
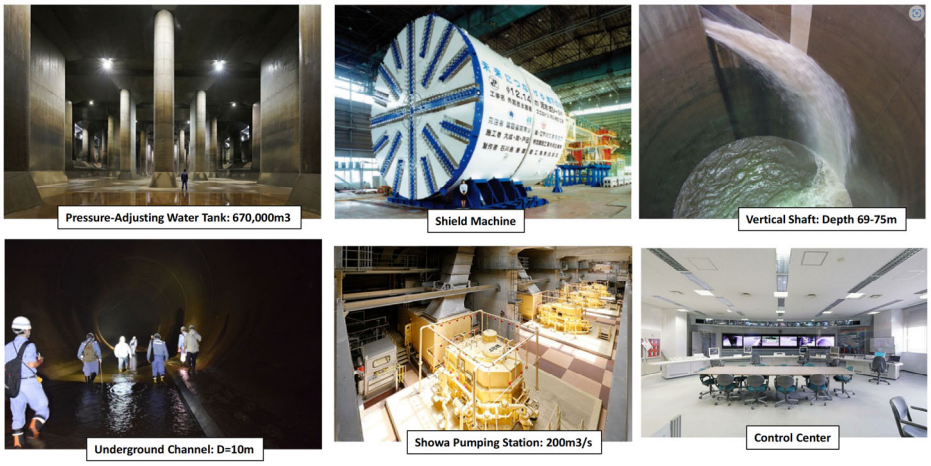
		project will be formulated considering the more higher rainfall intensity and higher sea water level caused by climate change. In this regard, the objective of potential project is to uprate existing drainage facility, but there is no previous phase of the specific project.	
9	Statutory Clearances required	The statutory Clearances are needed from the following Authorities: 1. Municipal Commission of Greater Mumbai (MCGM) 2. Mumbai Metropolitan Regional Development Authority (MMRDA) 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 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	
12	Implementing Agency	MCGM	The main Implementing Agency for this project is the Municipal corporation of Greater Mumbai (MCGM). MCGM will be involved in all phases (planning, project preparation, financing, implementation, O&M, and evaluation) of urban drainage, water supply, and sanitation project in Mumbai. The Stormwater Drainage Division of the MCGM 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 MCGM's Storm Water Drainage is shown in the figure below.  Figure Organogram of MCGM 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 Maharashtra UDD, the official request is submitted to DEA through MoHUA as below.  Figure Project Approval Procedure
	・Administrative State Government	UDD 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	Reduction of urban flooding up to the rainfall in case of climate change. The target rainfall intensity will be determined in the coming updated BRIMSTOWAD-III.
		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 of underground tunnels 3) Construction works for: *a.* Underground drains with total length of 8.2km,

			b. Pumping Stations with related facilities (2 sites with total capacity 42.5 m3/s *c.* Holding ponds (2 sites with capacity of 64,700 m3) 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 and training: a. Construction of new under drains b. Construction of Storm Water Pumping Stations c. Construction of Holding Ponds d. Training on operation and maintenance for new facilities 2) Location of Facilities Location maps for the facilities are shown in Figures below. **<u>Case-1: Underground Drain for Gol Deool</u>** Proposed Drain for Flooded Area of Gol Deool & Flooding Spots  **<u>Case-2: Underground Drain for Hindamata</u>** 

			Case-3: Underground drainage tunnel  3) Technical Information for each component Through augmentation on existing SWD system in Mumbai, design rainfall intensity in the BRIMSTOWAD -II was set at 55 mm of rainfall in an hour. Based on the recommendation, in order to reduce flooding during high tide coupled with heavy rains in the areas, under drains with storm water pumping stations were planned and designed. Similarly, holding ponds were planned either to store the storm water or gradually release through the operation at pumping stations.
		Outcome of the project	By implementing the project, following outcomes are envisaged: 1) Minimizing social 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 sea and outfalls by providing Gates 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

		Foreign Component and Technical Coop. component	**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) 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.

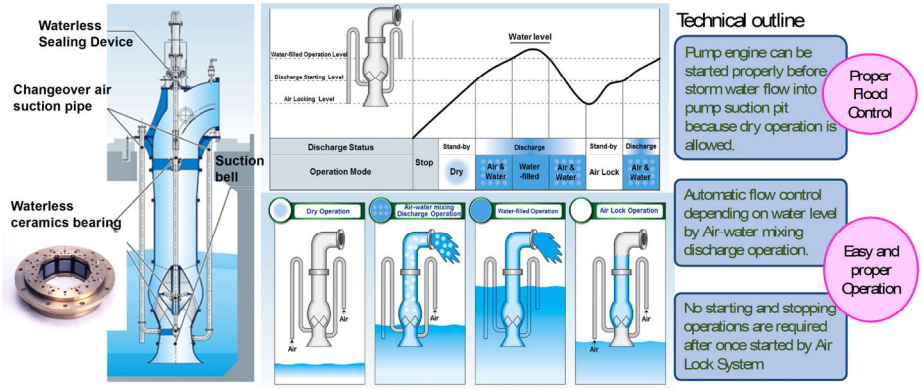


Figure Vertical mixed flow pomp not require pump suction pit

3) 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.

4) 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.

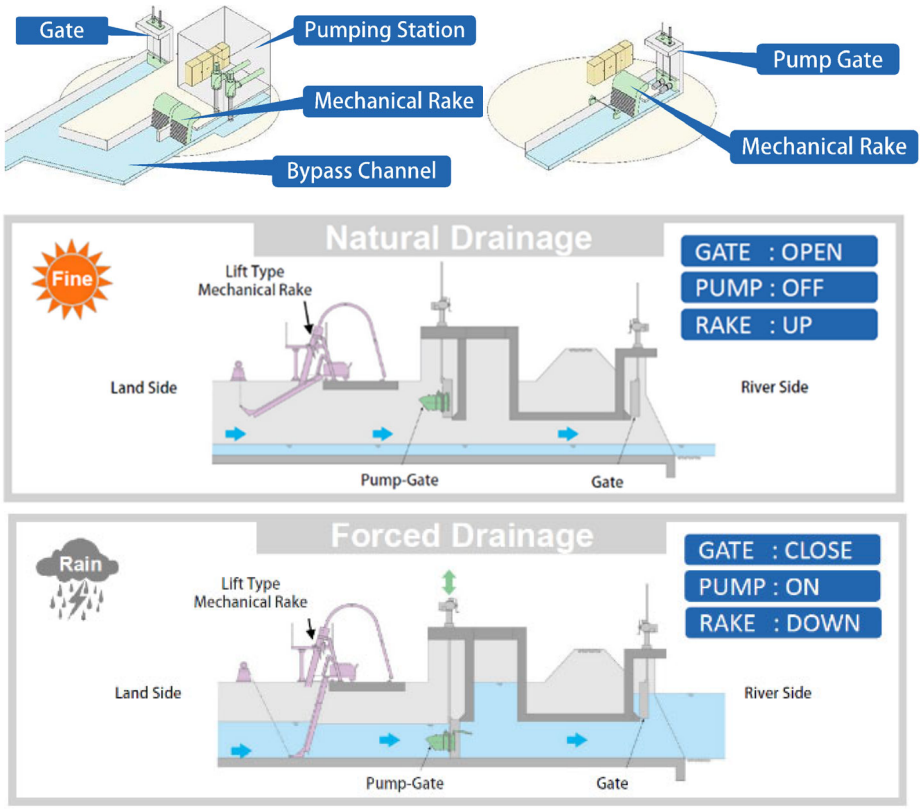


Figure Submergible Pumping system installing Pump Gate

5) 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 Comportment <u>1) Underground Tunnel Maintenance</u> Underground tunnels for Storm Water Drainage require flood inflow forecasts linked to weather forecasts and the associated systematic maintenance and management operations. In addition, although a removal machine is installed to prevent the inflow of large debris, silt and small debris will still flow into the underground tunnels. In response to the above, the following studies and investigations will be conducted to develop a maintenance and management plan for the underground tunnel. a) System construction and operation As a precondition for the construction of the system, the operational records of each pumping station and data on flooding damage in the catchment area are to be collected and organized. The system will be linked to DRR's Mumbai Control Operation Center, and will include weather forecasts and CCTV of flooding damage in the catchment area. Set critical water levels for drainage and the start of drainage operations. Design a system in which the pumping station and the control operation center are linked to the above water levels. b) Desilting of underground tunnels Investigate the volume of desilting after flooding, and organize the relationship with rainfall. The desilting plan (maintenance and management) for underground tunnels will be developed. Select the method and equipment for desilting. <u>2) Improve early warning system</u> 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.) <u>3) Public awareness campaign to prevent dumping of solid waste into existing wastewater systems (improved solid waste management)</u> 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 the City of Mumbai

Mumbai City is located on the west coast of India. It is the capital of Maharashtra and a city in the Mumbai Municipality District. The city has long flourished as a port city and is a financial and commercial center, with the central bank, the National Stock Exchange (NSE), the Securities and Exchange Commission, the head offices of various banks, and the chambers of commerce of various countries located in the city.

2. Population and population growth rate of Mumbai City

According to the 2011 Census, Mumbai had a population of 12,479,608. The population density was estimated at approximately 20,482 persons per square kilometer. This translates to 4.5 square meters of living space per citizen.
Including the surrounding cities, the population of the Mumbai metropolitan area in Maharashtra is 20,748,395, making it the second most populous metropolitan area in India after Delhi.
Mumbai's population was 3.09 million in 1950 and is projected to grow to 19.32 million in 2015, reaching 27.34 million by 2035.
The rate of man-made growth is 2.86% from 1950-2015 and is projected to increase by 1.75% from 2015-2035.

3. Mumbai's projected future population growth

Future population growth in Mumbai is projected as follows;

- The city is not expected to experience a significant rapid population growth rate in densely populated areas.
- The population growth rate is expected to be around 1.75%, as indicated by world population statistics.
- The population of the MCGM area is saturated, so the population growth rate is expected to be higher in the MMRDA area, which is a expansion urban area.
- The population growth in the Arabian Gulf Direct Discharge Area is expected to be moderate and is not expected to increase significantly, while the Upper Mithi River catchment area is expected to experience an increase in wastewater discharge due to population growth and will continue to need to improve the urban drainage capacity of the lowest catchment area.

4. Mumbai's projected future population and population density

The following table shows the projected future population and population density of the city of Mumbai, based on the World Population Statistics Sourcebook.

Table Population trends and future projections in Mumbai: 1950-2035

City	Country	Population (1,000)						Annual average population growth rate (%)	
		1950	2011	2015	2025	2030	2035	1950-2015	2015-35
Mumbai (Bombay)	India	3,089	12,480	19,316	22,975	25,057	27,343	2.86	1.75
population density(person/km2)		5,119	20,683	32,012	38,076	41,527	45,315		
City Area(km2)	603.4								

5. Population in Project Area

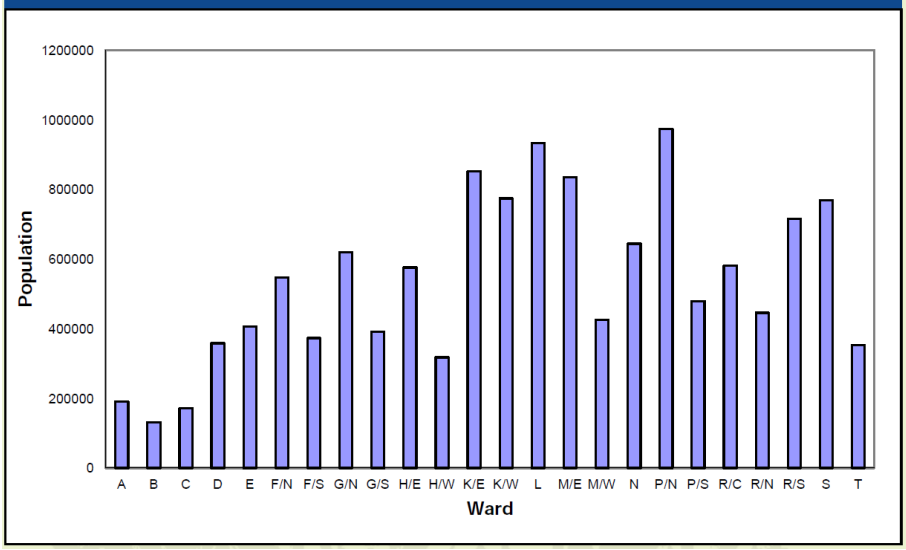
As per the mid-year election list of population in the year 2020, the wardwise area and population given by development planning and health shown as the bellow table;

Table No 4.2: Wardwise Area and Population

Administrative Ward	Area in Sq.km.	Population	Administrative Ward	Area in Sq.km.	Population
A	11.20	191450	L	15.62	933611
B	2.65	131718	M/E	38.19	835819
C	1.91	171941	M/W	17.62	426222
D	8.30	358933	N	29.68	644521
E	7.27	406967	P/N	46.70	974114
F/N	12.85	547438	P/S	25.19	479631
F/S	9.87	373529	R/C	47.95	581718
G/N	8.31	619878	R/N	14.17	446374
G/S	9.74	390890	R/S	18.31	715275
H/E	12.40	576624	S	32.55	769657
H/W	18.65	318281	T	44.91	353343
K/E	24.00	852546			
K/W	25.18	774733	TOTAL	483.22	12875213

Source: Development- Planning and Health Depts of MCGM

Graph 4.2.: WARDWISE POPULATION (Approx)



15	Details Action Plan (Year wise)	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 2034: Works implementation Public consultations for dissemination of the project among the stakeholders shall be held at appropriate timings during the preparation of DPR

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) target indicators	Following indicators are tentatively proposed for the project. The indicators shall be determined based on availability of the observing stations along the channel/river and available data. Operational indicator for the project target shall be follows; - Annual maximum discharge (m3/s) Outcome indicator for the project target shall be follows: - Inundation area due to levee breach or overflow (km2) targeted flood/ rainfall intensity Number of flooded houses due to levee breach or overflow (households) targeted flood/ rainfall intensity

17	Environmental sustainability of the project	Negative environmental and social impact are 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.
18	Land acquisition/Resettlement and Rehabilitation involved	The following land acquisitions are planned for this project. 1) Haji Ali New Pumping Station ・Water collection well (vertical shaft) ・New Pumping Station planned location 2) Hindamata Holoding Tunk and Pumping Station ・Holding Tunk planned location ・Water collection well (vertical shaft) ・New Pumping Station planned location 3) Underground drainage tunnel ・Water collection well (vertical shaft) ・New Pumping Station planned location
19	Linkages with Similar Projects	
(i)	Information regarding projects in similar undertaken previously (add evaluation reports, if any)	BRIMSTOWAD project is proposed to be implemented in two phases. There are 20 works in Phase-I and 38 works in Phase-II. The scope of the BRIMSTOWAD project is as under. 1. Rehabilitation and augmentation of underground drains in city. 2. Construction of new drains in RCC. 3. Training of nallhas in RCC M-40. 4. Widening and deepening of nallhas. 5. Construction of access road along the nallha. 6. Construction of Strom Water Pumping Stations.

Table No.12.1: Present status of the BRIMSTOWAD Projection

Details	Phase I				Phase II			
	City	W.S.	E.S.	Total	City	W.S.	E.S.	Total
Name of the Works	5	7	8	20	16	10	12	38
No. of completed works	5	6	7	18	14	4	6	24
No. of the works in progress	0	1	1	2	1	5	5	11
Tenders yet to be invited/ Tenders invited	0	0	0	0	1	1	1	3

Source: Storm Water Drain Dept of MCGM

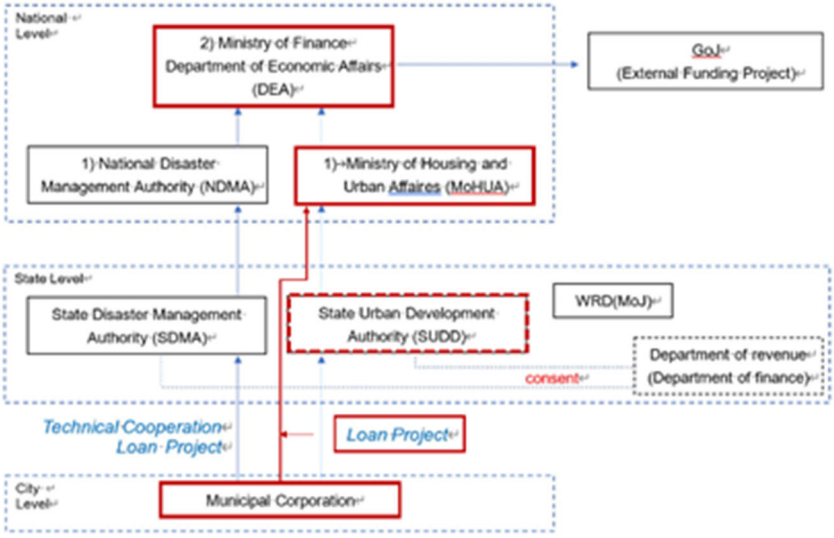
Table No.12.2: Status of Strom Water Pumping Stations under BRIMSTOWAD

Sr. No.	Pumping Station	Status
1	Haji Ali	Completed and commissioned in the month of May 2011
2	Irla	Completed and commissioned in the month of May 2011
3	Cleaveland	Completed and commissioned in May 2015
4	Lovegrove	Completed and commissioned in May 2015
5	Britannia	Completed and commissioned in the month of June 2016
6	Gazdarbund	Completed and commissioned in the month of June 2019
7	Mogra	NOC from Collector (MSD) for construction of Strom Water Pumping Station is pending.
8	Mahul	Land acquisition is in progress.

