Sponsored Thesis Project Competition on

"RE-IMAGINING URBAN RIVERS"

Season- 3

Project Title : Re-establishment of socio-cultural association between the city and river by creating a dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata.

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Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

A B S T R A C T

This thesis discusses the evolution of riverfront throughout the ages and conversion found in terms of change of function of riverfront. In the modern era the potential to convert the riverfront from its typically neglected situation and to bring it to the city's "front yard" is offered by riverfront development. Riverfront development has different approaches like social, cultural, Economical, ecological and Eco-sensitive that addresses a comprehensive idea of all the above approaches.

The research focuses on Kolkata, one of India's metropolitan cities, has a magnificent and glorious past, exhibiting its distinct legacy and culture, and owes its existence to its strategic location along the east bank of the river Hooghly, a distributary of the river Ganges.

The banks of the river, that used to be the city's nerve center and remained lively with a broad range of activities, are now abandoned places littered with dilapidated ancient buildings, cut off from the city, and lacking the once-pleasant scenery. In recent years, the riverfront has essentially become the city's backyard, devoid of any desired activity, which has led to an increase in environmental and urban concerns. The connection of the city has been lost in terms of their social association with the river. It is evident that the city has lost the social eminence of its riverfront because of the negligence towards its revival.

The study will focus on a discussion in response to existing issues faced by riverfront, addressing the urban concern for finding a suitable design solution or approach to revive the socio-cultural association between the city and river. The research concludes with design solutions focusing on Eco-sensitive riverfront approach, addressing three major elements – Social, Economical and Environmental.

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A C K N O W L E D G E M E N T

I would like to thank my guide, Assistant Professor. Ar. Kapil Natawadkar for supporting and guiding throughout this Thesis.

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Further I would like to thank my parents for their constant support and all my friends who helped me in completing within a limited time frame.

Puja Das.

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CHAPTER 01

OVERVIEW

1.1 Background of the study

If we look into history most of the human civilization started evolving along some river stretch because of the natural resources. Similarly in present days riverfronts are integrated part of the city. Those define the soul of the city.

Similarly for city of joy Kolkata has come into the picture because of HOOGHLY River and its ghats. In 1690, Job Charnock, an agent of East India Company first came to Ahiritola Ghat of the city and bought three villages (Sutanuti, Kolkata, Gobindapur) from the local landlord. In 1699, East India Company started developing the city as a Presidency city and named it Calcutta. Ghats are an integrated part of Kolkata's river-edge(Becker et al. 2015).

The 'ghats,' or stepped embankments that slope to the river, serve as the gateway to these soul streams. Not only do these provide access to aquatic bodies, but they also assist to provide a unique character of a city. They become focal points for a variety of events such as festivals, rituals, and performing arts, transforming them into adaptable communal locations - an important feature in city planning (Paul 2020).

1.2 Purpose of study

Kolkata, one of India's metropolitan cities, has a magnificent and glorious past, exhibiting its distinct legacy and culture, and owes its existence to its strategic location along the east bank of the river Hooghly, a distributary of the river Ganges.

The banks of the river, that used to be the city's nerve center and remained lively with a broad range of activities, are now abandoned places littered with dilapidated ancient buildings, cut off from the city, and lacking of the once-pleasant scenery. In recent years, the riverfront has essentially become the city's backyard, devoid of any desired activity, which has led to an increase in environmental and urban concerns.

The connection of the city has been lost in terms of their social association with the river. It is evident that the city has lost the social eminence of its riverfront because of the indifferent behaviour towards its revival.

The study will offer a discussion in response to issues, addressing the urban concern for finding a suitable solution or approach to revive the socio-cultural association between the city and river(Becker et al. 2015).

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1.3 Aim

To re-establish the socio-cultural association of the culturally rich riverfront city with restoration using an Eco-sensitive approach.

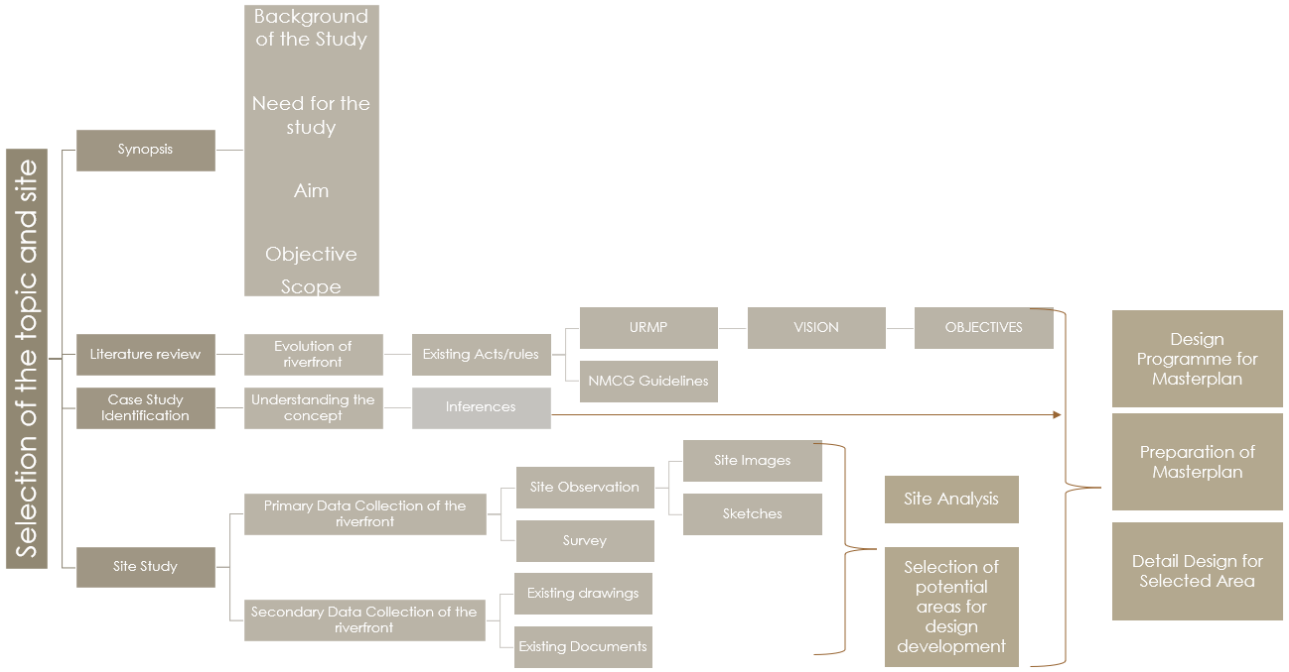
1.4 Objective

- To study and understand the historic context & changing character of the utility of the Riverfront.
- To identify the issues affecting the social association between the city and the river.
- To understand what is an Eco-sensitive approach and how to revive the riverfront using Eco-sensitive designing principles.
- To analyze the implication of an Eco-sensitive approach in this context.
- To combine the principles/guidelines identified from the literature to develop a set of landscape ecological guidelines for the design of the riverfront.

1.5 Limitations

- The study is limited to the particular stretch (North Calcutta) of Hooghly river.

1.6 Proposed Methodology



CHAPTER 02

River systems have played a significant role in the formation and sustenance of several cultures and civilizations, constituting an integral component of urban life(Becker et al. 2015). Riverfronts are those areas where land and water come together(Shrivastava 2021). They function as aesthetic and spiritual resources, a living system, as well as a corridor of never-ending stories. They form a memorandum over time, capturing different impressions along their banks over their lives, and serve as a reference for the future of humanity. They are a recreational area, a full ecological environment, and an infinite resource(Becker et al. 2015).

2.1 Riverfronts in India

Although rivers provide fundamental lifelines for towns in India, they also have a sacred significance. Several beliefs and traditions, whether physical or ethereal, form a part of the link, which is enriched by rituals and everyday life happenings occurring concurrently on the river's bank. Thus according to popular belief, the Ganga River has been the essence of India's cultural history ever since at least c. 2000 B.C., documenting the narrative of Aryanisation. Sense of place attachment has been found with the various rivers in several locations in India. Indian Rivers are widely accepted as holy goddesses and are associated with numerous social belief systems, mythological tales and cultural tradition. Hence it's often seen that religious practices affect the health of rivers in terms of polluting the water, throwing non-bio degradable waste etc. Along with establishing a place's cultural component, Indian rivers are crucial resources with immense potential for society, with both social and economic importance in daily life. They become the focal point of urban form, particularly in riverside neighbourhoods.

2.2 Evolution of urban waterfronts

- **Emergence of Waterfront Cities/towns :** Water is essential in trade and transportation. Waterfronts were commonly preferred in pre-industrial cities and villages. Waterfront cities had a tight and intricate interaction with water. To facilitate the transportation of goods and people, early communities were built near ocean/river ports. Trails merging at jetties offered access to massive wooden piers, but the rapid expansion kept a close link to water, where water traffic predominated (Shrivastava 2021).

- **Growth of waterfronts and the waterfront settlements :** The intimate physical and functional relationship in pre-industrial cities was disrupted by massive ports and concomitant commercial and industrial activities. As a result, smaller towns were changed into cities with busy streets, the shoreline was separated from older streets, commercial activity increased, and wooden piers were replaced by stone dockyards. The construction of railway connections to the ports further separated the early towns and

newer portions of the city from the shoreline. To alleviate traffic congestion, port authorities were established, and elevated motorways were built. The major land uses were industrial and transportation, and industrial complexes occupied the shoreline The concentration from these usage began to contaminate the waterways, and the waterfronts began to lose their natural appeal to urban inhabitants (Shrivastava 2021).

- **The decline/deterioration of waterfronts :** With advancements in transportation and logistics technology, many waterfront businesses shifted, and waterways gradually faced structural changes as they separated from the city. Following World War II, there was a rise in the pace of port operations due to containerization technologies; an increase in the number of larger container ships that could not negotiate existing shallow ports; an increase in highway travel in contrast to trains; the lack of urban residential districts along the waterfronts; and the degradation of industrial facilities and sectors along the waterfront(Shrivastava 2021).

- **The renewal of waterfront :**The decline of waterfront areas and economy was followed not just by residential flight to the outskirts, but also by growing pollution, crime, and old factory property pathways. Traffic at urban ports has decreased as container sectors and other businesses relocate to alternate places where space is available. Authorities acknowledged the consequences of these structural reforms on the economy and people' quality of life and recommended locals to restore the visual scenery and accessibility to waterfronts. Cities rediscovered the strategic benefits of a waterfront site for recreation and leisure as well as for mixed-use developments, in order to enhance the architectural & urban design aspect of the city's shorelines(Shrivastava 2021).

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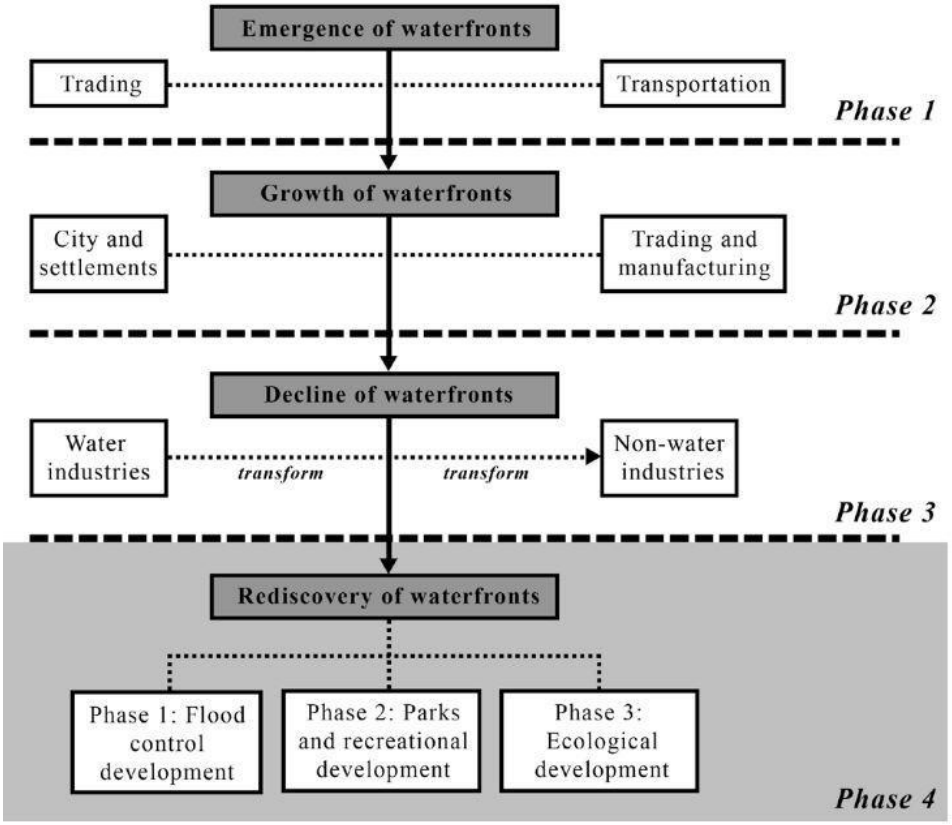

Fig. No. 1: Evolution of water-front

2.3 Issues with Urban River

- **Channelization** – Because of the Dredging and constructed banks/beds physical aspect of the river has been affected, natural flow of its path has been hindered, the floodplain link has been destroyed, and natural habitat has been gone, implying that aquatic life cannot be sustain (Rathore and Jadon 2019).

- **Water Pollution** - Impermeable urban surface increases run-off into rivers, which can include toxins from highways, decreasing water quality. Sewer and industrial discharges, as well as improperly linked household plumbing systems, often damage water quality(Rathore and Jadon 2019).

- **Deficiency of riparian vegetation** – Riparian Buffer Zones are home to several aquatic species but most of the river edges have been concretized in urban areas. That is a great threat to aquatic lack of trees in river riparian buffer zones often causing increase of river temperature and reduction of slope stability(Rathore and Jadon 2019).

- **Low-flows and increased flooding -** Over-abstraction and higher surface run-off in urban areas decreases low flows within a river while increasing flood frequency and reaction time when heavy rainfall occurs(Rathore and Jadon 2019).

- **Invasive species -** Because cities are nodes in global transport systems, urban rivers are especially sensitive to the introduction of invasive non-native species. Numerous people endanger the ecological landscape and native creatures(Rathore and Jadon 2019)

2.4 Types of Urban River-front

CULTURAL RIVERFRONTS	A riverfront with the sense of community, festivity, artistic expression, recreation, commercial bustle
ENVIRONMENTAL RIVERFRONTS	"Design with nature", might include shore stabilization, wetland preservation, prairie restoration etc.
HISTORIC RIVERFRONTS	A riverfront with "A sense of uniqueness and character" to a place. Provide a special educational experience by preserving the cultural heritage of place.
MIXED-USE RIVERFRONTS	A riverfront with a dynamic space containing various activities blended to complement each other.
RECREATIONAL RIVERFRONTS	A recreational riverfront is "The place of community gathering". parks, gardens, picnic areas, walking, cycling and water related activities including boating, fishing, etc.
RESIDENTIAL RIVERFRONTS	A riverfront where housings, creates opportunities for other activities like retail, recreation, restaurants.
WORKING RIVERFRONTS	A riverfront where river-related activity such as fishing, boat repair, etc happens.
REDEVELOPING RIVERRFRONTS	A riverfront where land uses have recently changed or where vacant and underutilized properties suggest potential for beneficial change.

Table No.1: Types of riverfronts

2.5 Riverfront Development :

a strategy for incorporating the river into the formation of the urban fabric that is environmentally mindful. Both the local and sporadic needs for facilities at the city level, such as expansive level city greens of various natures along with some recreational facilities, as well as the natural prospects of the land for establishing into a biodiversity zone for protecting and conserving heritage of the river basin, have been appropriately taken into account(Rathore and Jadon 2019).

Urban riverfronts today are expected to perform a variety of tasks, from recreational to economic activity to ecological duties. When done properly, urban renewal along riverfronts is a potent tool for communities to rebuild central city areas and revive commercial and industrial districts. More people desire to view biodiversity, participate in recreational activities, and learn about the natural and cultural history of rivers, which has increased demand for closer proximity to rivers. Urban riverfront initiatives must prioritise preserving and enhancing river health with efforts to revive the local economy(NMCG Report n.d.).

2.6 Criteria for sustainable riverfront development :

- **Primary level:** This includes the three key sustainability pillars that are essential to the success of any project: Environmental. economic and social.

- **Secondary Level:** Each one of the aforementioned elements is an additional element that is essential for realising each requirement. For instance, dealing with the problem of water management is classified as environmental because doing so helps a project be environmentally friendly.

- **Tertiary level:** This comprises indicators that are necessary to enable the tertiary level. As an illustration, safety is a crucial component of pedestrian planning, which is crucial in order to ensure the project has addressed the issue of sustainability practices.

CHAPTER 03

ECO-SENSITIVE APPROACH OF RIVER-FRONT DEVELOPMENT

This chapter gives a general overview of riverside planning and design and addresses the all-encompassing, and regionally-specific techniques required to enhance the environmental and socioeconomic health of urban riverfronts. It presents a compelling argument in favour of a watershed-scale regional planning process that calls for gradual, minor adjustments. This chapter's next three major sections provide real-world examples of how design and planning principles are used(Otto, McCormick, and Leccese 2004).

3.1 General Principles

- **Ecological goals and economic development goals are mutually beneficial** - Healthy, functional rivers are appealing to both residents and businesses. A well-informed population that appreciates riverfront amenities and activities is concerned about the

  river's long-term health. Residents and visitors alike are beginning to see the attractiveness of a more naturalistic riverfront. Aside from promoting tourism, these advantages include low-cost flood management, greater water quality, lower infrastructure expenditures & enhanced property values and tax base(Otto et al. 2004).

- **Safeguard and rehabilitate natural river characteristics and activities -**

  Rivers provide significant natural resources that must be conserved. Natural river characteristics such as meandering, backwaters, marshes, and gradually sloping banks perform critical biological roles. These also provide human benefits including such cleaner water supply and flood storage. It may be impossible to restore these elements in many urban contexts, but even little attempts can have a significant influence. Even the most seriously polluted rivers can benefit from environmental improvements(Otto et al. 2004).

- **Establish the riverfront as a public space –**

  Riverside design should take into account the demands of the community's many neighbourhoods, ages, and cultures. They allow people of the community to get up and personal with the river. As a result, this physical and sensory access contributes to the creation of vibrant, diversified spaces that foster a sense of belonging and a respect for the environment(Otto et al. 2004).

- **Compromises are necessary to achieve multiple objectives -**

  Along most metropolitan rivers, focusing solely on economic growth or environmental issues is neither realistic nor desirable. Few cities could recreate a perfectly natural river environment due to current development. However, waterfront redevelopment to increase a city's economic vitality does not have to lose natural features, aggravate riverside degradation, or restrict public access. The integration and balance of environmental, social, and economic issues will benefit riverfront communities(Otto et al. 2004).

- **Make the process of planning and designing riverfronts broadly participatory -**

  Design and development of any riverfront should involve a diverse range of community members. The effort must go beyond identifying traditional stakeholders and reach out to communities that may not have previously accessed the riverfront(Otto et al. 2004).

3.2 Planning Principles

- **Demonstrate characteristics of the city's unique relationship to the river in the riverfront design –** Each river city has a distinct relationship and experience with its river. Citizens must comprehend that their city's river is a location that provides them with opportunities. The region's identity is one that offers habitat for wildlife, leisure, drinkable water, and jobs. People that respect these features become advocates for preserving and rehabilitating their riverfronts(Otto et al. 2004).

- **Know the river ecosystem and plan for a scale larger than the riverfront -** It is also critical to comprehend how a river's structure has changed and how it could evolve in the future. Rivers are influenced by what occurs in their watershed, and riverside activity has an impact on locations further than the river's margin(Otto et al. 2004).

