Pune River Rejuvenation Project

Detailed Project Report – Draft

Pune Municipal Corporation, Pune
HCP Design, Planning & Management Pvt. Ltd., Ahmedabad
1. Project and Study Area
2. State of Pune’s Rivers
3. Objectives
4. Master Plan
5. Project Implementation
6. Next Steps
Project Chronology

• Work order to consultant 30 Jan
• Kick off Meeting 03 Feb
• Signing of Agreement 21 Mar
• Meeting with Stakeholders 27 Apr
• Geotechnical Investigation Report 09 Jun
• Area assessment Report 04 Jul
• Topographic Survey 16 Aug
• Concept Master Plan 24 Aug
• Hydrology and Hydraulics Report 12 Sep
• Preliminary Base Map 05 Dec
• Application for EIA 20 Apr
• Draft Master Plan 12 May
• Detailed Project Report – Draft 25 Jan

2016

2017

2018
1. Project and Study Area
Project area – along 44kms of Mula, Mutha and Mula-Mutha
Study area – entire catchment upstream of Pune and impacted downstream areas

- Pawana Dam
- Khadakwasla Dam
- Panshet Dam
- Mula River
- Mutha River
- Mula-Mutha River
- Mulshi Dam
- Warasgaon Dam
- Temghar Dam
- Khadakwasla Dam
- Panshet Dam
Topographical Survey

Cantonment Area

Mula River near Under Construction Bridge

Check Dam near Cantonment Area

Mula River near Shanti Nagar Bridge
The various details that were mapped in topographical survey have been enlisted below:

**River bed**
- Spot levels
- Contours
- River bottom and top edge
- Location and details of piped outfalls, drainage pipelines and manholes
- Culverts
- Bridge - column details, bridge top level, soffit level
- Check dam
- Weir
- Barrage
- Ghats & steps
- Temple, Visarjan tanks and Otta

**Surrounding area**
- Spot Levels
- Contours
- Building Height
- Permanent structures/ buildings/otta/shed
- Fences
- Retaining walls/ embankment wall
- Compound walls
- Footpath
- Location of nallas
- Location of manholes
- Trees – type and diameter of trunk
- Light poles
- Electric poles
- Sub station
- High tension lines
- Road
- Railway Tracks
Geo Technical Investigation - Bore Hole Locations
Geo Technical Investigation - Sample Collection and Analysis

Site Work near Mula River on April 13, 2016

Site Work near Mula River on April 11, 2016

Checking of Bore Log Samples

Specific Gravity Test
The investigation data, findings and recommendations have been incorporated in the report submitted on June 11, 2016.
Hydrology and Hydraulics Study - Meeting with Irrigation Department and CWPRS Officials

Meeting with CWPRS and Irrigation Department on 15 June, 2016

Meeting with Irrigation Department on 5th December, 2016

Meeting with CWPRS on 1st February, 2017

Meeting with CWPRS on 13th February, 2017
Riverfront Development Plan for Mula, Mutha and Mula-Mutha Rivers
Hydrology and Draft Hydraulic Report

Date: September 12, 2016

CLIENT: Pune Municipal Corporation (PMC), Pune

CONSULTANT: SCP Design, Planning and Management Pvt. Ltd., Ahmedabad

TECHNICAL CONSULTANT: Advance Engineering Consultant

COVID-19

Central Water and Power Research Station

Ministry of Water Resources, River Development & Ganga Rejuvenation

Government of India

Ministry of Finance

December 2017

Hydrology and Hydraulics Study – Approval by CWPRS, Pune

Sir,

Shri Shivas Bomsa
Chief Engineer
Pune Municipal Corporation
Swamraju Bhavan
Shivajinagar, Pune – 411 005

Ref:

1. PMC letter No. 114 dated 29.09.2017
2. Letter from PMC No. PMC/299 dated 05 December 2017

Sirs,

CWPRS have examined the hydrology and hydraulics report on Mula-Mutha river in context of River Front Development (RFD) planning as requested by PMC. The observations and suggestions of CWPRS during the course of interaction in this regard were addressed by the consultants of PMC. In principle, the report has taken into consideration the requisite aspects.

CWPRS being the premier research institute in hydraulics and conducting research in water resources development and water borne transport has also made an observation on the river ecology as the issue to be tackled for the post RFD scenario and the same was communicated to PMC. It appears that, this issue is also being addressed by PMC in a comprehensive manner under the umbrella of JICA report on Mula-Mutha.