Source: Storm Water Drain Dept of MCGM

Source:_BMC Environment STATUS REPORT2021-2021

Underground tunnel-style Storm Water Drainage construction using the pipe jacking method or shield tunneling method is being implemented in various projects within MCGM.

		In addition, various large drainage pumping stations such as Haji Ali Pumping Station are being constructed under BRIMSTOWAD II. However, these facilities use conventional technology and do not use the latest technology in pumps, gates, etc.
(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 project implemented by MCGM. 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.
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 MCGM 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 10-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.

PMC

(Discussion to fix the scope of potential projects)

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
Meeting with PMC to determine the scope of JICA Project

1. Current Situation

The status of development of stormwater drainage (SWD) and sewerage are as below:

		City Center		11 Villages (merged in 2018)	23 villages (merged in 2021)	
SWD						
	DP	-		In process	Will be approved soon	
	Plan	MP in 2007	DPR of NDMA project for priority area	DPR in 2020	DPR under preparation (by Oct.2024)	
		RP: 2years (based on previous Guideline)	*RP: 5years (based on latest Guideline)*	*RP: 2years (based on previous Guideline)*	*RP: 5years (based on latest Guideline)*	
		MP will be update in NDMA project with budget Rp 4.6Cr. (by Mar.2026)			-	
	Project	- 4 basins under JNNURM scheme	NDMA project for priority area (to be executed)	-	-	
	Estimated Cost	2800 Cr.		1200 Cr	1500Cr	
		Total 5500 Cr. (4675(85%)+825(15%))				
Sewerage						
	Plan	DPR for JICA project		DPR for Sewerage development	MP for 23 villages	
	Project	JICA ODA project is ongoing		Project under state budget is ongoing	Phase I: 16 villages	Phase II: 7 villages
					under AMRUT 2.0	-
	Cost	-		-	533.85Cr.	900Cr.

2. Proposed Project (1st priority: SWD)

1) Implementation of SWD development for entire city

- The consultant will update SWD MP under NDMA budget (Rp 4.6Cr.), then the SWD will be developed under JICA ODA.

Area	Cost in 2025
City Center	2800 Cr.
11 villages	1200 Cr.
23 villages	1500 Cr.
Total	5500 Cr.

2) Implementation of SWD development for 23 villages

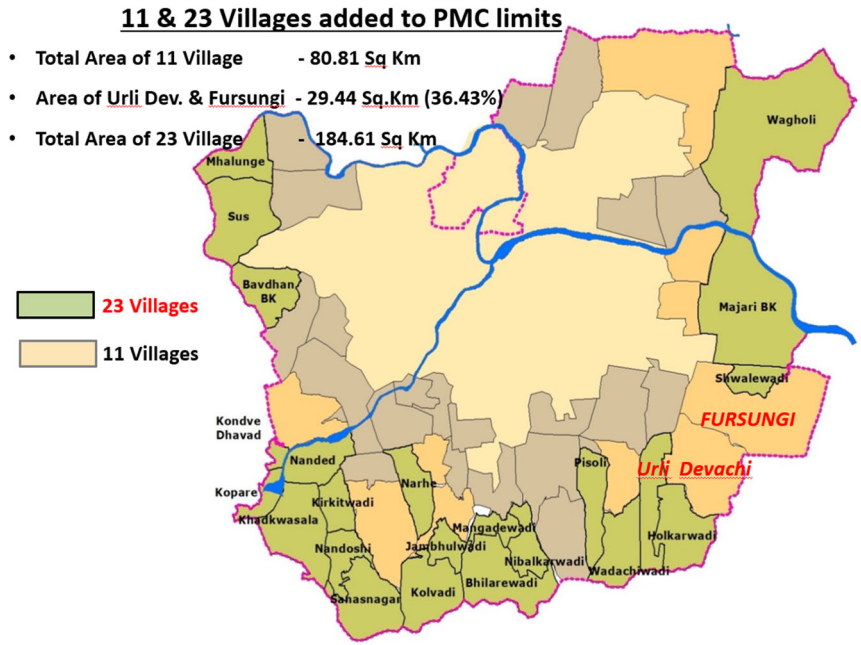
- The consultant is preparing DPR for 23 villages, then the SWD will be developed under JICA ODA.

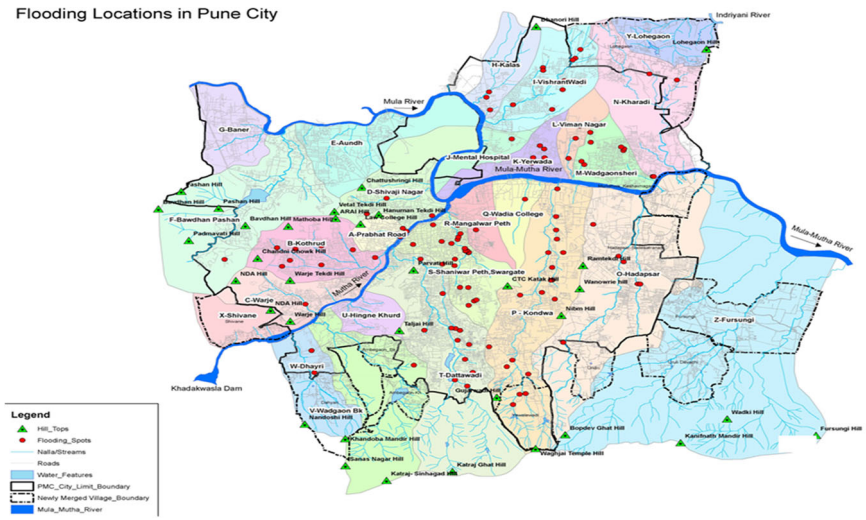
Area	Cost in 2025
23 villages	1500 Cr.

3) Preparation of SWD MP for entire city and implementation of priority project

- Considering the limitation of budget, the update of MP in NDMA project will target for 11 villages and entire MP will be implemented under JICA TC.
- Selected priority project will be executed under JICA ODA

Area	Cost in 2025
To be proposed in MP	To be proposed in MP





3. Result of Discussion with PMC (June.12,2024)

Discussion held with AMC of Pune Municipal Commission for opting the most feasible option under phase I, II, & III.

- SWD Master Plan will be prepared in NDMA budget. If the budget is not enough, PMC will allocate the budged to accelerate SWD improvement in PMC.
- For PMC, the budget and schedule are both important. The SWD improvement is urgently required in Pune City.
- Development of SWD shall be implemented in phased manner. The area with latest MP/DPR based on latest CPHEEO manual shall be prioritized.

The summary of the same is as follows:

Proposed Phase I Under JICA Funding	Proposed Phase II Under JICA Funding	Proposed Phase III Under JICA Funding
• Strom Water Drainage scheme for 23 villages. Cost approx. INR 1500 Cr	• Implementation of SWD works in the City Center. • The updated Master Plan/ DPR with new CPHEEO design guidelines and with reasonable price escalation is expected to be available by March 2026. • The implementation works for improvement of SWD may be taken up in phase II, with approx. estimated cost of Rs. 2800 Cr	• Implementation of SWD works in the 11 villages. • The updated Master Plan/ DPR with new CPHEEO design guidelines and with reasonable price escalation is expected to be available by March 2026. • The implementation works for improvement of SWD may be taken up in phase III, with approx. estimated cost of Rs. 1200 Cr
• Balance 7 out of 23 villages for sewerage scheme. Cost approx. INR 900 Cr		
• Total cost proposed for the services (Strom Water Drainage and Sewerage) for 23 towns under phase I is approx. INR 2400 Cr		

GHMC

(Discussion to fix the scope of potential projects)

DATA COLLECTION SURVEY ON DISASTER RISK REDUCTION SECTOR IN INDIA

September 2024

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd (NK)

Yachiyo Engineering Co., Ltd

1

Agenda of Meeting

1. Introduction of JICA Survey Team
2. Objectives of the Survey
3. Outline of the Survey
4. Implementation Schedule of the Survey
5. Longlisted/ Shortlisted Cities
6. Proposal and related information
7. Japan Visit (For Reference)

2

2

1. Introduction of JICA Survey Team

Position	Name	Company
Team Leader/ Formulation of disaster risk reduction	Takamasa NISHIKAWA	Nippon Koei (NK)
Deputy Team Leader/ Disaster risk assessment	Shoichiro MISAKI	Nippon Koei (NK)
Measures against flooding	Toru TAKAHASHI	Yachiyo Engineering (YEC)
Organization and legal structure/ Formulation of flood management project	Yuichi YAMAGUCHI	Nippon Koei (NK)
Economic/ investment impact analysis	Uyu TANAKA	Yachiyo Engineering (YEC)
Urban flood technology	Hitoshi KANEKO	Nippon Koei (NK)
Supporting Staff	Mayank Agrawal Rishabh Chaudhary Anil Kumar	Nippon Koei India (NKI)
	Kaori TANIMOTO	Nippon Koei (NK)

3

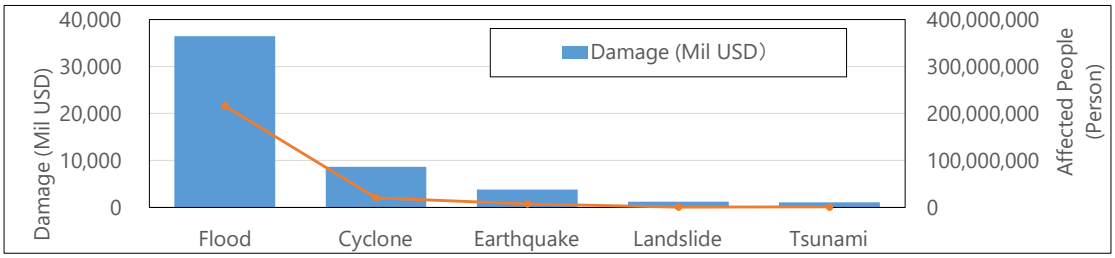
3

2. Objectives of the Survey

The objectives of this survey are:

- to collect and organize basic information on disaster risk reduction sector in India,
- to propose potential yen loan projects and technical cooperation by Japan International Cooperation Agency (JICA) to reduce or mitigate disaster risk especially for urban flood protection or management, and
- to prepare Preliminary Project Report (PPR) to promote the potential project.

If the needs of ODA and cooperation are confirmed in the sector, the JICA Survey Team will support approval procedure of the potential projects.



4

4

3. Outline of the Survey

Long-List of Candidate Cities for Yen Loans (10 cities)

▼

Online Interview with Longlisted Cities (10 cities)

▼

Selection of Priority Cities (6 cities)

▼

Site Survey for Priority Cities (6 cities)

▼

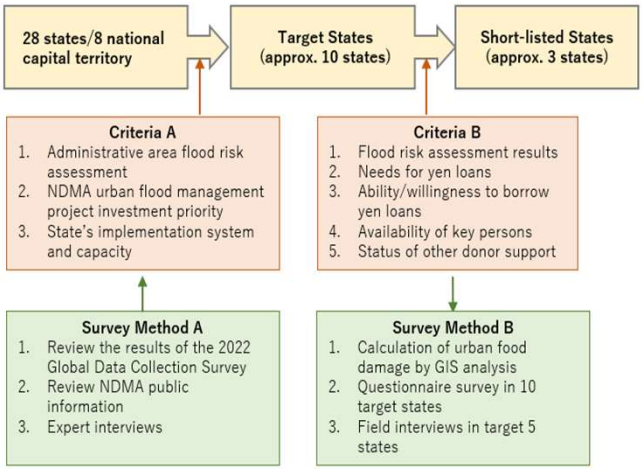
Selection of Shortlisted Cities (3 cities)

▼

Site Survey to formulate of potential project for Shortlisted Cities (tentative: 3 cities)

▼

Preparation of Preliminary Project Report of Shortlisted Cities



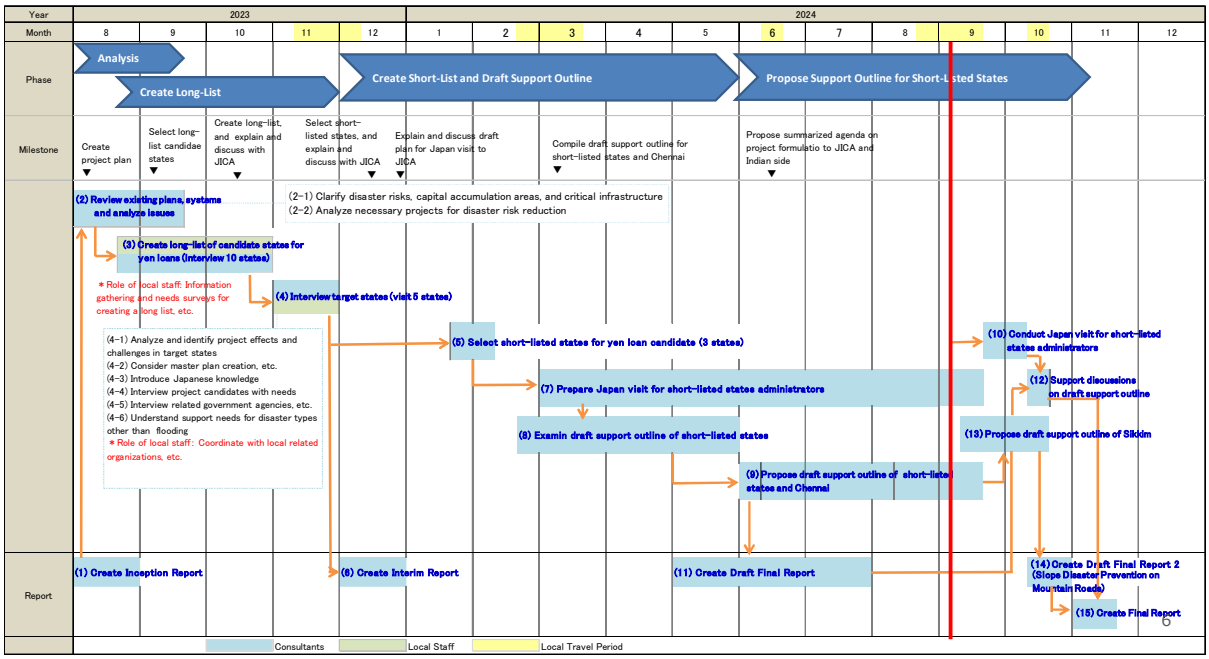
* **Target Disaster:** Urban Flood Mitigation/Management etc.

* **Type of Project:** ODA Loan Project, Sector Loan Project, Technical Assistance (Capacity Development)

5

5

4. Implementation Schedule of the Survey



6

6

5. Longlisted Cities/ Priority Cities/ Shortlisted Cities

Following states and 10 cities were proposed considering i) priority cities of NDMA's flood management activities, ii) asset in flooded area, iii) population of the city, and iv) vulnerability of the city.

As a result of interview and data collection, following three shortlisted cities were tentatively selected considering the request from the municipal corporations.

States	Longlisted Cities	Priority Cities	Shortlisted Cities
Gujarat	Ahmedabad, Surat	Ahmedabad, Surat	Ahmedabad
Maharashtra	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay), Pune (Poona)
Andhra Pradesh and Telangana	Hyderabad	Hyderabad	Hyderabad (tentative) (requested in June:)
Bihar	Patna		
Delhi	Delhi		
Odisha	Bhubaneswar		
Assam	Guwahati	Guwahati	

* Cities in Red: Population in 2023 is more than 10million
Cities in Green: Population in 2023 is more than 5million

7

7

6-1. Proposal and related information_Summary

■ **Scope of JICA Project (tentatively proposed in the draft PPR)**

	Hyderabad
Preparation of SWD Master Plan	✓*
Preparation of JICA FS and DPR for priority project	✓
Tender (Selection of Consultant by executing agency)	(✓)
Preparation of BD and Tender documents	✓
Tender (Selection of Contractor)	✓
Implementation of priority project (Construction and CS)	✓
Technical cooperation for capacity development	✓

Note ✓: Proposal for the scope of JICA project
* Necessity of updated SWD MP shall be discussed with GHMC.
(instead of Strategic Nala Development Programme (SNDP)).

8

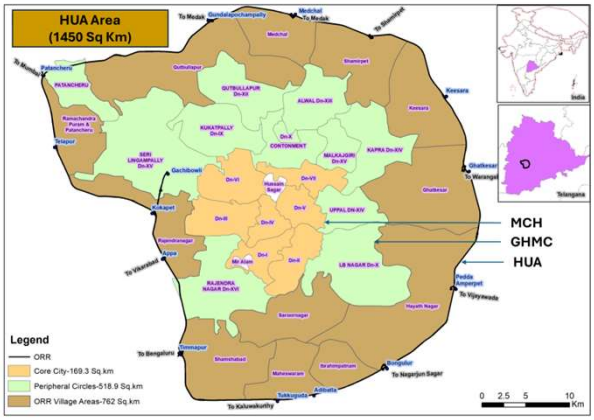
6-2. Hyderabad Urban Drainage Project

Background of Request

- JST visited Hyderabad in Dec 2023 and had Meetings with Greater Hyderabad Municipal Corporation (GHMC) Officials.
- GHMC Officials informed that after recent floods (Oct. 2020) , **State Government launched Strategic Nala Development Programme (SNDP)** with an Exclusive wing to Plan, develop and maintain comprehensive Storm water Drainage system in Hyderabad Urban Agglomeration (HUA).
- Accordingly SNDP has Identified and Prioritized Proposal for SWD Development in Two Phases
  - Phase I (58 No. of Works consisting of 69.49 Km with NR 985.45 Crores (Under Implementation)
  - Phase II (415 No. of Works consisting of 451.232 Km with **INR 5135.15 Crores** for which Govt has accorded administrative Sanction. (Yet to be Implemented)
- There is Change of Govt in the State during Dec.-2023, the Present Govt is keen to avail JICA's Financial and Technical Assistance.
- Further GHMC has shared the copy of SNDP DPR and other Available Data with JST in June-24 and expressed that they are looking forward for JICA's technical, financial support and collaboration in SNDP of Hyderabad Urban Agglomeration to mitigate Risk of Urban Flooding in Hyderabad.