- **Minimize new floodplain development -** Alluvial plains that are undeveloped and connected are critical to river health. New riverfront construction, such as paths and parkland, must be constructed to avoid floodplain intrusions. Structures or facilities that must be built must be planned to: • ensure that pollutants are not released during floods; • create no net loss in flood storage space; and • generate no flooding or other downstream consequences(Otto et al. 2004).

- **Provide for public access, connections, and recreational uses -** Physical and visual accessibility along the renovated river should not be limited to a few communities or enterprises. In appropriate settings, individuals ought to be able to interact and connect with the river, whether by wading, fishing, releasing a boat, or relaxing on the riverside. Economic redevelopment along riverfronts is more effective when it combines visible and physical access to the water, such as new mixed-use construction with residences, eateries or cafes, and open space(Otto et al. 2004).

- **Celebrate the river's environmental and cultural history through public education programs, riverfront signage, and events -** Riverfronts have a rich human and environmental history. Informative and path-finding systems can explain the river, its ecology, and the relationship between river and city history. People are drawn to the riverfront by educational and cultural events, performances, and public art(Otto et al. 2004).

3.3 Designing Principles

- **Preserve natural river features and functions -** Community can safeguard vulnerable parts of streams and rivers from development by using zoning, land preservation strategies, and cautious site design. Communities should determine environmental objectives for urban riverfronts and detect absent or altered natural features as part of the preservation process(Otto et al. 2004).

- **Buffer sensitive natural areas -** Buffers that are well-designed safeguard water quality as well as plant and wildlife habitats. Buffers provide shade, which cools the water and protects aquatic habitats. Native plants offer cover and food for the river's birds, mammals, and other species. Humans benefit as well: thriving buffers are physically beautiful and frequently serve as greenbelts, parks, & recreational spaces(Otto et al. 2004).

- **Restore riparian and in-stream habitats -** Rebuilding riparian habitat needs more than just replacing native plants. To establish a healthy water cycle and water quality, planners must first consider watershed and region variables. Planting buffer zones, for example, must be built and maintained, runoff must be regulated and cleansed, and additional dams and reservoirs must be eliminated or eliminated whenever practicable. Similarly, reservoir and dam in-stream inflows must be regulated to safeguard habitat for wildlife(Otto et al. 2004).

- **Reduce hardscapes -** Streets, parking spaces, walkways, driveways, concrete paths, rooftops, as well as other impermeable structures restrict rainwater from passing through soil and refilling streams and rivers as groundwater. Groundwater—water that passes through underground soil and rocks—supplies almost half of all river flow. During drought, the proportion can increase(Otto et al. 2004).

- **Manage stormwater on site and use non-structural approaches -**Ecologically built riverfronts catch, store, and absorb stormwater, and otherwise organically treat and discharge it. Wetlands and bioswales, for example, can provide both habitat for wildlife and aesthetic quality. Such natural systems can frequently replace storm pipelines and other constructed structures, the majority of which discharge large amounts of untreated runoff straight into streams and rivers(Otto et al. 2004).

- **Balance recreational and public access goals with river protection -** Riverfront settlements need to provide amenities for as many recreational as feasible while integrating some competing uses (such as motorised boats and observation platforms) and regulating potential misuse of the river corridor(Otto et al. 2004).

- **Incorporate information about a river's natural resources and cultural history into the design of riverfront features, public art, and interpretive signs -**

Environmental understanding and learning are critical along urban rivers since so many land resources and references have been lost. The public may be unaware of the river's background and purpose. A well-informed public that knows river ecology and the potential for regeneration will support efforts to improve and maintain the river. People must also be educated about water quality and how to use their rivers safely(Otto et al. 2004).

3.4 NMCG – Urban River Management Plan

Design Philosophy of URMP Framework - The URMP framework is built on the three foundations of sustainable development: the environment, the economy, and the social. As a result, it is expected that the URMP activities would be: • environmentally friendly • economically profitable • socially inclusive(Basin 2020)

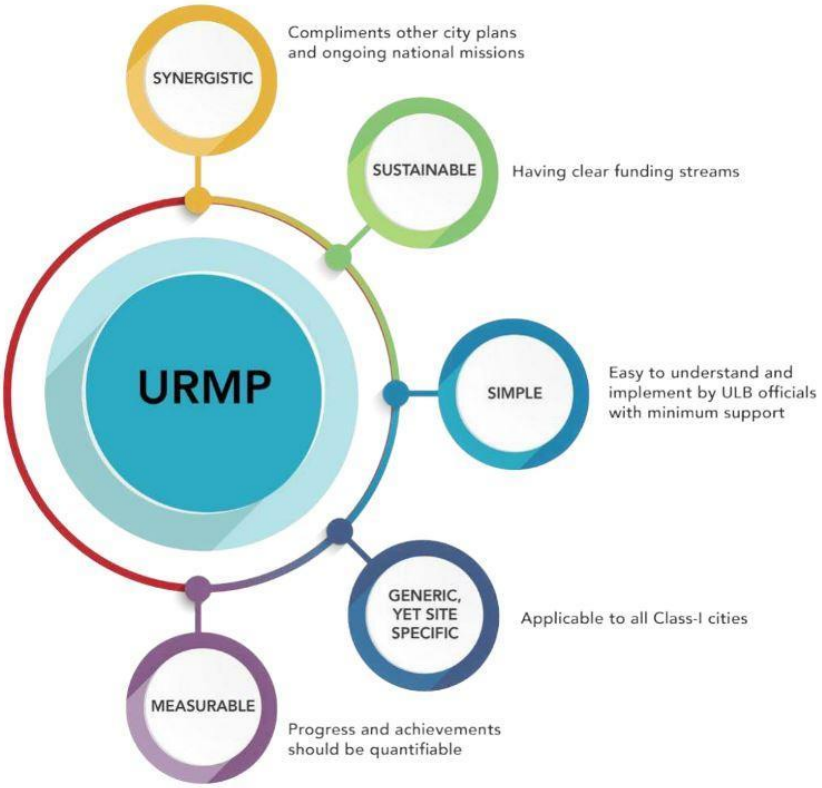

Fig. No. 2 : Design principles of the Urban River Management Plan framework(Basin 2020)

Design Principles

- **Simple:** The URMP architecture was designed to be simple and succinct. The goal is not to produce an overwhelming collection of instructions, but rather to offer a framework for effective and measurable activities to be conducted. Furthermore, because the URMP will have to be produced by Urban Local Bodies (ULBs) who currently struggle with a variety of other obligations, the plan's simplicity would get greater support(Basin 2020).

- **Generic yet city-specific:** The URMP's overarching structure has been created to be generic in order to guarantee that all river cities within the Ganges Basin have a shared vision that includes goals for river management. However, because each city has its own personality, the framework enables for city-specific factors to be incorporated in the URMP(Basin 2020).

- **Synergistic:** The purpose of the URMP is not to reinvent the wheel. Instead, it recognises and supports the function and relevance of various Plans that a city may have. These include, among other things, the Master Plan, the City Sanitation Plan, and the City Development Plan. The URMP also explores synergies with ongoing urban missions in the city, including Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart City Mission, and Swachh Bharat (Urban), with the goal of incorporating some parts of the URMP into these missions(Basin 2020)

- **Long-term:** Given that financial restrictions are a major reason why many ambitious initiatives fail, the framework guarantees that there's a clear line of financing and funds for the numerous interventions to be done inside the URMP(Basin 2020).

- **Measurable:** The URMP must include a facility for reflection and course correction'. This effectively implies that the URMP will function as a live document that is constantly updated to adapt to evolving demands. To that end, the framework has developed provisions for verifiable and quantifiable development under the URMP(Basin 2020)

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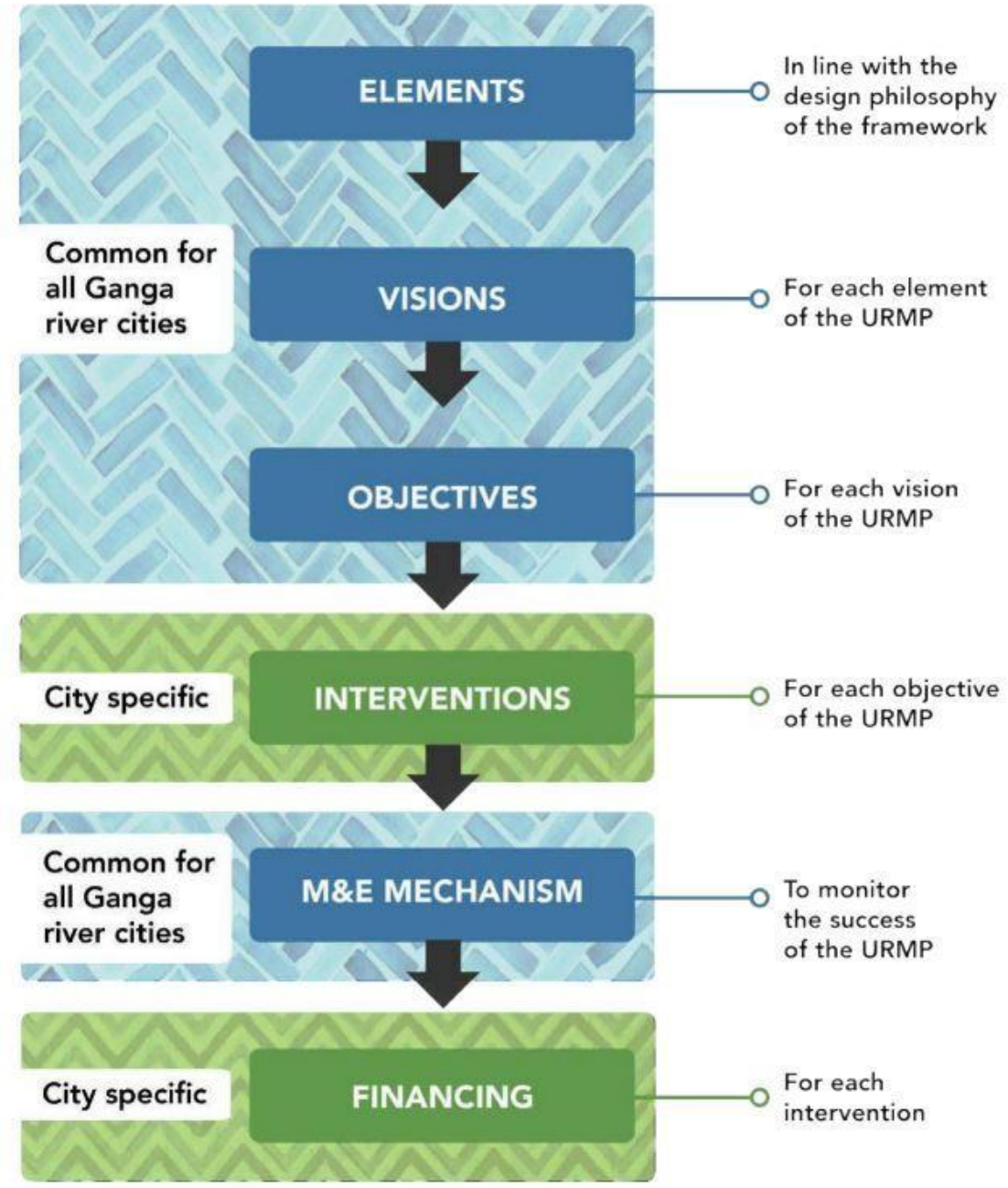

Fig. No. 3: Conceptual framework of the Urban River Management Plan(Basin 2020)

CHAPTER 04

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

Study of Kolkata Stretch

4.1 Brief about Site

North Kolkata's precincts could be considered as an illustration to observe the several strata of lifestyle evolution across time and space. The Hooghly River flows through the city, making it a perfect location for studying the evolution of humans and its connection with the river. The riverbank here had been the epicentre of urban growth, finally culminating in a city that rose from this very specific river-edge, bringing with it a number of tales related with its growth, particularly along the length from the Circular Canal to the Burrabazar district. This urban edge has numerous definitions of a 'place,' a shared ground for multiple perceptions and activities(Becker et al. 2015).

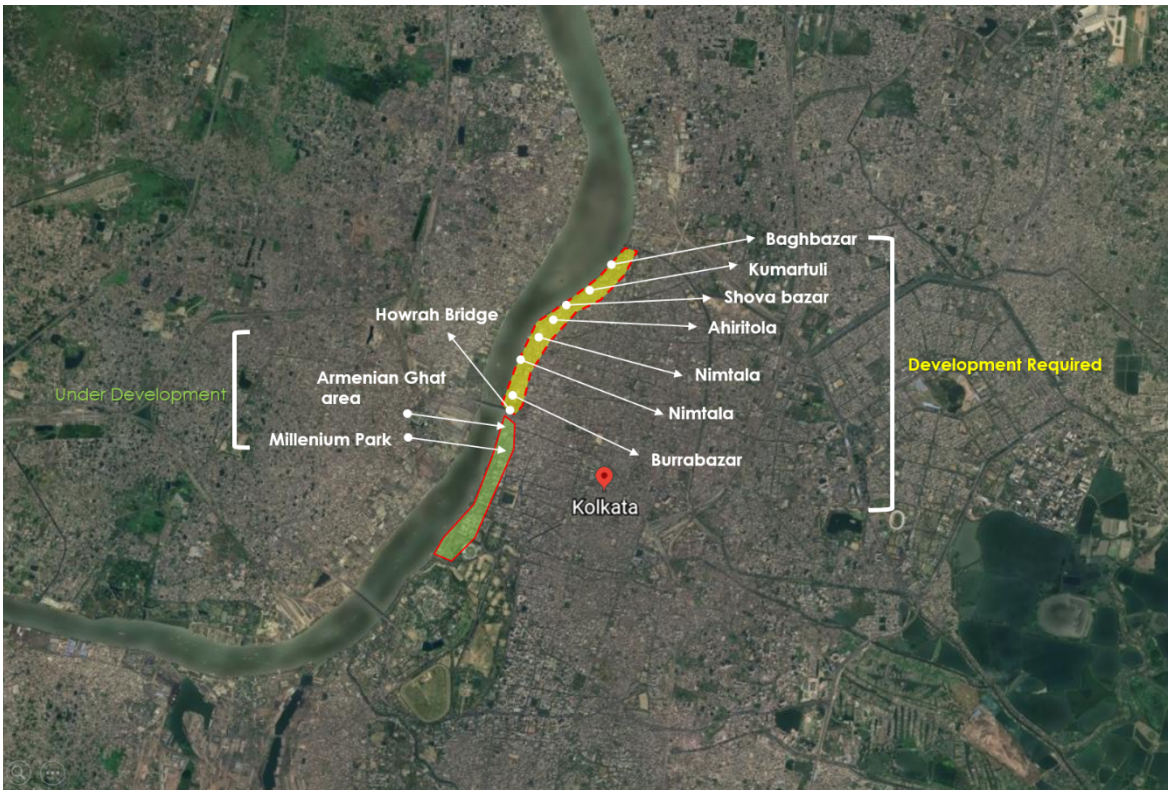

Fig. No. 4: North Kolkata Region Map

4.2 Historic Context and Growth of the City

If we look into the history of civilization, most of the settlements developed along any river bank due to availability of resources, ease of transport etc. Similarly, Kolkata, one of the metropolitan cities of India, well known for its cultural heritage, has been developed along the eastern bank of river Hooghly. The city started expanding from three villages – Sutanuti, Kalikata and Gobindapur after 1690. With the arrival of Britishers these villages started growing and ultimately transformed into Calcutta.

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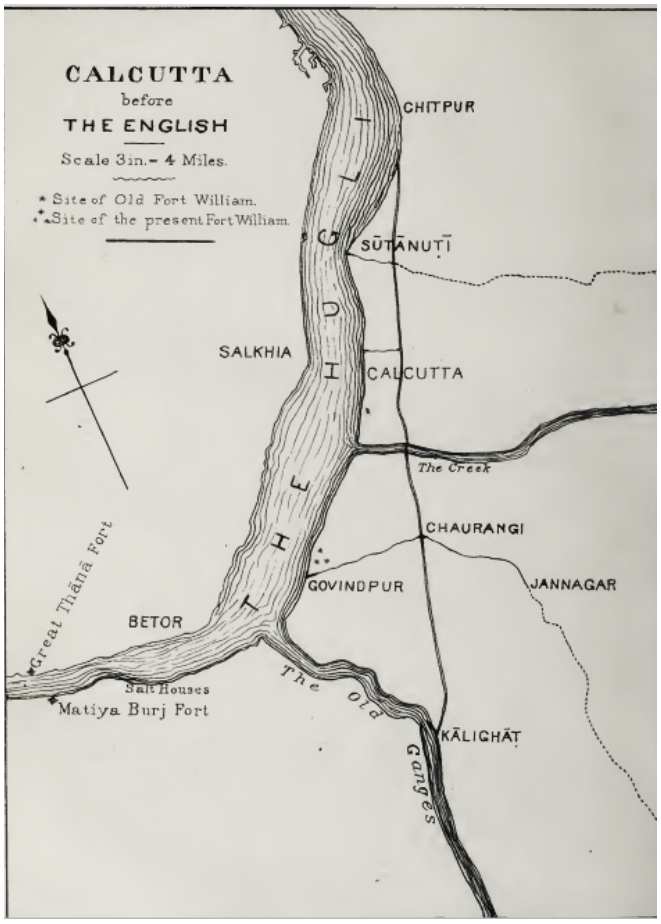

Fig. No. 5: Map Showing Three Villages
Source : https://puronokolkata.com/2018/06/17/finding-dhurrumtollah/

An official of the East India Company named Job Charnock had specifically selected the area close to the village of Sutanuti to establish and increase trade after dealing with numerous competing delegations and difficult encounters with the then-Mughal governor of Bengal, Shaishta Khan. While Govindopore is located in the southern region, where the British first settled and built their imperial capital around Fort William, the majority of the native population's urban expansion occurred in the northern region.

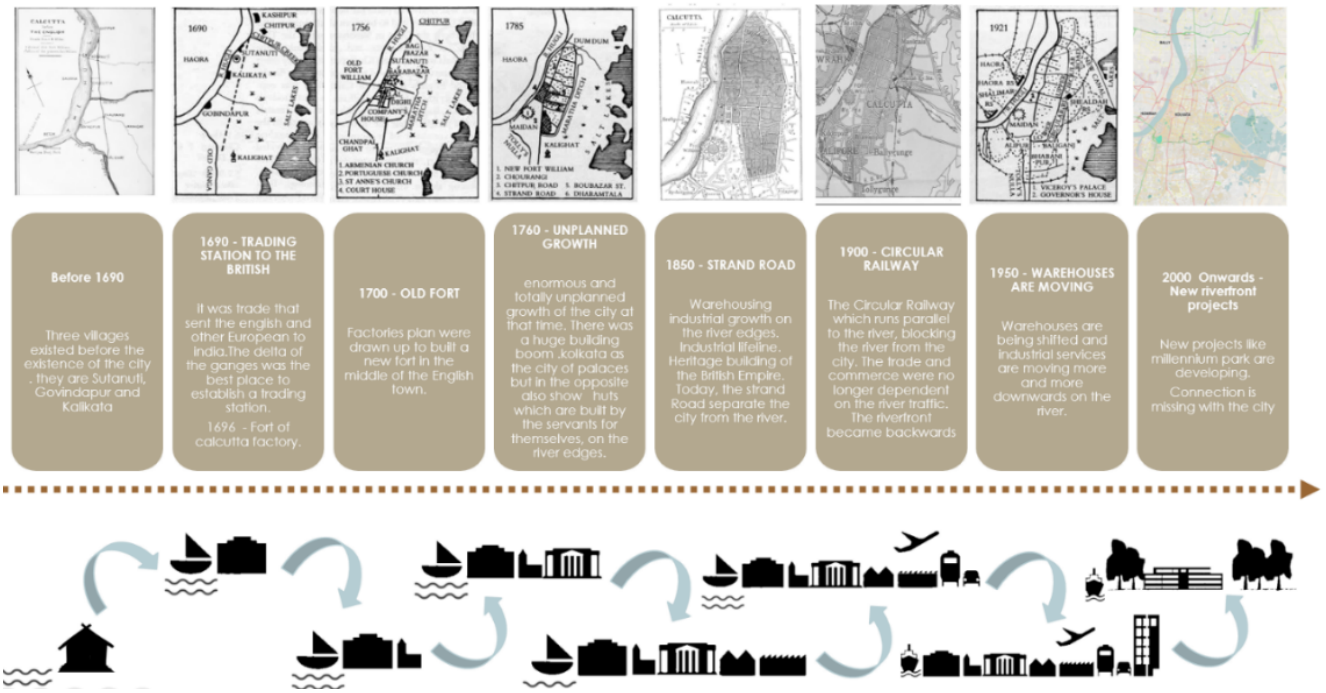

Fig. No. 6 : Evolution of Hooghly River front of Kolkata

Central Calcutta became a vibrant epicenter of diverse range of activities. The city's trade and commerce gradually increased, which led to an increase in the demographic index and an organic structure in the density of the expanding urban fabric. The migrant population started settling in this region that causes unregulated growth of the neighborhood without proper infrastructure. Gradually with the time passing due to evolution of technology and advancement of transport, the trade and commerce were no longer dependent on river traffic. Hooghly waterfront, once-bustling center of the city had been changed into desolate places, littered with dilapidated old buildings, cut off from the rest of the city, and bereft of the once-pleasant scenery(Becker et al. 2015).