In light of the above facts, CWPRS clears the report on hydrology and hydraulics of Mula-Mutha as regards RFD project.

This issues with the approval of Director, CWPRS.

Shri Shivas Bomsa
Chief Engineer

Pune Municipal Corporation

Shivajinagar, Pune

December 2017
Baseline Monitoring

Noise monitoring done for EIA

Air monitoring done for EIA

Image showing collection of water samples

Image showing air monitoring
Opinion Survey – Survey Locations
Public Consultation
Meetings held with various stakeholders

Meeting on 9 March, 2016 with SE, Irrigation Dept.

Meeting on 11 June, 2016 with MLA

Meeting on 11 June, 2016 with Press Media

Meeting on 18 Aug, 2016 with NGOs

Meeting on 5 July, 2017 with Standing Committee

Meeting on 31 July, 2017 with NGO
## Public Consultation

Meetings held with various stakeholders

### List of key stakeholder meetings for Mula, Mutha, and Mula-Mutha River Development Project, Pune

<table>
<thead>
<tr>
<th>Date</th>
<th>Action Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-Dec-16</td>
<td>Meeting with Municipal Commissioner, PMC and Settlement Commissioner, Land Records Dept.</td>
<td>To discuss the draft preliminary base map and further process for finalization of the base map.</td>
</tr>
<tr>
<td>9-Jan-17</td>
<td>Meeting of CWPRS, PMC and HCPDPM</td>
<td>For discussion of Hydrology and Draft Hydraulics Report and their inputs.</td>
</tr>
<tr>
<td>1-Feb-17</td>
<td>Meeting of Director, CWPRS, PMC and HCPDPM</td>
<td>For technical vetting to be carried out by CWPRS</td>
</tr>
<tr>
<td>13-Feb-17</td>
<td>Meeting of CWPRS, PMC and HCPDPM</td>
<td>Regarding their observations and issues about the study of the Hydrology and Draft Hydraulics</td>
</tr>
<tr>
<td>1-Mar-17</td>
<td>Meeting with Deputy Director, Land Records Dept.</td>
<td>Regarding further steps for Mojani Procedure</td>
</tr>
<tr>
<td>8-Mar-17</td>
<td>Meeting with Hon. Municipal Commissioner, PMC</td>
<td>Regarding Cost of Project, Priority Projects, Implementation strategies, Funding mechanism for the project</td>
</tr>
<tr>
<td>9-Mar-17</td>
<td>Meeting with CWPRS</td>
<td>Regarding discussion of observations and issues about the study of the Hydrology and Draft Hydraulics for the Pune Riverfront Project</td>
</tr>
<tr>
<td>17-Mar-17</td>
<td>Meeting with PMC, Hon. Municipal Commissioner, DIP Cell</td>
<td>Regarding status update, revenue generation, further steps for ground truthing, finance mechanism</td>
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<tr>
<td>29-Jun-17</td>
<td>Meeting with Expert Appraisal Committee, MOEFCC</td>
<td>A presentation to committee for seeking Terms of Reference (TOR) for EIA procedure</td>
</tr>
<tr>
<td>4-Jul-17</td>
<td>Meeting with Members of Standing Committee of PMC and PCMC</td>
<td>To give a discuss the Draft Master Plan and get suggestions</td>
</tr>
<tr>
<td>5-Jul-17</td>
<td>Meeting with Mayor, PMC and PCMC and the Members of Legislative Assembly</td>
<td>To discuss the Draft Master Plan and get suggestions</td>
</tr>
<tr>
<td>31-Jul-17</td>
<td>Meeting with Parineeta Dandekar, NGO representative</td>
<td>To discuss the Draft Master Plan and get suggestions</td>
</tr>
<tr>
<td>29-Aug-17</td>
<td>Meeting with DSLR, Land Records Dept.</td>
<td>Regarding the status of Final base map</td>
</tr>
<tr>
<td>7-Sep-17</td>
<td>Meeting with Director, CWPRS</td>
<td>For the approval of the draft Hydrology and Hydraulics Report</td>
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</tbody>
</table>
The combined approved base map prepared by HCPDPM and submitted to Departments of Land Records for review, verification and approval.
Base Map Preparation
Meeting with Land Record Department Officials on 1\textsuperscript{st} September, 2016