9

6-3. Hyderabad Urban Drainage Project



- Hyderabad is Subjected to Major Floods in the Year 1908, 1954,1962,1970, **2000**, 2008, **2020**.
- Development of Storm water drainage System in not taken up in line with the City Development and change in Land use leading Urban Drainage Problems.
- Rainfall pattern and intensity has been changed in Hyderabad in recent years.
- Several Studies were done in the Past whereas Implementation is done based on the Critical requirement and based on availability of funds .
- In Nov-2020 **Strategic Nala Development Programme (SNDP)** to Plan, develop and maintain comprehensive SWD system in HUA (Prepared Proposal under Phase-I and Phase –II)

Year	1933-2007	2007-2020	2020 to Present
	Hyderabad Municipal Corporation (MCH)	**Greater Hyderabad Municipal Corporation (GHMC)**	**Hyderabad Urban Agglomeration (HUA)**
Area (Sq.Km)	169.3	518.9 (=688.2-169.3)	762.8(=1450-688.2)
Drainage Studies	Kirlosker Committee Study (Unit hydrograph)	Storm Water Drainage Master Plan (Voyants Solutions Pvt Ltd: 1/5Y)	DPR Under SNDP (Phase-I and Phase -II) (1/5Y based on CPHEEO)
Report	2002	2012	2022
Proposal Executed	Channelization of Major Nalas Taken up	Not fully implemented (5-10% only) No DPR, lack of fund, land issue	64 No. of works with INR 1095 Crores (Phase I loan) . **Phase II Proposal are Yet to be Taken Up**

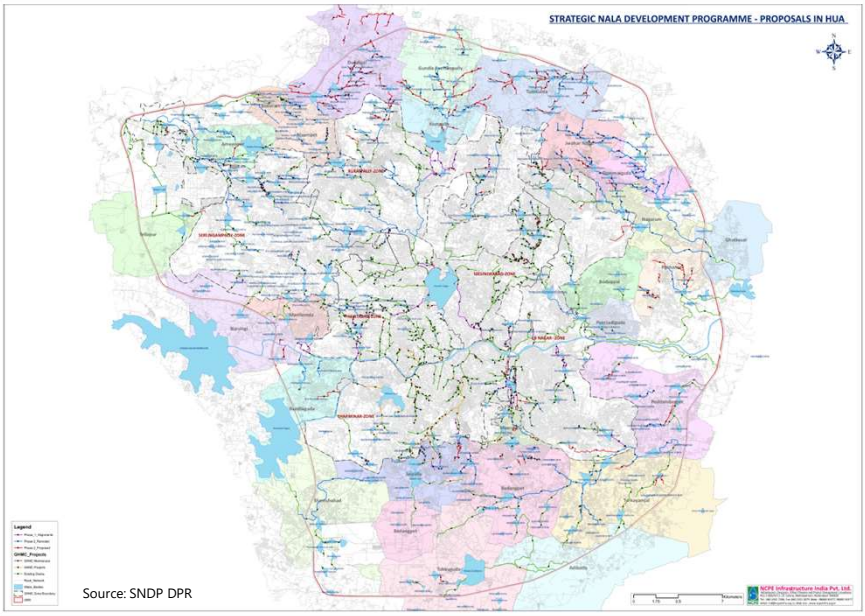
10

6-4. Hyderabad Urban Drainage Project

Priority Projects under SNDP (Phase –II) in Hyderabad and its Abstract Cost

S. No	Project Area (GHMC / ULB)	No. of Works	Length in 'Km'	Cost in Rs. Crores
A	GREATER HYDERABAD MUNICIPAL CORPORATION			
1	L B Nagar	23	38.021	460.53
2	Charminar	33	26.350	305.70
3	Khairatabad	11	14.651	148.37
4	Serilingampally	30	38.760	434.43
5	Kukatpally	31	47.269	663.51
6	Secunderabad	20	10.780	128.68
	Total (A)	148	175.831	2141.22
B	ULBs (Excluding GHMC within ORR)			
	(Details annexed)			
	Total (B)	267	275.401	2993.93
	Grand Total (A + B)	415	451.232	5135.15

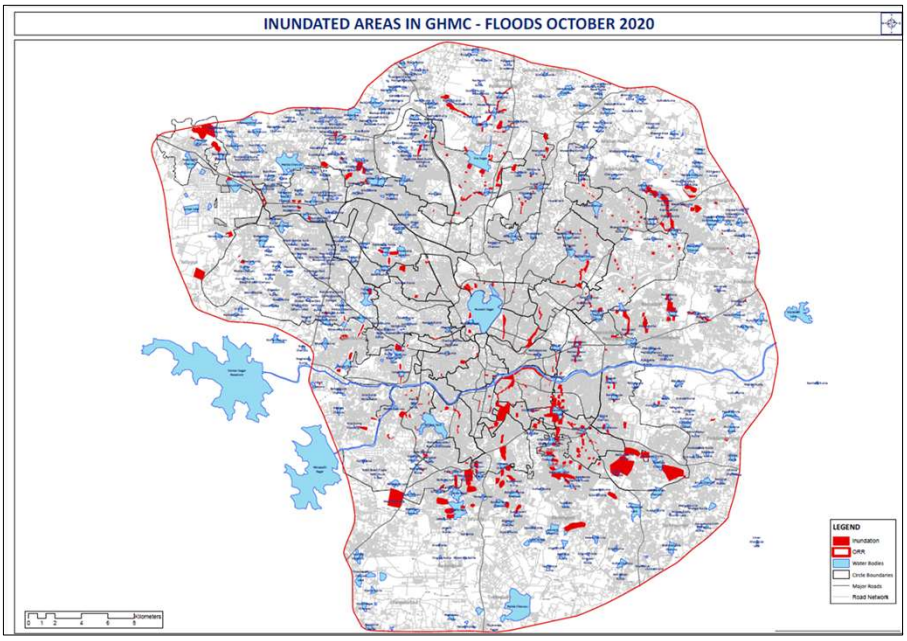
- These Proposal has been evolved based on extensive interaction with the stake holders and a thorough understanding of the ground conditions. Efforts have been made to avoid land acquisition and clearance of encroachments as far as possible by identifying alternate alignments to carry the storm water.



Source: SNDP DPR

11

6-5. Hyderabad Urban Drainage Project



12

6-6. Proposal for Update of SWD MP

Situation

- Rainfall pattern and intensity has been changed in Hyderabad in recent years.
- GHMC has already implemented the SWD development based on SNDP (1st Phase).
- Remaining project: SWD development in GHMC and HUA (2nd Phase of SNDP)
- Impact of Climate change shall be considered.

Proposal

1st Phase (by JICA)

1) JICA Feasibility Study to confirm technical and financial feasibility of SNDP (Phase II)

2) Implementation of the Project (SNDP-II)

3) Capacity Development

2nd Phase

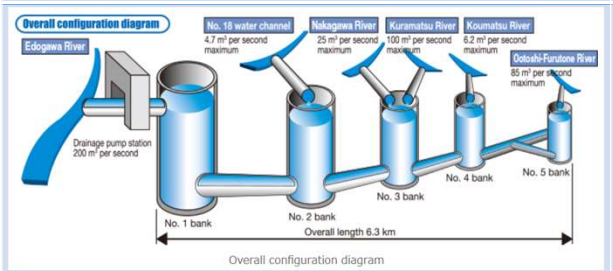
13

13

6-7. Comprehensive Solutions for Urban flooding experienced in Japan

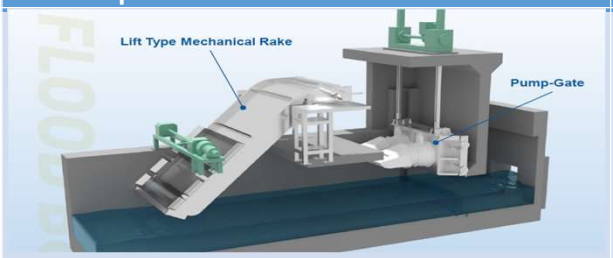
JICA can propose comprehensive solutions including structural and non-structural measures.

Underground discharge channel



Regulation Pond

Gate Pump



Plastic Storage Facility

14

7-1. Japan Visit (For Reference)

(1) Objective

Giving an opportunity for the participants lean about the followings and reflect them into their future Disaster Risk Reduction (DRR) countermeasures.

1) Urban drainage countermeasures

2) Japan's advanced technologies regarding the major projects of each city

(2) Target participants

Ministry, each shortlisted city and state authority (total 7 persons)

Tentative candidates: Mumbai (MCGM), Ahmedabad (AMC), Hyderabad (GHMC)

(3) Duration and Timing of Japan Visit

Sep.28 to Oct. 5, 2024 (updated schedule)

15

15

7-2. Japan Visit (For Reference)

Day	Training Contents	Relevant Japanese Technology/ Remarks	Accommodation
—	Arrival to Tokyo		Tokyo
1	Courtesy visit to JICA Ministry of Land, Infrastructure, Transport and Tourism (MLIT) Life Safety Learning Center Meteorological Science Museum	Comprehensive SWD works in Japan Public awareness activities in Japan	Tokyo
2	Tsurumi River - Kawawa River Retarding Basin - Tsurumigawa Basin Center & Multipurpose Retarding Basin Shibukawa underground storage tank (Kawasaki city)	Urban reservoir/diversion channel/multipurpose usage	Tokyo
3	Water Reclamation Center at Tokyo Metropolitan Government Tokyo Nogawa Osawa Regulation Pond/	Waterproofing of STPs, Upgrading of existing drainage against urban drainage	Tokyo
4	Metropolitan outer area underground discharge channel Misato SWD pumping station Misato Drain and regulation pond	Large scale/deep depth storage pond (suburban area)	Tokyo
5	Tatsumi Tide Embankment/ Flood Gate Presentation of technologies by Japanese company	Storm surge and tsunami countermeasures for rivers and canals	Tokyo
—	Depart from Tokyo to Delhi		

16

MCGM

(Preparation of BRIMSTOWAD-III)

DATA COLLECTION SURVEY
ON
DISASTER RISK REDUCTION SECTOR IN INDIA

Preparation of BRIMSTOWAD-III

September 2024

Japan International Cooperation Agency (JICA)
Nippon Koei Co., Ltd (NK)
Yachiyo Engineering Co., Ltd

1

Agenda of Meeting

1. Outline of the JCIA Study (Data Collection Survey in DRR Sector)
2. Proposal for update of BRIMSTOWAD (SWD M/P)
3. Necessary Data for BRIMSTOWAD-III

2

2

1. Outline of the JICA Study (Data Collection Survey in DRR Sector)

(1) The objectives of this survey:

- to collect and organize basic information on disaster risk reduction sector in India,
- to propose potential yen loan projects and technical cooperation by Japan International Cooperation Agency (JICA) to reduce or mitigate disaster risk, and
- to prepare Preliminary Project Report (PPR) to promote the potential project.

(2) The Target Disaster:

- Urban Flood Protection/Mitigation/Management
- Road, etc.

(3) Type of Project:

- ODA Loan Project,
- Sector Loan Project,
- Technical Assistance (Capacity Development)

3

3

1. Outline of the JICA Study (Data Collection Survey in DRR Sector)

(4) Result of Selection:

Following states and 10 cities were proposed considering i) priority cities of NDMA's flood management activities, ii) asset in flooded area, iii) population of the city, and iv) vulnerability of the city.

As a result of interview and data collection, following three shortlisted cities were selected.

States	Longlisted Cities	Priority Cities	Shortlisted Cities
Gujarat	Ahmedabad, Surat	Ahmedabad, Surat	Ahmedabad
Maharashtra	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay), Pune (Poona)
Andhra Pradesh and Telangana	Hyderabad	Hyderabad	Hyderabad
Bihar	Patna		
Delhi	Delhi		
Odisha	Bhubaneswar		
Assam	Guwahati	Guwahati	

* Cities in Red: Population in 2023 is more than 10million
Cities in Green: Population in 2023 is more than 5million

4

4

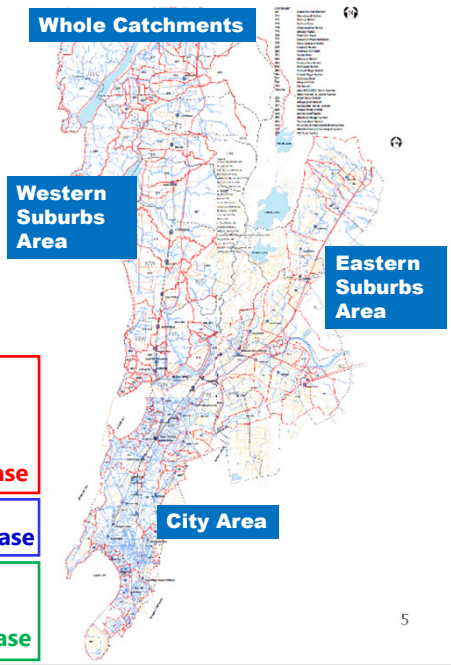
2. Proposal for Update of BRIMSTOWAD (SWD MP)

(1) Situation in Mumbai

- Rainfall pattern and intensity has been changed in Mumbai in recent years.
- MCGM has already implemented the sub-projects proposed in BRIMSTOWAD-II.
- Impact of Climate change shall be considered.

(2) Proposal of the Project

1) **Update of Stormwater Drainage Masterplan considering climate change and city development**
2) **Selection of Priority project** — **1st Phase**
3) Preparation of DPR of Priority project — **2nd Phase**
4) Implementation of Priority project
5) Capacity Development — **3rd Phase**



5

5

2. Proposal for Update of BRIMSTOWAD (SWD MP)

(3) Scope of Work to Prepare SWD Master Plan (BRIMSTOWAD-III)

1) Review of related studies, projects, and existing facilities
2) Setting out the target year and design condition (Hydrological analysis)
3) Field Investigations

   Topographic survey, Geotechnical Survey, Inventory survey,

   Environmental and social survey, etc.
4) Hydraulic analysis including preparation of hydraulic model
5) Formulation of master plan (proposal of subprojects)
6) Estimation of the preliminary project cost
7) Economic analysis
8) Formulation of the phasing plan and selection of priority project for the next phase

6

6

2. Proposal for Update of BRIMSTOWAD (SWD MP)

(4) Target Area

- Target Area of BRIMSTOWAD-II
  (City Area, Western Suburban Area, Eastern Suburban Area)
- Newly merged area (transferred from other authority, newly developed area, etc.)

(5) Condition of Planning (Return Period*)

	BRIMSTOWAD-II (existing)	BRIMSTOWAD-III (updated)
River	1/10 years (MCGM area) 1/100 tears (MMRDA area)	**Condition** considering **Climate Change** *Reference) CPHEEO Design Guideline (2019) 1/5 years (business, commercial, urban residential, etc.) 1/100 years (airport and other critical infrastructures such as railway stations, power stations, etc.) Adoption of higher return period considering socio-environmental conditions is possible: justification by committee constituted by state government is needed
Stormwater Drainage Facility	1/1～1/5 years? (55 mm/hr)	

* Return period: Average time between flood events which was estimated based on the flood record. Currently the rainfall intensity has become more stringent due to climate change, so the hydrological analysis will be needed to set design condition.