4.3 Present Scenario

Presently, there is a distinct rhythmic flow of activity along the riverfront nodes in north Kolkata. Mostly landmark based or ghat oriented activities happen through the river stretch. From one intersection to the next, the ambiance, urban character, and modes of habitation changes. The way of life here reflects a variety of traits. However, the riverfront, which was once the lifeline of the city, no longer accurately reflects the lofty position it once occupied. It is currently overrun and used as a landfill by the river. Only in the festive seasons give the feeling of being alive. By the river, it is currently overgrown and used as a dump.

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Fig. No. 7: Present Scenario of Site

4.3 Need for the study

Issues	Brief description
• Pollution :	The landscape of the city riverfront has become a regular scene of "dilapidated ruined structures lining a river edge with polluted ghats and unattended garbage dumping grounds". The river edge, which is supposed to be the face of the city, is no more what it used to be.
• Change in function :	The Burra bazaar precincts showcase total negligence towards the river edge. The large warehouse facilities which were directly connected to their prior location beside the river edge have no more purpose for being there. The pattern of movement of goods has changed.
• Lack of attraction :	The river bank only reflect specific daily activities, with very little footfall. Empty spaces between active zones have created gaps that have given rise to unsocial activities.
• Narrow riverside :	A narrow riverside road lined with temporary built stalls leading to the ferry jetty is a common sight within the place. The rest of the area has become a dumping ground by the river.
• Node-based landmarks :	The riverfront is adopted by users for very specific uses and not looked upon from a holistic perspective. These node-based landmarks could be the reason for partial enlightenment of the potential of the river, and not as a wholesome entity.

Table No.2: Issues of Kolkata Riverfront

CHAPTER 05

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

INTRODUCTION TO FIVE PATCHES

North Kolkata riverfront broadly classified into 5 areas based on the unique character of the areas – Bagbazar , Kumartuli , Sovabazar-Ahiritola , Burrabazar and Armenian Ghat Zone which includes Mallick ghat flower market.

BAGBAZAR –

Bagbazar is a neighbourhood of North Kolkata, in Kolkata district in the Indian state of West Bengal. Bagbazar reflects a blend of the old and new, and of course the chaos of Kolkata. Bagbazar Ghat was once called Rogo Mitter's Ghat, after the son of Black Zamindar, Gobindaram Mitra, one of the wealthiest and most influential natives of those times. Bagbazar Ghat is still important as it is a steamer jetty today and helps passengers, primarily office goers, cross the river to the opposite bank.

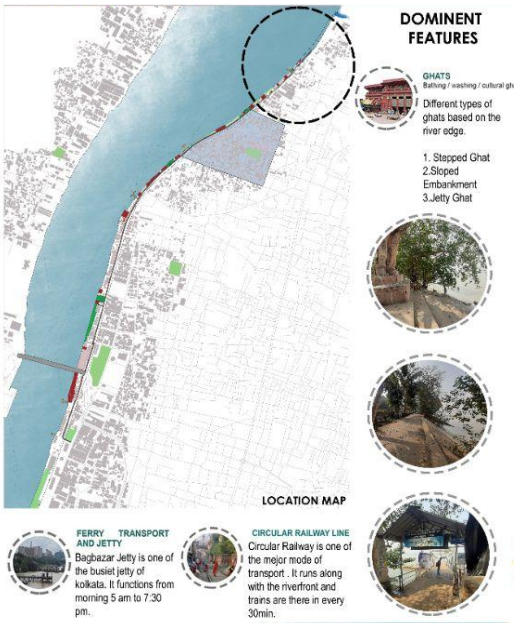


Fig. No. 8: Location map of Bagbazar

Fig. No. 9 : Base Map of Bagbazar

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

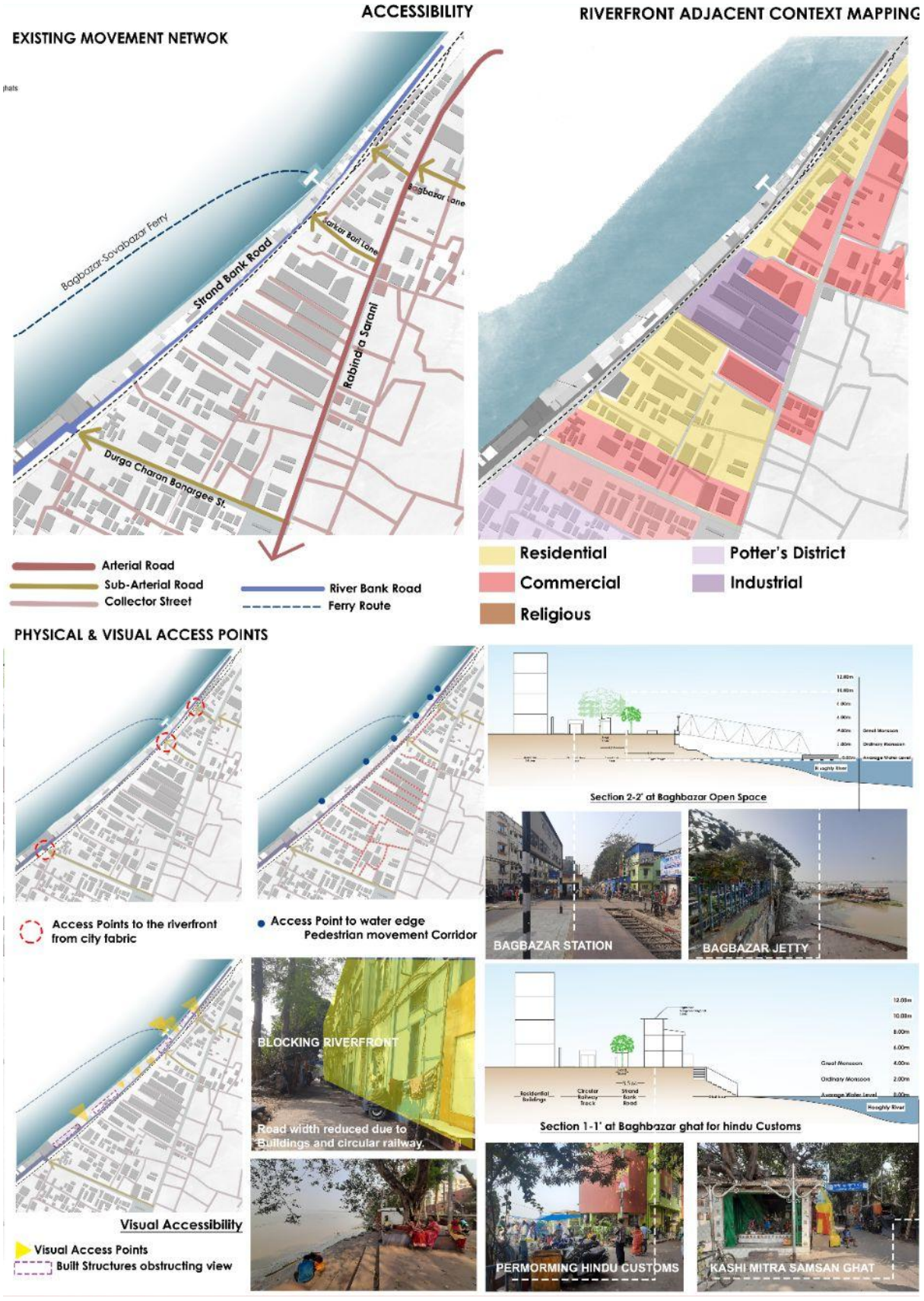


Fig. No. 10 : Context Analysis of Bagbazar

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

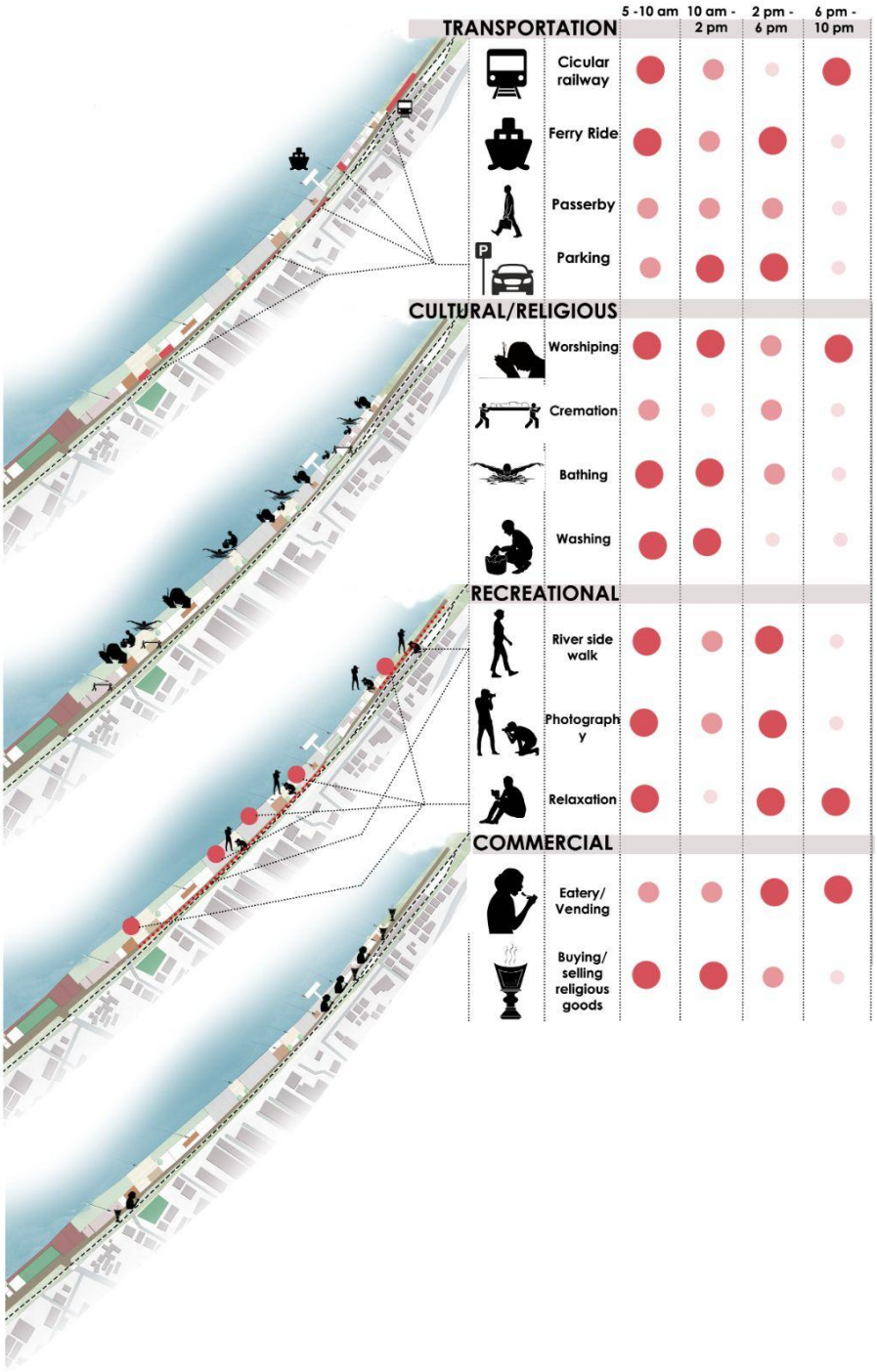
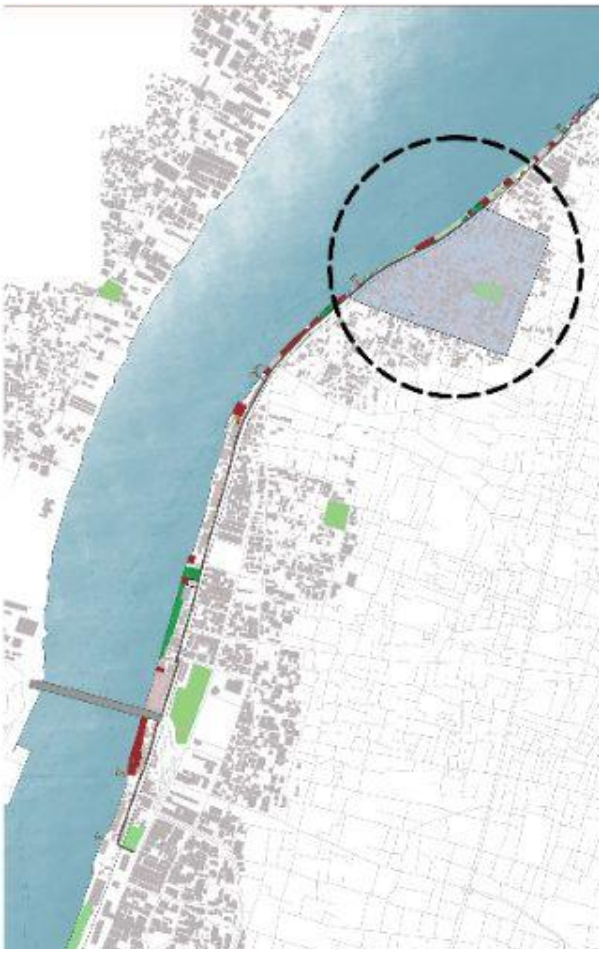


Table No.3: Activity Mapping of Baghbazar

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

KUMARTULI –

A little neighbourhood in Kolkata known as Coomartolly is a one-of-a-kind potter's area in the city's northern fringes. The location is well-known for its ability in sculpting Hindu Gods and Goddesses out of mud for various festivals in West Bengal all year long. They also export their heroes to other nations and cultures. Banamali Sarkar Street is the name of the renowned street with idol shopkeepers. Nearby is the Dhakeshwari Mata Temple, a well-known Hindu shrine.



Kumartul is a story driven by the artisan community of Kolkata who makes Durga idols.. They have existed in this fabric since the 16th century even before the Britishers arrived . Their strong hold remained in Sutanuti because of the evidential dominance that the Durga Puja has on Kolkata. The timeline talks about the fight of their land when Bitishers and later on Marwaris both attempted to Shift them elsewhere. The Zamindars stronghold and emotion for creativity and skill retained their integrity for this livelihood.

Fig. No.11 : Location map of Kumartuli

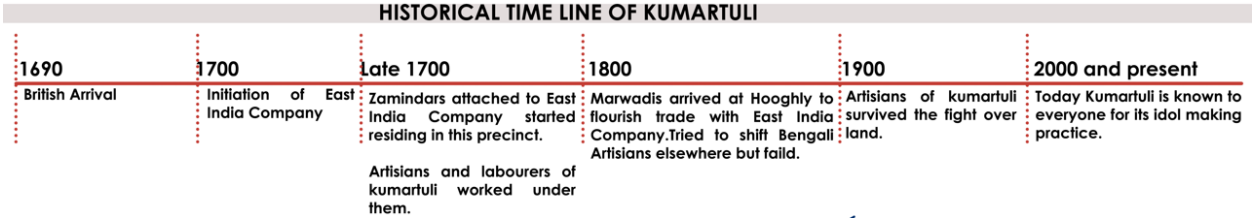


Fig. No.12 : Location map of Kumartuli

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

Fig. No.13 : Base map of Kumartuli

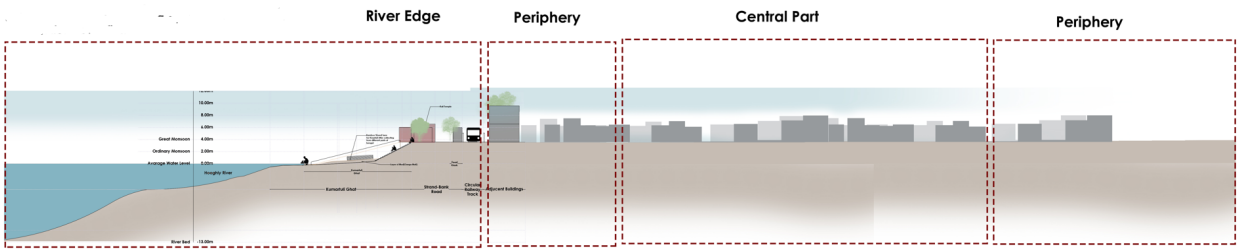
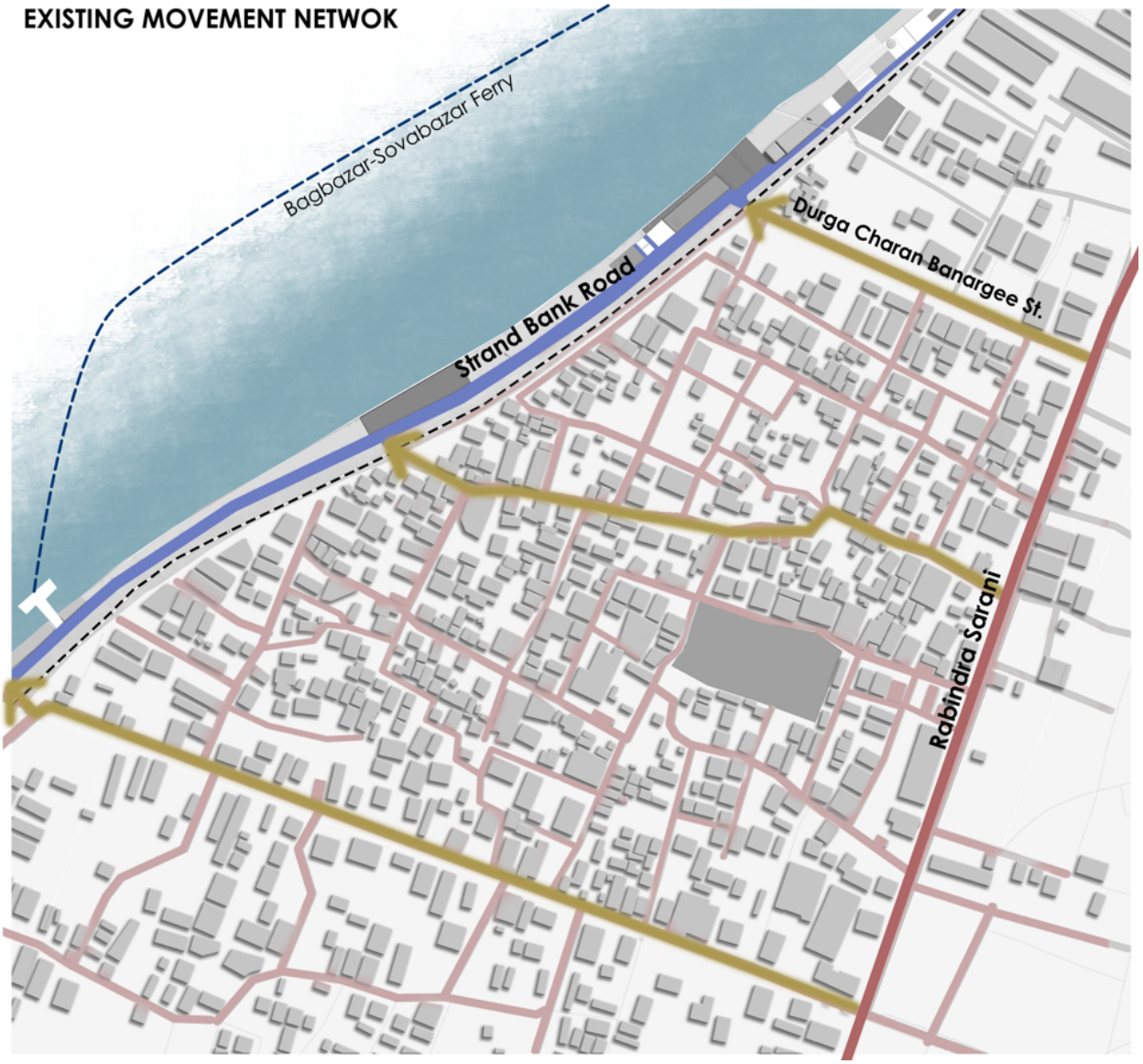