Discussion with Mr. M.B. Patil, District Superintendent of Land Records on December 28, 2016 for next steps of finalization of base map
2. State of Pune’s Rivers
Pune’s rivers – a place for dumping garbage
Pune’s rivers – fed by sewage and garbage from nallas
Pune's rivers – around 252 MLD of untreated sewage
Pune’s rivers – piecemeal, haphazard infrastructure
Pune’s rivers – a place for dumping construction debris
Pune’s rivers – uncoordinated bridge construction
Pune’s rivers – where the edges are private and the banks are inaccessible
Pune’s rivers – a barrier that divides Pune
Pune’s rivers – dry most of the year
Pune’s rivers – a neglected asset that the city has turned its back to
Problems and Causes

1. Pollution and flooding
   i. The river is polluted because of incomplete sewerage network and inadequate sewage treatment.
   ii. The river floods because of inadequate flood protection measures

Completion of sewage, sewage treatment and flood protection works is urgently needed
Problems and Causes

2. Garbage/debris dumping and encroachment
   
   i. Lack of public access along the entire length of the rivers makes it easy to misuse the rivers - garbage dumping, encroachment, crime, parking, etc.
   
   ii. Lack of clear boundaries makes it difficult to monitor the rivers

For a well managed river, creating a public realm along the river is absolutely essential
City has expanded into areas not inundated by the normal monsoon flow.
Periodic threat of flooding
Understanding the threat of flooding
Understanding the threat of flooding
Threat of flooding
River land boundary as per revenue records
100 year and 25 year inundation lines
Land owner’s do not agree – they accept the flood risk and want flood protection measures.
Land that will be inundated in a 100yr peak flood is in many places privately owned (1238 Ha.)
Problems and Causes

4. 1238 Ha. privately owned land (351 Ha. of it developed) within red/blue inundation boundaries
   i. Land that will be inundated in a 100yr peak flood is in many places privately owned (1238 Ha.)
   ii. Some people want all such land to remain undeveloped or to be acquired
   iii. Land owner’s do not agree – they accept the flood risk and want flood protection measures
   iv. Dismantling existing developments in inundation areas is very difficult
   v. Acquiring all private properties within inundation lines is a huge financial and governance challenge

The overlap of privately owned land and land within inundation boundaries should be removed without the use of acquisition and without lowering the flood carrying capacity of Pune’s rivers
Problems and Causes

5. Piecemeal approach to river development
   i. Uncoordinated, piecemeal bridge, weir, check-dam and embankment building has reduced the flood carrying capacity of the river
   ii. Un-thoughtful channelization in Mutha river has marred Pune’s rivers
   iii. Exposed interceptor sewage lines and manholes obstruct floods, appear unhygienic and are easily damaged
   iv. Uncoordinated piecemeal development of ghats and gardens have done little to improve the condition of Pune’s rivers
   v. Un-thoughtful use of river banks for streets/ parking have marred Pune’s rivers

Development of Pune’s rivers requires a comprehensive planning approach that:
- Tackles causes not symptoms
- Is phased and financially viable
3. Objectives
**Objectives**

1. **Clean the River and make it pollution free**
2. **Reduce risk of flooding**
3. **Create a continuous public realm along the river**
4. **Retain water**
5. **Improve city’s access to the riverfront**
6. **Integrate heritage structures, current activities, parks and gardens**
1. Complete sewerage network – existing nallas and piped outfalls connecting to the river
1. Complete sewerage network – existing sewer lines
1. Complete sewerage network – sewer lines proposed under JICA

- Nallas without existing sewer line
- Piped outfalls without existing sewer lines
- Sewer lines proposed under JICA
1. Complete sewerage network – proposed sewer line to curb the outfalls

Approximately 23 km of Trunk lines need to be constructed along the river to curb the existing piped outfalls.
2. Improve interceptor sewer – multiple sewer lines along the river
2. Improve interceptor sewer – existing condition
2. Improve interceptor sewer – shift sewer lines closer to the edge of river land
3. Augment treatment capacity – untreated sewage discharged into the river
3. Augment treatment capacity – existing sewage treatment plants

- Existing STP
  - 30 MLD
  - 18 MLD
  - 8 MLD
  - 17 MLD
  - 15 MLD
  - 130 MLD
  - 45 MLD
  - 40 MLD
  - 50 MLD
  - 32 MLD
  - 20 MLD

- MLD: million liters per day
3. Augment treatment capacity – proposed STP under JICA and NRCD
3. Augment treatment capacity – proposed STP under riverfront development
3. Augment treatment capacity – tertiary treatment - phytorid beds

Schematic diagram of the Phytorid system

Phytorid beds at Rainbow Drive, Sarjapura Road, Bangalore

Phytorid beds at Rainbow Drive, Sarjapura Road, Bangalore
3. Augment treatment capacity – location of tertiary treatment facility for STPs
3. Augment treatment capacity – treatment locations of major nallas