7

3. Necessary Data for BRIMSTOWAD-III

Necessary data and information		Authorities
1) Topographic Map	Latest DTM or base map	Disaster management department of MCGM
2) Data of Rivers (Mithi River, Oshiwara River, Poisar River, Dahisar River)	Sectional and longitudinal drawings of rivers including river facilities such as weirs and gates	SWD department of MCGM
	Water level and discharge data of the rivers (Design high water level and past maximum high-water level of the river etc. with those locations)	Disaster management department of MCGM
3) Precipitation, Tidal level	hourly data in the last 10 years with the location map and coordinate of monitoring point. Climatic analysis of climate change (rainfall volume, rainfall intensity, rainfall pattern, seawater level, etc.)	Disaster management department of MCGM
4) Stormwater drainage facilities	• As built drawings of network, pumping stations and storage tanks after preparation of BRIMSTOWAD-II • Specifications and locations of pumping stations and storage tanks • organization and budget for operation and maintenance of SWD facilities	Regional Offices of MCGM

8

8

3. Necessary Data for BRIMSTOWAD-III

Necessary data and information		Authorities
5) Facilities against cyclone, hightide, and tsunami	• Drawing and information of facilities against cyclone, hightide, and tsunami such as gate, pumping station	Disaster management department of MCGM
6) Development plan including new areas	• Map of newly expanded area and future development plan such as spatial plan or city development plan, if any	MCGM
7) Existing dam (Vihar Lake and Powai Lake)	• Drawings and data of Vihar Lake and Powai Lake. ➢ Drawing ➢ Daily rainfall, Water level, Inflow & outflow discharges for 10 years ➢ Geophysical and soil investigation data, Sedimentation volume • Reservoir operational rule for water level control during rainy season and just before cyclone etc.	Water supply department of MCGM
8) Asset and population	• Population and asset data in each administrative jurisdiction	MCGM
9) Financial Data	• Annual financial reports of MCGM in 10 years (including expenditure for SWD works)	MCGM
10) Environmental protection area	• Environmental protection area • MCGM policy of resettlement and rehabilitation (R&R)	MCGM

9

9

JICA

(Outline of Requests from Shortlisted Cities)

DATA COLLECTION SURVEY ON DISASTER RISK REDUCTION SECTOR IN INDIA

October 2024

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd (NK)

Yachiyo Engineering Co., Ltd

1

Agenda of Meeting

1. Introduction of JICA Survey Team
2. Outline of the JICA Study
3. Longlisted/ Shortlisted Cities
4. Proposal and related information
5. Proposal for Mumbai
6. Proposal for Pune
7. Proposal for Ahmedabad
8. Proposal for Hyderabad

2

2

1. Introduction of JICA Survey Team

	Position	Name	Company
*	Team Leader/ Formulation of disaster risk reduction	Takamasa NISHIKAWA	Nippon Koei (NK)
*	Deputy Team Leader/ Disaster risk assessment	Shoichiro MISAKI	Nippon Koei (NK)
	Measures against flooding	Toru TAKAHASHI	Yachiyo Engineering (YEC)
	Organization and legal structure/ Formulation of flood management project	Yuichi YAMAGUCHI	Nippon Koei (NK)
	Economic/ investment impact analysis	Uyu TANAKA	Yachiyo Engineering (YEC)
*	Urban flood technology	Hitoshi KANEKO	Nippon Koei (NK)
	Road Specialist	Hisatoshi NAITO	Nippon Koei India (NKI)
	Slope Stability Specialist	Hiroaki TAUCHI	Nippon Koei (NK)
	Supporting Staff	Mayank Agrawal Rishabh Chaudhary Anil Kumar	Nippon Koei India (NKI)
		Kaori TANIMOTO	Nippon Koei (NK)

3

3

2. Outline of the JICA Study (Data Collection Survey in DRR Sector)

(1) The objectives of this survey:

- to collect and organize basic information on disaster risk reduction sector in India,
- to propose potential yen loan projects and technical cooperation by Japan International Cooperation Agency (JICA) to reduce or mitigate disaster risk, and
- to prepare Preliminary Project Report (PPR) to promote the potential project.

(2) The Target Disaster:

- Urban Flood Protection/Mitigation/Management
- Road, etc.

(3) Type of Project:

- ODA Loan Project,
- Sector Loan Project,
- Technical Assistance (Capacity Development)

4

4

3. Longlisted Cities/ Priority Cities/ Shortlisted Cities

Following states and 10 cities were proposed considering i) priority cities of NDMA's flood management activities, ii) asset in flooded area, iii) population of the city, and iv) vulnerability of the city.

As a result of interview and data collection, following three shortlisted cities were tentatively selected considering the request from the municipal corporations.

States	Longlisted Cities	Priority Cities	Shortlisted Cities
Gujarat	Ahmedabad, Surat	Ahmedabad, Surat	Ahmedabad
Maharashtra	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay), Pune (Poona)	Mumbai (Bombay), Pune (Poona)
Andhra Pradesh and Telangana	Hyderabad	Hyderabad	Hyderabad
Bihar	Patna		
Delhi	Delhi		
Odisha	Bhubaneswar		
Assam	Guwahati	Guwahati	

* Cities in Red: Population in 2023 is more than 10million
Cities in Green: Population in 2023 is more than 5million

5

5

4. Proposal for Shortlisted Cities

■ **Scope of JICA Project (tentatively proposed in the draft PPR)**

	Mumbai	Pune*1	Ahmedabad*2	Hyderabad
Preparation of SWD Master Plan	✓			
Preparation of JICA FS and DPR for priority project	✓	✓	✓	✓
Tender (Selection of Consultant by executing agency)	(✓)	(✓)	(✓)	(✓)
Preparation of BD and Tender documents	✓	✓	✓	✓
Tender (Selection of Contractor)	✓	✓	✓	✓
Implementation of priority project (Construction and CS)	✓	✓	✓	✓
Technical cooperation for capacity development	✓	✓	✓	✓

Note ✓: Proposal for the scope of JICA project
*1: PMC requested both SWD and Sewerage developments.
*2: AMC is requesting grant scheme of Gujarat state, and priority subprojects (Kharikut canal and Chandrabhaga canal projects) are in approval process as of August 2024.

6

5. Mumbai

Flood Event: >300mm/6hr in July 8, 2024

Mumbai rains: Andheri, Kurla submerged in water following heavy rains.(PTI)

https://www.livemint.com/news/mumbai-rains-2024-andheri-kurla-submerged-in-heavy-rains-water-logging-in-many-areas-schools-colleges-shut-video-11720410767057.html
https://www.thehindu.com/news/cities/mumbai/mumbai-rains-on-july-8-2024/article68380224.ece

7

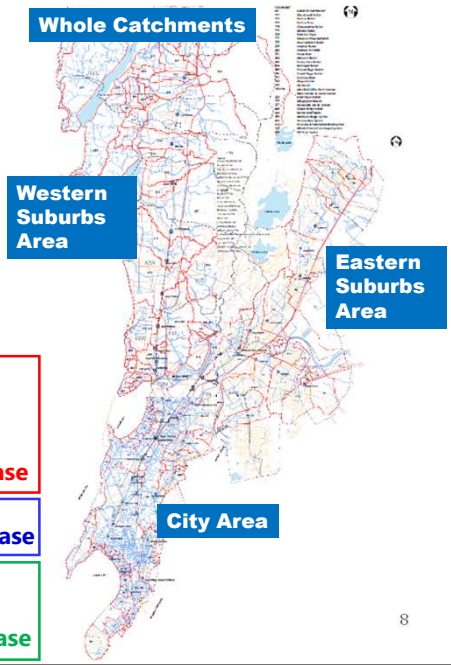
5-1. Proposal for Update of SWD MP

Situation

- Rainfall pattern and intensity has been changed in Mumbai in recent years.
- MCGM has already implemented the sub-projects proposed in BRIMSTOWAD-II.
- Impact of Climate change shall be considered.

Proposal

1) **Update of Stormwater Drainage Masterplan considering climate change and city development**
2) **Selection of Priority project+ Pre-FS** — **1st Phase**
3) **Preparation of DPR of Priority project** — **2nd Phase**
4) Implementation of Priority project
5) Capacity Development — **3rd Phase**



8

8

5-2. Proposal for Update of BRIMSTOWAD (SWD MP)

(1) Scope of Work to Prepare SWD Master Plan (BRIMSTOWAD-III)

1) Review of related studies, projects, and existing facilities

2) Setting out the target year and design condition (Hydrological analysis)

3) Field Investigations

Topographic survey, Geotechnical Survey, Inventory survey,

Environmental and social survey, etc.

4) Hydraulic analysis including preparation of hydraulic model

5) Formulation of master plan (proposal of subprojects)

6) Estimation of the preliminary project cost

7) Formulation of the phasing plan and selection of priority project for the next phase

8) Pre-FS for the priority project

9

9

5-3. Proposal for Update of BRIMSTOWAD (SWD MP)

(2) Target Area

- Target Area of BRIMSTOWAD-II
  (City Area, Western Suburban Area, Eastern Suburban Area)
- Newly merged area (transferred from other authority, newly developed area, etc.)

(3) Condition of Planning (Return Period*)

	BRIMSTOWAD-II (existing)	BRIMSTOWAD-III (updated)
River	1/10 years (MCGM area) 1/100 tears (MMRDA area)	**Condition** considering **Climate Change** *Reference) CPHEEO Design Guideline (2019) 1/5 years (business, commercial, urban residential, etc.) 1/100 years (airport and other critical infrastructures such as railway stations, power stations, etc.) Adoption of higher return period considering socio-environmental conditions is possible: justification by committee constituted by state government is needed
Stormwater Drainage Facility	1/1～1/5 years? (55 mm/hr)	

* Return period: Average time between flood events which was estimated based on the flood record. Currently the rainfall intensity has become more stringent due to climate change, so the hydrological analysis will be needed to set design condition.

10

10

5-4. Necessary Data for BRIMSTOWAD-III（情報提供依頼内容以外の項目）

項目	情報
Mithi川の管轄	MMRDAは非公式に事業をMCGMに移管した模様（書類はない）
ムンバイの環境保護区	最上流の湖周辺（Forest area以外は全て護岸工事済み） 河口部のマングローブ（手つかず）
気候変動の影響評価	Disaster Management DepartmentからはClimate Action Plan 2022は入手済みだが、どのシナリオをベースにするか要協議
他の3つの主要河川（Dahisar, Poisar, Oshiwara）の状況	Mithi川以外の河川では、対応できるところは全て護岸（Retaining Wall）整備済み。一部区間では住民移転ができず河道が狭くなっている。図面なく、Google Earth等で確認することを勧められた（整備レベル：10年確率降雨）
ポンプ場維持管理状況	各ポンプ場は同一構造6m3/secのポンプが設置されている（標準化している）。 全て、発電機によるポンプの稼働 潮位に応じてゲート、ポンプを稼働させ、維持管理はできている。また、ポンプ稼働状況は、Disaster ManagementのHPにて一元的にモニタリング可能（監視のみ） 参考：流入下水（汚水）を下水処理場で処理している10月15日～3月15日の5か月間のみ（それ以外は海に垂れ流し）
住民移転問題	Mithi川周囲のように手続きを踏めば（時間を掛ければ）住民移転→河川拡幅ができているが、その他河川でも解決できていない箇所もあり、簡単には解決できない問題と理解している。（そのための対策が地下放水路　とMITRAは言われていた）
開発規制	確認中

11

5-4. Necessary Data for BRIMSTOWAD-III（情報提供依頼内容以外の項目）

項目	情報
BRIMSTOWADの対策優先順位	浸水箇所を順次解消していくことを目標として、現在残っているのはCityの中心地区。 HindamataとGoldewool 浸水対策優先地区：CityかWestern Suburban area
ポンプ能力等	現時点でMCGMが整備したものは,PPT含まれると考えています
ダム	MCGMでも別部署（水道部門）が所管しており、情報提供を依頼済み
地形データ	BRIMSTOWAD-2では2.5m以上の開水路は測量した模様
整備目標	気候変動を考慮するが今後検討（IIT　Bombayも回答なし）
津波、高潮等	ゲートにより逆流防止対策を行っている。 津波の被害は受けていないとのこと（アラビア海側にはない？）
その他問題点	BRIMSTOWAD-2のデータがPDFで変換・結合をするとデータの正確性が失われる 元データの提供を依頼しようとしたが、BRIMSTOWAD-2の担当会社がすでに事業を終了し、データが入手できない。測量レポート等もない模様 BRIMSTOWADは2008年から作成され2018年に提出された（2008年ベースの情報）

12

12

5-4(1). Necessary Data for BRIMSTOWAD-III

Necessary data and information		Authorities
1) Topographic Map	Latest DTM or base map	Disaster management department of MCGM
2) Data of Rivers (Mithi River, Oshiwara River, Poisar River, Dahisar River)	Sectional and longitudinal drawings of rivers including river facilities such as weirs and gates	SWD department of MCGM
	Water level and discharge data of the rivers (Design high water level and past maximum high-water level of the river etc. with those locations)	Disaster management department of MCGM
3) Precipitation, Tidal level	hourly data in the last 10 years with the location map and coordinate of monitoring point. Climatic analysis of climate change (rainfall volume, rainfall intensity, rainfall pattern, seawater level, etc.)	Disaster management department of MCGM
4) Stormwater drainage facilities	• As built drawings of network, pumping stations and storage tanks after preparation of BRIMSTOWAD-II • Specifications and locations of pumping stations and storage tanks • organization and budget for operation and maintenance of SWD facilities	Regional Offices of MCGM

13

13

5-4(2). Necessary Data for BRIMSTOWAD-III

Necessary data and information		Authorities
5) Facilities against cyclone, hightide, and tsunami	• Drawing and information of facilities against cyclone, hightide, and tsunami such as gate, pumping station	Disaster management department of MCGM
6) Development plan including new areas	• Map of newly expanded area and future development plan such as spatial plan or city development plan, if any	MCGM
7) Existing dam (Vihar Lake and Powai Lake)	• Drawings and data of Vihar Lake and Powai Lake. ➢ Drawing ➢ Daily rainfall, Water level, Inflow & outflow discharges for 10 years ➢ Geophysical and soil investigation data, Sedimentation volume • Reservoir operational rule for water level control during rainy season and just before cyclone etc.	Water supply department of MCGM
8) Asset and population	• Population and asset data in each administrative jurisdiction	MCGM
9) Financial Data	• Annual financial reports of MCGM in 10 years (including expenditure for SWD works)	MCGM
10) Environmental protection area	• Environmental protection area • MCGM policy of resettlement and rehabilitation (R&R)	MCGM

14

14

5-5. BRIMSTOWAD-III準備会議（9/21）

＜MITRA説明＞
- 土地利用の変化により、流出率が増大（60%の浸透域が今はほぼゼロ）
- 気候変動の影響により、降雨強度が増大
- 以上の理由により、地下放水路が必要。そのためにはMPの策定が必要。

＜MCGM説明＞
- BRIMSTOWADに基づいて都市排水対策を実施してきた
- ヒンダマタにHolding Pondを建設し、35-55mm/hrに対応した

＜意見交換＞
- BRIMSTOWAD-3の作成→優先事業を、JICA支援にて行うことについて合意
- 対象区域はムンバイ全域を想定しているが、提供できる情報に応じて判断
  （MITRA側はThaneを含めることを要望しているが、ペンディング）
- 必要な情報を提供することについてムンバイ側合意（MCGMのSWD部門のCEが窓口）
- 実施機関はMCGM、MITRAはコーディネート（テクニカルアドバイザーも別機関）
- BRIMSTOWAD-3は、新規に雇用されたコンサルタントが準備する
- 案件を実施するために、JICAとしてミニッツに署名を得る必要がある。
  ミニッツドラフトをJICA側より提供（Generalな内容のミニッツ）

15

15

6. Pune

Flood Event: >114mm/24hr in July 27, 2024 (3rd highest rainfall in 66years)

https://www.newindianexpress.com/nation/2024/Jul/25/
maharashtra-rains-parts-of-pune-city-submerged-shivajinagar-records-third-highest-24-hour-rainfall-in-66-years

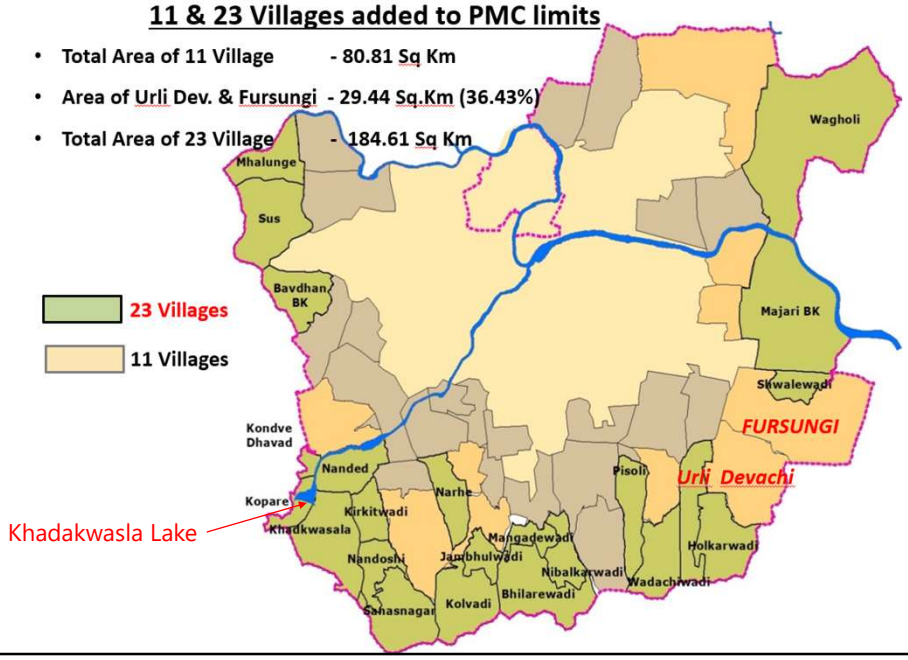
16

16

6-1. Pune: Proposal for implement SWD and Sewerage Project

11 & 23 Villages added to PMC limits

- Total Area of 11 Village - 80.81 Sq Km
- Area of Urli Dev. & Fursungi - 29.44 Sq.Km (36.43%)
- Total Area of 23 Village - 184.61 Sq Km



17

17

6-2. Pune: Proposal for implement SWD and Sewerage Project

		City Center		11 Villages (merged in 2018)	23 villages (merged in 2021)	
SWD						
	DP	-		In process	Will be approved soon	
	Plan	MP in 2007	DPR of NDMA project for priority area	DPR in 2020	DPR under preparation (by Oct.2024)	
		RP: 2years (based on previous Guideline)	*RP: 5years (based on latest Guideline)*	*RP: 2years (based on previous Guideline)*	*RP: 5years (based on latest Guideline)*	
		MP will be update in NDMA project with budget Rp 4.6Cr. (by Mar.2026)			-	
	Project	- 4 basins under JNNURM scheme	NDMA project for priority area (to be executed)	-	-	
	Estimated Cost	2800 Cr.		1200 Cr	1500Cr	
		Total 5500 Cr. (4675(85%)+825(15%))				
Sewerage						
	Plan	DPR for JICA project		DPR for Sewerage development	MP for 23 villages	
	Project	JICA ODA project is ongoing		Project under state budget is ongoing	Phase I: 16 villages	Phase II: 7 villages
					under AMRUT 2.0	-
	Cost	-		-	533.85Cr.	900Cr.

