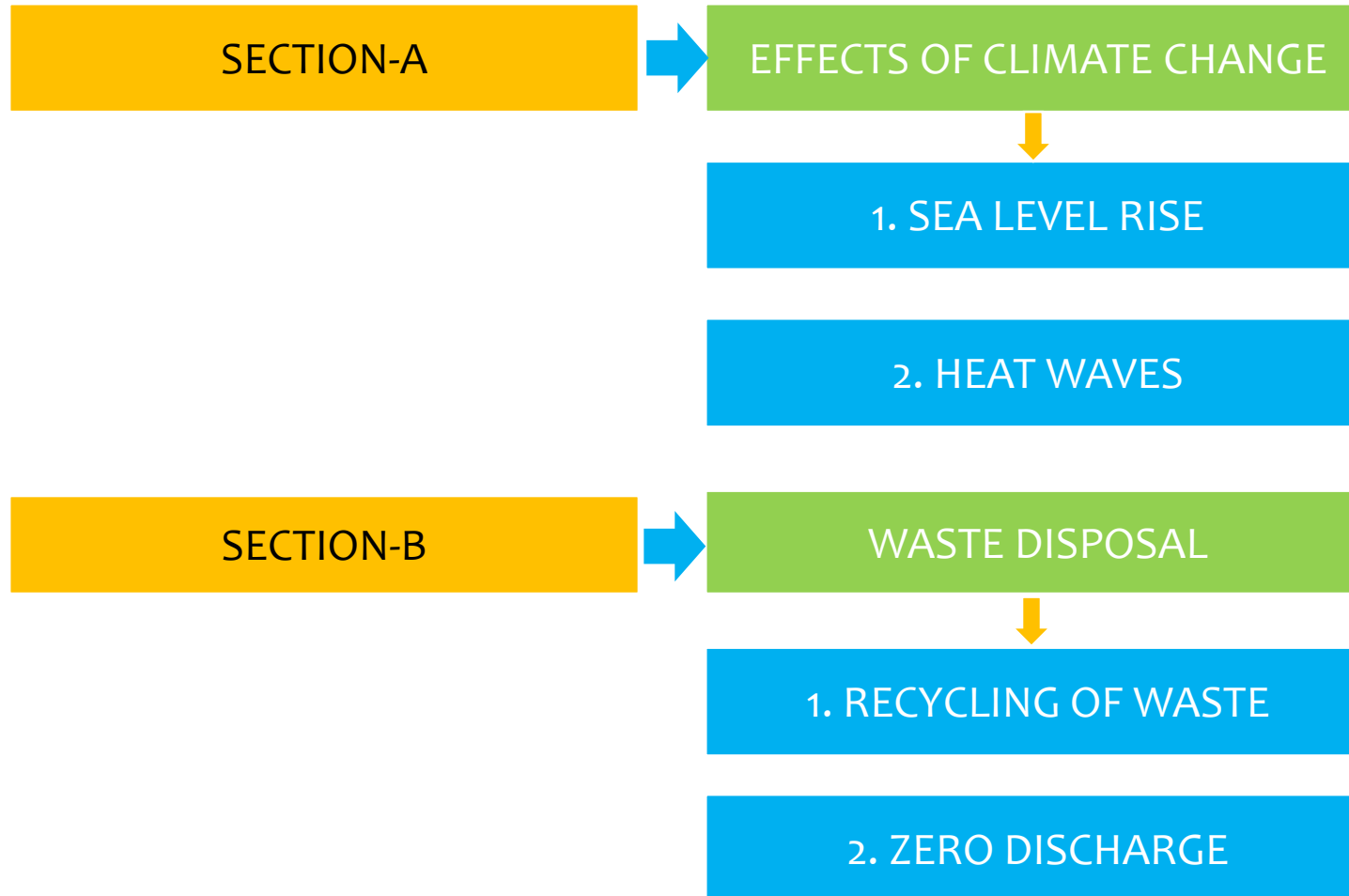


FROM RISK TO RESILIENCE: BUILDING FOR FUTURE

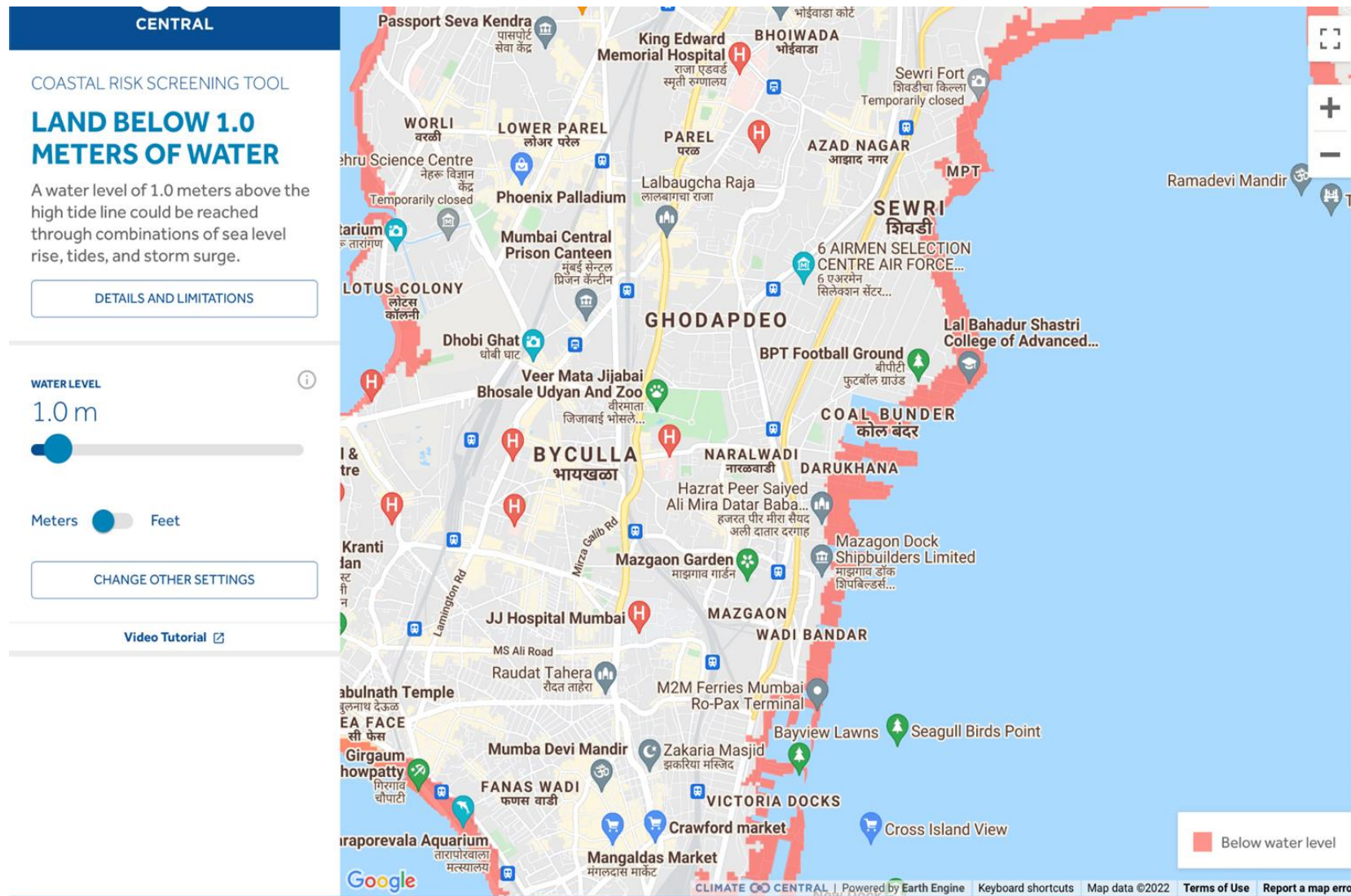


PRESENTATION OUTLINE



MEASURES TO PREVENT RISE IN SEA LEVEL

LAND PROJECTED TO BE BELOW ANNUAL FLOOD LEVEL IN 2050



(Source: Nasa Sea Level Rise Tool 2022)