![Map showing proposed outfall treatment locations of major nallas.](image-url)
Objectives

1. Clean the River and make it pollution free
2. Reduce risk of flooding
3. Create a continuous public realm along the river
4. Retain water
5. Improve city’s access to the riverfront
6. Integrate heritage structures, current activities, parks and gardens
Normal monsoon flow
Area inundated under peak flood – obstructions to the flow of water
Obstructions to the flow of water (as identified in the Final Hydrology and Hydraulics Report approved by CWPRS, Pune):
- Water Retention structures - weirs, check dams
- Low level bridges
- Structures like visarjan tanks
- Infrastructure elements like manholes, pipelines, etc.
- Rocky protrusions
- Silt and construction debris
- Low lying roads within the river bed
Removal of obstructions - reducing HFL

River land boundary

Existing HFL

Lowered HFL

Inundation area

Private land

River Land
Proposed HFL

Proposed red line

Proposed blue line

Inundation area

River land boundary

Private land

River Land
Defining Embankment Types

A. Sparsely developed areas – Rural Riparian Embankment

B. Moderately developed areas – Urban Riparian Embankment

C. Intensely developed areas – Engineered Embankment
Sparsely developed surrounding areas
Rural Riparian Embankment – Existing

- Private Property
- Inaccessible public land
- Barren edge
- Polluted water
- Sewage
Rural Riparian Embankment – Proposed

- Plantation
- Accessible public green space
- Pedestrian path
- Green space
- Natural edge
- Clean and retained water
Rural Riparian Embankment – Examples

River Teme, United Kingdom

South Waterfront park, Portland

Merri creek trail, Melbourne, Australia
Moderately developed surrounding areas
Urban Riparian Embankment – Existing

- Private property
- Inaccessible banks
- Sewage outfalls
- Polluted water
Urban Riparian Embankment – Proposed

- Private property
- Continuous public access
- Lower level walkway
- Access steps
- Green edge
- Clean and retained water
Urban Riparian Embankment – Examples

Kamo river, Kyoto

Trnovski pristan, Ljubljaana

Yanweizhou riparian wetlands, Jinhua city, China
Urban Riparian Embankment Type II – Proposed

- Private property
- Continuous public access
- Lower level walkway
- Access steps
- Green edge
- Clean and retained water
Urban Riparian Embankment Type III – Proposed

- Private property
- Lower level walkway
- Pitching
- Access steps
- Clean and retained water
Intensely developed surrounding areas
Urban Section – Existing

- Private Property
- Existing retaining wall
- Existing drainage manhole
- Inaccessible land
- Narrow channel
- Polluted water
Urban Section – Proposed

- Proposed Upper Promenade
- Proposed Lower Promenade
- Interceptor Sewer
- Private Property
- Access Points
- Clean and retained water
Urban Section – Examples

- Tiber river, Rome
- Schuylkill trail, Philadelphia
- Seine, Paris
Embankment Types

<table>
<thead>
<tr>
<th>Embankment Type</th>
<th>Length</th>
<th>79% green embankments</th>
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</thead>
<tbody>
<tr>
<td>Rural Riparian</td>
<td>33.9 km</td>
<td>(37%)</td>
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<tr>
<td>Urban Riparian</td>
<td>38.8 km</td>
<td>(42%)</td>
</tr>
<tr>
<td>Engineered</td>
<td>19.8 km</td>
<td>(21%)</td>
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Landscape Strategy

1. Tall grass near the river bed
2. Grass on the pitching

1. Tall Grass near the river bed: Saccharum Spontaneum

2. Grass on the pitching: Vetiver Grass in just 90 days after planting
1. Trees on the pitching (slope- 1:3) preferably along trails
2. Shrubs at the junction of promenade and pitching
1. Trees on Upper Promenade
   Cananga odorata Tree
   Canopy height 6-8 mts Canopy dia. 4-5 mts

2. Trees on Lower Promenade
   Mangifera indica Tree
   Canopy height 10-12 mts Canopy dia. 6-8 mts
Objectives

1. Clean the River and make it pollution free
2. Reduce risk of flooding
3. Create a continuous public realm along the river
4. Retain water
5. Improve city’s access to the riverfront
6. Integrate heritage structures, current activities, parks and gardens
Neglected banks