18

6-3. Pune: Proposal for implement SWD and Sewerage Project

3. Result of Discussion with PMC (June.12,2024)

Discussion held with AMC of Pune Municipal Commission for opting the most feasible option under phase I, II, & III.

- SWD Master Plan will be prepared in NDMA budget. If the budget is not enough, PMC will allocate the budged to accelerate SWD improvement in PMC.
- For PMC, the budget and schedule are both important. The SWD improvement is urgently required in Pune City.
- Development of SWD shall be implemented in phased manner. The area with latest MP/DPR based on latest CPHEEO manual shall be prioritized.

The summary of the same is as follows:

Proposed Phase I Under JICA Funding	Proposed Phase II Under JICA Funding	Proposed Phase III Under JICA Funding
• Strom Water Drainage scheme for 23 villages. Cost approx. INR 1500 Cr	• Implementation of SWD works in the City Center.	• Implementation of SWD works in the 11 villages.
• Balance 7 out of 23 villages for sewerage scheme. Cost approx. INR 900 Cr	• The updated Master Plan/ DPR with new CPHEEO design guidelines and with reasonable price escalation is expected to be available by March 2026.	• The updated Master Plan/ DPR with new CPHEEO design guidelines and with reasonable price escalation is expected to be available by March 2026.
• Total cost proposed for the services (Strom Water Drainage and Sewerage) for 23 towns under phase I is approx. INR 2400 Cr	• The implementation works for improvement of SWD may be taken up in phase II, with approx. estimated cost of Rs. 2800 Cr	• The implementation works for improvement of SWD may be taken up in phase III, with approx. estimated cost of Rs. 1200 Cr

19

19

7. Ahmedabad

Flood Event: about 300mm/24hr at the end of August, 2024

Several locations in Gujarat State were flooded in August, 2024.

https://www.hindustantimes.com/india-news/gujarat-floods-rain-august-29-2024-death-toll-pm-modi-imd-issues-red-alert-101724891393969.html

20

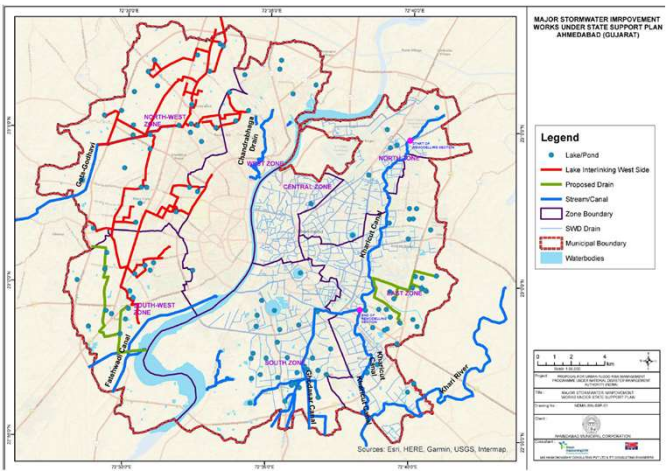
20

7-1. Ahmedabad: Proposal for Improvement of SWD Facilities

- Flood spot was spread all over the cities.
- To improve the situation, AMC is implementing drainage projects:
  - Updating master plan(to be completed by the end of 2024)
  - Enhancing the drainage
  - Connection between Lake and Lake at western side of the Sabarmati River etc.

➢ Estimated required amount by the master plan: Rs. 8,271 Cr

➢ NDMA is supporting the implementation of the project with the amount of Rs. 250 Cr



➢ Implementation of the sub-projects

➡ JICA's ODA Loan

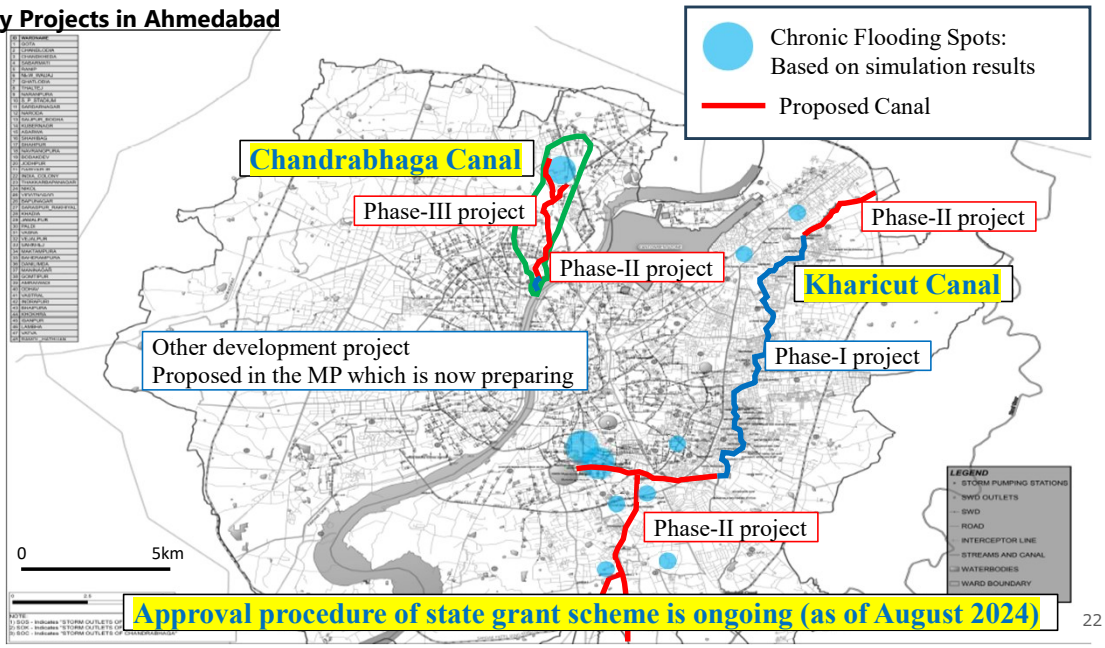
(AMC requested JICA for 2nd phase of project)

21

21

7-2. Ahmedabad: Proposal for Improvement of SWD Facilities

Priority Projects in Ahmedabad



Approval procedure of state grant scheme is ongoing (as of August 2024)

22

22

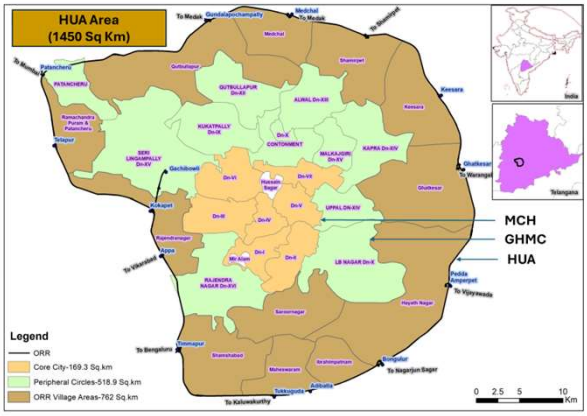
8. Hyderabad

THE OCTOBER 2020 FLOOD IN HYDERABAD

- 11th October 2020 floods were caused due to fourth tropical cyclone and third deep depression 'BOB O2' of the North Indian Ocean cyclone season and and hit the east coast of India over the following three days.
- This severe flood was the outcome of 300 mm rainfall in 6 hours on October 17, out of the mean annual rainfall of 827.2 mm.
- The initial waterlogging on roads and flooding of basements took a serious turn in no time leading to submergence of several residential colonies.
- Water levels in some localities reached as high a 12 feet.
- Over 37, 000 people were evacuated to safer places.
- The estimated loss was Rs. 900 crores.
- The state government compensated the owners of houses in which water had entered by paying Rs. 10, 000
- The loss of life was pegged at 17, in Hyderabad and its suburbs, caused by house collapse, electrocution and getting swept away in flood waters.

23

8-1. Hyderabad Urban Drainage Project



- Hyderabad is Subjected to Major Floods in the Year 1908, 1954,1962,1970, **2000**, 2008, **2020**. And rainfall pattern and intensity has been changed in Hyderabad in recent years.
- Several Studies were done in the Past whereas Implementation is done based on the Critical requirement and based on availability of funds .
- In Nov-2020 **Strategic Nala Development Programme (SNDP)** to Plan, develop and maintain comprehensive SWD system in HUA (Prepared Proposal under Phase-I and Phase –II)
  - Phase I (58 No. of Works consisting of 69.49 Km with NR 985.45 Crores (Under Implementation)
  - Phase II (415 No. of Works consisting of 451.232 Km with **INR 5135.15 Crores** for which Govt has accorded administrative Sanction. (Yet to be Implemented)

Year	1933-2007	2007-2020	2020 to Present
	Hyderabad Municipal Corporation (MCH)	**Greater Hyderabad Municipal Corporation (GHMC)**	**Hyderabad Urban Agglomeration (HUA)**
Area (Sq.Km)	169.3	518.9 (=688.2-169.3)	762.8(=1450-688.2)
Drainage Studies	Kirlosker Committee Study (Unit hydrograph)	Storm Water Drainage Master Plan (Voyants Solutions Pvt Ltd: 1/5Y)	DPR Under SNDP (Phase-I and Phase -II) (1/5Y based on CPHEEO)
Report	2002	2012	2022
Proposal Executed	Channelization of Major Nalas Taken up	Not fully implemented (5-10% only) No DPR, lack of fund, land issue	64 No. of works with INR 1095 Crores (Phase I loan) . **Phase II Proposal are Yet to be Taken Up**

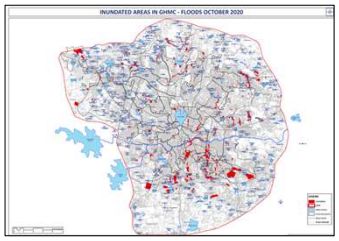
24

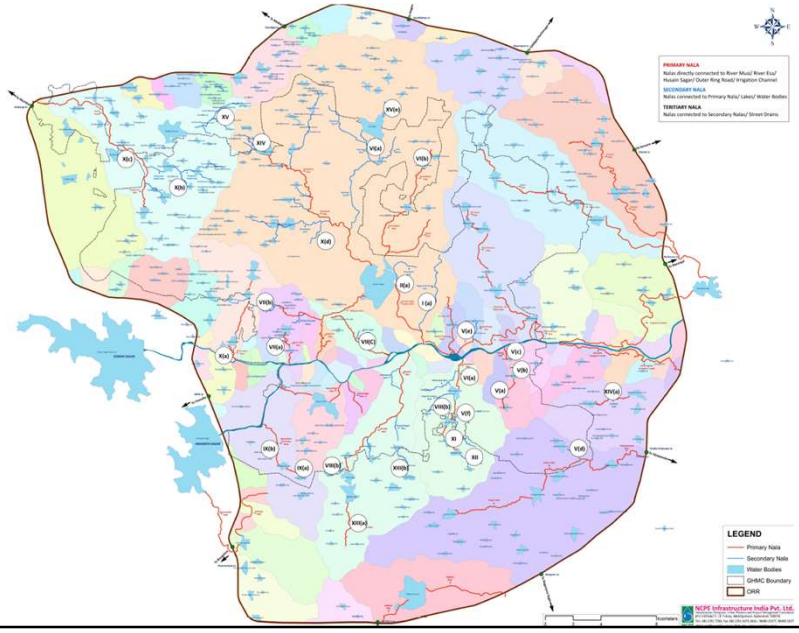
8-2. Hyderabad Urban Drainage Project

Priority Projects under SNDP (Phase –II) in Hyderabad and its Abstract Cost

S. No	Project Area (GHMC / ULB)	No. of Works	Length in 'Km'	Cost in Rs. Crores
A	GREATER HYDERABAD MUNICIPAL CORPORATION			
1	L B Nagar	23	38.021	460.53
2	Charminar	33	26.350	305.70
3	Khairatabad	11	14.651	148.37
4	Serilingampally	30	38.760	434.43
5	Kukatpally	31	47.269	663.51
6	Secunderabad	20	10.780	128.68
	Total (A)	148	175.831	2141.22
B	ULBs (Excluding GHMC within ORR)			
	(Details annexed)			
	Total (B)	267	275.401	2993.93
	Grand Total (A + B)	415	451.232	5135.15

These Proposal has been evolved based on extensive interaction with the stake holders and a thorough understanding of the ground conditions. Efforts have been made to avoid land acquisition and clearance of encroachments as far as possible by identifying alternate alignments to carry the storm water.





25

8-3. Hyderabad Urban Drainage Project

SNDP Phase II Proposal

Area	Project Cost (in Rs. Cr)	No of works	Length (in km)	No of HHs affected
GHMC	2141.22	148	175.83	1.30 Lakh
Surrounding ULBs	2993.93	267	275.40	
Total	5135.15	415	451.23	

- Under H-CITI Project , 35 priority works from the above 148 works of GHMC were taken up for which special financial assistance was sought from GoI for an amount of Rs. 582.42 Crores for the FY 2024-25.
- 6 works were in progress and balance 29 works are in tender process.
- Financial assistance is yet to be decided for the balance 380 works costing around Rs 4500Cr under SNDP II

GHMC/ Government is exploring possible financial resources and committed for providing full-fledged storm water drainage system in HUA to mitigate flooding in future.

26

8-4. Hyderabad Urban Drainage Project

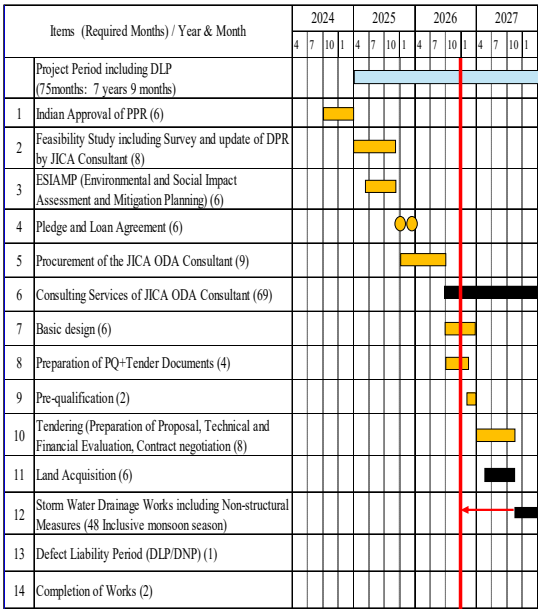
GHMC's Proposed Schedule (in total > 8 years)

- JICA Feasibility Study and review SNDP: 12 months
  (Pledge and LA: 3 months)
- Procurement of consultant for the project by GHMC: 12 months
- Design works and preparation of tender document: 12 months

(by Jan. 2027)

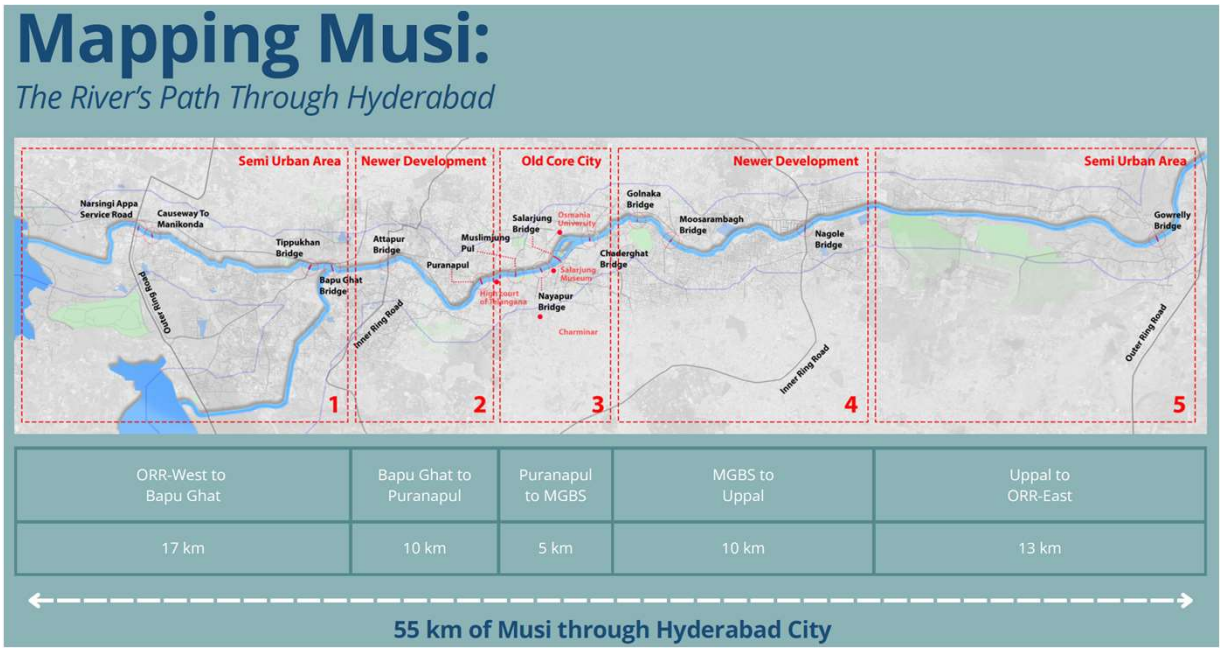
- Procurement of the contractor by GHMC: 12 months (PQ can be overlapped)
- Construction Period: > 48 months.