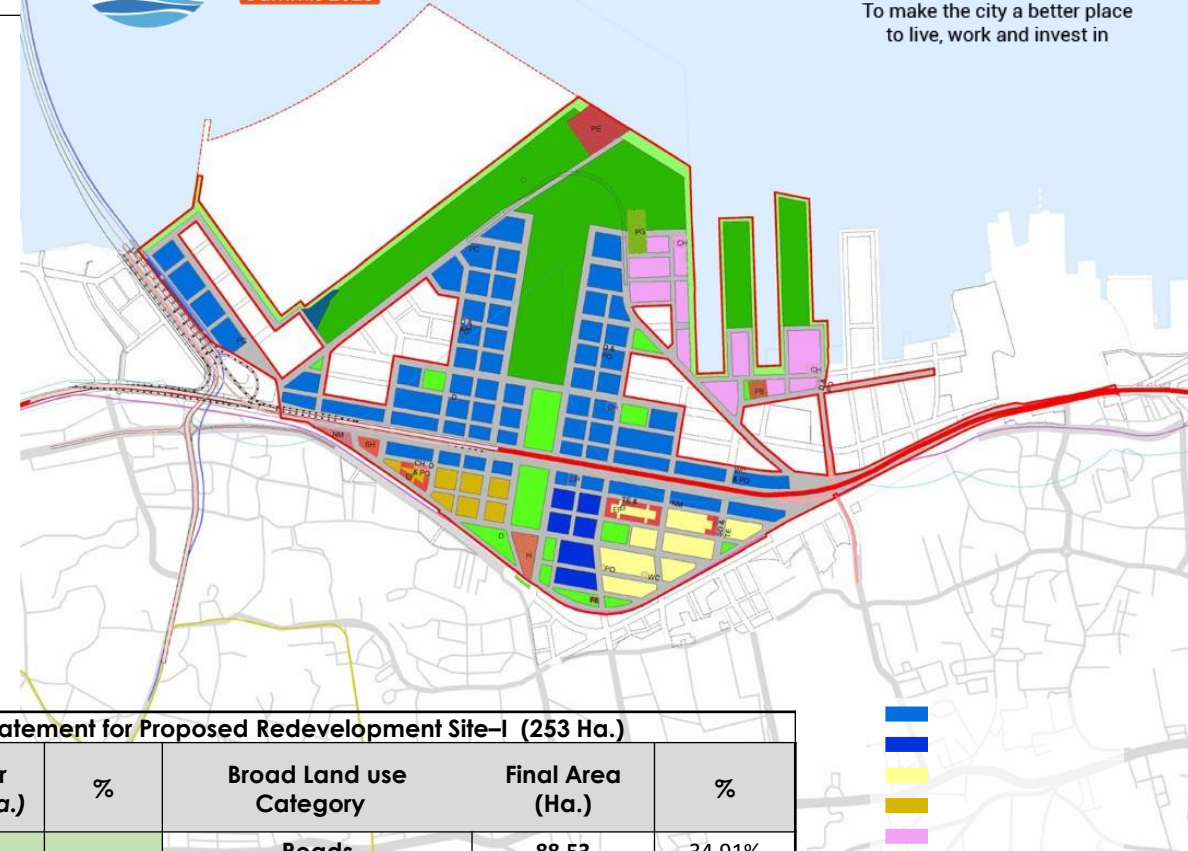
Planning Proposals

- Well designed Storm water drainage system integrating with SWD structure of Main City
- Strengthening the water front
- Development of Promenade
- Dyke inside the Sea to create barriers



OPEN SPACES IN NEW DEVELOPMENT OF MbPT

- Out of total 253.63 Ha. of redevelopment area, 75.03 % of area is proposed for open space, roads, amenities (proposed on independent plots) and Port Eco- Tourism.
- Only 24.97% area comes under Buildable Land use
- 34% of the area under roads

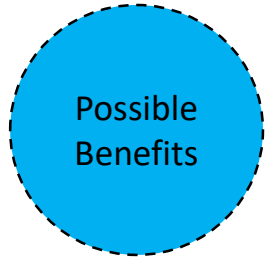


Land Use Statement for Proposed Redevelopment Site-I (253 Ha.)				
Break-up of Area under Public & Saleable use (Ha.)	%	Broad Land use Category	Final Area (Ha.)	%
190 Gardens & Open Spaces/ Roads/ Amenities/ Tourism	75	Roads	88.53	34.91%
		*Gardens & Open Spaces	82.36	32.47%
		Amenities	9.84	3.88%
		Port Eco-Tourism	9.56	3.77%
63 Hi-Tech City & Residential	25	Hi-Tech City	50.79	20.03%
		Residential	12.54	4.94%
253		Total Area (Redev. Site-I)	253.62	100.00%

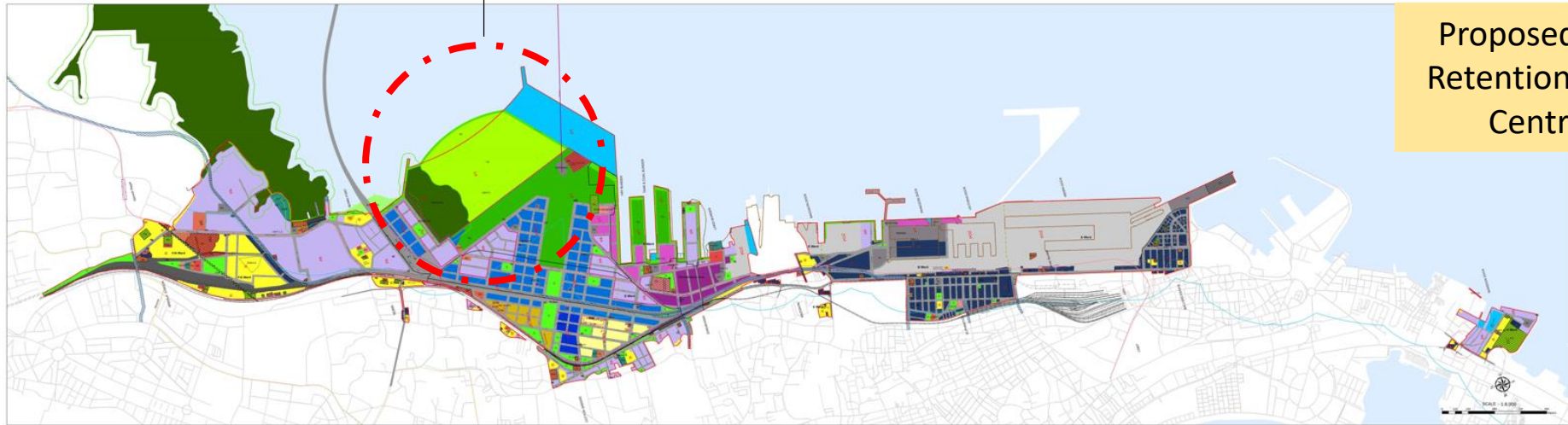
Proposed Land Use Plan of Redevelopment Site-1 MbPT SPA