Mula River

Mutha River

Mula Mutha River
Continuous public realm

Rural Riparian

Urban Riparian

Urban Section

Upper Promenade

Pedestrian Path

Upper Promenade

Lower Promenade

Upper Promenade

Lower Promenade
Continuous public realm along the river through embankment
Existing condition

- STP Outfall
- Inaccessible banks
- Dry River Bed
- Inaccessible banks
Continuous public realm – proposed

- Upper Level Promenade
- Pitching/ with Green cover
- Accessible Banks
- Lower Level Promenade
- Jetty
- Cleaned water retained by check dams
Continuous public realm – proposed
Continuous public realm – example

Seine, Paris

Paris Plages

Brush Creek, Kansas City
Visarjan tanks – existing

Visarjan Tank at Mahtoba Garden, Mula
Visarjan Tanks near Bund Garden bridge, Mula-Mutha
Visarjan Tank near Aundh Ravet bridge, Mula
Visarjan Tanks near S.M Joshi Bridge
Visarjan tanks – existing

Existing Immersion Tanks

Existing Visarjan tanks: 16
Proposed Visarjan tanks: 39

Visarjan tanks – proposed

- Proposed Immersion Tanks
- Existing Immersion Tanks
Visarjan tanks – proposed
Visarjan tanks - proposed

Upper Level Promenade
Engineered section retaining wall
Lower Level Promenade
Clean retained water
Ghats – existing

Dnyaneshwar Ghat, Khadki cantonment - Mula river

Ahilyabai Holkar Ghat, Sangam - Mutha River

Ghats near Alka Talkies - Mutha River

Ghat near Z Bridge, Mutha River
Ghats – existing

- Visarjan ghat near Kharadi
- Ganpati Visarjan near Baba Bhide bridge - Mutha, September 2016
- Ganesh Visarjan in Mula-Mutha River
- Visarjan ghat near Kharadi
Ghats – proposed

Proposed ghats: 50

Proposed ghats:

Mula

Existing ghats:

Mula

Pawana

Mula-Mutha

Mutha
Dnyaneshwar ghat – existing
Dnyaneshwar ghat – Ganesh visarjan activity
Ghats – existing

- Underutilized banks
- Omkareshwar temple
- Narrow polluted water channel
Ghats – proposed

- Omkareshwar temple
- Clean Retained water
Access – existing

Access steps near Shinde bridge, Mutha river

Access steps near Dengale bridge, Mutha river

Access near Z Bridge, Mutha river

Access ramp near Dengale bridge, Mutha river
Access – existing

Existing access points: 53
Proposed access points: 270
Access – proposed

Upper Promenade
Sloped Walkway
Lower Promenade

Upper Promenade
Access Steps
Lower Promenade

Upper Promenade
Historic Wall
Lower Promenade

Upper Promenade
Ramp
Lower Promenade
Access Steps
Objectives

1. Clean the River and make it pollution free
2. Reduce risk of flooding
3. Create a continuous public realm along the river
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6. Integrate heritage structures, current activities, parks and gardens
Dry – Mutha river looking towards Z bridge
Dry - Mula-Mutha River from Kalyaninagar bridge
Water retention structures – existing
Water retention structures – proposed

- Near KT weir
- Near Bund Garden
- Near Garware bridge

Existing Weir/ Check dam/ Barrage to be upgraded

Proposed Barrage
Water retention structures – proposed

Near KT weir
Near Bund Garden
Near Garware bridge
Near Cantonment

Stretch 3
Stretch 4
Stretch 5

Mula
Mula-Mutha

Existing Weir/ Check dam/ Barrage to be upgraded
Proposed Barrage

0 0.5 1 2 KM
Longitudinal section – existing Mula, Mutha and Mula-Mutha river

Key Map

Confluence of Pawana and Mula River

Confluence of Mula and Mutha River

Mula River

22.2 km

Mula – Mutha River

11.8 km

Wadgaon Bypass Bridge

Confluence of Mula and Mutha River

Mutha River

10.4 km

Mula – Mutha River

11.8 km

Key Map

- Existing Red Line
- Existing Blue Line
- Existing Bridge
- Existing Bridge to be removed/upgraded
- Barrage
Longitudinal section – proposed Mula, Mutha and Mula-Mutha river

Key Map:
- Proposed Embankment Line
- Proposed Red Line
- Proposed Blue Line
- Existing Bridge
- Proposed Bridge
- Existing Bridge to be removed/upgraded
- Barrage

