

NOIDA RIVERFRONT DEVELOPMENT, NOIDA

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Abstract:

It is evident from history that human settlements typically evolved along the water edge, and Indian cities have always had sociocultural and religious parts that have been inextricably woven within the urban waterbodies. The connection between a town and its city district is unique and forever dynamic, depending on the functions carried out on adjacent land. People owe their life and have learned to live in society, developing different cultures and civilizations on the riverfront. However, in contemporary Indian cities, the riverfronts are neglected, resulting in the city being deprived of the integral aesthetic potential of the river. These are often screened with the backsides of industries, slums, marketing yards for all varieties of wastes, and unplanned growth.

Noida, a neighboring town at the edge of Delhi, lacks any mythological history and identity of its own. The riverfront along the Yamuna in Delhi is now gaining value, and therefore, developing a riverfront on the banks of Yamuna along Noida is a requisite to create a face for the town and to provide an identity beyond rising IT and industrial hub. Taking inspiration from the Ghats of Varanasi, this proposal is an attempt to create new public realm facing towards the river that is strongly connected to the city's urban fabric.

The study will be limited to architectural and spatial aspects only and will not develop policies and regulations. An ecological perspective will be partially taken into consideration, assuming improved water quality in the river with ongoing projects.

Key words:

Riverfront Development, Urban Rivers, Place making, Yamuna, Public Space

Project Background:

The condition of the Yamuna River in Noida, like many other urban centers in India, is a cause of concern. The river is heavily polluted due to untreated industrial waste, sewage, and garbage disposal. The high levels of pollutants have severely impacted the water quality and ecosystem of the river, affecting the health and well-being of the communities that depend on it. The government has implemented various measures to address the issue, including setting up sewage treatment plants, imposing fines on polluting industries, and promoting public awareness campaigns to reduce pollution. Despite these efforts, the problem persists, and the river's condition remains a significant challenge for the city's development. The Yamuna Riverfront Development project in Noida aims to address the issue by promoting ecological conservation and creating a safe and clean environment for the communities to enjoy the river's benefits.

The proposed title 'Noida Riverfront Development' is an attempt to restore the lost existence of the Yamuna River in Noida. The city's lost connection to the river is the driving factor for choosing this theme to create harmony between the flowing river, the existing natural environment, and the urban population and infrastructure. Due to its perennial nature and narrow width, the river is neglected by the city and considered "by most residents as a "Nala" drain, resulting in it being merely a collection basin for solid waste and sewage; what flows into the river year-round is untreated sewage discharged into the river from the nallas and solid waste from households. The connection between a city and its riverbank is exclusive and constantly changes depending on what functions are performed on the adjacent land. People owe their lives to the riverbank, have learned to navigate society, and have developed different cultures and civilizations. However, in modern cities, the riverbank is neglected. The result of this neglect is that the city is deprived of the beautiful aesthetic potential of the river. These are often obscured by the backs of industries, slums, and landfills for all forms of waste and unplanned growth. Encroachments continue to threaten the health of the river and the safety of visitors.

Noida, a part of Delhi, has no mythological history or identity of its own. Therefore, the development of a riverfront along the Yamuna in Noida is an opportunity to give the city a face and promote its identity, apart from being an emerging IT and industrial center.