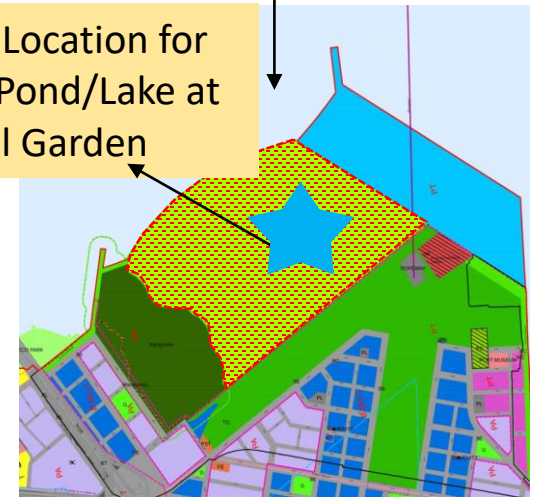
STORM WATER RETENTION PONDS TO REDUCE FLOOD RISKS



- Water storage
- Natural biomass production
- Biodiversity preservation
- Flood risk reduction
- Erosion/sediment control
- Recreational opportunities
- Aesthetic/cultural value
- Create aquatic habitat
- Reduce peak temperature
- Reuse of water



Proposed Location for Retention Pond/Lake at Central Garden



Proposed Land Use Plan of MbPT SPA



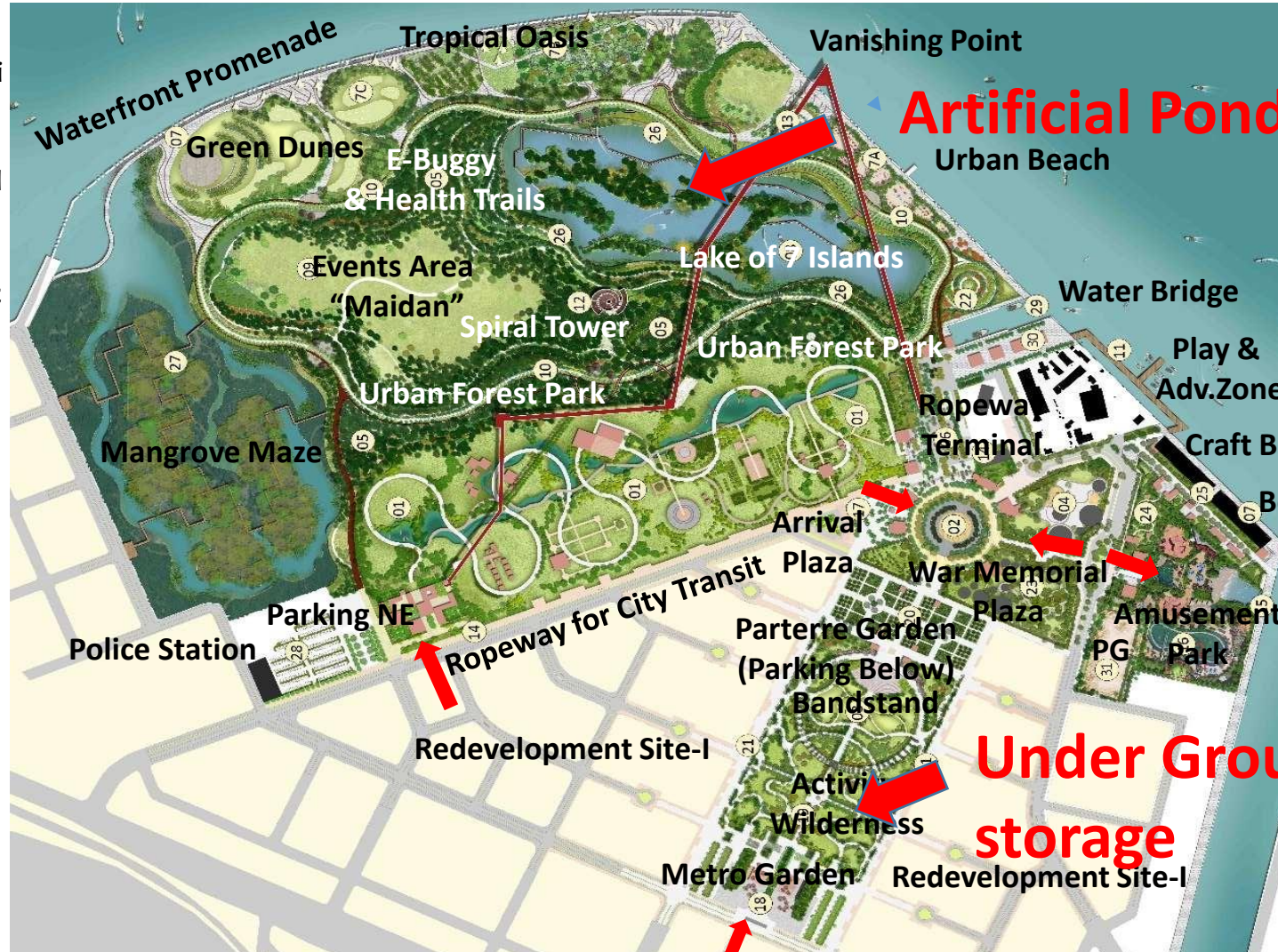
CENTRAL GARDEN MASTER PLAN

MbPT has proposed a Central Garden with a waterfront at Haji Bunder.