Confluence of Pawana and Mula River: 22.2 km

Confluence of Mula and Mutha River: 11.8 km

Wadgaon Bypass Bridge

Mula River: 10.4 km

Mula-Mutha River: 11.8 km

K.T. Weir, Shaniwar

22.2 km

11.8 km

22.2 km

11.8 km
Boating facilities – existing

COEP Boat club- Mula

Boating facilities near Mula Pawana Sangam

Annual Regatta Boating Festival organized at Royal Connaught Boat Club, Sangamvadi, Pune by COEP Students

Boating facilities – existing

Existing boating facilities: 2
Boating facilities – proposed

Proposed boating facilities: 16
Cleaning, Aeration and Maintenance

Example - Trash Skimmer, Example – Yamuna river

Figure 4.80: Images showing examples for cleaning, aeration and maintenance
Boating facilities – proposed

Sambhaji baug, Mutha

Kalyani nagar bridge, Mula - Mutha

Shantinagar, Mula
Objectives

1. Clean the River and make it pollution free
2. Reduce risk of flooding
3. Create a continuous public realm along the river
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6. Integrate heritage structures, current activities, parks and gardens
Bridges

Maharshi Shinde Bridge - Mutha River

Kakasaheb Gadgil Bridge (Z Bridge) - Mutha River

Shivaji Bridge - Mutha River

New Yerwada Bridge - Mula Mutha River
Bridges – existing

- Railway Bridge
- Vehicular Bridge
- Pedestrian Bridge
- 2-Wheeler Bridge

Distances:
- 3.12 km
- 3.15 km
- 2.5 km
Bridges – proposed

- Upgradation of Bridges
- Proposed Bridge
- Existing Bridges
- Lifting of Bridges as per hydraulic study
- Proposed pedestrian bridges
- Proposed Bridge

0 0.5 1 2 KM
Roads to be removed and alternative roads to be strengthened

Low-lying River side road along Mutha River

Low-lying Road along Mutha River (August, 2016)

Low-lying road getting submerged during monsoon along Mutha River near Omkareshwar Temple (August, 2016)
Roads to be removed and alternative roads to be strengthened

- Roads to be Removed
- Roads to be Strengthened
- Existing Road network
- Roads outside Project Boundary
Objectives

1. Clean the River and make it pollution free
2. Reduce risk of flooding
3. Create a continuous public realm along the river
4. Retain water
5. Improve city’s access to the riverfront
6. Integrate heritage structures, current activities, parks and gardens
Heritage structures – existing

Shivaji Bridge

Holkar Bridge on Mula River

Nanasheb Peshwa Samadhi on Mutha River

Shanivanwada
Ghorpade ghat – existing
Ghorpade ghat – morning view with yoga and jogging activity
Integrating heritage structures – view of historic wall from Dengale bridge

- Existing Heritage wall
- Huge manholes
- Narrow polluted water channel
- Neglected banks
- Existing Ramp
Integrating heritage structures – view of historic wall from Dengale bridge

- Green areas
- Cycle track
- Ghats
- Clean retained water
- Boating facilities
- Pitching
- Lower level Promenade
- Access steps
- Integration of Historic wall
Integrating heritage structures – view of historic wall from Dengale bridge
Integrating heritage structures – view of historic wall from Dengale bridge

Green areas
Cycle track
Ghats
Clean retained water
Boating facilities
Integrating heritage structures – view of historic wall from Dengale bridge
Integrating heritage structures – view of historic wall from Dengale bridge
Gardens – existing

- Bund Garden along Mula-Mutha River
- Nana Nani Udyan along Mutha River
- Botanical Garden along Mula river
- Sambhaji Garden along Mutha river
The total area of existing gardens is **82.45Ha**.
Integrating existing gardens with the riverfront project

- Botanical garden
- Rural Riparian
- Mula River
Integrating gardens – existing
Integrating gardens – proposed

Proposed red line
Proposed blue line

River
River Land

Rural riparian
Promenade

Botanical garden
Public land
Sambhaji udyan – existing
Religious places – existing

Vriddheswar Temple - Mutha River

Omkareshwar Temple - Mutha River

Vitthalwadi Temple - Mutha River

Temple near Rajiv Gandhi bridge, Mula River
Religious places – existing

Existing temples: 18
Omkareshwar Temple – existing
Omkareshwar Temple – morning activities along the proposed ghat and temple access
Crematoriums and burial grounds - existing

Crematorium near Mumbai Pune Bypass - Mutha River

Crematorium near Shivaji Maharaj Bridge - Mula River

Burial Ground, Khadki cantonment - Mula River

Crematorium Near Wakad ByPass Mula River
Crematoriums and burial grounds – existing