Fig. No 14. : Context Section of Kumartuli

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata



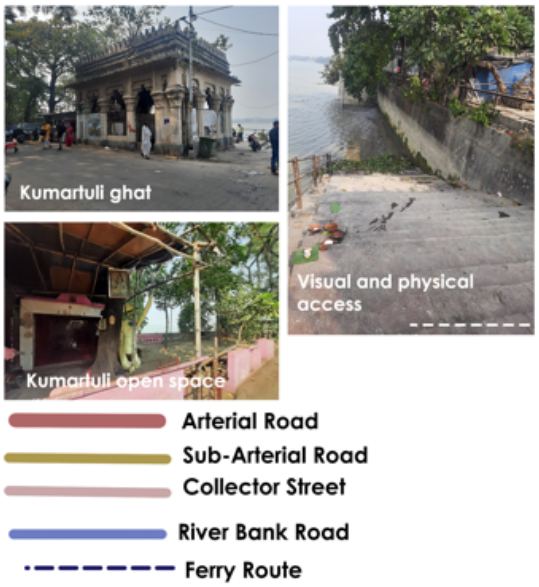


Fig. No 15. : Context Section of Kumartuli

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

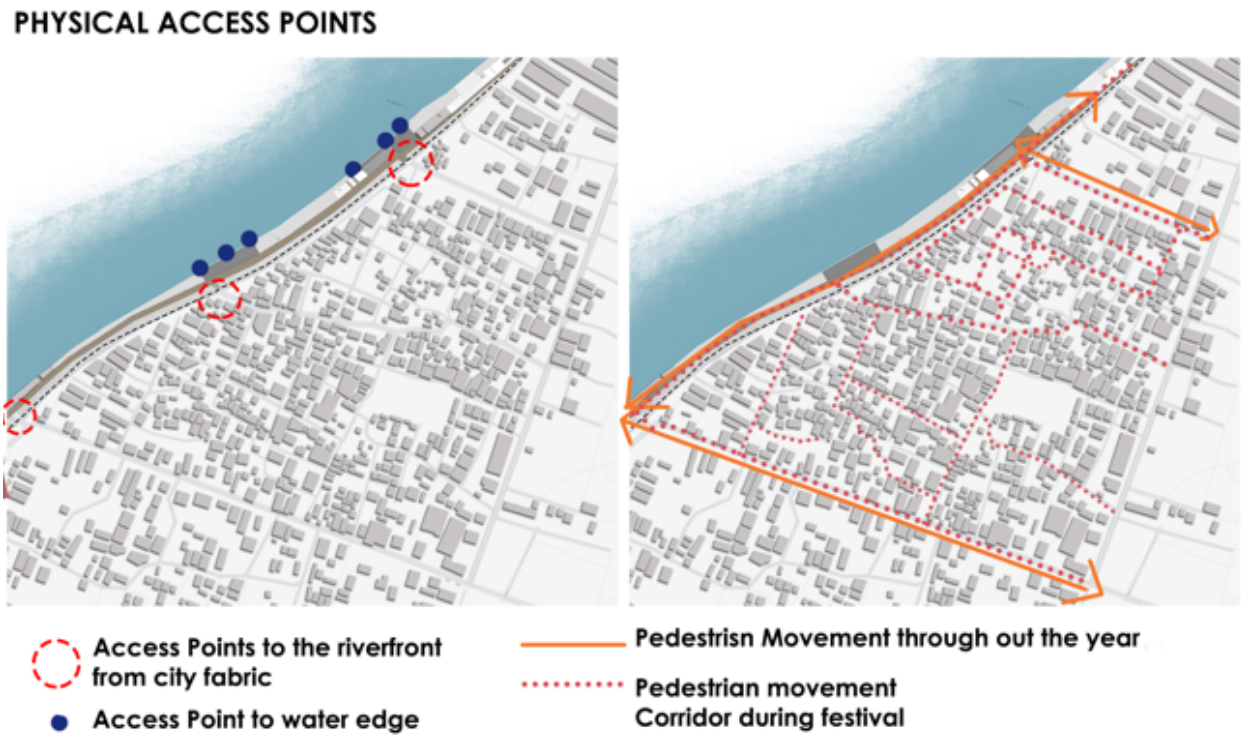


Fig. No 16. : Physical Access Points of Kumartuli

Fig. No 17. : Pedestrian Movement of Kumartuli

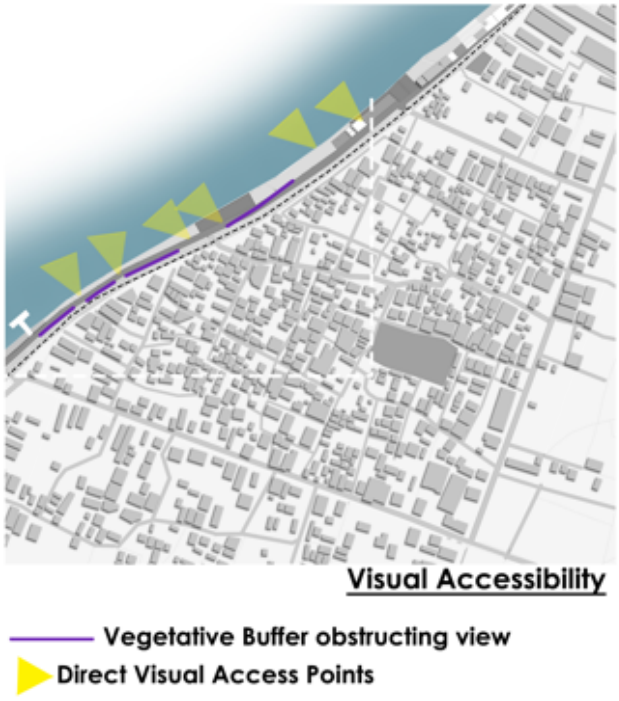


Fig. No 18. : Visual Accessibility Mapping of Kumartuli

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

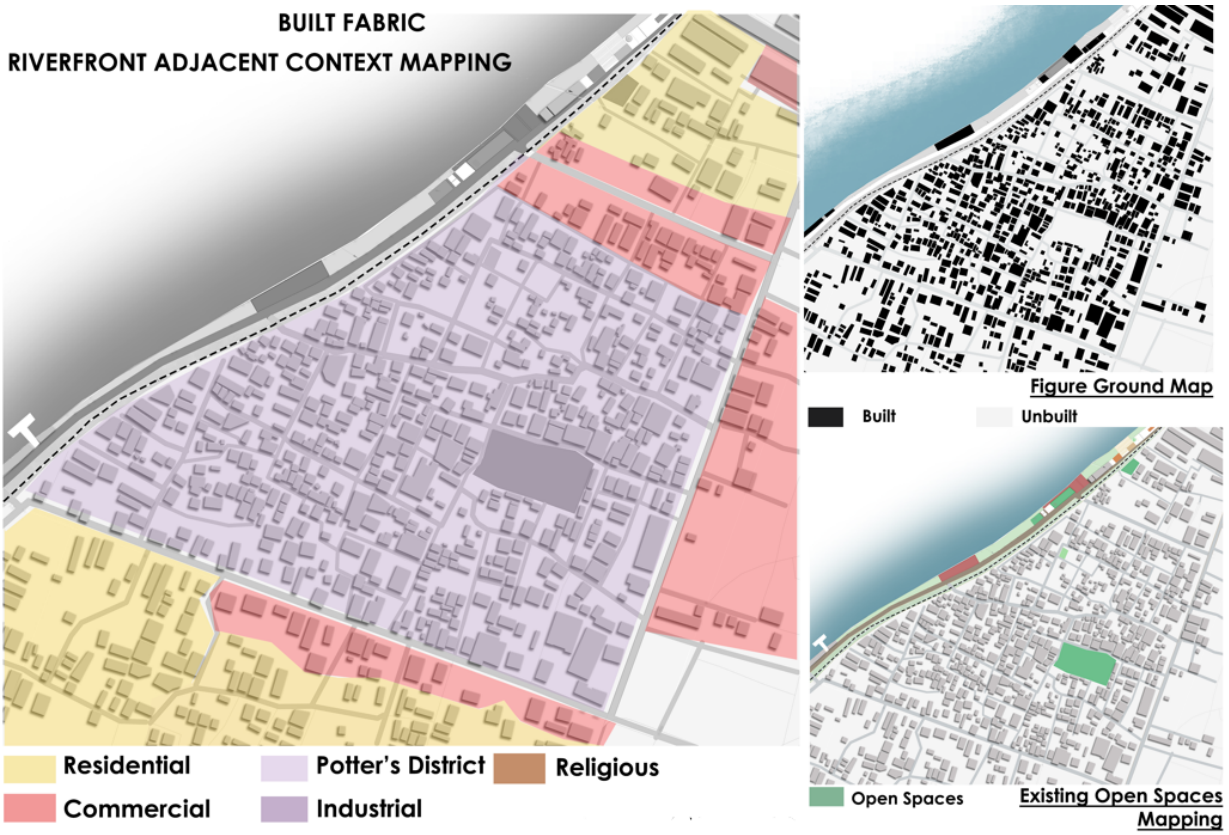


Fig. No 19. : Context Mapping of Kumartuli

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

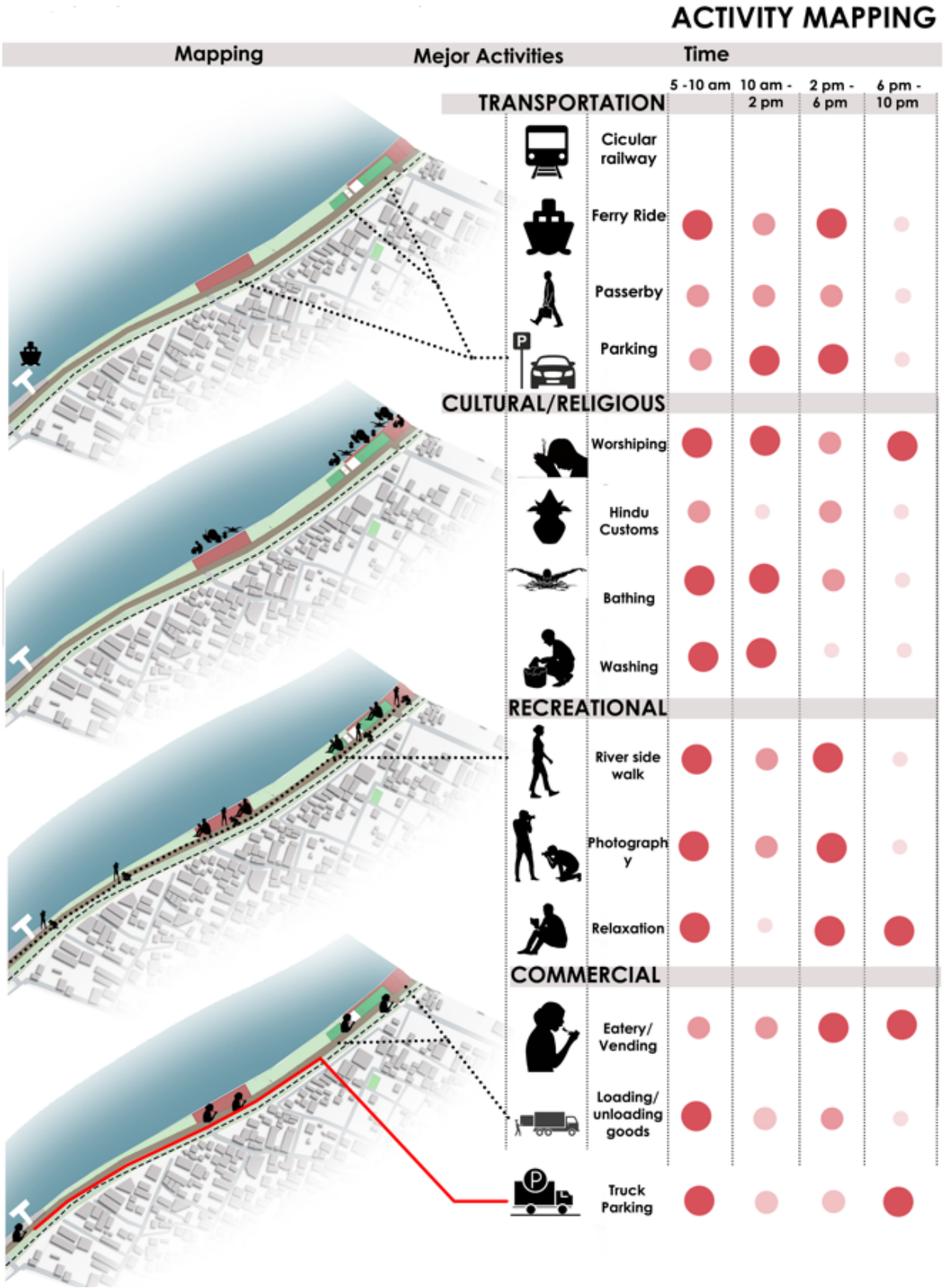


Table No.4: Activity Mapping of Kumartuli

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

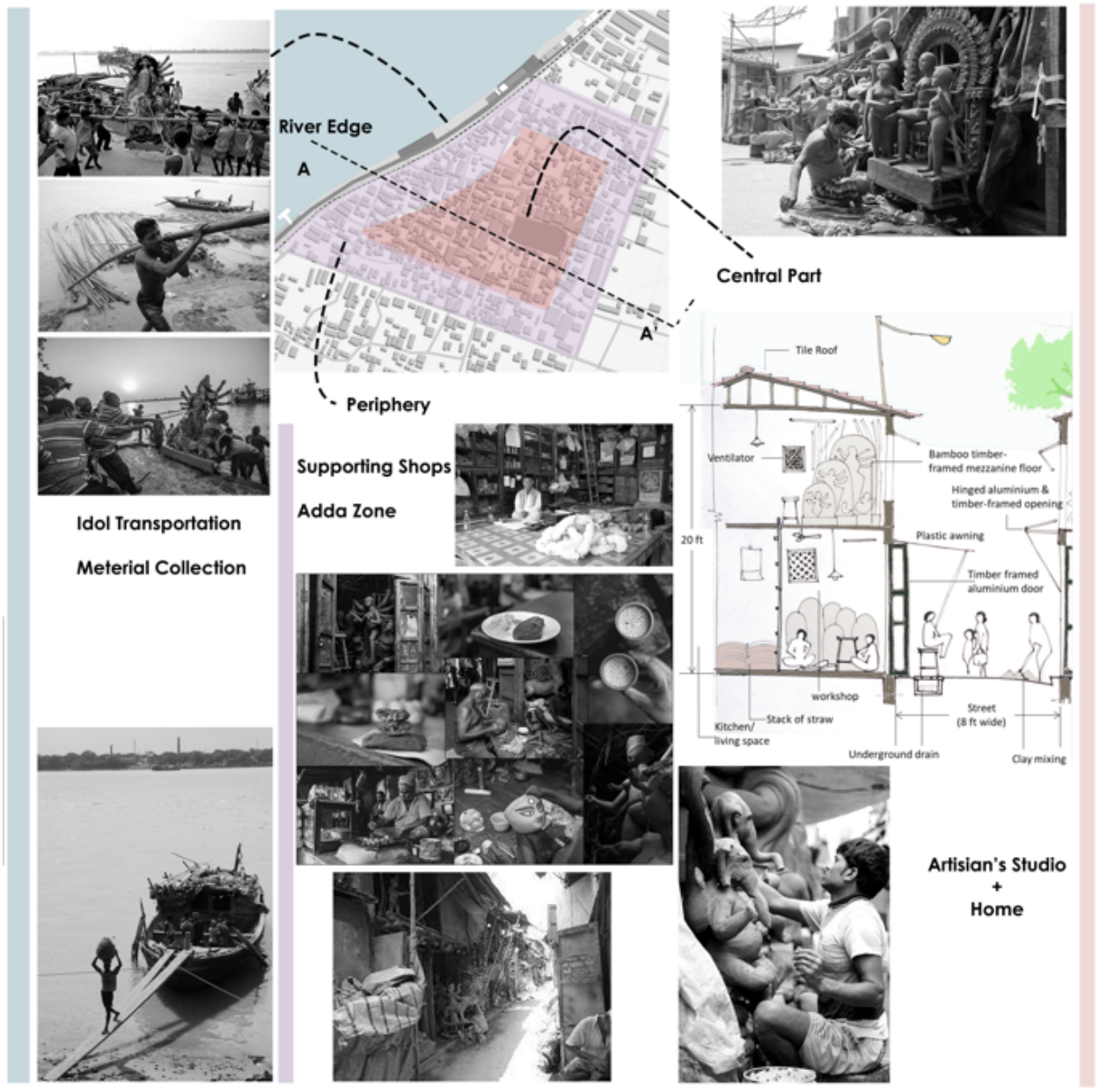


Fig. No 20. : Livelihood of Kumartuli

SOVABAZAR-AHIRITOLA -

Shobhabazar is a North Kolkata suburb in the Kolkata district of West Bengal, India.Following their stunning victory at the Battle of Plassey, the British decided to establish the rebuilt Fort William in the heart of Gobindapur. Residents of the hamlet were compensated and given land in Taltala, Kumortuli, and Shobhabazar.