The total area under the Central Garden is 145 Ha.

Effective Storm Water Management for flood control:

The park will also act as a “rainwater park”, using a sustainable storm water management strategy for the re-circulation of rain water. This is planned to be achieved through the creation of a lake to store the surface runoff, and the water can be used for various purposes, preventing water-logging during excessive rains.



- 01. 12 Nation Park of Alliance
- 02. War Memorial plaza
- 03. Bandstand
- 04. Play and Adventure zone
- 05. Urban Forest Park
- 06. Ropeway Station Plaza
- 07. Waterfront Promenade
- 7A. Urban Beach
- 7B. Tropical Oasis
- 7C. Green Dunes
- 08. Lake of 7 islands of Mumbai
- 09. Events Area "Maidan"
- 10. E-Buggy and Health Trail
- 11. Water Bridge
- 12. Spiral Tower View Point
- 13. Vanishing Point
- 14. Ropeway for City Transit
- 15. Bollywood Street
- 16. Amusement Park
- 17. Arrival Plaza
- 18. Metro Garden
- 19. Activity Wilderness
- 20. Parterre Garden & Basement Parking
- 21. Active Edge
- 22. Sensory Garden
- 23. Art Industry
- 24. Crafts Bazaar
- 25. Bombay Bazaar
- 26. Fresh Water Wetland
- 27. Mangrove Maze
- 28. Parking
- 29. Ferry Point
- 30. Ferry Point Retail
- 31. Existing Playground

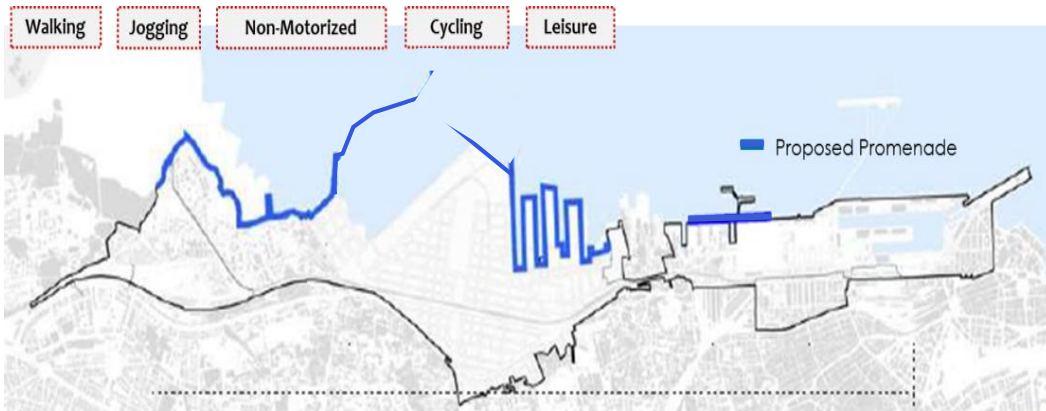


11 Km of Waterfront Promenade

Proposed Eastern Waterfront promenade stretches to about 11 km in length, covering the Eco-Park area in the North & passing over the expansive greens, followed by the tourism piers.

The waterfront edge shall have various public activities such as gardens, children plazas, food courts, etc. and continuous walkable promenade along its entire length.