Existing crematoriums and burial ground: 18
Crematoriums and burial grounds – existing

- Existing Crematorium
- Sewage Outfalls
- Existing steps leading to the river
- Polluted Water
Improved steps and ghats leading to the river
Clean and retained water

Crematoriums and burial grounds – existing

Existing Crematorium
Upper Walkway
Lower Walkway
Improved steps and ghats leading to the river
Clean and retained water
Eateries – existing

Eateries near Z-Bridge
Existing Eateries: 5
Eateries – proposed

Proposed Eateries: 11

Existing Eateries:

0
0.5
1
2
KM

Proposed Eateries
Existing Eateries
Z Bridge – organized eateries
Eateries – existing

- Inaccessible banks
- Dry River Bed
4. Master Plan
<table>
<thead>
<tr>
<th>Description</th>
<th>Area (Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>River Land</td>
<td>687</td>
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<td>River Section</td>
<td>526</td>
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<tr>
<td>Total area under Embankment</td>
<td>180</td>
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<tr>
<td>Minimum land to be acquired to</td>
<td>81</td>
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<tr>
<td>ensure continuous embankments</td>
<td></td>
</tr>
<tr>
<td>Balance land for Public amenities</td>
<td>62</td>
</tr>
<tr>
<td>Project Area</td>
<td>768</td>
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</table>
Embankments

River Land: 687 Ha
River Section: 526 Ha
Total area under Embankment: 180 Ha
Minimum land to be acquired to ensure continuous embankments: 81 Ha
Balance land for Public amenities: 62 Ha
Project Area: 768 Ha
Area acquired for embankment continuity

- River Land: 687 Ha
- River Section: 526 Ha
- Total area under Embankment: 180 Ha
- Minimum land to be acquired to ensure continuous embankments: 81 Ha
- Balance land for Public amenities: 62 Ha
- Project Area: 768 Ha
Balance land for Public Amenities

- River Land: 687 Ha
- River Section: 526 Ha
- Total area under Embankment: 180 Ha
- Minimum land to be acquired to ensure continuous embankments: 81 Ha
- Balance land for Public amenities: 62 Ha
- Project Area: 768 Ha
There is not much land available for further development...
Proposed land use

- Plaza
- Food court
- Crematorium
- Temple ghat
- Ganesh visarjan
- Parking
- Dhobi ghat
- Plaza
- Food court
- Crematorium

Amenities

- Gardens/Urban Forest/Open grounds

64% 19% 17% 74% 26%
Proposed greens – Gardens, Urban forests, Open grounds

Percentage of remaining land under proposed greens – gardens, urban forests, open ground 74%
Strategy for Urban Forests

Example of urban forest in Portland, Oregon
Example of riverfront park: Georgetown Waterfront Park Washington DC, United States
Strategy for Open Grounds

Example of open grounds: Corregidor Island, Philippines
Proposed amenities – temple ghats, visarjan, parking facility, public plaza, food courts

Percentage of remaining land under proposed greens – gardens, urban forests, open ground

74%

Percentage of remaining land under amenities – ghats, visarjan, parking facility, public plaza, food courts

26%
5. Project Implementation
Status of Work

PART 1 – FEASIBILITY STUDY

Kick off meeting
Task Review+
Project Scheduling

Topographical Survey ✔
Geotechnical Investigation ✔
Hydrology & Hydraulics ✔
Area Assessment ✔
Environmental Monitoring ✔

Vision & Objectives Identification ✔

Public Consultation-1 (Opinion Survey) ✔

Existing Condition Analysis

Master Plan

Concept Master Plan ✔

Base Map ✔

Public Consultation-2 (Expert’s Discussion & Workshop) ✔

PART 2

DETAILED DESIGN AND IMPLEMENTATION OF PROJECT

Draft Master Plan ✔

Draft EIA ✔

Draft DPR ✔

Final EIA

Final DPR

Statutory Approvals

Statutory Approvals

SPV Formation
**Priority Project Stretches**

- **Project Stretch – 1**
  - Aundh Baner Smart City Area – 6.32 km
  - Cost: 153 Cr.

- **Project Stretch – 2**
  - Kharadi Area – 7.2 Km
  - Cost: 290 Cr.

- **Project Stretch – 3**
  - Sangam to Lakadi Pul Area – 5.3 km
  - Cost: 80 Cr.