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

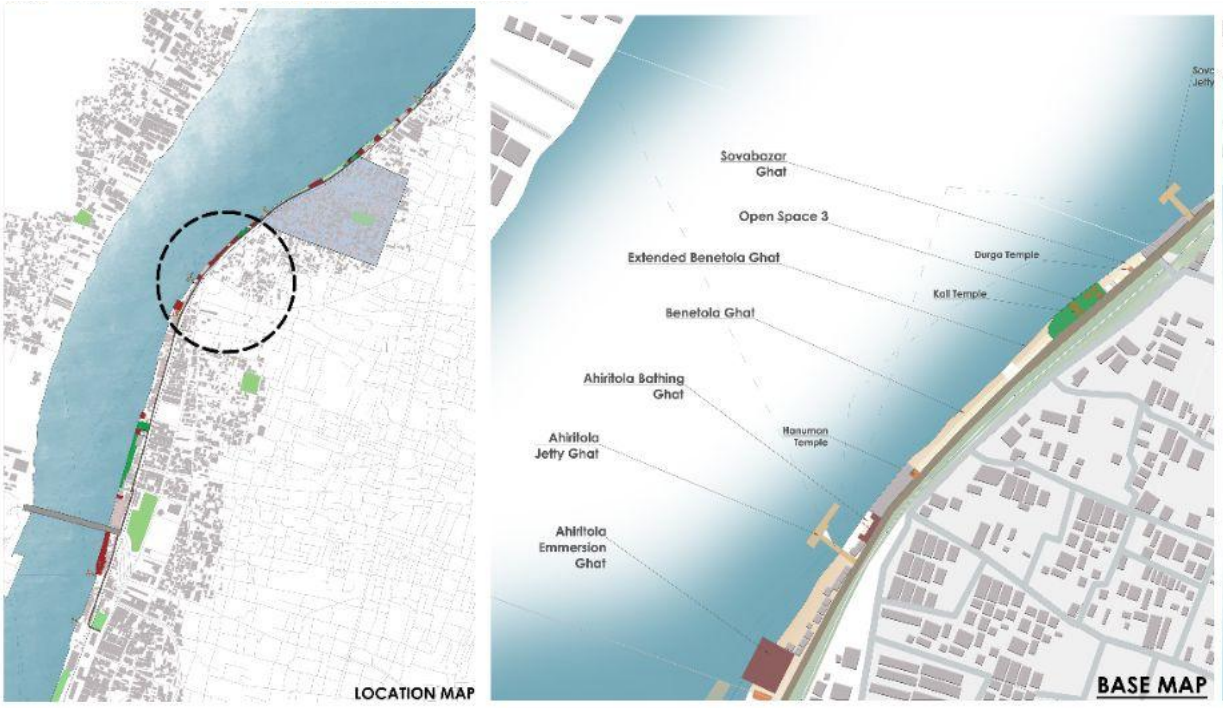


Fig. No.21 : Base map of Sobhabazar

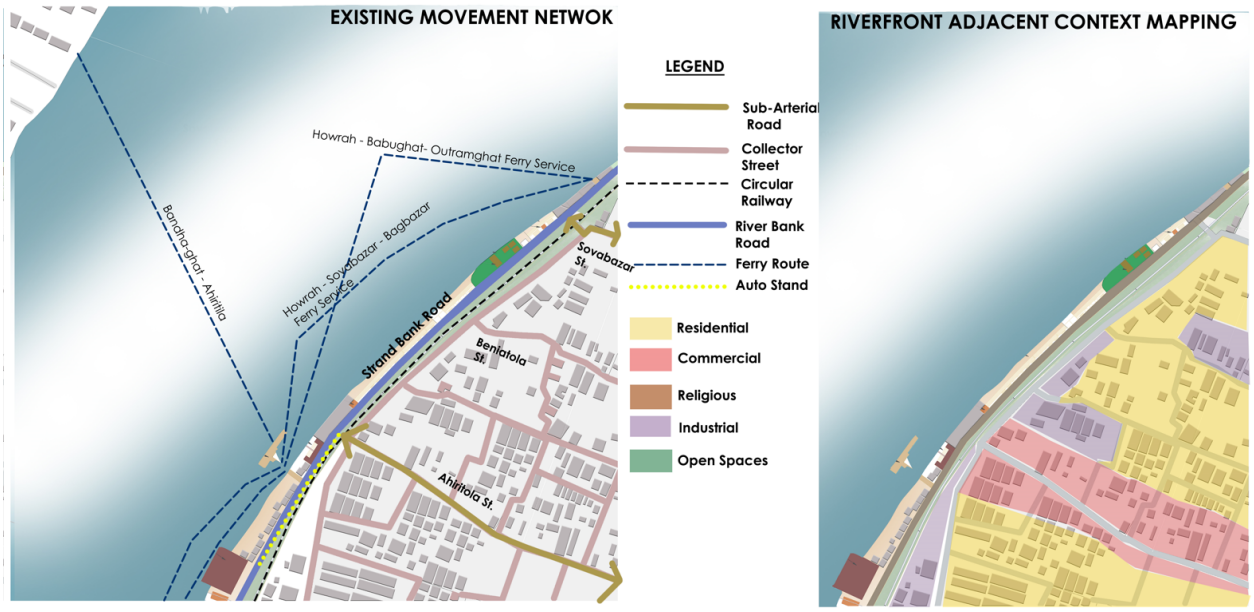


Fig. No.22 : Movement Network and Context mapping of Sobhabazar

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

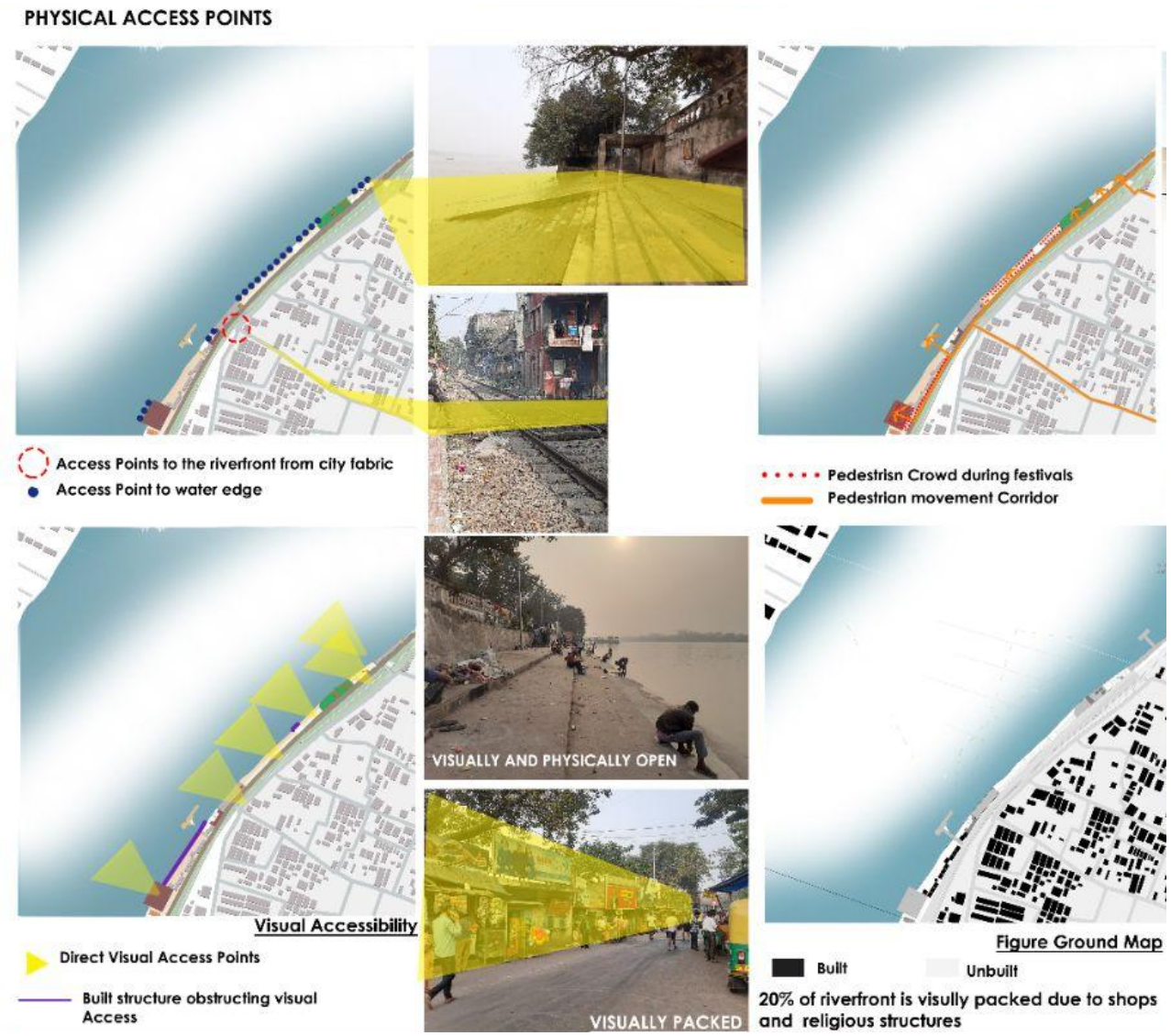


Fig. No 23. : Context Mapping of Sovabazar

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

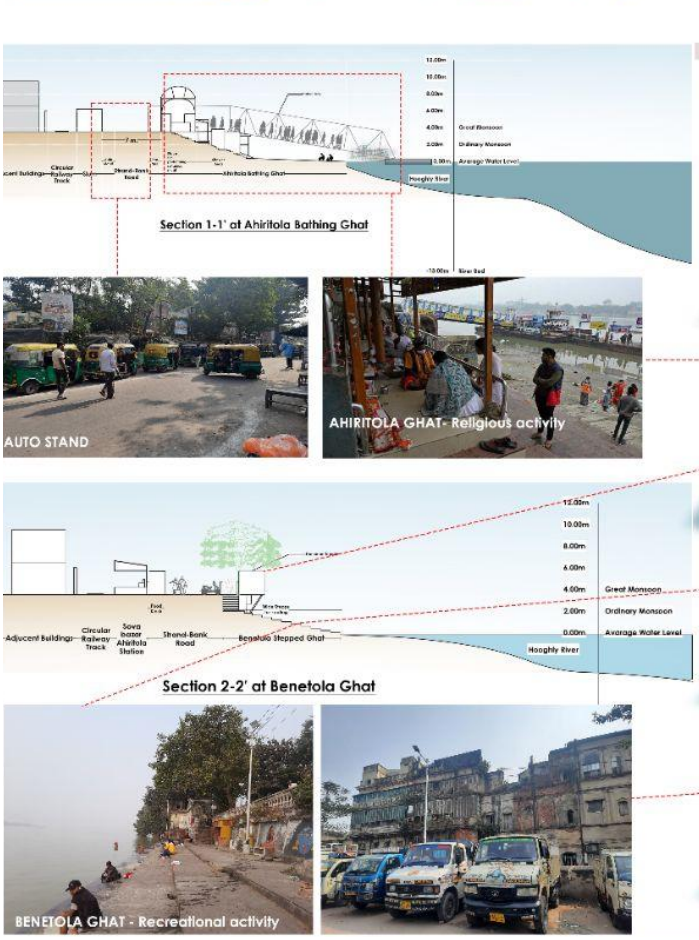


Fig. No 24. : Sections at Sovabazar

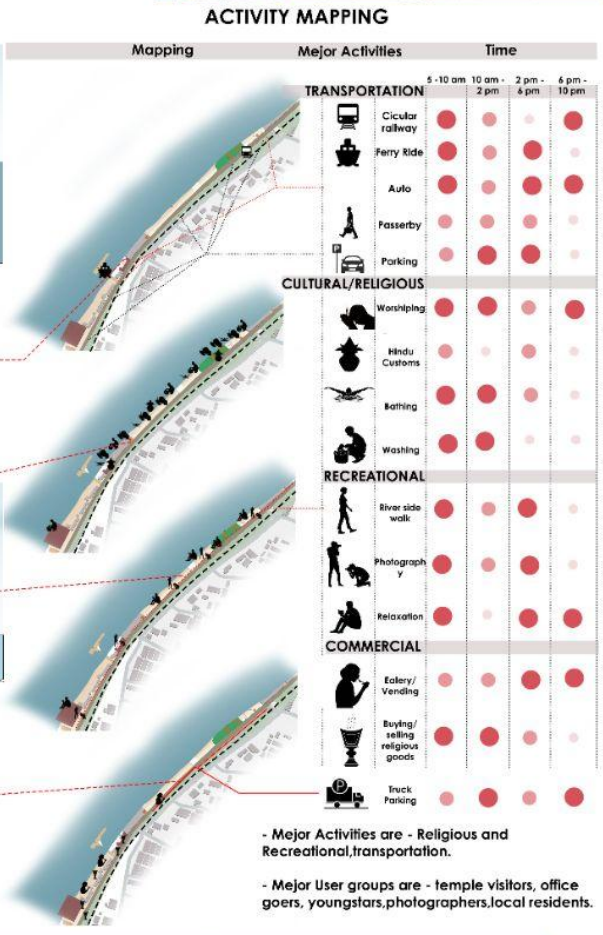


Table No.5: Activity Mapping of Sovabazar

Burrabazar -

Burrabazar, the largest in India's wholesale market, was once a marketplace for yarn and textiles during British rule. Merchants of fiber and cloth thrived in this area; individuals such Shobharam Bysack, who supplied textiles to the British East India Company, made millionaires.Along with this commercial area there is a stretch along with hooghly riverfront which were used as warehouses. Presently most of them are abandoned/non-functional and block the scenic visual access to the river.This area is the most packed area of north kolkata riverfront stretch but has huge potential to develop as urban greens with various kinds of parks,plaza and recreational spaces.

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

Fig. No 25. : Burrabazar location map & site impression

Fig. No 26. : Burrabazar Base Map

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

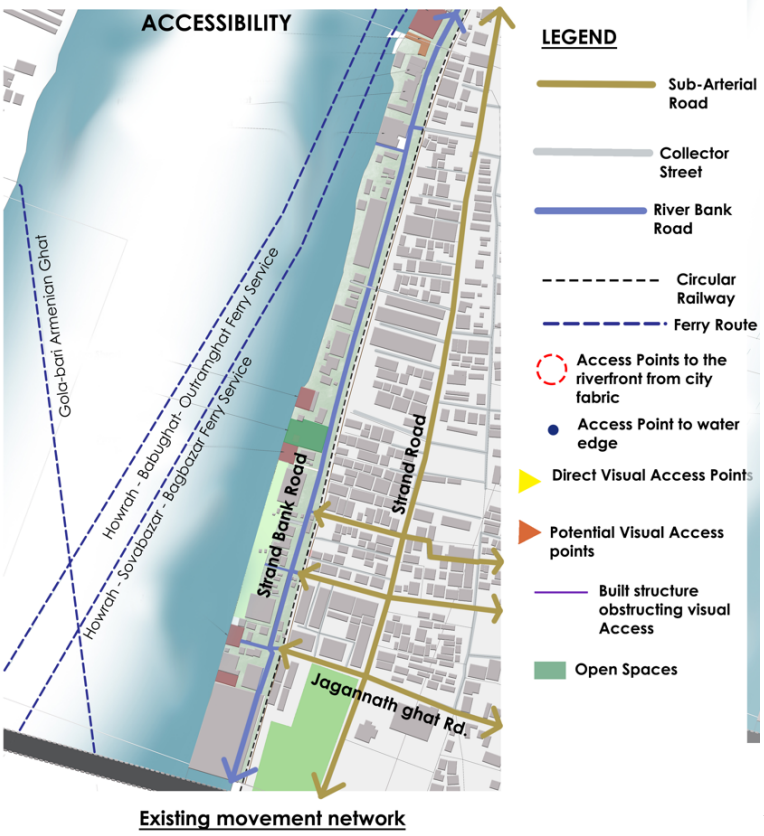


Fig. No 27. : Burrabazar Movement Network

Fig. No 28. : Burrabazar Context Map

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

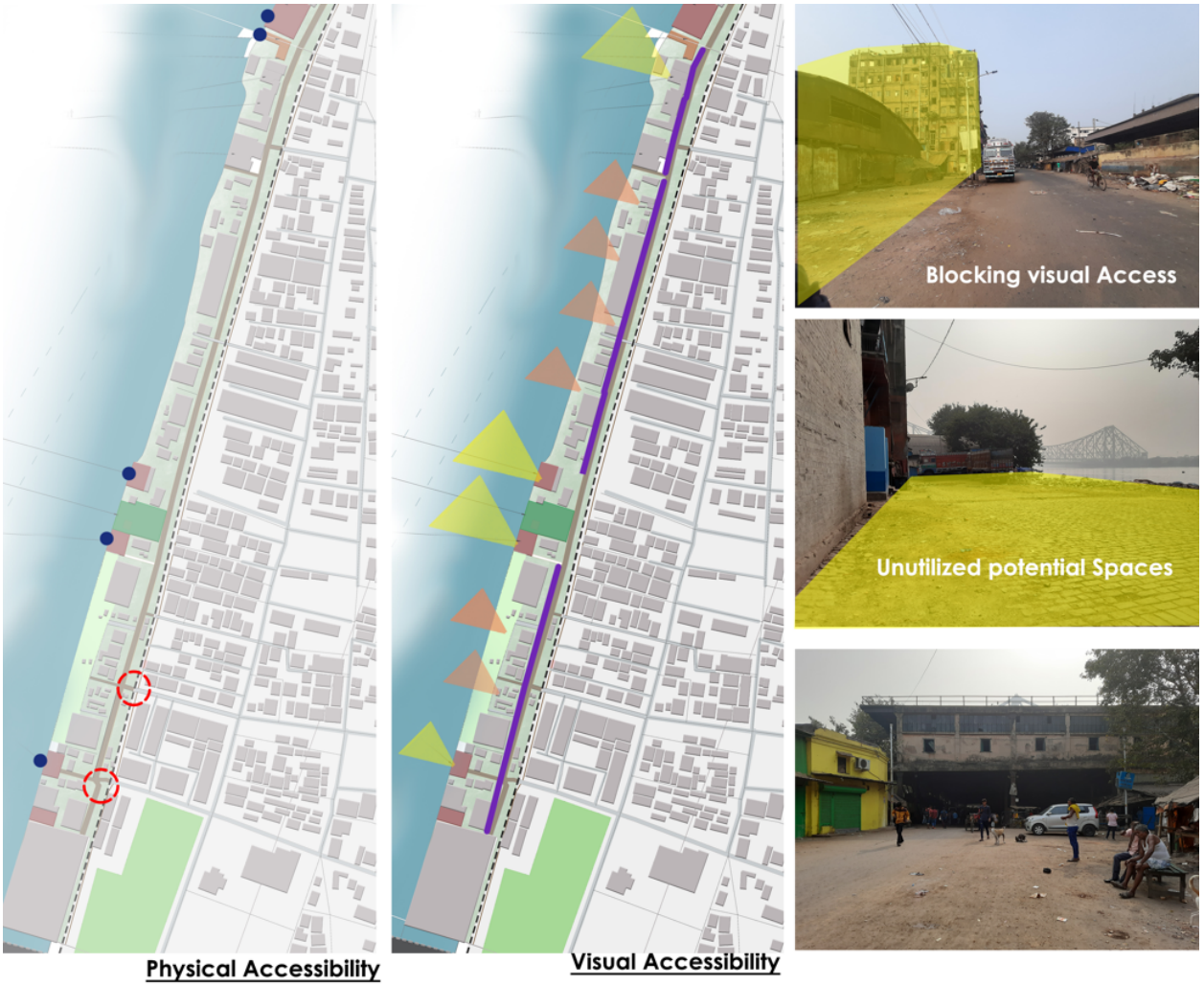


Fig. No 29. :Burrabazar Accessibility Map

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

ARMENIAN GHAT & MALLICK GHAT ZONE -

Underneath the Howrah Bridge, on the eastern shore of the Hooghly River, is the largest wholesale flower market in East India, located at Mallick Ghat.

This 125-year-old market starts at 4 a.m. and sees strong business as everyone gathers here in droves, from flower vendors to folks looking for a garland for their house puja. There is a wide range of flowers available, including roses, marigolds, and lotus. The market stretches from beneath the Howrah Bridge to Mallick Ghat. It has flower shops on both sides and provides a strange vista. Flowers from that market are not solely provided to practically all of the city's main occasions and events, but are also sent throughout Europe.