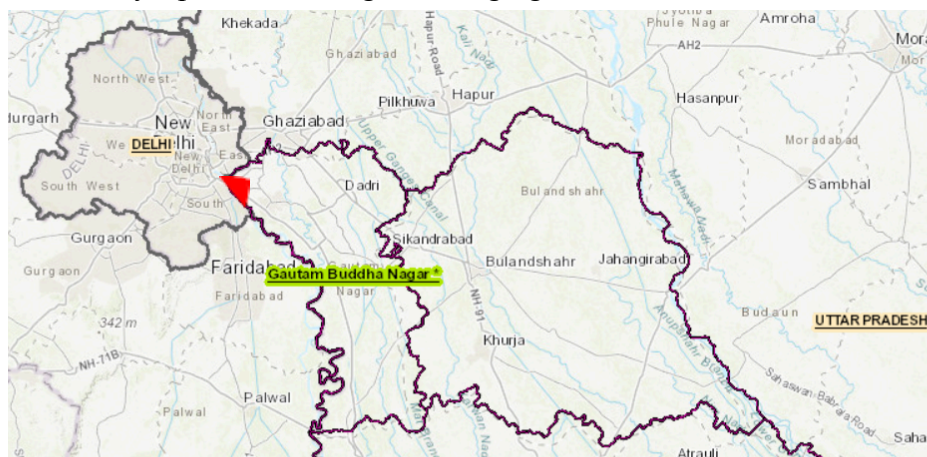


Figure 1 Site Vicinity (Source – One map GNIDA)

Introduction:

Any new investment along rivers encourages activity, releases vitality and increases land values, while creating places for people to enjoy. Cities have turned their backs on riverbanks, cutting the soul connection between people and water bodies. In Delhi-Noida, the flowing river Yamuna is dry for almost 9 months of the year. 80% of the Yamuna's total pollution is due to sewage and waste from 22 drains. Hence, the Yamuna Riverfront Project is being undertaken, but the part flowing through Noida is not considered. Developing a riverfront where people can access the river and experience the river throughout the day without the changing seasons being a hindrance. This ultimately helps to boost the economy through the river.

Riverfront development has become a new 'normal' in recent years when it comes to shaping the future of modern cities on a global scale. They are becoming an active urban face and promising centers of recreation and culture. In India, rivers are part of Indian culture and rituals. Many festivals are associated with the element of water. Such festivals are for example - Ganapati Visarjan, Durga Visarjan, Chhath Puja, Kawad Yatra, Ekadashi Snan, Kumbh Mela etc. Because of the associated notion of purity, the riverbed has become a perfect site for temples and other religious places.

Contemporary riverbank developments in India face the daunting task of balancing the divided notions of home and world. Riverfront development in Indian cities is usually guided by socio-cultural benefits. Earlier development authorities mainly aimed at improving the socio-cultural fabric while improving infrastructure and amenities along the riverbanks. Since most rituals in Hindu culture presuppose the presence of water bodies, religious significance was always attached to these developments. However, some rivers were also considered as ports as they were navigable throughout the year. The city is reduced to a continuous urban sprawl and no longer offers an identity.

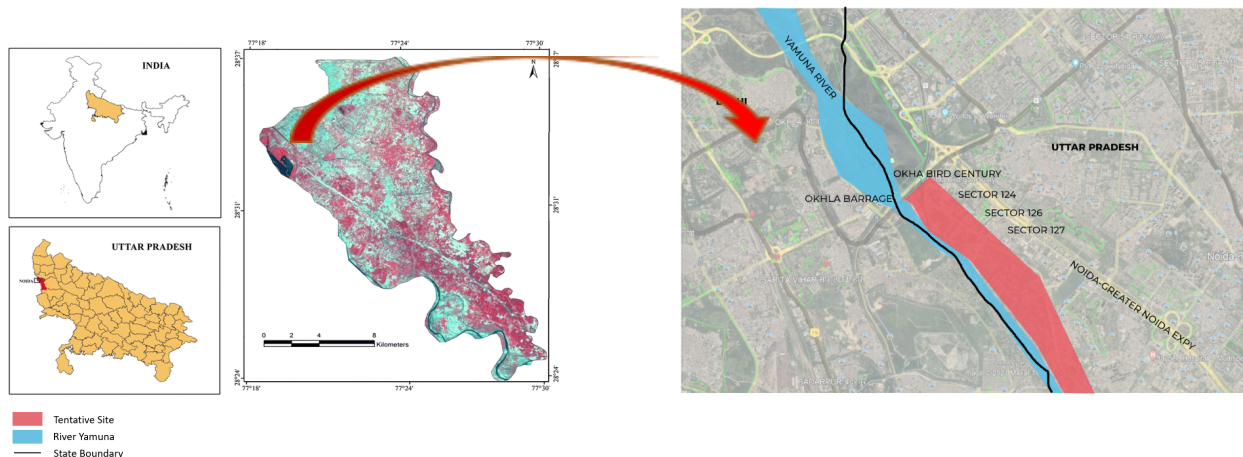


Figure 2 Site location (Source – Google earth)

Rules, Regulations and byelaws:

A certain set of rules and regulations derived by several researches done by authorities are required for every design to accomplish riverfront development in a sustainable and responsible manner that takes into account the ecological, social, and cultural aspects of the river and its

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surroundings. Table 1 has been prepared to list down the possible acts and rules that are applicable on the riverfront site, along with the authorities responsible for managing them.