- **Project Stretch – 4**
  - Bund Garden Area – 6.54 km
  - Cost: 119 Cr.
<table>
<thead>
<tr>
<th>Sr No.</th>
<th>Particular</th>
<th>Amount (in Rs. Crores)</th>
<th>% of Total Cost</th>
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<td>River-Edge Protection</td>
<td>1,245</td>
<td>48</td>
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<tr>
<td>B</td>
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<td>287</td>
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<tr>
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<td>E</td>
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<td>93</td>
<td>4</td>
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<tr>
<td>F</td>
<td>Landscape</td>
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<tr>
<td>L</td>
<td><strong>Total Cost</strong></td>
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<td><strong>100.00%</strong></td>
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## Cost break up for rivers

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<td>100</td>
<td>74%</td>
<td>11%</td>
<td>15%</td>
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</table>
Project Finance

- To assess the possibility of the project being self-sustained
- To explore the various components for generating the finance
## Project Finance

### Revenue Sources

<table>
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<th>Components</th>
<th>By statutory classification</th>
<th>By Status of development</th>
<th>By ownership</th>
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<td>Between blue and red line</td>
<td>Outside Red Line between Influence line</td>
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<td>Planning Fee</td>
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<td>FSI/ TDR Import</td>
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<td>Change of restrictive zones / use</td>
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<tr>
<td>Land Development Rights</td>
<td>73 Ha that is available has been taken even though about 50% of it is Government land</td>
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<td></td>
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</table>

Above is based on preliminary assessment – indicative only
Project Finance

Expenditure

- The total time line for the project is envisaged for 10 years
- Three phases for capital expenditure, starting in Year 1, Year 4 and Year 7 respectively
- First two phases (Year 1 & Year 4) are three years each. Last phase (Year 7) is four years
- 10% of the capital cost is incurred in each year of the capital expenditure
- 1% per year is incurred on maintenance expenditure
- Annual escalation of 4% on the cost of capital expenditure and O & M expenditure
Project Finance

Approach

- Phase I to be financed by PMC+PCMC and borrowing
- Project completion will increase attractiveness of land sale and drive up the rates
- Land development right from Year 4 will finance Phase II expenditure
- Revenues from levies will meet operating costs and start generating surplus to finance
- Phase III; any borrowing for Phase III can be repaid through future surplus
- Guiding Principle – PMC + PCMC support is less than 100 crores per year
Project Finance

Financing

- PMC & PCMC support the project in proportion to the capital cost and potential revenue share in their respective areas

- Equity contribution – in proportion to share of urban infrastructure, bridges, access and ghat works (common areas and facilities for whole city)

- Contribution of land proceeds as equity – ULB/ Govt land will be provided as equity

- Annual grant – Rs 100 crores per year from year 4 for eight years. If land proceeds or revenue growth is better than assumed, this support will not be necessary.

- Interest rate assumed at 10% p.a
6. Next Steps
Status of Work

PART 1 – FEASIBILITY STUDY

Kick off meeting
Task Review+
Project Scheduling

Topographical Survey
Geotechnical Investigation
Hydrology & Hydraulics
Area Assessment
Environmental Monitoring
Vision & Objectives Identification
Public Consultation-1 (Opinion Survey)

Existing Condition Analysis

Draft Master Plan

Concept Master Plan

Partnership Establishment

Draft DPR

Final DPR

Statutory Approvals

Statutory Approvals

Draft EIA

Final EIA

Draft DPR

Final DPR

SPV Formation

PART 2

DETAILED DESIGN AND IMPLEMENTATION OF PROJECT
Next Steps

1. Clearance from Irrigation department
2. Final base map
3. Final EIA
4. SPV formation
5. Land transfer
SPV formation
Formation and Structure

Following are the steps for formation of the SPV

1. Identification of Board of Directors
2. Application for Director’s Identification Number (DIN)
3. Application for name of Company
4. Memorandum of Association and Articles Association
5. Registration for various taxes
6. Obtaining the Certificate of Incorporation
SPV formation
Formation and Structure

Example organization chart identifying selected board of directors for Special Purpose Vehicle for Sabarmati Riverfront Development Project.
**SPV formation**

**Formation and Structure**

Example organization chart identifying selected board of directors for Special Purpose Vehicle for Sabarmati Riverfront Development Project.

Suggested sample organization chart identifying board of directors for Special Purpose Vehicle for Pune Riverfront Development Project.
Approvals required from Hon. Standing Committee, PMC and Hon. General Body, PMC

1. Approval of the DPR – Draft
2. Formation of SPV
3. Land Transfer to SPV
4. Empowerment of SPV to raise financial capital for execution and maintenance
Thank you