Fig. No 30. :Armenian Ghat Location Map & Base Map

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

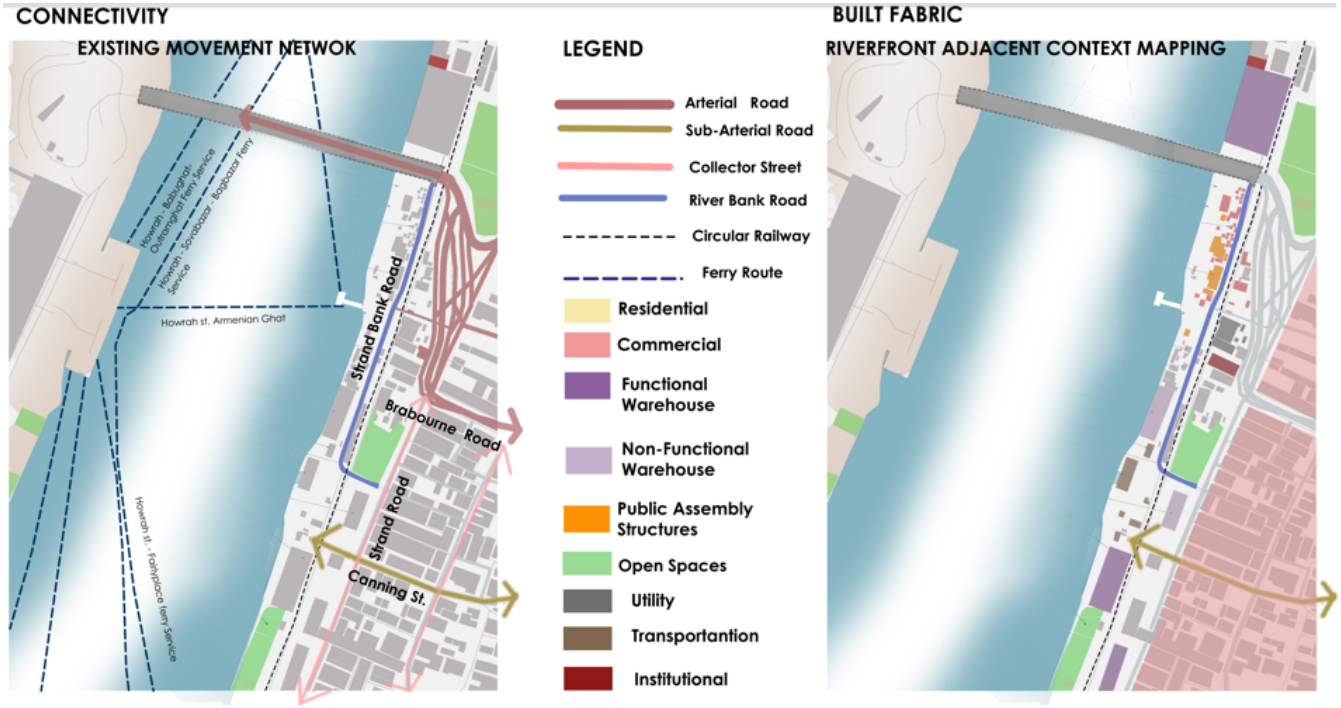


Fig. No 31. :Armenian Ghat Connectivity Map & Context Map

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

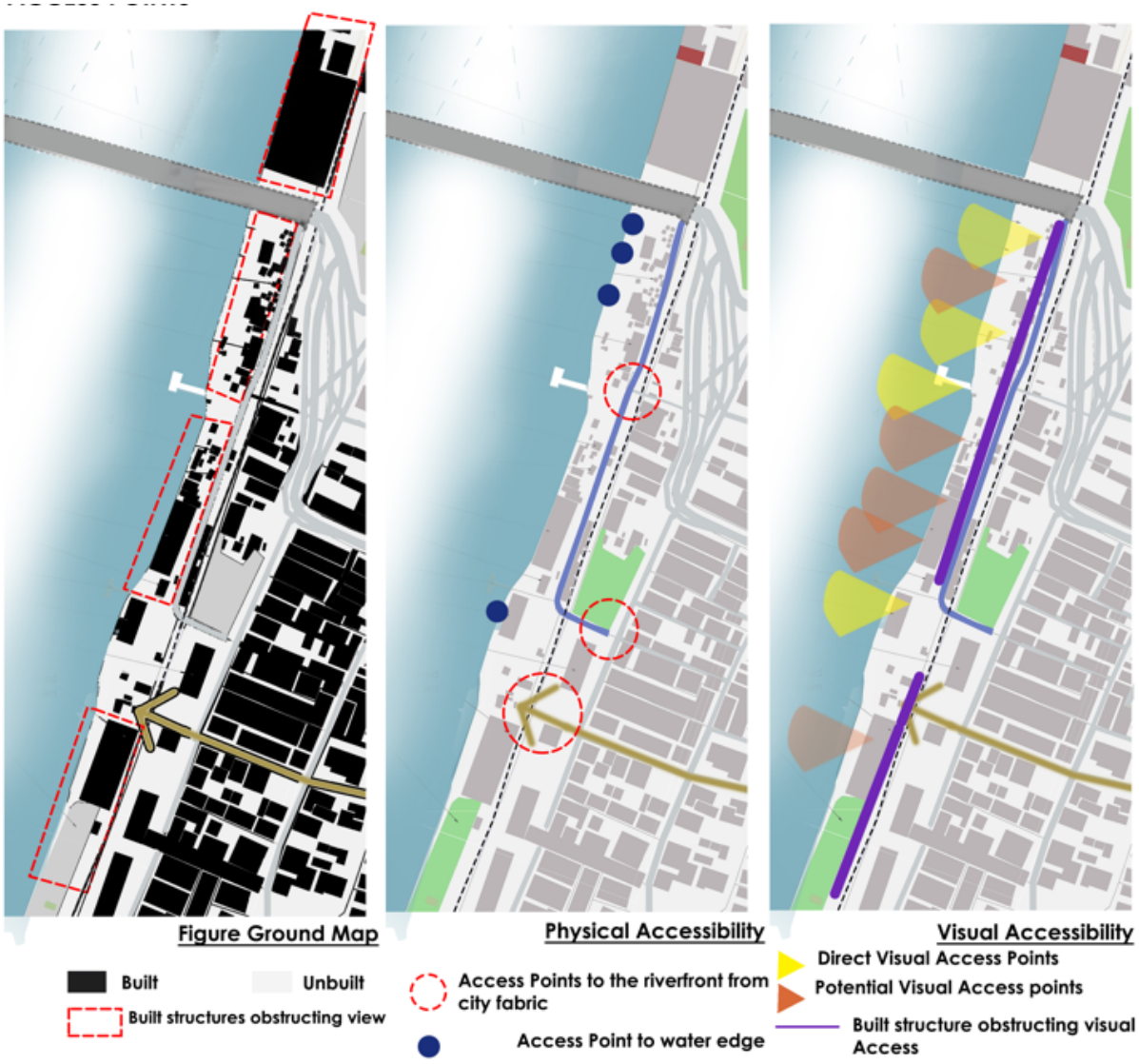


Fig. No 32. :Armenian Ghat Accessibility Map & Figure Ground Map

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

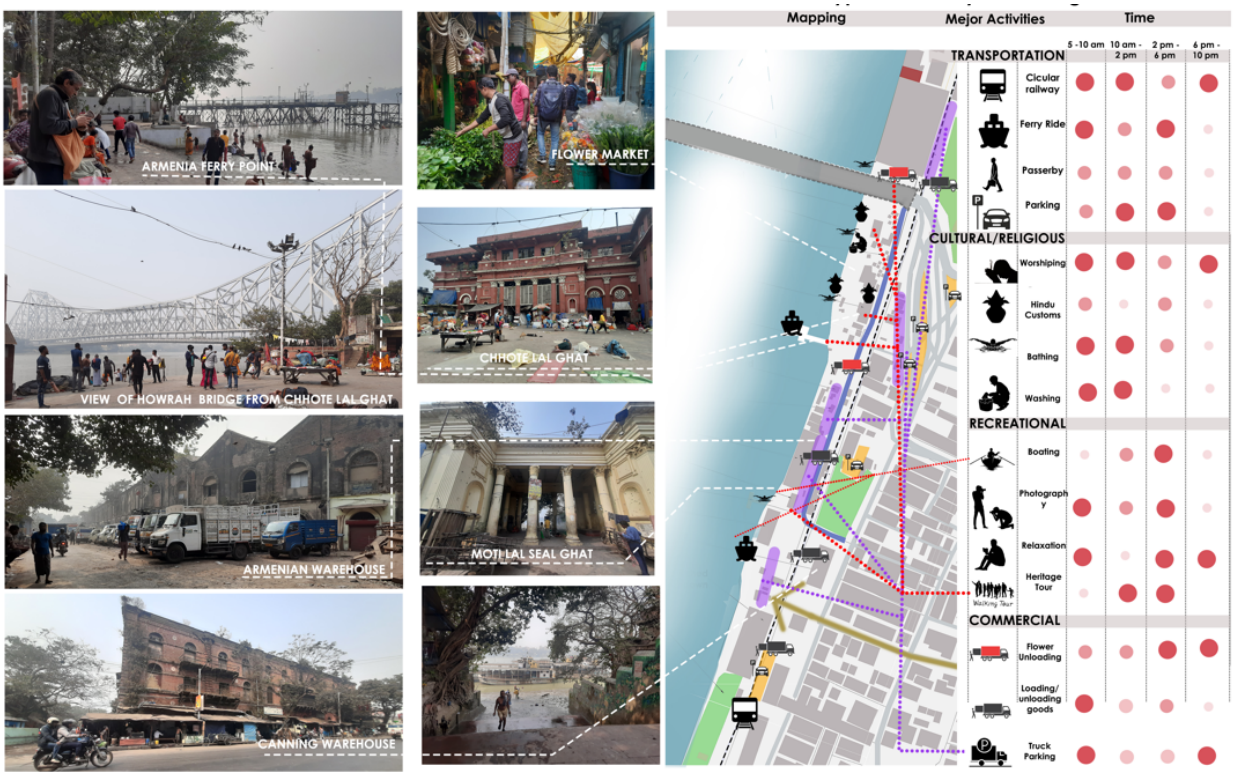


Table No.6: Activity Mapping of Baghbazar

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

CHAPTER 06

Comprehensive Understanding of the five patches -

PARAMETERS	BAGBAZAR	KUMARTULI	SOVABAZAR	BARABAZAR	ARMENIAN GHAT	FINDINGS
Accessibility						
Circular Railway						
Ferry transport						
Strand Bank Road-R.O.W	3M	8M	8M	10M.	8M.	
Strand Bank Road - Condition	Narrow because of encroachment.	No designated space for parking , vehicles are often park in haphazard manner.	Pedestrian vehicular conflict at junction point.	Pedestrian vehicular conflict at Bhoothnath temple area.	conflict due to multiple activities happening on the road itself.	
Riverfront Nodes	Major conflict point due to narrow strand bank road.	Has potential to develop as major navigation node for Artisan's district.	Major conflict point due to un-regulated vehicular circulation.	Major conflict point due to un-regulated vehicular circulation.	Major conflict point due to un-regulated vehicular circulation.	
Immediate Context of Riverfront	Residential , Commercial	Artisan's District(Idol Makers)	Residential , Commercial, Industrial	Residential , Commercial, Industrial(Warehouse)	Commercial, Industrial (Warehouse) , Institutional	User Groups are 20% residential and 80% visitors.
Built Environment of the riverfront	20% riverfront space is occupied by buildings .	riverfront space is mostly free of buildings.	10% % riverfront space is occupied by buildings	90% riverfront space is occupied by buildings .	70% riverfront space is occupied by buildings .	Most packed area of the riverfront.
River edge Condition						
Ghats						
Slopped Embankment						
Mud Flats						
Non Constructed						
Physical Access Points (ghats)	6 • Narrow & medium • Separated Recreational Bathing ,washing, Religious purpose	6 • Medium & wide • Continuous Material Transport Bathing , washing, Religious purpose	5 • Medium & wide • Continuous Recreational , Bathing , washing, Religious purpose.	4 • Narrow & medium • Separated Bathing ,washing, Religious purpose	4 • Medium & wide • Seperated. Recreational , Bathing , washing, Religious purpose.	
Visual Access	50%	90%	90%	10%	20%	Kumartuli and sova bazar area is mostly visually open & Barabazar, Armenian ghat area is packed.
From ghat						
From Road						
Obstruct By Buildings						
Potential Open Spaces	Ganga teerth sabha adjacent open space	Strand Bank Road and Durga Charan Street adjacent junction.	Kali Temple Area	Prasanna Kumar Ghat Adjacent	Mallick Bazar Flower Market. Strand Ware House area.	
Major Activities						
Transportation						
Religious						
Cultural						
Re-creational						
Commercial						

Table No.7: Comprehensive Understanding

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

ISSUE MAPPING

Existing 3 m. wide strand-bank road between Bagbazar ghat to Kashi-mitra Ghat

Vehicles are parked in haphazard manner.

Under utilized riverfront space.

Most packed area of the riverfront

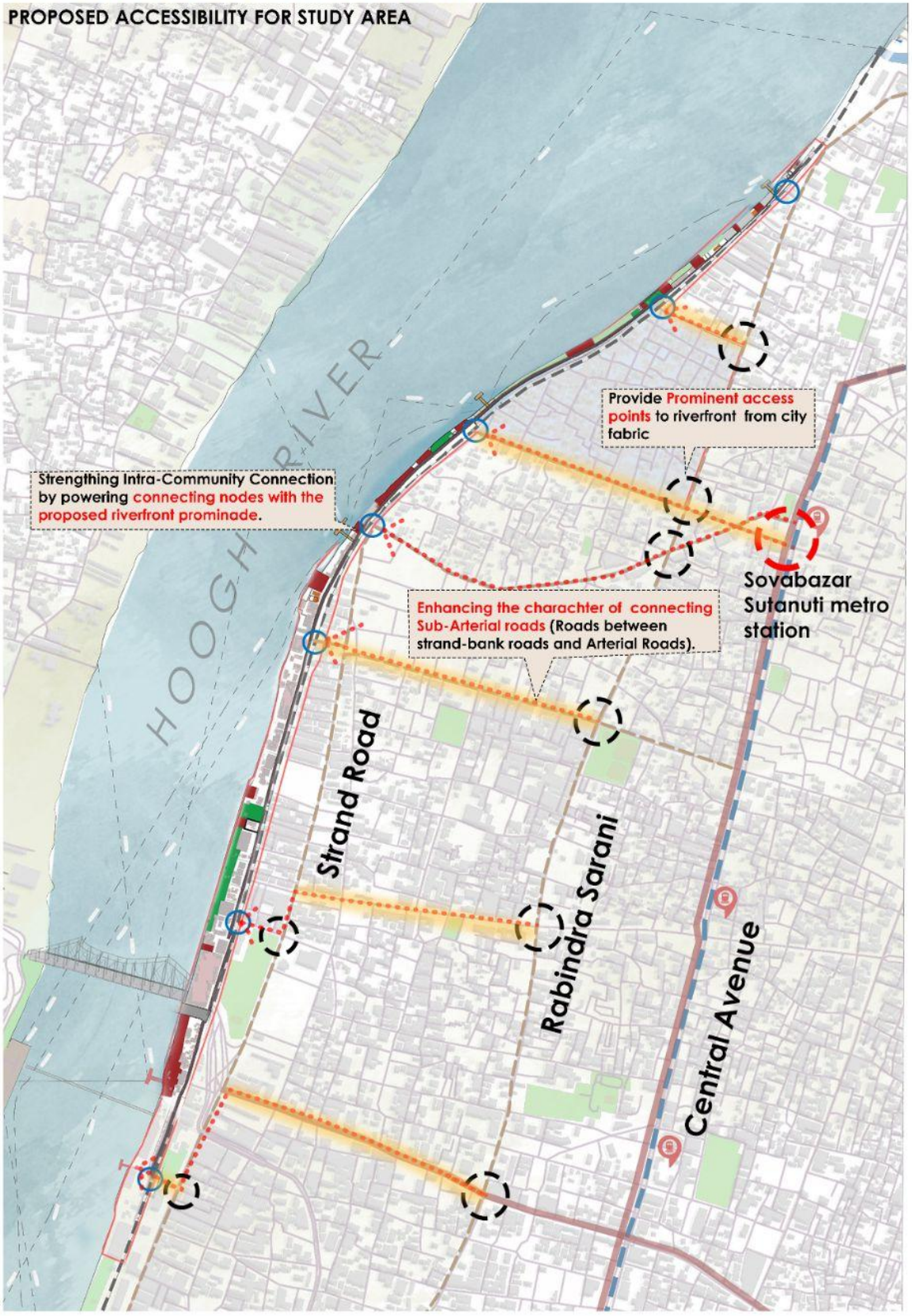
River edge as Transition Node

LEGEND

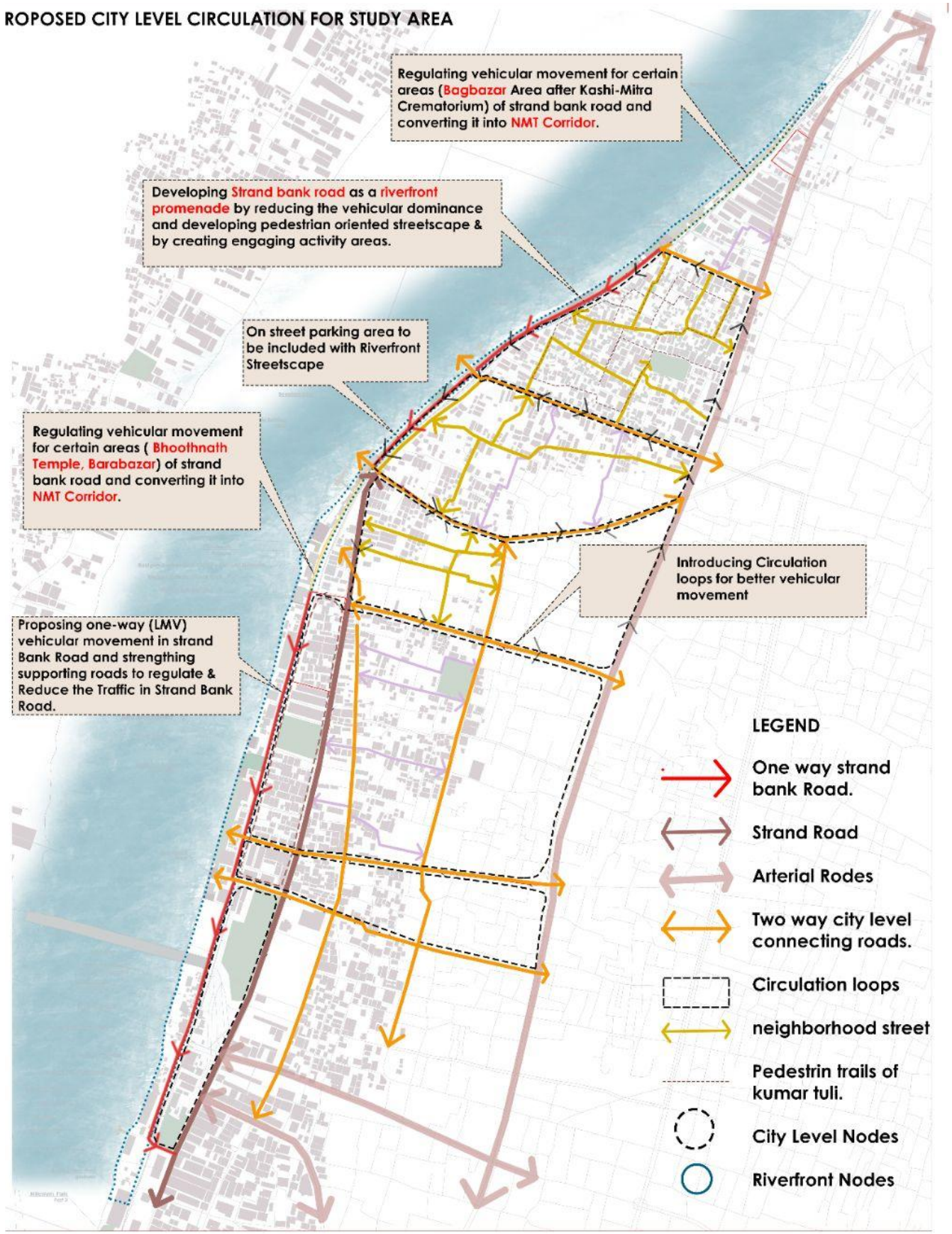
- Blocked Visual Access
- Encroachment
- Conflict at Junction
- Untilized river edges used for garbage dumping
- **Strand Road :**
  - No Foothpath
  - Hapazard Parking since there is no onstreet parking
  - No resting spaces
  - Discontinuous Shading