Table 1: Environmental Regulations and Legislations (Source: Author)

S.NO	Act/Rule	Purpose	Applica-bility	Reason for applicability	Authority
1	Wildlife (Protection) Act 1972	The Wildlife Protection Act, 1972 has been formulated in order to protect the wild life in sanctuaries and National Park.	Yes	The selected patch is within the area of 10km.	Chief Conservator Wildlife, Wildlife wing, state forest department, MoEF, GoI
2	Land Acquisition Act, 1894 (As amended) right to fair compensation and transparency in land acquisition, rehabilitation and resettlement act 2013	Sets out rule for acquisition of land by govt.	No	No private land acquisition is involved.	
3	The Air (Prevention and Control of Pollution) Act, 1981	To control air pollution by controlling emission of air Pollutants as per the prescribed standards.	Yes	This act will be applicable during the construction stage.	SPCB
4	Water Prevention and Control of (Pollution) act, 1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Yes	This act is applicable for the construction stage of the project.	SPCB
5	The Noise Pollution (Regulation and Control) Rules, 2000	The standards for noise for day and night have been promulgated by the MoEF for various land uses.	Yes	This act will be applicable for all construction equipment deployed at worksite.	SPCB

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6	Municipal Solid Wastes (Management and Handling) Rules, 2000	To manage collection, transportation, segregation, treatment and disposal of municipal solid waste	Yes	This rule is applicable both during the construction stage (from generation of waste from labor camp) and generation of waste from ghat users during operation stage.	Moe, CPCB, SPCB
7	Public Liability Act and Insurance act 1991	This act details out the requirement of protection from hazardous materials and accidents and sets the guideline how to store the hazardous materials.	No	Largely no such hazardous waste is being expected from ghat development project hence this act is not applicable. Contractor need to abide by this act if they store hazardous substances such as petroleum products, etc.	SPCB

Design Overview and Methodology:

"To revitalize the relationship between river and city through socio-petal, ingenious and compelling sustainable practices to reshape the urban interface of river and city with respect to ecology and culture, and to revitalize the identity of the city on its shore".

The project establishes the physical connection between the city and the river. It focuses on the creation of a new public space facing the river, closely linked to the urban fabric. Improving the quality of the environment and creating recreational opportunities will promote the socio-economic development of the neighborhoods and revitalize the cultural connection to the river.

Employment opportunities through the creation of economic activities to generate livelihoods.

Improving security measures by establishing efficient escape routes during religious gatherings along the project ghats.

Objective of Vision:

The proposals aim to improve the standard of living of the people and the sanitary conditions of the river and its surroundings. They also aim to establish better connections between this zone and other parts of the city in terms of transportation and access. Additionally, the proposals call for the renewal and restoration of damaged ecosystems and habitats through active human interventions and actions. They also aim to boost the economy and employment opportunities related to this section. The proposals also focus on enabling settlement and riverbank adaptation to changing river flows and seasonal variations in river water. Finally, the proposals seek to make the riverbank dynamic through the seasonal distribution of activities.

Roadmap Of The Project:

The above images show- case a flow chart of the design methodology followed. Steps undertaken to develop an economical and sustainable design solution to achieve an active recreational space along the riverside.