Minimum schedule



27

8-5. Musi Riverfront Development Project



28

8-5. Musi Riverfront Development Project

Elevating Musi:

Addressing Core Areas for Sustainable Progress

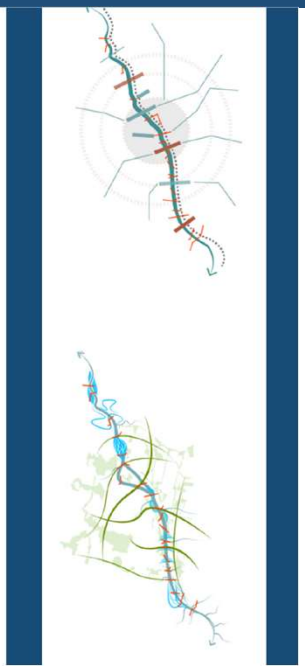
Enhancing River Ecology
Water Management: Constructing 39 new STPs along the river in addition to existing 52 STPs.
Sewer Infrastructure: Developing trunk and interceptor sewer main lines.

Preserving Heritage Structures
Adaptive Reuse: Converting historic buildings for modern uses while preserving their essence.
Tourism Circuit: Creating a heritage tourism circuit with a Musi Interpretation Centre.

Alleviating Traffic Congestion
East-West Corridor: Developing a new corridor along the river to ease city traffic.

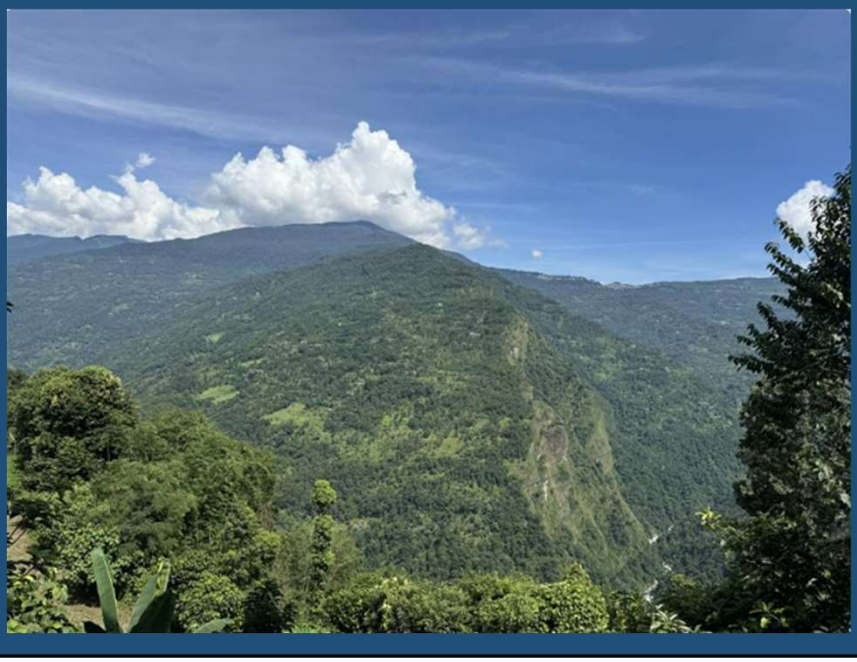
Mitigating Flood Risks
Flood Mitigation Infrastructure: Implementing flood control measures like bund strengthening.

Safeguarding Livelihoods and Managing Encroachments
Rehabilitation and Resettlement: Providing dignity housing and securing people's livelihoods.
Flood Protection: Ensuring safety by mitigating flooding risks.



29

9. Sikkim



30

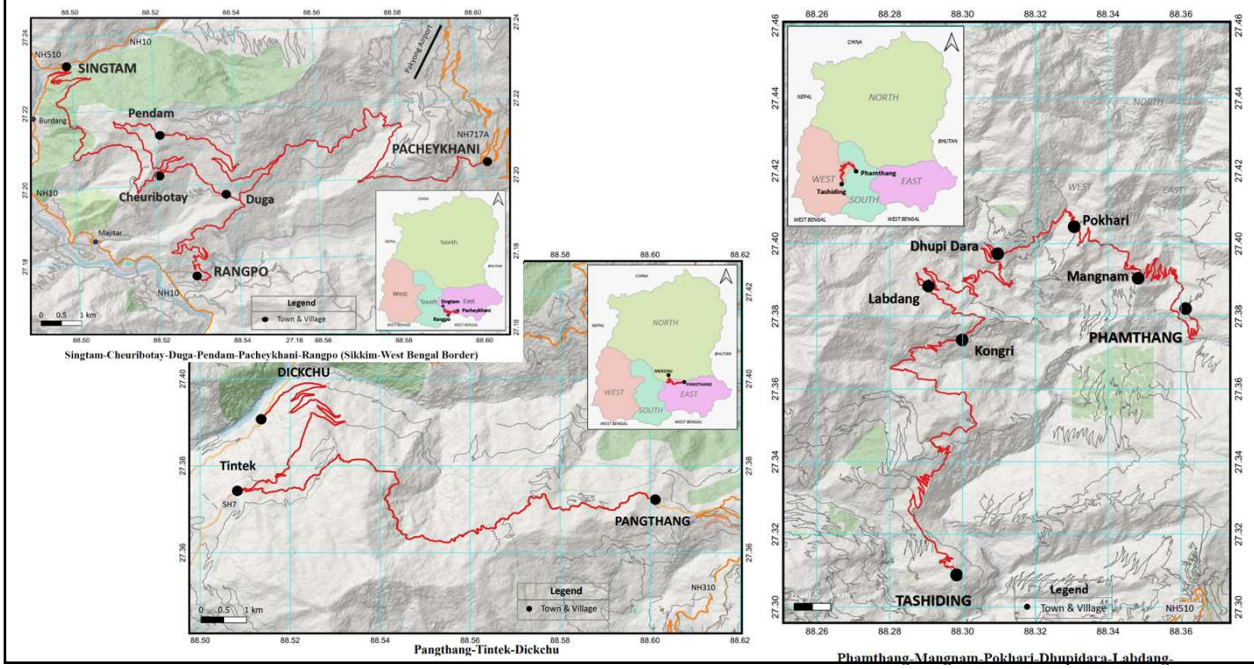
9-1. Road Project in Sikkim

PROJECTS PROPOSED BY ROADS AND BRIDGES DEPARTMENT THROUGH JICA FUNDING

Sl. No	NAME OF WORK	LENGTH (IN KM/M)	APPROXIMATE COST OF THE DPR(IN RS. CRORE)	REMARKS
1	Widening and up gradation of road from Singtam-Chewrebotey-Pacheykhani-Rangpo.	45.00 km	₹ 390.56	Cost estimate ready
2	Widening, up gradation and carpeting of road from Baiguney to Soreng via Gelling, Chakung to the double lane standard	26.82 km	₹ 222.10	Cost estimate ready
3	Widening, up gradation and carpeting of road along Phamtam-Mangnam-Pokhari-Dhupidara-Labdang-Kongri-Tashiding to the intermediate lane standard	60.00 km	₹ 480.00	Cost estimate projection is based on a normative cost of Rs 8.00 cr/km.
4	Widening, Up gradation and Carpeting of road along Pangthang-Tintek-Dikchu to the Intermediate lane standard.	30.00 km	₹ 240.00	Cost estimate ready
5	Constuction of 2-lane bridge at Jalipool along Ranipool-Pakyong road including up gradation of road from Jalipool to Ranipool.	38.00 m	₹ 28.56	Cost estimate ready

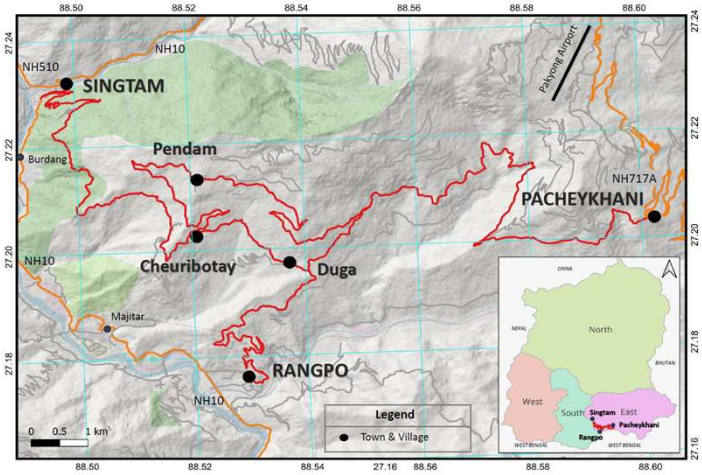
31

9-2. Road Project in Sikkim

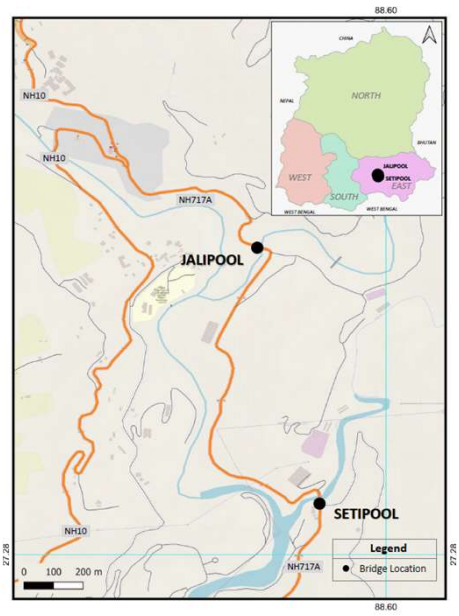


32

9-3. Road Project in Sikkim



Singtam-Cheuribotay-Duga-Pendam-Pacheykhani-Rangpo (Sikkim-West Bengal Border)



Jalipool Bridge and Setipool Bridge,
Pakyong road, East Sikkim

33

Appendix-6-2

MINUTES OF MEETING WITH SHORTLISTED CITIES

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with Additional City Engineer (ACE) Ahmedabad Municipal Corporation (AMC)

Subject : **MOM of the Meeting Held with ACE**

Day, Date and Time : **Tuesday, 13th Jun 2024 11:30 AM – 12:30 PM IST**

Place : **Additional City Engineer (ACE) Office**

Attendance :

No.	Name	Position
Ahmedabad Municipal Corporation (AMC)		
1.	Mr. Rakesh P Bodiwala	Additional City Engineer (ACE), AMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. The Team Leader presented the draft Preliminary Project Report (PPR) prepared for the three identified potential projects.
2. ACE informed that AMC has requested grant from State Government for Kharikat Canal Phase-II and Chandrabhaga Phase-II project under SWARNIM scheme of State Government.
3. ACE also informed that Municipal Corporation's priority is to secure as much grant possible from State government and the remaining fund can be taken from JICA.
4. Team Leader asked if in case JICA ODA loan is taken then only 85% of the project cost shall be funded by JICA while remaining 15% is to be borne either by State Government or AMC. To this ACE informed that there are three possible scenarios for 15% share which are as below:
   i. 15% is borne by AMC;
   ii. 15% is borne by State Government;
   iii. 15% is split into 50-50% share between State Government and AMC

   He further informed that this scenario will be finalized after approval for JICA ODA fund is secured at senior level.
5. ACE also informed whether the project timeline mentioned in the PPR is firm or flexible as the projected timeline for the completion of project is very long. This will also make Municipal Commissioner and Deputy Municipal Commissioner uninterested in taking JICA loan, as the city will suffer from water logging for such longer duration.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with City Engineer (CE) Ahmedabad Municipal Corporation (AMC)

Subject : **MOM of the Meeting Held with CE**

Day, Date and Time : **Tuesday, 13th Jun 2024 3:00 PM – 4:00 PM IST**

Place : **City Engineer (CE) Office**

Attendance :

No.	Name	Position
Ahmedabad Municipal Corporation (AMC)		
1.	Mr. Vijay Patel	City Engineer (CE), AMC
2.	Mr. Chirag K Brahmbatt	Deputy City Engineer (DCE), AMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. The Team Leader informed the City Engineer about the project and also presented the draft Preliminary Project Report (PPR) prepared for the three identified potential projects.
2. The City Engineer asked for the current loan interest to which Team Leader replied that it highly depends on the nature of project however, currently it is 2% p.a.
3. The City Engineer also enquired about the timeline from the beginning till completion of the project. Team Leader informed it is estimated that the project will get completed in 88 months including time taken for the approval on PPR by Indian side and Japanese side, securing of loan, bid management and construction activity.
4. Deputy City Engineer said that the timeline is very long, and it will make Municipal Commissioner and Deputy Municipal Commissioner lose interest in taking JICA loan as it is too much a time for completion of priority projects. He requested JST to squeeze the timeline to 4-5 years' including all procedures.
5. The City Engineer informed that he would discuss with Deputy Municipal Commissioner and Municipal Commissioner on the draft PPR.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with Deputy Municipal Commissioner (DyMC)
Ahmedabad Municipal Corporation (AMC)

Subject : **MOM of the Meeting Held with DyMC**

Day, Date and Time : **Tuesday, 14th Jun 2024 12:00 Noon – 12:30 PM IST**

Place : **Deputy Municipal Commissioner (DyMC) Office**

Attendance :

No.	Name	Position
Ahmedabad Municipal Corporation (AMC)		
1.	Mr. Mihir Patel	Deputy Municipal Commissioner (DyMC), AMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Rishabh Chaudhary	Assistant Engineer- 2, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. The Team Leader presented the draft Preliminary Project Report (PPR) prepared for the three identified potential projects.
2. DyMC informed that AMC has requested grant for taking up Kharikat Canal Ph-II and Chandrabhaga Canal Phase-II project from State government. However, the State Government has yet to provide a grant. He further informed that based on the decision of the State Government, potential projects can be finalized.
3. He also inquired about the project timeline whether the timeline is tentative or finalized because the project timeline is very long. Team Leader informed that timelines highly depend on the approval procedure in Indian and Japanese govt. side.
4. DyMC informed that Municipal Commissioner (MC) is presently outside India, so he will discuss the PPR with MC once he returns back and will revert to JST for further update.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with MCGM officials at Municipal Corporation of Greater Mumbai (MCGM) office.

Subject : **MOM of the Meeting Held with MCGM Officials**

Day, Date and Time : **Tuesday, 18th Jun 2024 11:30 PM – 02:00 PM IST**

Place : **Municipal Corporation of Greater Mumbai (MCGM) Office.**

Attendance :

No.	Name	Position
Municipal Corporation of Greater Mumbai (MCGM)		
1.	Sh. Rasal	Deputy Chief Engineer – SWD – MCGM
2.	Sh. Dashputre	Executive Engineer – Planning SWD - MCGM
3.	Ms. Samruddhi Nilawar	Sr. Consultant – MCGM
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. Team Leader made the brief of the agenda of the meeting and past discussions.
2. Team Leader informed the technologies used in Japan for flood mitigation, especially the deep tunnels and pumping's.
3. ExEn told that there are holding ponds available at some locations, which are performing well in the part of flood mitigation.
4. These holding ponds are at Hindamata location, designed for the rainfall intensity of 55 mm/hr.
5. Regarding deep tunnels for Drainage works, as told by ExEn that availability and procurement of land is big issue in case of construction of tunnels, also routing and depth of the tunnels are to be considered in the initial phase of the proposal for providing adequate and required space for construction.
6. There are 2 pumping stations which are on hold due to land issues. A) Mogra pumping station and B) Mahul pumping station.
7. ExEn informed that presently they are having deep tunnels in sewerage schemes which are at least 70 mtrs below the ground level and 3 km deep in the sea, to release the treated effluent in the sea bed without disturbing the aquatic life natural scenario.
8. ExEn also raised the point for the intervention of solid waste in the drains, and how to avoid these constraints during planning of tunnels and pumping's.
9. 40-50% of household waste is thrown into the drains directly, results in settlement's and

reducing the carrying capacity of the drains.

10. Around 50-60% is siltation. The provision of mesh on the parapets of the big drains/ Nallah's at some locations is already under planning, to restrict the intervention of solid waste. As screening of big size material is a still a challenge.
11. It was informed by ExEn that all the major works and proposal of improvement is presented in BRIMSTOWD – 2. Also, BRIMSTOWD- 2 was designed on the rainfall intensity of 55mm/hr, which further may be updated as per the unexpected rainfall scenario and climate change.
12. The TOR for BRIMSTOWD – 3 is still under finalization with IIT Bombay, which also includes the are left out in BRIMSTOWD – 2.
13. MWH was the consultant who prepared BRIMSTOWD – 2 for MCGM, but the consultant hasn't provided any editable copy of the planning drawings. Only PDF copy is available.
14. Mumbai is divided into 3 sections a) southern part is City Part, b) Northen part is divided into Eastern and Western suburbs.
15. The major cause of 2005 floods is undistributed rainfall pattern. The city receives the rainfall of 80mm, however, for the same time duration the suburbs (Eastern and western) receive more 994 mm rainfall. As BRIMSTOWD-1 is designed on 25mm/hr rainfall, the unprecedented rainfall fails the design and resulted in major floods.
16. As like the Mithi river improvement program, other rivers in the suburbs are also under consideration like; Poisar lake, oshivara and walvat.
17. The water from Tulsi lake and vihar lake water is used for drinking purpose too.
18. Team Leader requested for the data from MCGM officials, which they assured to provide shortly.
19. The list of data requested is attached as enclosure under which the data provided by MCGM is highlighted.