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

PROPOSALS FOR POLICY LEVEL INTERVENTIONS :



Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata



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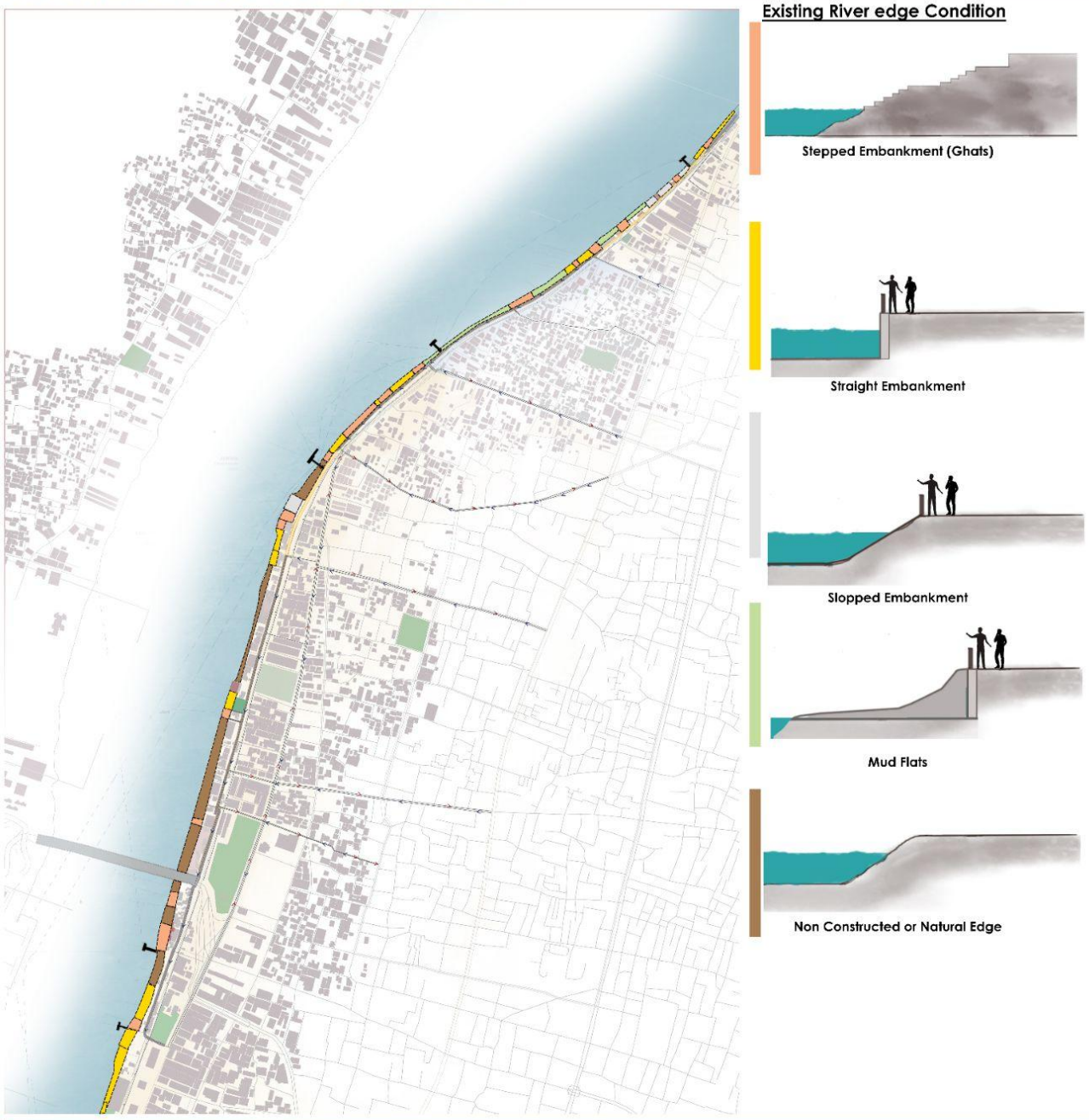

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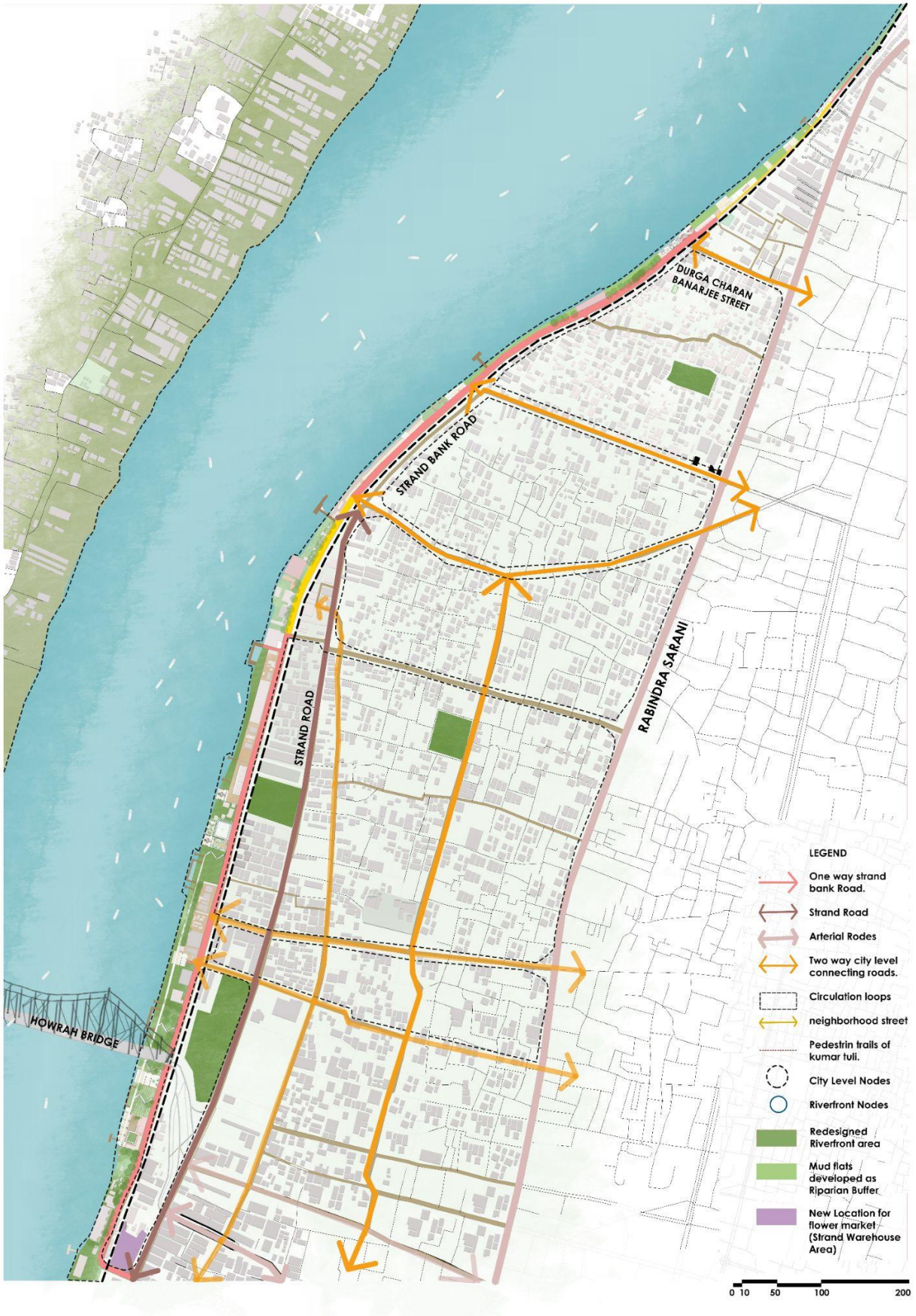
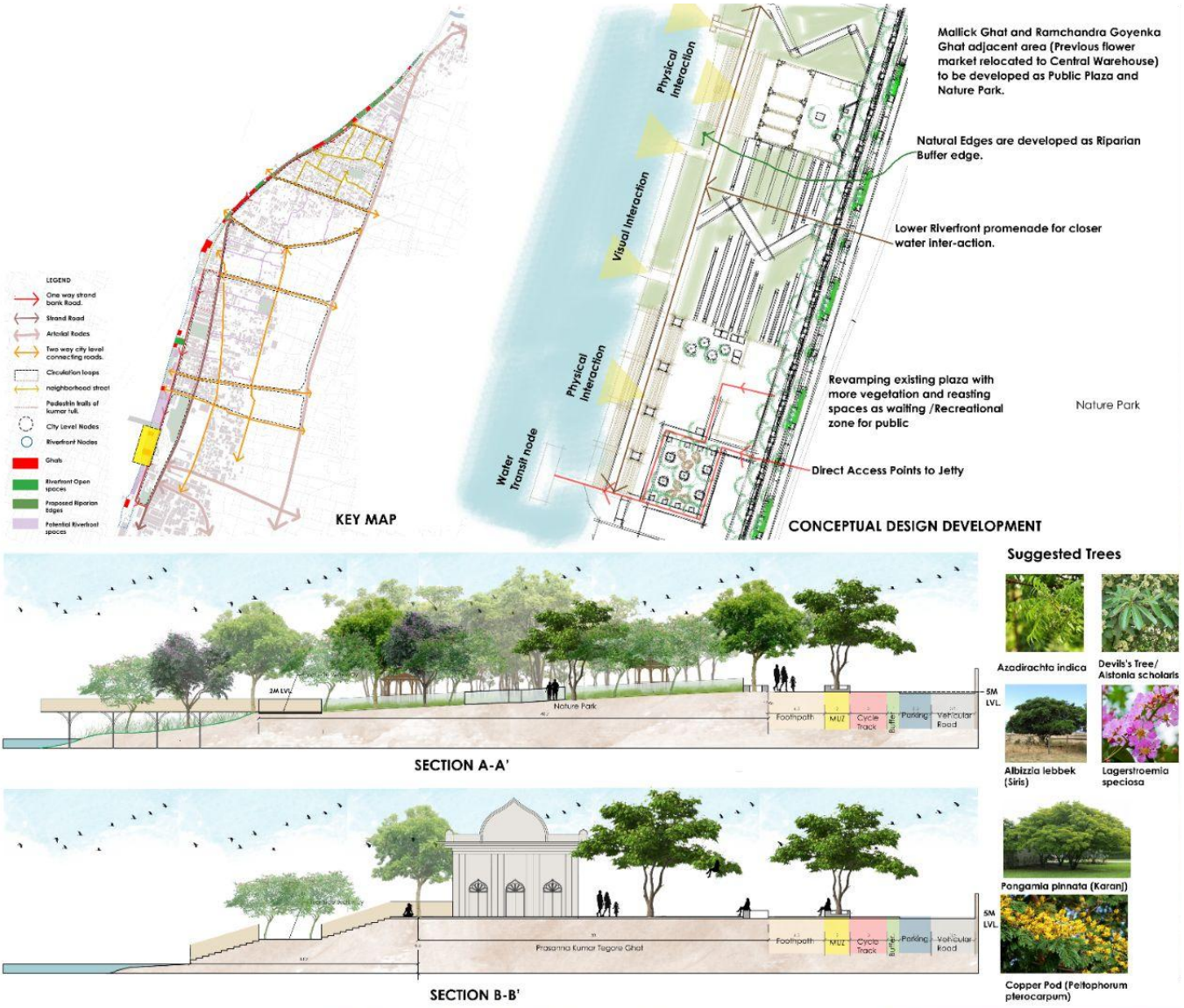


Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

ARMENIAN GHAT & MALLICK GHAT ZONE -

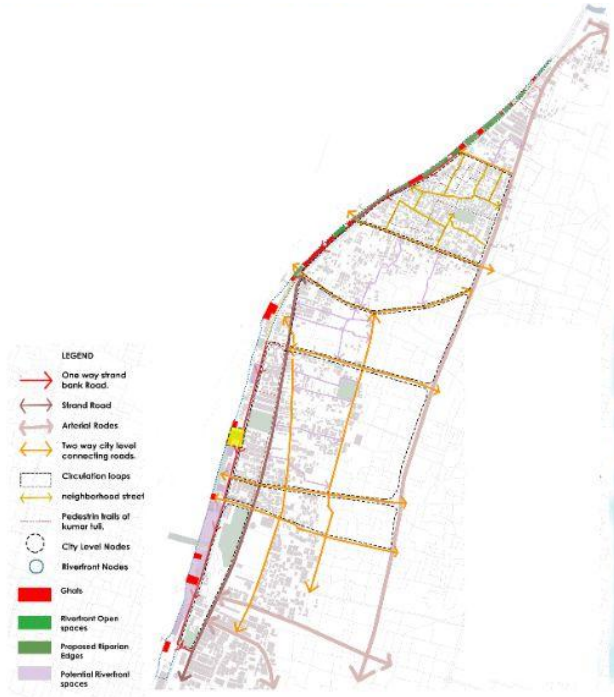


Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

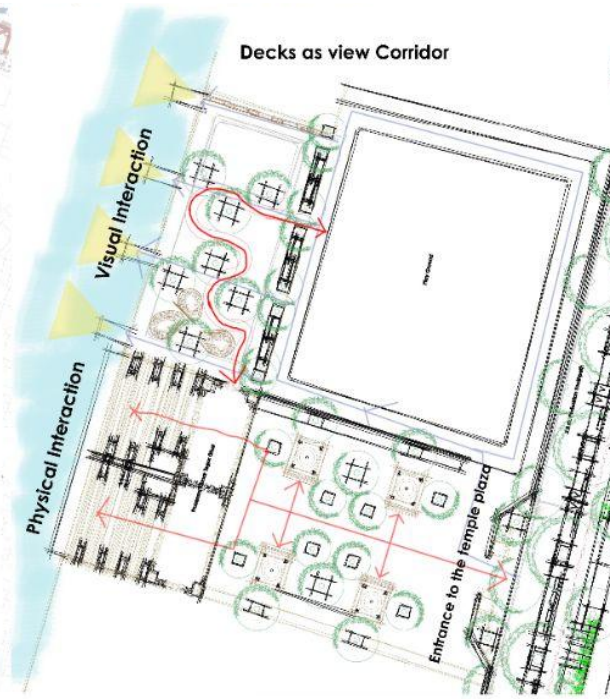
PLAN OF MALLICK GHAT AND ADJACENT AREA

PRASANNA KUMAR TEGORE GHAT -

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata



KEY PLAN



CONCEPTUAL DESIGN DEVELOPMENT

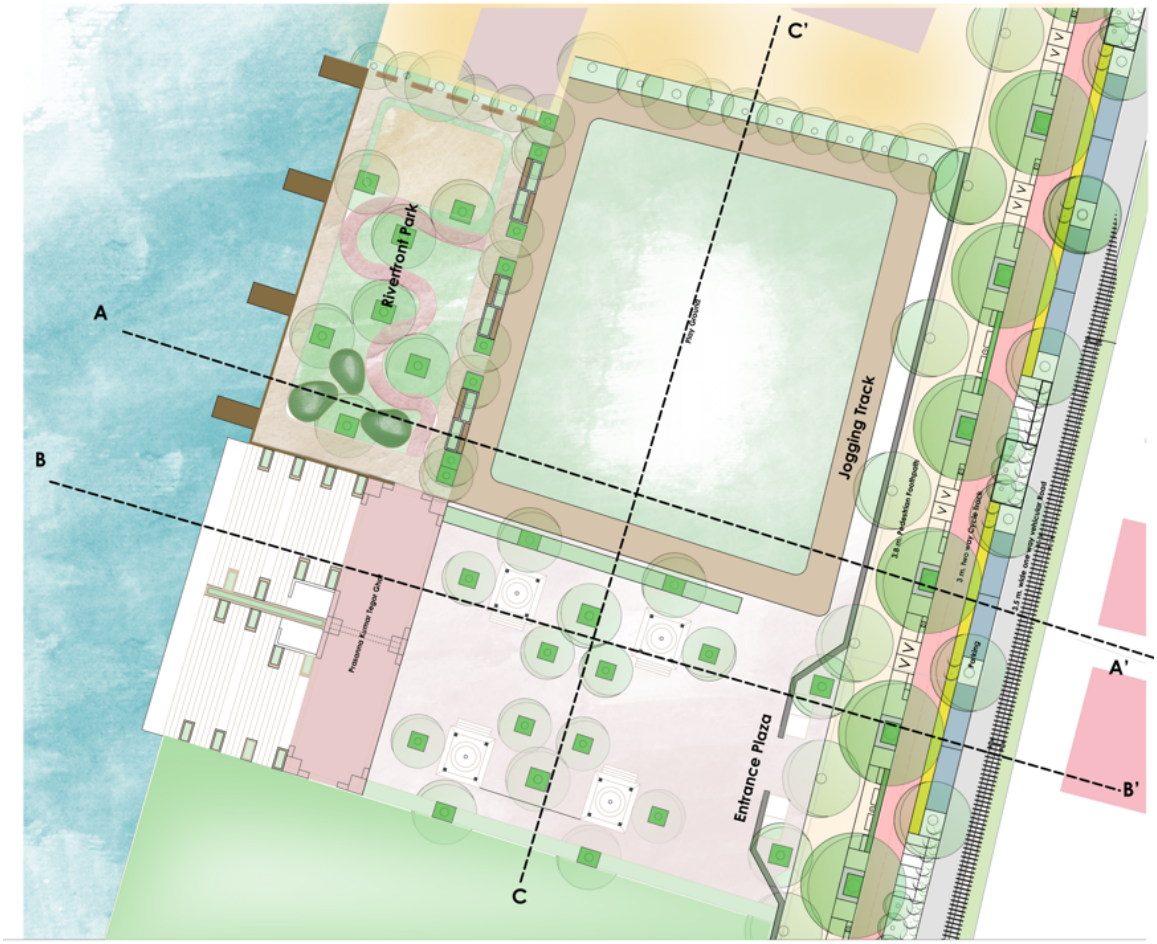
SECTION WITH PLANTING PALATTE

SECTION A-A'

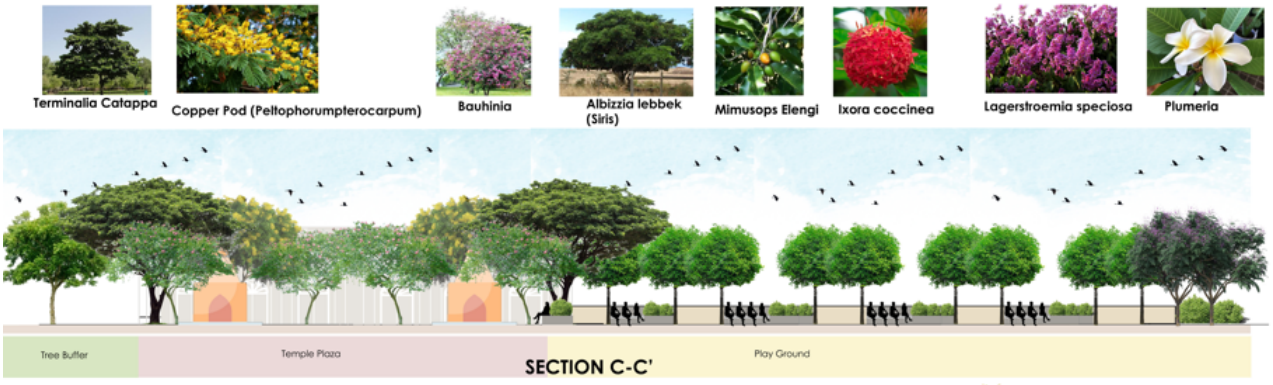
SECTION B-B'