The Promenade shall also act as Buffer for any storm surge



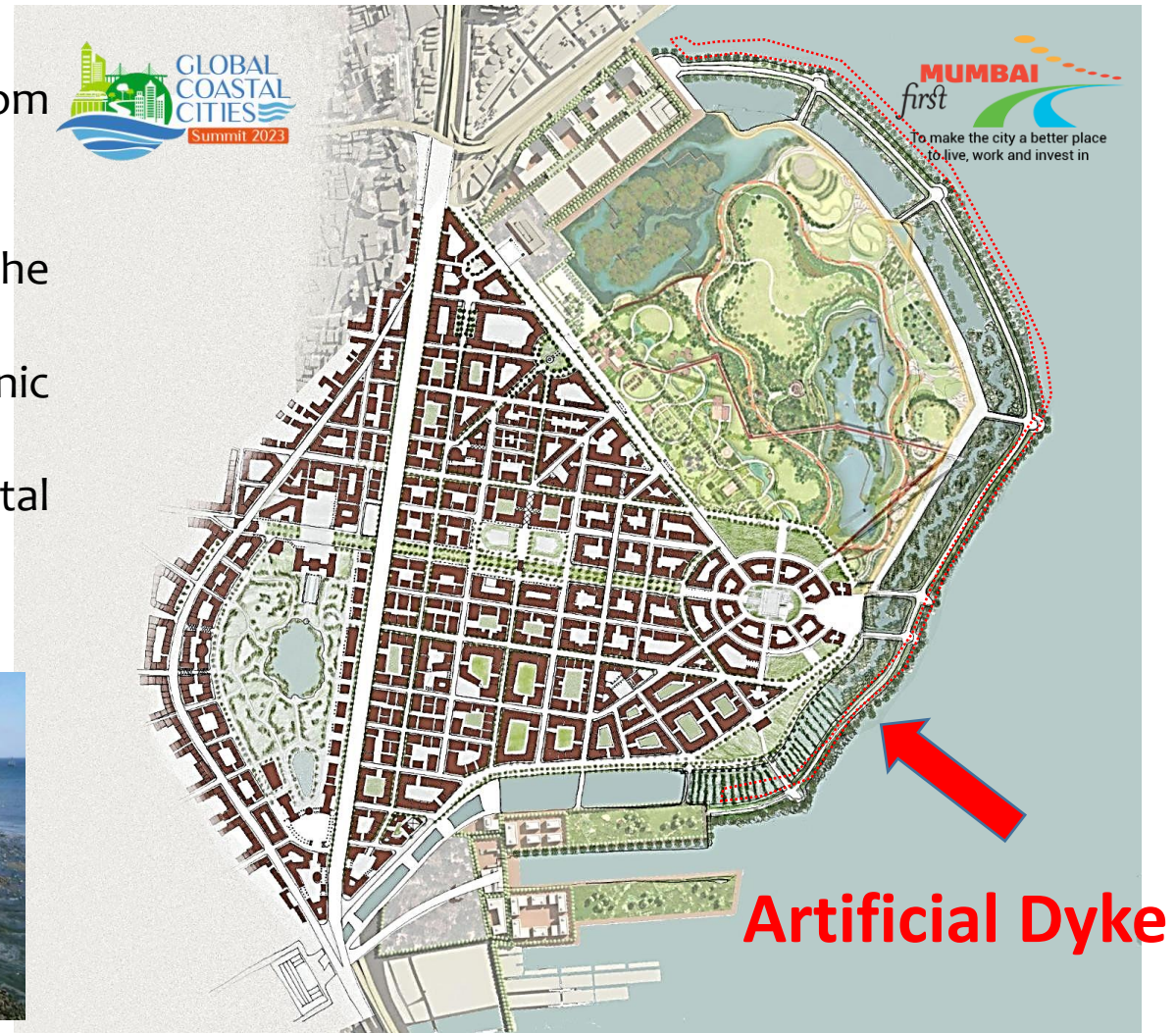
FROM RISK TO RESILIENCE: BUILDING FOR FUTURE



STORM SURGE MANAGEMENT STRATEGY: A DIKE & A COASTAL PATH

- A dike along the shore line of MbPT SPA.
- Protects city areas, urban infrastructure and nature from **storm surge**.
- Serves as a boundary wall to the **retention ponds**.
- Create a great opportunity to open a coastal path along the dike.
- possible to ride a bike, skate or walk along this scenic stretch.
- The new dike integrates climate protection and coastal protection with other green and recreational purposes.

One of the largest climate adaptation projects in Denmark takes place south of Copenhagen where a new dike has been built behind the old dike.



2. MEASURES TO REDUCE THE IMPACT OF HEAT WAVES

WIND FLOW PATTERN



Wind Direction (January 2000-2008)

Sr. No.	Wind Direction	%
1	N	12%
2	NE	6%
3	E	4%
4	SE	2%
5	S	6%
6	SW	13%
7	W	36%
8	NW	20%

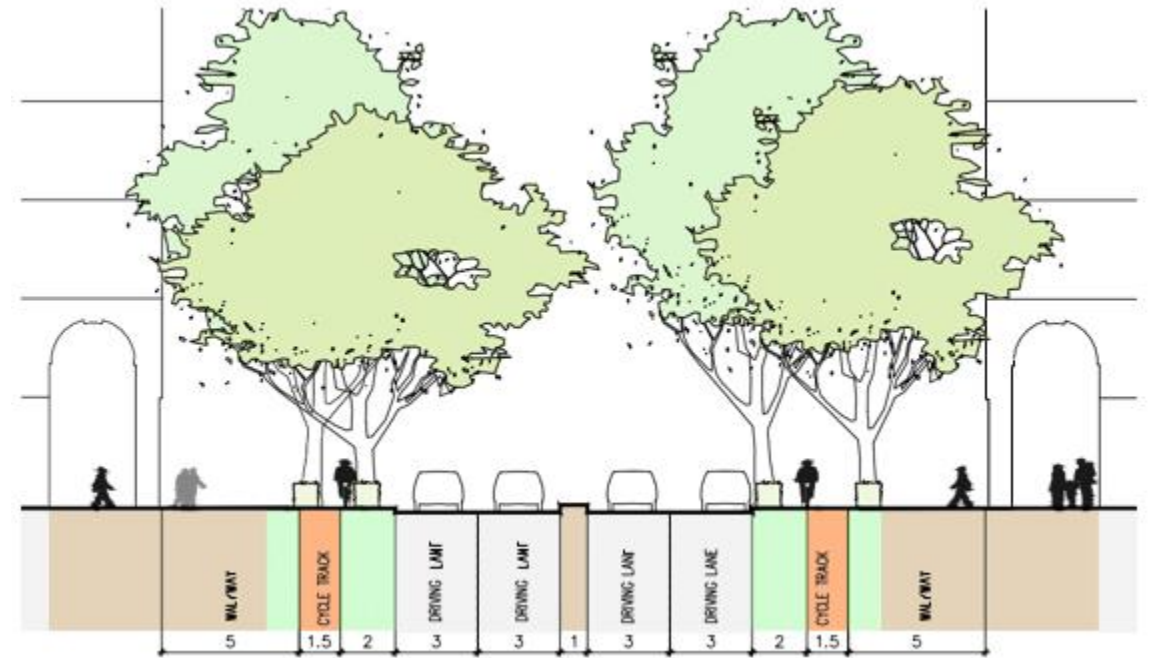
(Source: Weatheronline.in)