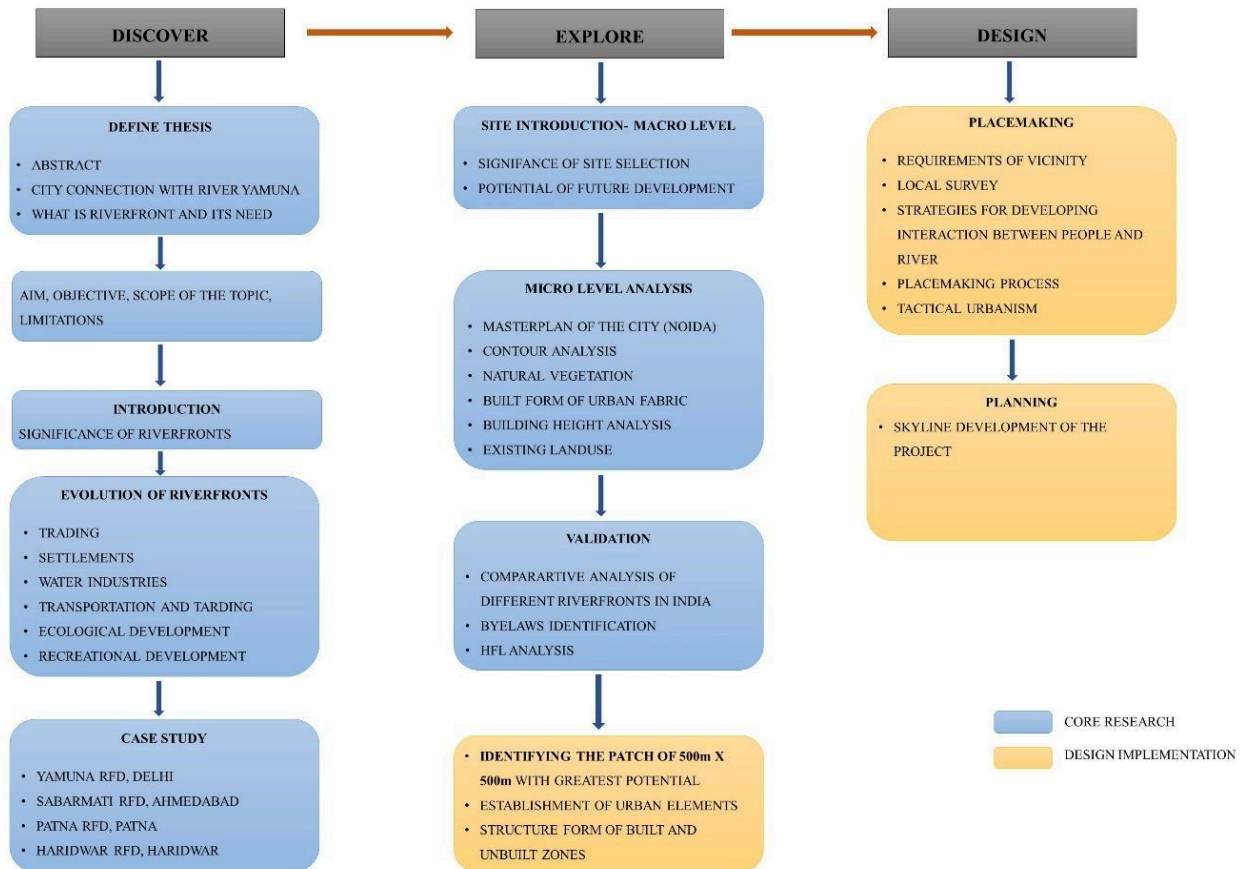


Figure 3 Roadmap (Source - Author)

Site Analysis:

The proposed riverfront is located within 10 km of the Okhla Bird Sanctuary along Sectors 124, 125, 126, 127 and 128 in Noida, Uttar Pradesh. The proposed building must conform to the modern expression of commercial construction, considering the world-class transport, recreational and educational centres in the vicinity. Noida has developed various sectors, including Sectors 62, 125, 126, 127, 132, 135, 136, 142, 143, 144, 153, 154, etc., which provide institutional and other office facilities to a large number of offices and workplaces. The fact that the level of facilities in Noida and the transport connectivity to Delhi will increase in the short term implies that the population growth is likely to accelerate in the future.