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

PRASANNA KUMAR TEGORE GHAT AND ADJACENT OPEN SPACE -



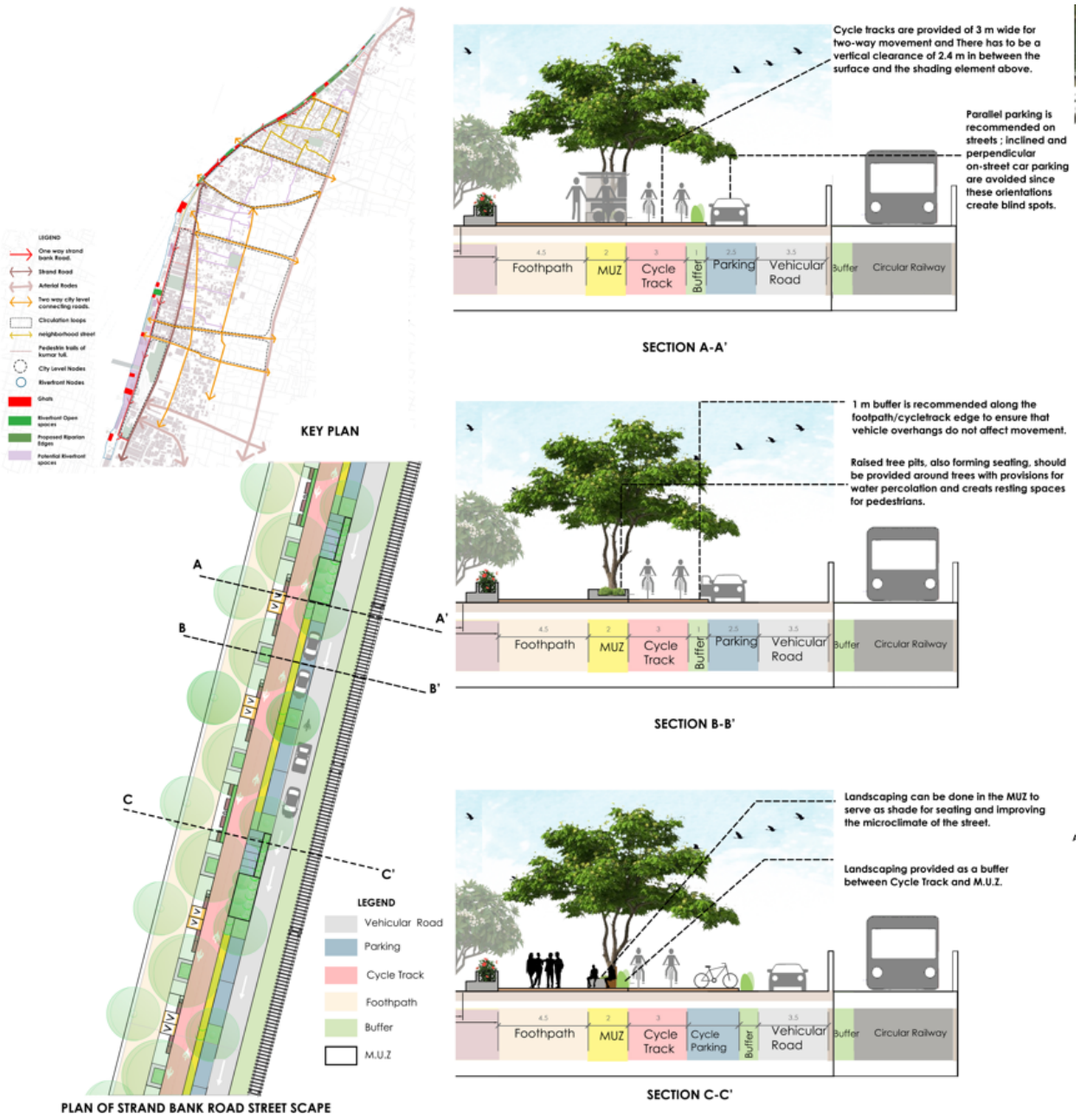
PLAN OF PRASANNA KUMAR TEGORE GHAT AND ADJACENT OPEN SPACE



SECTION C-C'

Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

STREET-SCAPE OF STRAND ROAD -



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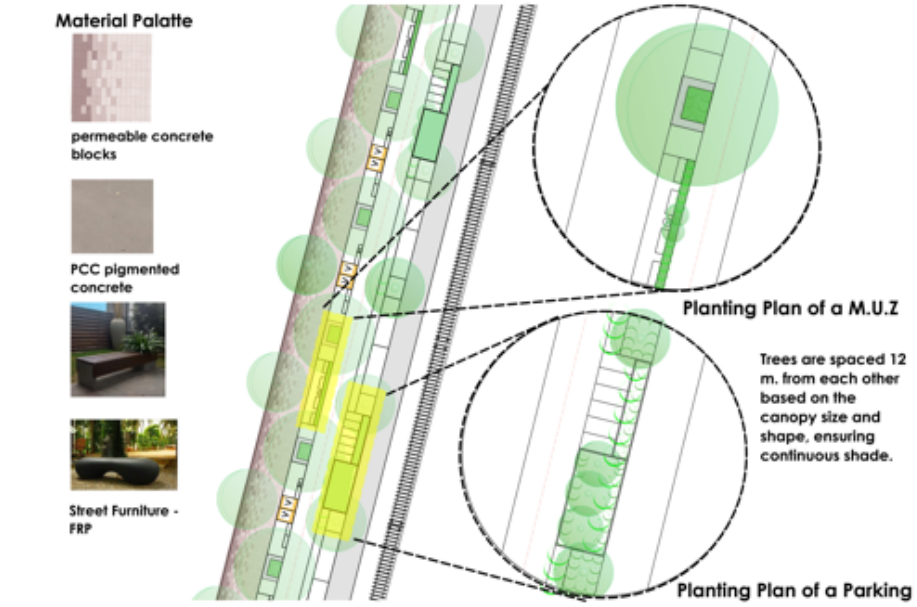
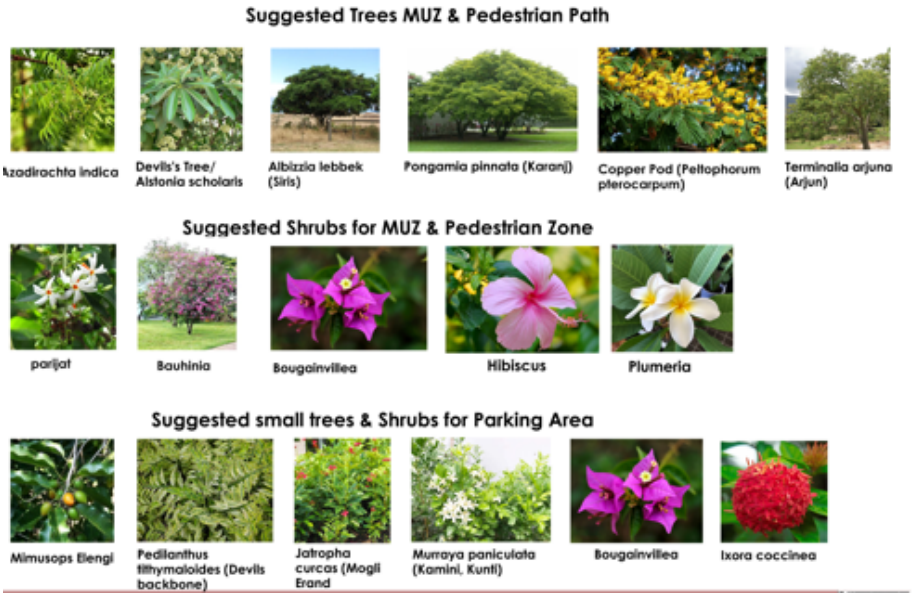
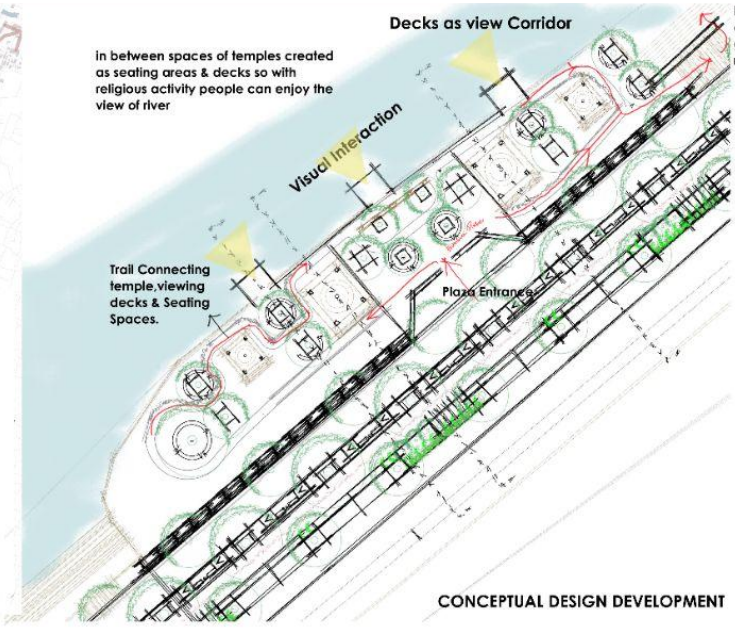




Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata

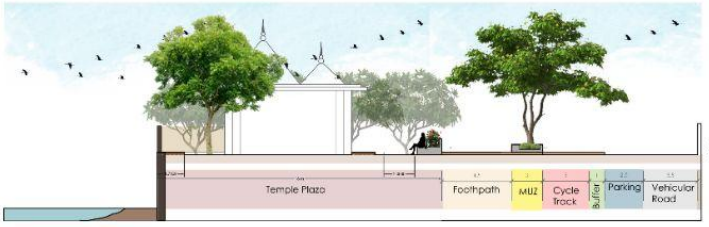
SHOBHABAZAR ADJACENT OPEN SPACE -

KEY PLAN



CONCEPTUAL DESIGN DEVELOPMENT

SECTION A-A'



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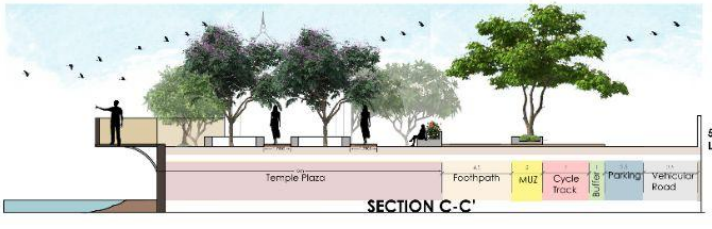
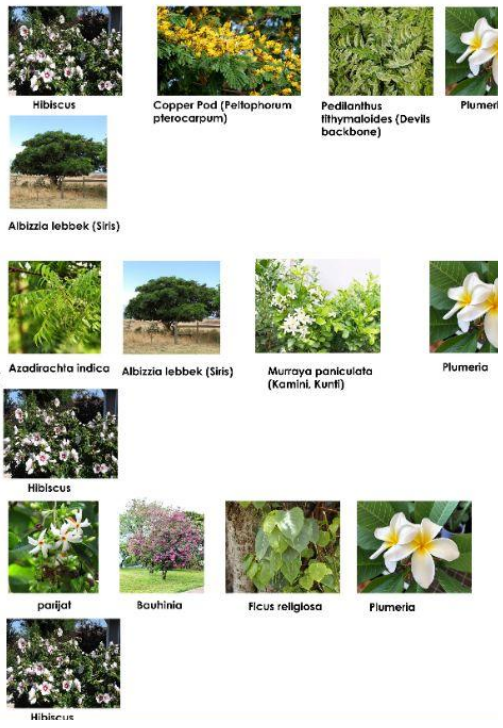


SECTION C-C'

PLANTING PALETTE



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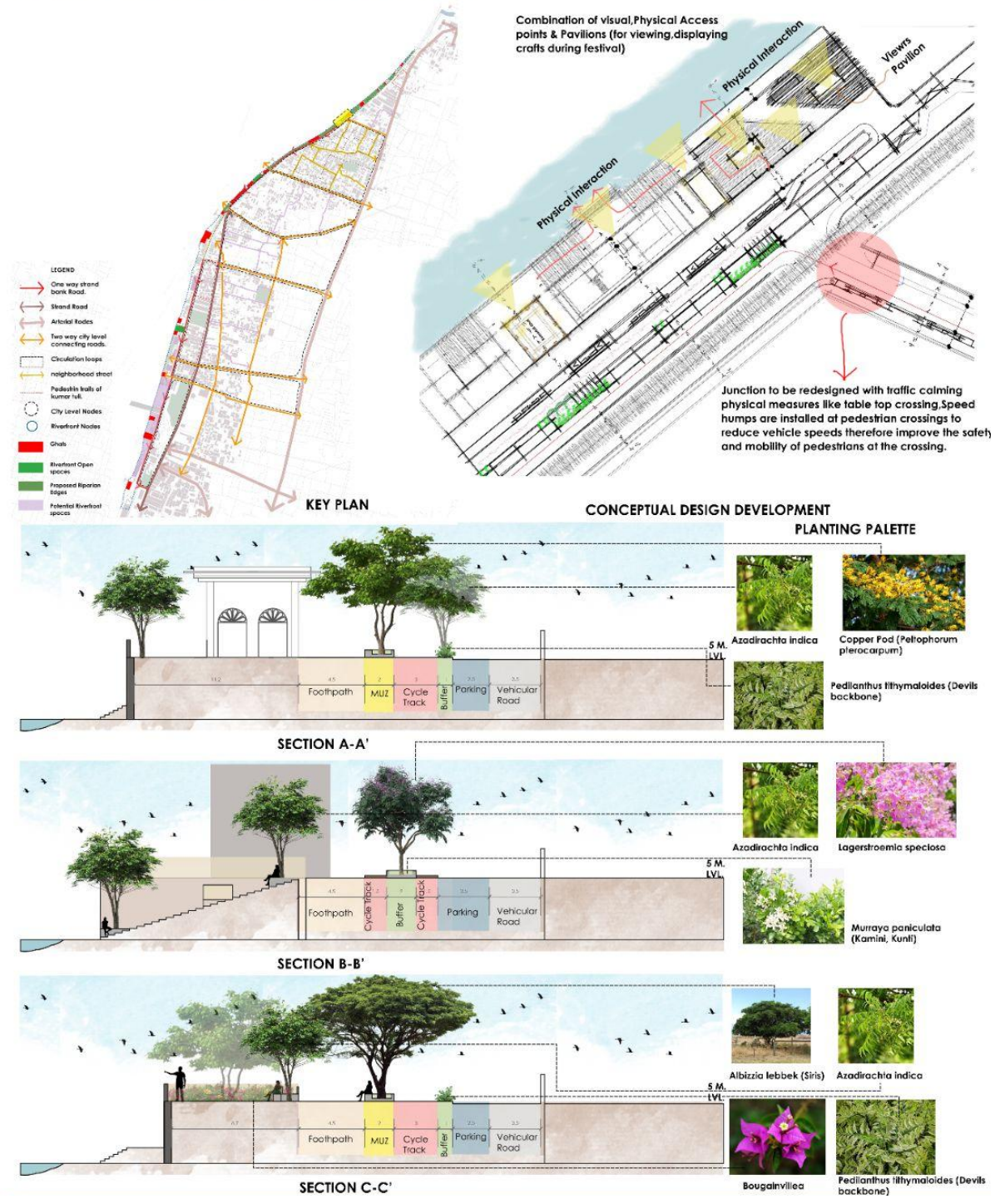
Re-establishment of socio-cultural association between the city and river by creating dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata



KUMARTULI GHAT ADJACENT OPEN SPACE -

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BIBLIOGRAPHY

Reference to a journal publication with an article number:
Remote, N., Centre, S., Space, I., Disaster, N., Authority, M., & Defence, C. (n.d.). Flood Hazard Atlas – West Bengal.

Reference to a report:
Otto, B., McCormick, K., & Leccese, M. (2004). Ecological riverfront design: Restoring rivers, connecting communities. *APA Planning Advisory Service Reports*, (518–519), 1–170.

Reference to book:
Paul, A. (2020). *The case of Hooghly River stretch in the Kolkata Metropolitan Area*.

Reference to a journal publication with an article number:
NMCG Report. n.d. "Guidance Note for Environmentally Sensitive, Climate Adaptive and Socially Inclusive Urban Riverfront Planning and Development."

Reference to a journal article:
Kapoor, S. (2016). Theme : Framework for Riverfront Development, (November), 0–11.

Reference to a journal article:
Chakrabarti, D. (2020). Fuzzy Existences and In-betweenness: Place and Practices of the Idol-making Industry of Kolkata. *Urbanities-Journal of Urban Ethnography*, *10*(3, SI), 176–193.

Reference to a journal article:
Shrivastava, S. (2021). an Ecological Approach Towards-the Socio-Cultural Development of a Riverfront, *8*(5), 445–458. Retrieved from https://www.researchgate.net/publication/352135025

Reference to a journal article:
Rathore, A. A., & Jadon, S. S. (2019). A sustainable approach for urban Riverfront development. *International Research Journal of Engineering and Technology*, 4136–4142. Retrieved from www.irjet.net

Reference to a online document:
https://www.slideshare.net/RAJORSHICHATTERJEE/kolkata-past-and-present-rajorshi-chatterjeespadurban-planning

Reference to a journal article:
NABILAH REDZUAN, & NURUL SYALA ABDUL LATIP. (2016). Principles of Ecological Riverfront Design Redefined. *Creative Space*, *4*(1), 29–48. https://doi.org/10.15415/cs.2016.41002

Reference to a journal article:
NIUA, & NMCG. (2021). *Strategic Guidelines for Making River-sensitive Master Plans*.

Reference to a journal article:
Brief, P. (2020). " The Future of River Management ," (May).

Reference to a journal article:
Otto, B., McCormick, K., & Leccese, M. (2004). Ecological riverfront design: Restoring rivers, connecting communities. *APA Planning Advisory Service Reports*, (518–519), 1–170.

Reference to a journal article:
Paul, S. (n.d.). *Envisioning an Eco-Cultural Urban Landscape-Studies on the Ghats of the River Bhagirathi-Hooghly in Kolkata, India*. Retrieved from https://www.researchgate.net/publication/337441000

Reference to a pdf:
Bardhan, Suchandra. (2020). Study & Documentation of 'Ghats' Along the Calcutta Riverfront. 10.13140/RG.2.2.36344.26882.

CERTIFICATE OF COMPLETION

This is to certify that this thesis project titled "**Re-establishment of socio-cultural association between the city and river by creating a dynamic riverine zone with Eco-sensitive Riverfront Design – A case of Hooghly River, North precinct of Kolkata**" was carried out by Miss. **Puja Das**, a student of **Landscape Architecture**, at the **School of Planning and Architecture, Vijayawada**. The research for this project was undertaken under the guidance of the afore-mentioned institute and completed during the period of **14.12.2022** to **19.05.2023**.

This project was shortlisted under the *Sponsored Thesis Project Competition on "RE-IMAGINING URBAN RIVERS" (Season- 3)* hosted by the National Institute of Urban Affairs (NIUA) and the National Mission for Clean Ganga (NMCG).

This report has been submitted by the student as a final deliverable under the competition. All parts of this research can used by any of the undersigning parties.

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   Signature -

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   26/7/2023

3. **Sponsors**
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   Authorized Representative - G Asok Kumar, Director General
   Signature -

National Institute of Urban Affairs