- East-West road network will create the wind draft

2. MEASURES TO REDUCE THE IMPACT OF HEAT WAVES

ARCADES ALONG THE MAJOR STREETS AS A SHADE OPTION

- Arcades allows for efficient pedestrian movement, and a dynamic street edge.
- These shall provide with shaded covered pedestrian spaces and increase the commercial viability of the retail outlets on the ground floor thus ensuring seamless integration of public and private realm.
- Shaded Footpaths



2. MEASURES TO REDUCE THE IMPACT OF HEAT WAVES

GREEN BUILDING(GB): A COMPREHENSIVE SOLUTION TO URBAN HEAT

- Green Building has been a flagship for sustainability, to provide people with sustainable, resilient, safe, and livable environments.
- Temperature around GBs can be 0.35 °C lower than that around conventional buildings.
- Application of deep GB design strategies and offering solar access for all new buildings using passive design principles can **counterbalance UHI** effects.
- The LEED system (US) suggests vegetated and high albedo roofs and at least 50 % of the parking spaces under the ground, deck, rooftop, or a building, or site hardscape with shading, high-reflectance paving materials, or open grid pavement systems.

(Source: <https://www.sciencedirect.com/science/article/abs/pii/S0378778822004777>)

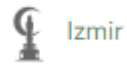


2. MEASURES TO REDUCE THE IMPACT OF HEAT WAVES

USE OF REFLECTIVE & PERMEABLE PAVEMENTS



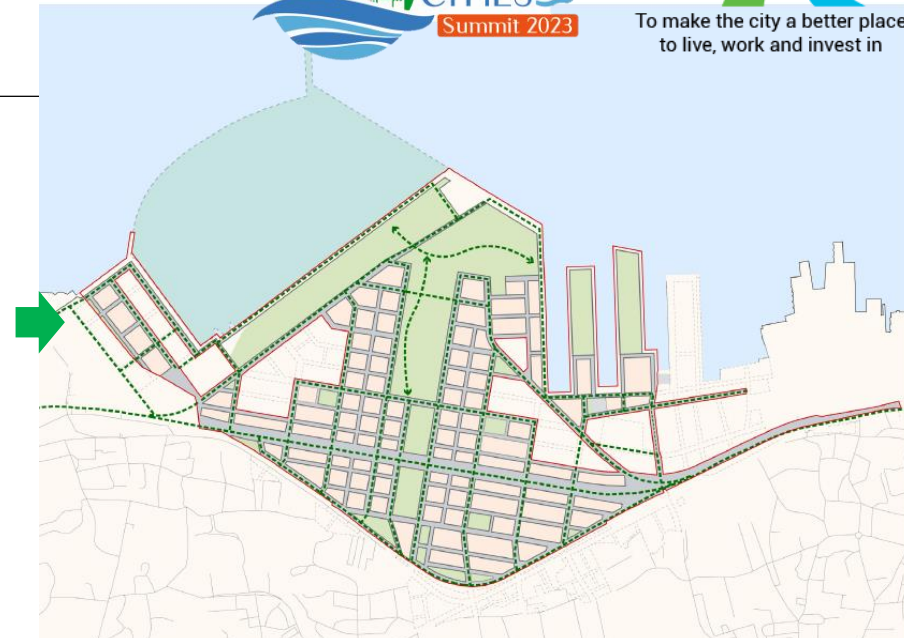
← Cool Pavements



Izmir



Valladolid



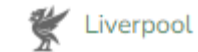
← Cycle Pedestrian Green Paths



Izmir



Valladolid



Liverpool



Green Parking Pavements

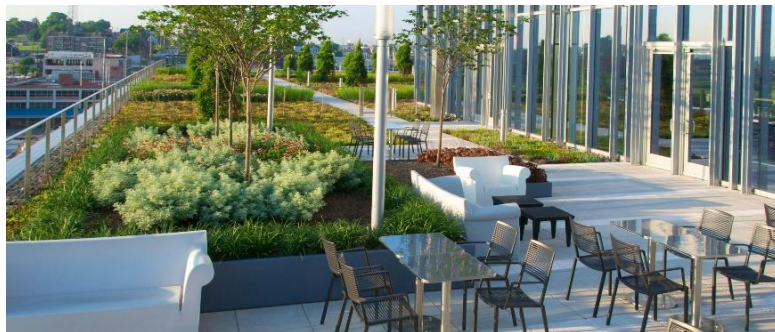
Source: <https://www.urbangreenup.eu/solutions/cool-pavement.kl>

GREEN COVER & GREEN ROOFING

- Planting deciduous trees or vines to the west is typically most effective for cooling a building, especially if they shade windows and part of the building's roof.
- Trees and vegetation that directly shade buildings decrease demand for air conditioning.
- Shading, can help reduce peak summer temperatures by 1–5°C.