Encl: 1. List of Data provided.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with MCGM officials at Municipal Corporation of Greater Mumbai (MCGM) office.

Subject : MOM of the Meeting Held with MCGM Officials

Day, Date and Time : Wednesday, 19th Jun 2024 11:30 AM – 05:00 PM IST

Place : Municipal Corporation of Greater Mumbai (MCGM) Office.

Attendance :

No.	Name	Position
Municipal Corporation of Greater Mumbai (MCGM)		
1.	Sh. S V Choudhary	Chief Engineer – SWD – MCGM
2.	Sh. Dashputre	Executive Engineer – Planning SWD - MCGM
3.	Ms. Samruddhi Nilawar	Sr. Consultant – MCGM
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. Team Leader explains the proposal with multiple options to formulate the project.
   - The 1st options comprise of Preparation of updated Master Plan DPR with identification of DPRs
   - The 2nd option is implementation for the proposal under consideration like: Hindamata & Andheri subway.
   - Option 3 comprised of Preparation of Master Plan, Preparation of DPRs for the priority phases and Implementation of the Priority works.
2. Team Leader informed the technologies used in Japan for flood mitigation, especially the deep tunnels and pumping's.
3. CE showed the interest for the preparation of Master Plan under JICA Technical Co-operation.
4. It was discussed to fix up the scope for the preparation of Master plan.
5. CE informed that all drains, rivers and lakes are under the jurisdiction of MCGM. However, the creeks are under the jurisdiction of Central Government.
6. The scope should be restricted till the outfall point of the drains discharging in the creeks. The creeks shall be excluded from the scope of work.
7. CE also informed that MCGM is having 2 Nos. of training centers where all kinds of Technical and Administrative trainings are provided to all MCGM officials from various divisions.

8. Regarding deep tunnels for Drainage works, as told by ExEn that availability and procurement of land is big issue in case of construction of tunnels, also routing and depth of the tunnels are to be considered in the initial phase of the proposal for providing adequate and required space for construction.

9. There are 2 pumping stations which are on hold due to land issues. A) Mogra pumping station and B) Mahul pumping station

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with MCGM officials at Municipal Corporation of Greater Mumbai (MCGM) office.

Subject : MOM of the Meeting Held with MCGM Officials

Day, Date and Time : Thursday, 20th Jun 2024 01:30 PM – 02:30 PM IST

Place : Municipal Corporation of Greater Mumbai (MCGM) Office.

Attendance :

No.	Name	Position
Municipal Corporation of Greater Mumbai (MCGM)		
1.	Sh. Dashputre	Executive Engineer – Planning SWD - MCGM
2.	Ms. Samruddhi Nilawar	Sr. Consultant – MCGM
JICA HQ/ JICA India		
1.	Mr. Minoru Matsunoshita	Sr. Deputy Director, South Asia Division 1(India/ Bhutan), JICA HQ
2.	Ms. Yuka Aota	Project Formulation Advisor, JICA India
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. JICA official explains the outcome of the UDD Meeting
2. JICA official mention the concern of UDD Secretary for the nomination of MCGM for Japan Training
3. JICA official explains the preparation and consideration of the Bid Documents to be procured under JICA Funding.
4. JICA official also explains the procedure of funding
5. It was advised by ExEn to include the Municipal Commissioner from the initial stage of the project formulation.
6. It was informed by ExEn that the Development plan 2034 is GIS Based.
7. ExEn told that the balance things can be discussed in the next scheduled meeting with CE, as many points are to be elaborated by the Decision makers.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with MCGM officials at Municipal Corporation of Greater Mumbai (MCGM) office.

Subject : **MOM of the Meeting Held with MCGM Officials**

Day, Date and Time : **Thursday, 20th Jun 2024 03:30 PM – 04:30 PM IST**

Place : **Municipal Corporation of Greater Mumbai (MCGM) Office.**

Attendance :

No.	Name	Position
Municipal Corporation of Greater Mumbai (MCGM)		
1.	Sh. Sridhar v Choudhary	Chief Engineer – SWD, MCGM
2.	Sh. Dashputre	Executive Engineer – Planning SWD - MCGM
JICA HQ/ JICA India		
1.	Ms. Yuka Aota	Project Formulation Advisor, JICA India
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. JICA India Introduced themselves to the CE - SWD.
2. JICA India explains the outcome of the UDD Meeting
3. JICA India mention the concern of UDD Secretary for the nomination of MCGM for Japan Visit
4. As CE shows the interest to get the Master Plan prepared under JICA cooperation for SWD, JICA India and JST requested for the official letter.
5. CE advised to EEP for the issuing the letter, the time frame suggested by CE is 2 weeks to accord all approval for letter issuance.
6. It was advised by CE to brief the proposal to Municipal Commissioner (Sh. Bhushan Gagrani, email: mc.mcgm.gov.in)
7. JST will prepare the request letter, seeking time from Municipal Commissioner along with JICA India and MCGM.
8. CE also advised that the preparation/ revision of master plan may include lot of underground survey and coordination with various departments.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with IIT Professor at Indian Institute of Technology – Bombay.

Subject : **MOM of the Meeting Held with IIT Professor**

Day, Date and Time : **Friday, 21st Jun 2024 09:30 AM – 10:30 AM IST**

Place : **Indian Institute of Technology – Bombay.**

Attendance :

No.	Name	Position
Indian Institute of Technology – IIT, Bombay		
1.	Prof. Sh. Ravi Sinha	Department of Civil Engineering, IIT B
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

1. TL gave the presentation for brief of the project.
2. TL gave the presentation for the insights for SWD works completed/ Ongoing/ Proposed for Mumbai.
3. IIT Prof. explained the situation and history of SWD works in Mumbai as below:
   i. the city drains were designed for 25mm/Hr rainfall, which is insufficient.
   ii. During early 19th century, the Northern part was completely agricultural area.
   iii. The main reason for the flooding is the reduced carrying capacity of meethi river, due to slums and there is no connection among ponds.
   iv. On an average, southern part of Mumbai is experiencing the rainfall of approx. 200mm/hr for small instance of time.
   v. Arrangement of walls with gates is done for the low-lying residential areas.
4. IIT Prof. showed his interest to link with the project formulation and Master planning.
5. Meeting ended with thanks.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with Additional Municipal Commissioner (AMC)
Pune Municipal Corporation (PMC)

Subject : **MOM of the Meeting Held with AMC**

Day, Date and Time : **Tuesday, 10th Jun 2024 03:00 PM – 05:00 PM IST**

Place : **Pune Municipal Corporation Office**

Attendance :

No.	Name	Position
Pune Municipal Corporation (PMC)		
1.	Sh. Rajendra Bhosle	Municipal Commissioner, PMC
2.	Sh. Prithvi Raj B. P	Additional Municipal Commissioner, PMC
3.	Chief Engineer	PMC
4.	Sh. Santosh Tandale	Superintendent Engineer, SWD, PMC
5.	Sh. Jagdish Khanore	Superintendent Engineer, Sew, PMC
6.	Sh. Gojare	Superintendent Engineer, SWD, PMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)
Additional Support		
1.	Primove Consultant Team	

During the meeting the points of discussion held are noted as mentioned below:

1. Team Leader made the project brief and past discussions with PMC to AMC
2. The Team Leader presented the draft Preliminary Project Report (PPR) prepared for the identified potential projects.
3. AMC explains the recent events of Cloud burst in Pune happened on 4th & 8th June 2024 with rainfall intensity of 123mm in 2hrs and 100 mm in 100 mins respectively.
4. PMC is very much concerned for the improvement of SWD in Pune city.
5. Presentation was made by Primove consultant for the ongoing sewerage and SWD projects required funds from JICA.
6. The SWD scheme is divided into 3 phases: a) Old Pune city b) 11 Villages C) 23 Villages
7. SWD DPR for 23 Villages is under preparation on the new guidelines provided by CPHEEO Manual. SWD DPR for 11 Villages was prepared in 2020 on the old CPHEEO manual and need to be updated on the new guidelines. SWD DPR for old Pune city was prepared in 2007, which also need to be revised on the updated CPHEEO Guidelines.
8. DPR for Sewerage scheme in 23 towns is already prepared with total budget of approx. INR1400 Cr, out of which INR 533 Cr was sanctioned under AMRUT scheme and the

Consultant propose the scope to cover 16 villages. About INR 900 Cr is covering 7 villages requires external or additional funding.

9. The budget estimated for SWD scheme in Old Pune city is INR 2800 Cr, for 11 Villages INR 1200 Cr and for 23 Villages INR 1500 Cr.

10. It was also informed by PMC that the Development Plan for 11 villages and 23 villages is under approval, and DP of 23 Villages will be approved on priority.

11. Further it was advised by AMC of PMC to have a detailed meeting with Primove consultant to fix the scope of work and to set the priority for implementation.

12. Municipal Commissioner and Additional Municipal Commissioner are concerned about the funding pattern. It was proposed by top PMC officials that out of the total sanctioned amount by JICA, PMC may share only 15%, Balance 85% should be the grant from GoI/ GoM. The PMC can bear approximately Rp.300 – 500 Cr., hence the total budget shall be less than Rp. 3500 Cr if 85% of the project cost is owed by UDD.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with Superintendent Engineer (SE) Pune Municipal Corporation (PMC), and Primove Consultant Team

Subject : MOM of the Meeting Held with SE and Consultant Team

Day, Date and Time : Tuesday, 11th Jun 2024 10:00 AM – 1:00 PM IST

Place : Pune Municipal Corporation Office

Attendance :

No.	Name	Position
Pune Municipal Corporation (PMC)		
1.	Sh. Jagdish Khanore	Superintendent Engineer, Sew, PMC
2.	Sh. Gojare	Superintendent Engineer, SWD, PMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)
Additional Support		
1.	Primove Consultant Team	

During the meeting the points of discussion held are noted as mentioned below:

1. Team Leader advised to set the scope of work and tentative budget required for the funding.
2. Consultant conveyed that the 1st Master plan considering old Pune city with the area of 234Sq Km was prepared in 2007 with the budget of INR 1800 Cr out of which approx. INR 800 Cr works are already completed.
3. This 2007 master plan requires revision on the new CPHEEO guidelines for SWD works.
4. SWD DPR is ready for 11 villages and was prepared in 2020, this also needs to be updated on new CPHEEO guidelines. Also, the funding agency for the 11 villages SWD scheme is yet to be finalized.
5. SWD DPR for 23 Villages is under preparation (Survey work is going on) on the new guidelines provided by CPHEEO Manual.
6. As per consultant since from 2016 to present 500 flooding spots were identified.
7. For the priority hot spots in old Pune city the estimated budget was approx. INR 470 Cr, out of which NDMA funded INR 280 Cr.
8. NDMA funds also had provision to update the Master Plan prepared in 2007.
9. The timelines for updating the Master plan for Old city and 11 villages is set to be 18 months from the date of finalization of the consultant.
10. DPR for Sewerage scheme in 23 towns is already prepared with total budget of approx.

INR1400 Cr, out of which INR 533 Cr covering 16 villages is sanctioned under AMRUT scheme. About INR 900 Cr is covering 7 villages requires external or additional funding.

11. The components involved in 7 villages sewerage scheme are:

    a) 4 STPs
    b) 2 FSTPs
    c) Netwok Length: 278 KM
    d) Trunk main: 46 KM

12. The budget estimated for SWD scheme in Old Pune city is INR 2800 Cr, for 11 Villages INR 1200 Cr. and for 23 Villages INR 1500 Cr.

13. It was also informed by PMC that the Development Plan for 11 villages and 23 villages is under approval, and DP of 23 Villages will be approved on priority.

14. Site visit was conducted in the second half for understanding the on going and Proposed SWD/ Sewerage works.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with Additional Municipal Commissioner (AMC)
Pune Municipal Corporation (PMC)

Subject : **MOM of the Meeting Held with AMC**

Day, Date and Time : **Tuesday, 12th Jun 2024 10:30 PM – 11:30 PM IST**

Place : **Pune Municipal Corporation Office**

Attendance :

No.	Name	Position
Pune Municipal Corporation (PMC)		
1.	Sh. Prithvi Raj B. P	Additional Municipal Commissioner, PMC
2.	Sh. Santosh Tandale	Superintendent Engineer, SWD, PMC
3.	Sh. Jagdish Khanore	Superintendent Engineer, Sew, PMC
4.	Sh. Gojare	Superintendent Engineer, SWD, PMC
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)
Additional Support		
1.	Primove Consultant Team	

During the meeting the points of discussion held are noted as mentioned below:

1. Team Leader made the brief of the discussion held with PMC and Primove consultant.
2. Team leader presented the proposal attached as enclosure to this MoM.
3. AMC commented that the update of SWD MP will be implemented under NDMA fund and PMC will provide sufficient budget for this work if the budget is not enough.
4. AMC proposed to develop SWD and Sewerage in phased manner. AMC proposed to develop SWD and Sewerage system as below:

   1st phase: SWD and Sewerage systems in 23 villages

   2nd phase: SWD in City area after update MP based on latest CPHEEO manual

   3rd phase: SWD in 11 villages after update MP based on latest CPHEEO manual
5. AMC is concerned about the funding pattern. It was again proposed by AMC that out of the total sanctioned amount by JICA, PMC may share only 15%, Balance 85% should be the grant from GoI/ GoM.

Encl: 1. Proposal presented by JST

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Urban Development Department (UDD), Maharashtra

---

Subject : MOM of the Meeting Held with Secretary UDD Div 2, Maharashtra

Day, Date and Time : Thursday, 20th June 2024 11:30 AM – 12:30 PM IST

Place : 4th Floor UDD office, Mantralaya, Mumbai

Attendance :

No.	Name	Position
Urban Development Department		
1.	Dr. K. H. Govinda Raj	Principal Secretary, UDD Div 2
2.	Sh. Shrikant Andge	Deputy Secretary, UDD Div 2
JICA HQ/ JICA India		
1.	Mr. Minoru Matsunoshita	Sr. Deputy Director, South Asia Division 1(India/ Bhutan), JICA HQ
2.	Ms. Yuka Aota	Project Formulation Advisor, JICA India
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. JICA officials gave the opening remarks for the project introduction and explained the Japan training schedule and requested for the finalization nomination from UDD Maharashtra.

b. Principal Secretary UDD II, nominated the Deputy Secretary for attending the training in Japan and also advised that the nomination for MCGM shall be a Senior level officer and the present nomination for the Executive Engineer may be re-think by MCGM.

c. JICA HQ and JST explains the prospective projects discussed with MCGM and PMC.

d. Principal Secretary UDD II, advised that MCGM and PMC should share the proposal with UDD Maharashtra for the further proceedings and paper work to be initiated for procurement of the loan.

e. Meeting ended with thanks from JST.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Municipal Corporation of Greater Mumbai (MCGM)

Subject : **MOM of the Meeting Held with officials of MCGM**

Day, Date and Time : **Thursday, 5th September 2024 11:00 AM – 17:30 PM IST**

Place : **MCGM Main office, Worli, Mumbai**

Attendance :

No.	Name	Position
MCGM		
1.	Sh. Sridhar Choudhary	Chief Engineer – SWD Planning, MCGM
2.	Sh. Dashaputre	Executive Engineer – SWD Planning Cell, MCGM
3.	Ms. Samruddhi Nilawar	Sr. Consultant, MCGM
JICA HQ		
1.	Mr. Wataru KOYAMA	South Asia Division 1, South Asia Department
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed about the agenda of the meeting and specific focus on Data provision.

b. Information provided by MCGM SWD Department:

- BRIMSTOWD-2 was started in 2008 and the report was submitted in 2018. The survey data requires the confirmation on the development took place from 2008 to till date.
- The left-out area in BRIMSTOWD-2 is to be covered in BRIMSTOWD-3.
- It is informed by MCGM that the development plan prepared in 1991 is valid 2012, the new development plan prepared is valid till 2034 known as DP 34. Available on MCGM website.
- Survey data need to be recreated as BRIMSTOWD-2 is been divided majorly into 3 categories a) maintain the existing system b) Widening and deepening c) New connections. The work is done in bits and pieces so coordination with the Regional MCGM offices in required to obtain the as built drawings for the completed works under BRIMSTOWD-2.
- It has been informed that 6 major pumping station and 10 mini pumping stations are available.
- The data requested from MCGM, and its related department is listed below:

Item	Requests
1) Topographic Map	• The latest DTM or base map to prepare the BRIMSTOWAD-III (Not available with MCGM, however **MCGM** will try to get the latest survey data from other consultants) Note: Please confirm which topographic map or DTM was utilized in BRIMSTOWAD-II.
2) Data of Mithi River, Oshiwara River, Poisar River, Dahisar River (longitudinal and section, catchment)	• Original data of hydraulic model in BRIMSTOWAD-II (GIS data including attributes of existing and proposed alignment of drains, elevation, size etc. shown in the map of BRIMSTOWAD-II) • Sectional and longitudinal drawings of rivers including river facilities such as weirs and gates **in MCGM** to assess how much additional survey is needed. • Water level and discharge data of the rivers (Design high water level and past maximum high-water level of the river etc. with those locations) Note: Please confirm the scale of the map, the available pitch for the cross section of rivers
3) Precipitation, Tidal level	• Precipitation and tidal data **in MCGM**: hourly data in the last 10 years with the location map and coordinate of monitoring point. **This data is available with Disaster Management Department. Requested to MCGM to kindly provide this data**. • Climatic analysis of climate change (rainfall volume, rainfall intensity, rainfall pattern, seawater level, etc.) **This data is available with Disaster Management Department. Requested to MCGM to kindly provide this data**
4) Stormwater drainage network including pumping stations and storage tanks	• Original data of hydraulic model in BRIMSTOWAD-II (Already mentioned above) • As built drawings of network, pumping stations and storage tanks after preparation of BRIMSTOWAD-II **(As built drawing is to be provided by MCGM in coordination with the regional offices)** • Specifications and locations of pumping stations and storage tanks **(MCGM)** • organization and budget for operation and maintenance of SWD facilities **(MCGM)**
5) Facilities against cyclone, hightide, and tsunami	• Drawing and information of facilities against cyclone, hightide, and tsunami such as gate, pumping station (**This data is available with Disaster Management Department. Requested to MCGM to kindly provide this data)**
6) Development plan including new areas from BRIMSTOWAD-II	• Land use plan based on the urban development plan of MCGM **(provided by MCGM)** • Map of newly expanded area and future development plan such as spatial plan or city development plan.
7) Existing dam (Vihar Lake and Powai Lake)	• Drawings and data of Vihar Lake and Powai Lake. ➢ Drawing ✓ General Plan, Typical Cross Section, Section along Dam Axis ✓ Structural drawings for overflow section ✓ Raw water intake facilities ➢ Daily data for 10 years ✓ Daily rainfall, Water level ✓ Inflow & outflow discharges ➢ Other data, if available ✓ Geophysical and soil investigation data ✓ Sedimentation volume • Reservoir operational rule for water level control during rainy season and just before cyclone etc. **(to be provided by MCGM)**
8) Asset and population by catchments	• Population and asset data in each administrative jurisdiction (ward?) **(MCGM advised to use ward wise population)**
9) Financial Data	• Breakdown of annual expenditure for SWD works in MCGM in 10 years to confirm the financial capability of MCGM. (Not available) •
10) Economic data	• Estimated Damage Losses in 2005 and 2024 flood events to evaluate economic effects by implementing the SWD works ➢ Direct losses: sector by sector due to event (Quantities & cost in IDR)

	➢ Indirect losses ➢ Total Losses
11) Environmental protection area	• Environmental protection area in Mumbai such as area around lake, preservation of mangrove near the river mouth of Mithi River, etc. **(Coastal Management plan available on MCGM website)**
12) Regulation applied for land development	• Current rules and regulations applied for the land development • Is there any run-off regulation or restriction for the development area planned or applied in MCGM? (e.g. requirement of storage tank/pond to avoid the increase of peak run-off flow during the rainfall. •
Other information to fix the scope of work	• Encroachment is critical issue for the development of SWD facilities. Safeguard is inevitable, but how long this procedure is needed, if required. **(MCGM policy of R&R)** • How the priority of sub-project was determined in BRIMSTOWAD-II? • Which area shall be prioritized considering the flood event in 2024?

MCGM assured to provide the data mentioned in the above list.

C. The meeting ended with thanks from JST.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with officials of Haji Ali Pumping Station Municipal Corporation of Greater Mumbai (MCGM)

Subject : **MOM of the Meeting Held with officials of Haji Ali Pumping Station MCGM**

Day, Date and Time : **Friday, 06th September 2024 10:00 AM – 12:30 PM IST**

Place : **Haji Ali Pumping Station, Mumbai**

Attendance :

No.	Name	Position
MCGM		
1.	Sh. Nagpure	Engineer In Charge – Haji Ali Pumping Station
JICA HQ		
1.	Mr. Wataru KOYAMA	South Asia Division 1, South Asia Department
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed about the agenda of the meeting and specific focus on the visit and understanding the operation of the pumping station.

b. Information provided by Department:

- The pumping station will be upgraded in 2025.
- Presently 6 Pumps are installed with capacity of 6m3/sec @ 6 M static head.
- In June 2024 rains all 6 pumps were working for 2 to 3 Hrs per day.
- The pumps are working during High tide only.
- During low tide the flow is less so the discharge will took place with gravity.
- Presently 4 DGs are installed with the capacity of 1250 KvA for 3 DGs and 1 No. DG of 2000 KvA.
- All DGs will be upgraded to 2000 KvA by next year.
- The construction of this pumping station was completed in 2007.

S.No	Monsoon Year	Monsoon Duration (HH:MM:SS)
1.	2016	440:29:35
2.	2017	361:57:10
3.	2018	352:12:10
4.	2019	650:09:36

5.	2020	843:32:46
6.	2021	661:51:28
7.	2022	667:50:33
8.	2023	469:54:25

- On the day of Visit the level of Nallah was 23.75M and Sea water level was 24.53M.

C. The meeting ended with thanks from JST.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with officials of Hinda Mata Mini Pumping Station

Municipal Corporation of Greater Mumbai (MCGM)

Subject : **MOM of the Meeting Held with officials of Hinda Mata Pumping Station MCGM**

Day, Date and Time : **Friday, 06th September 2024 13:30 AM – 14:30 PM IST**

Place : **Hinda Mata Mini Pumping Station, Mumbai**

Attendance :

No.	Name	Position
MCGM		
1.	Sh. Khilari	Engineer In Charge – Hinda Mata Pumping Station
2.	Sh. Nikhil Shitey	Engineer - MCGM
JICA HQ		
1.	Mr. Wataru KOYAMA	South Asia Division 1, South Asia Department
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed about the agenda of the meeting and specific focus on the visit and understanding the operation of the pumping station.

b. Information provided by Department:

- Before the commencement of the project the inundation was for 8-10 Hrs and after commencement it reduced to 1-2 Hrs only.
- The Project was started in July 2021 and commissioned in 2022. However, the scheduled completion was planned in Oct 2024.
- Presently 7 Pumps are installed with capacity of 3000m3/Hr.
- Pit 1 is having 3 Pumps
- Pit 2 is having 4 Pumps
- The Rising Main is of MS Pipe having 1600 mm Dia.
- There are 2 Holding ponds available:
  1. PM Garden Holding pond with Capacity of 36000 m3
  2. St. Xaviers holding Pond with Capacity of 28000 m3

C. The meeting ended with thanks from JST.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with officials of Mithi River Disposal Point Municipal Corporation of Greater Mumbai (MCGM)

Subject : **MOM of the Meeting Held with officials of Meethi River Disposal Point, MCGM**

Day, Date and Time : **Friday, 06th September 2024 14:30 AM – 16:00 PM IST**

Place : **Mithi River Disposal Point , Mumbai**

Attendance :

No.	Name	Position
MCGM		
1.	Sh. Prashant Ramgude	Assistant Engineer – Meethi River Development Authority (MCGM)
2.	Sh. Nikhil Shitey	Engineer - MCGM
JICA HQ		
1.	Mr. Wataru KOYAMA	South Asia Division 1, South Asia Department
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader of JICA Survey team briefed about the agenda of the meeting and specific focus on the site visit.

b. Information provided by Department:

- The Bay area is high with the river disposal area, so during high tide there is a back water issue.
- Till Bandra Kurla Complex (BKC) it is covered with the Mangroves.
- The planning of BKC is under MMRDA
- The Departmental scope for Mithi River development during 2005 was:
    1. Flood Protection
    2. Retaining walls
    3. Deepening
    4. Widening
    5. Reconstruction of Retaining wall
    6. Service Roads

- 2006 the desilting and widening works started for short term.

- 2007 widening of Rivers and Balance works till 2013
- 2013 to 2024 Balance work with Land acquisition, and finalizing the court matters
- 2024 BMC started the work for the improvement of Non Tidal Portion

C. The meeting ended with thanks from JST.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Greater Hyderabad Municipal Corporation (GHMC) Officials

---

Subject : **MOM of the Meeting Held with GHMC Officials and Site visit**

Day, Date and Time : **Thursday, 9th Sep 2024 10:00 AM – 11:45AM IST**

Place : **5tH Floor, CE SNDP Chambers, GHMC**

Attendance :

No.	Name	Position
Greater Hyderabad Municipal Corporation (GHMC) Officials		
1.	Sh. M. Koteswara Rao	Chief Engineer, Strategic Nala Development Program (SNDP)
2.	Sh. P.V. Rao	Dy. Chief Engineer
3.	Sh. S. Bhaskar Reddy	Superintending Engineer -1, SNDP
4.	Sh. Zakir Hussain	Superintending Engineer -2, SNDP
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misaki	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)
4.	Mr. M. Anil Kumar	AGM Manager, Nippon Koei India Pvt Ltd
SNDP Consultant		
1.	S.M.Subhani	Director, NCPE Infrastructure India Pvt Ltd

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader, JST briefed about the outline and objective of Data Collection Survey on Disaster Risk Reduction Sector in India, tentative Scope of JICA Project for Hyderabad.

b. CE, GHMC has given a brief presentation covering past major floods in Hyderbad, Studies taken up on Storm water drainage in Hyderabad.

c. It was informed that after the recent floods (Oct-2020), the State Government has taken Initiative and established the Strategic Nala Development Program (SNDP) which has prepared proposals to prevent and mitigate the consequences of flooding in future.

d. CE Informed that under SNDP Phase-I, 63 No of works were taken up during 2021-22 with a cost of INR 985.55 Crores which are in the advance stage of Completion. The Proposals include construction of new drains in alternate alignment (box drains under Roads) as there is no space for expansion of existing drain.

e. Under SNDP-II Proposals for implementation of 415 No of works with Cost INR 5135.15 is made for which the State government has given administrative

Study on Data Collection Survey on Disaster Risk Reduction Sector in India
MOM of the Meeting Held with Musi Riverfront Development Corporation Ltd (MRDCL) Officials

Subject	:	**MOM of the Meeting Held with MRDCL Officials**
Day, Date and Time	:	**Wednesday, 11th Sep 2024 11:15– 11:45 IST**
Place	:	**3rd Floor, The Engineer-in-Chief, Public Health Building, AC Guards, Hyderabad**

Attendance :

No.	Name	Position
Musi Riverfront Development Corporation Ltd. (MRDCL) Officials		
1.	Ms. P. Gouthami, IAS	Joint. Managing Director
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misaki	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. M. Anil Kumar	AGM Manager, Nippon Koei India Pvt Ltd

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader, JST briefed about the outline and objective of Data Collection Survey on Disaster Risk Reduction Sector in India, and the status of Data Collection with respect to SNDP-II Project of Hyderabad.

b. Team Leader, JST enquired about the status/ Proposed Project components under Musi Riverfront Development Project with Jt. Managing Director.

c. Jt. Managing Director, MRDCL, explained the Project Components and Proposals in Musi River Front Project with the Power Point Presentation.

d. Jt. Managing Director informed that Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) has Prepared Sewerage Master Plan for HMA area and is implementing about 31 STPs in Hyderabad which are in the advanced stage of Completion. Further MRDCL will implement balance STP as per Master plan.

e. Jt. Managing Director Informed MRDCL is in talks with

(i) World Bank for funding different Project in Old City area to an extent of 500 million USD,

(ii) AIIB for Infrastructure components (Bridges) along river Musi to an extent of 500 million USD

(iii) Talks with ADB just started (MRDCL is looking for funding for

Interceptor Sewer Lines along river Musi)

f. Jt. Managing Director Informed that they are also planning for an East west Corridor along River Musi to address traffic Issues in City and Feasibility Report for the same is ready with MRDCL and they are ready to share with JICA (if required)

g. Jt. Managing Director informed that under MRDCL Consultancy Services for Preparing simulation Model for Hydraulics of River Musi from Osman sagar Dam downstream point to ORR east near Gowrelli and from Himayat Sagar Dam Downstream Point to confluence point at Bapughat is entrusted to Voyants Solutions Pvt Limited and is under Progress. Further it is advised to contact MRDCL Engineer Mr. Dattu Panthu and collect the available details pertaining to the said Study.

h. It was informed that appointment of Consultancy services for Aggregate Master Planning of the Musi Riverfront Development Project will be completed soon, and consultant will be on board by end of Sep-24.Further Jr. Managing Director informed that Draft Master Plan for Musi Riverfront Development project will be ready with 4-5 Months after board of consultant i.e., Feb-25

i. Jt. Managing Director Informed that (if required), they can share the available details of MRDCL Project with JICA to check possibility of funding MRDCL Project.

Sanction vide G.O No.760 dated 27-9-2023. Government is exploring possible financial resources and committed to providing full-fledged storm water drainage systems to Hyderabad.

f. CE GHMC informed that they are very much looking for Technical and Financial Assistance from JICA and willing to apply Japanese Technologies wherever possible in Hyderabad specifically in Management of Lakes.

g. CE also informed that Under H-CITI Project, 35 priority works (from SNDP-Phase II) are proposed to be taken up during financial year for the FY 2024-25 with special financial assistance sought from GoI for an amount of Rs. 582.42 Crores. Tenders for these 35 works will be called Soon.

h. Mr. Nishikawa, (JST) enquired whether GHMC would like to prepare Storm water Master Plan. CE informed that in all 6 Administrative Zones of GHMC with consultation with all Stakeholders proposals for Primary and Secondary drains are made by SNDP once funds are available, they will prepare DPR and call tenders for Implementation. Further CE informed that Maintenance division of GHMC will construct tertiary drains which connect to secondary drains.

i. Mr. S.M.Subhani briefed about the methodology adopted for division of catchments based on Topography based drain connectivity model (TBDC).

j. Further Mr. Subhani informed that Prioritization of the drain under SNDP is based on extensive field visits and number of meetings with field staff, Assistant engineers, Deputy executive engineers, Sanitation staff of each Zone in GHMC and ULBs in surrounding area within ORR based on the below identified problems

   ✓ Extent of inundation
   ✓ Number of days of inundation
   ✓ Number of properties and households effected due to flooding
   ✓ Reasons for inundation like missing drain links between water bodies, bottle necks in the existing drainage system

k. Mr. Nishikawa, (JST) enquired whether river MUSI HWL is considered in the design of SNDP Drains. Mr. S.M. Subhani (SNDP Consultant) confirmed that all the SNDP drains Invert Levels are higher than HWL of River Musi.

l. Design rainfall of 53mm/h was not taken into consideration an impact of climate change.

m. After the meeting, JST had a site visit along with GHMC officials to look into the ongoing and completed phase 1 works.

Study on Data Collection Survey on Disaster Risk Reduction Sector in India

MOM of the Meeting Held with Greater Hyderabad Municipal Corporation (GHMC) Officials

---

Subject : **MOM of the Meeting Held with GHMC Officials and Site visit**

Day, Date and Time : **Thursday, 10th Sep 2024 5:30 PM – 18:00PM IST**

Place : **1st Floor, Commissioner Chamber, GHMC Office**

Attendance :

No.	Name	Position
Greater Hyderabad Municipal Corporation (GHMC) Officials		
1.	Smt. Amra Pali Kata, IAS	Commissioner, GHMC
2.	Sh. M. Koteswara Rao	Chief Engineer, Strategic Nala Development Program (SNDP)
3.	Sh. S. Bhaskar Reddy	Superintending Engineer -1, SNDP
4.	Sh. Zakir Hussain	Superintending Engineer -2, SNDP
JICA Survey Team (JST)		
1.	Mr. Takamasa Nishikawa	Team Leader, JICA Survey Team (NK)
2.	Mr. Shoichiro Misak	Deputy Team Leader, JICA Survey Team (NK)
3.	Mr. Mayank Agrawal	Assistant Engineer- 1, JICA Survey Team (NKI)
1.	Mr. M. Anil Kumar	AGM Manager, Nippon Koei India Pvt Ltd

During the meeting the points of discussion held are noted as mentioned below:

a. Team Leader, JST briefed about the outline and objective of Data Collection Survey on Disaster Risk Reduction Sector in India, tentative Scope of JICA Project for Hyderabad.

b. Commissioner, GHMC informed that they are very much looking for Technical and Financial Assistance from JICA.

c. Team Leader, JST informed that PPR of Hyderabad Drainage project is to be submitted though proper Channel to JICA [Municipal Administration and Urban Development Department (MA&UD) to Department of Economic Affairs, Govt to India] and Commissioner informed that they will do the needful.

d. Commissioner, GHMC requested to shorten the Implementation schedule to the extent Possible as the Govt of Telangana want to ground the SNDP-2 Project as early as possible.

e. Chief Engineer, SNDP informed that GHMC will provide any other available information required by JST and requested to shorten the time for the extent possible for the Preparatory work/ Design period.

f. Commissioner, GHMC conveyed that from the State Governments standpoint procurement of contractors for implementation of the identified works should be finished early by Jan-27.

g. Commissioner Informed that for the FY 2024-25 35 no. of priority works out of 148 works of GHMC (From SNDP-II Proposal) with an amount of Rs. 582.42 Crores were taken up for which special financial assistance was sought from GoI.

h. Further Commissioner GHMC requested Team Leader, to suggest any ready to implement Japanese Technologies which can be adopted in Hyderabad to addresses flooding issues.