Fig 4.58. St Joan Boulevard, Spain



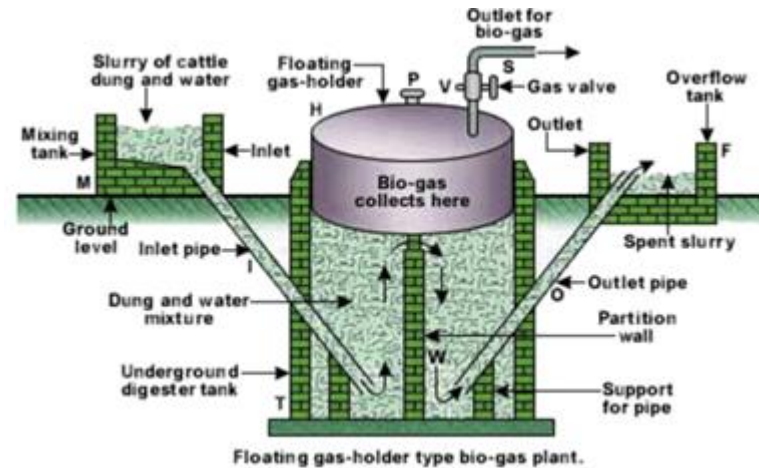
CLIMATE-RESILIENT GREEN BUS STOPS- POLAND MODEL

- Four cities in Poland have chosen to use the so-called Green Bus Stop as a Nature Based Solution to reuse rainwater as a resource and contribute to the reduction of UHI effect.
- Each bus-stop is covered with a plant-based green roof with a water retention layer – such a roof stops up to 90% of the storm water falling on its surface.
- Green Bus Stop emits less heat than the traditional counterpart does, at times as much as 10°C less.

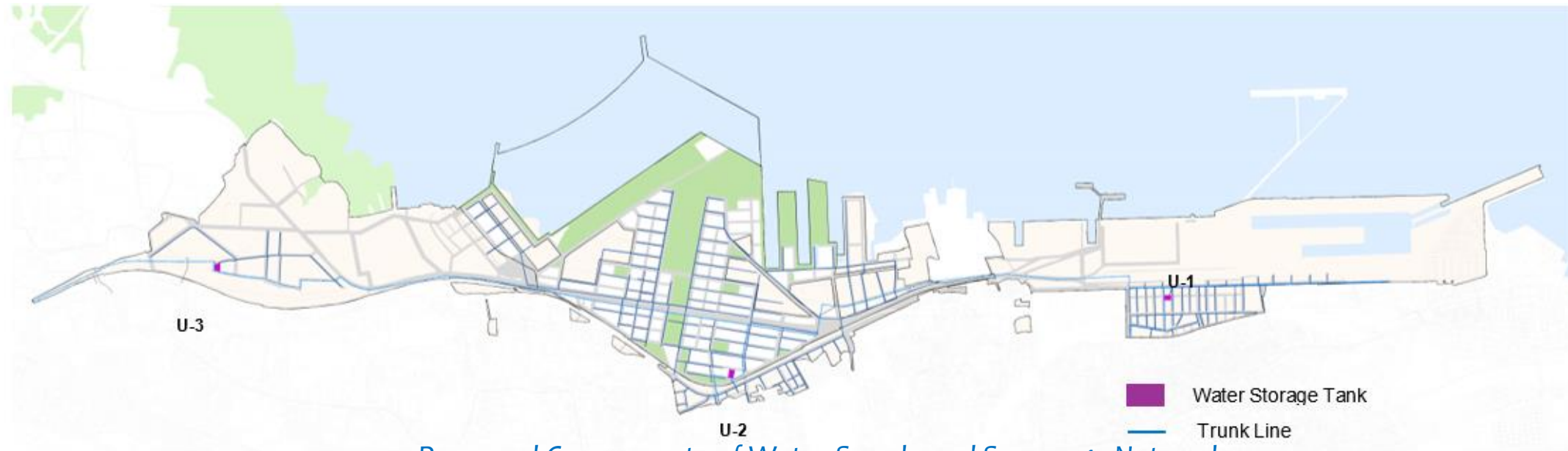


SOLID WASTE MANAGEMENT STRATEGY

- Waste segregation at source (dry and wet waste).
- Organic waste to be treated at designated place
- Dry waste to be Recycled.
- Other scenario is to develop a waste to energy plant that can take care of wet as well as dry waste.
- Reuse of construction/ demolition waste for upcoming construction activities.



- SPA Master Plan proposes to develop an integrated sewerage network with pumping stations at critical locations and STP for treatment of waste water.
- To treat the waste water generated, STP with capacity of 55 MLD with Membrane Bio-Reactor (MBR) Technology
- The treated water coming out of STP shall be used for flushing, horticulture and light industrial activities nearby.



Proposed Components of Water Supply and Sewerage Network

THANKS



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