In terms of geographical features, the soil in Noida is moderately fertile. The city is located in earthquake zone IV, which is a high damage risk zone with the potential of MSK VIII

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earthquake. The terrain in Noida is generally plain with a gradual slope varying between 0.2-0.1 percent from northeast to southwest. The city experiences three major seasons: summer from March to June, winter from October to February, and monsoon from July to September. Noida is well-connected through Anand Vihar Terminal Railway Station (ANVT) and Ghaziabad Junction Railway Station (GZB) as well as the Indira Gandhi International Airport (37 km), Hindon Airport (27 km), and New Delhi to Noida (23 km). According to the 2011 Census, the population of Noida was 6.37 lakhs, with 3.3 lakhs males and 2.8 lakhs females.



Figure 4 Site Image 1(Source - Author)



Figure 5 Site Image 2(Source - Author)



Figure 6 Site images3 (Source - Author)

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Design Development:

River Yamuna separating the city from Delhi doesn't have formal access as captured by miners, farm owners, local nursery owners and many more. The development has to be done in a way to avoid the illegal activities occurring at the site.

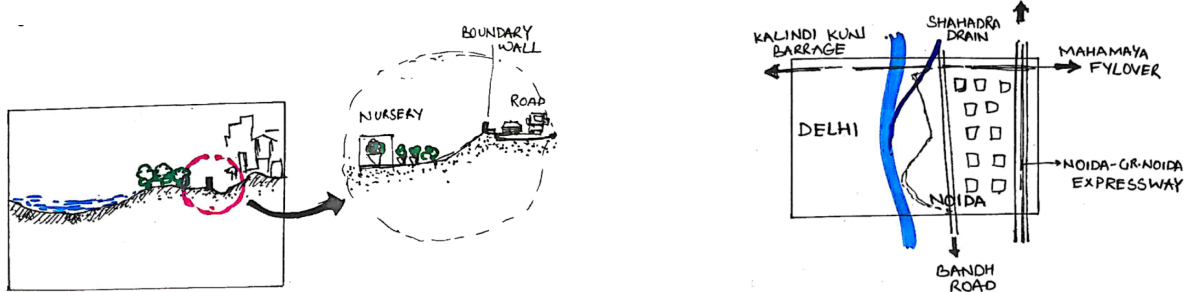


Figure 7 Existing site Scenario (Source - Author)



Figure 8 Flood line of river in previous years (Source- Author)

Historically, the Yamuna River was the backbone of civilization in northern India. This natural resource was once considered sacred. The modern Yamuna has become a dumping ground for society's waste. As a result, settlements along the river are undeveloped and the land is parceled out for industry and infrastructure.

However, the floodplain of the river is informally claimed and cultivated by low castes within the city, while the riverbank has no formal urban use. The space is used as a dumping ground for the remnants of the society's industry, rubbish and energy infrastructure. As of 9 September 2010, the Yamuna River level remains above the danger mark at 204.83 meters.

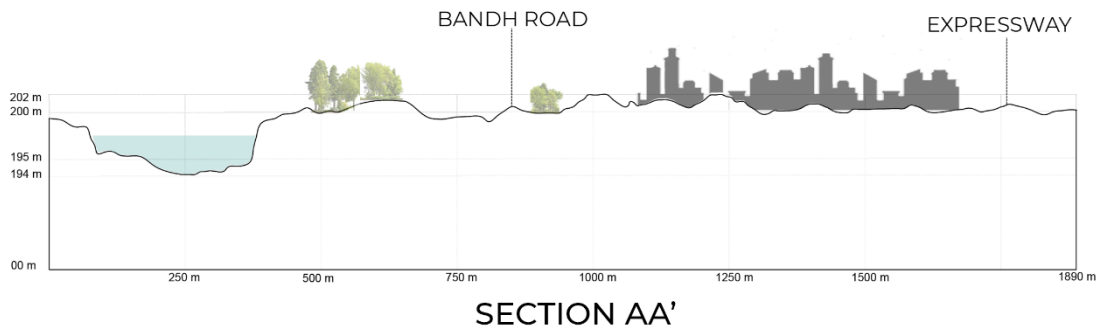


Figure 9 Site Section AA' (Source - Author)

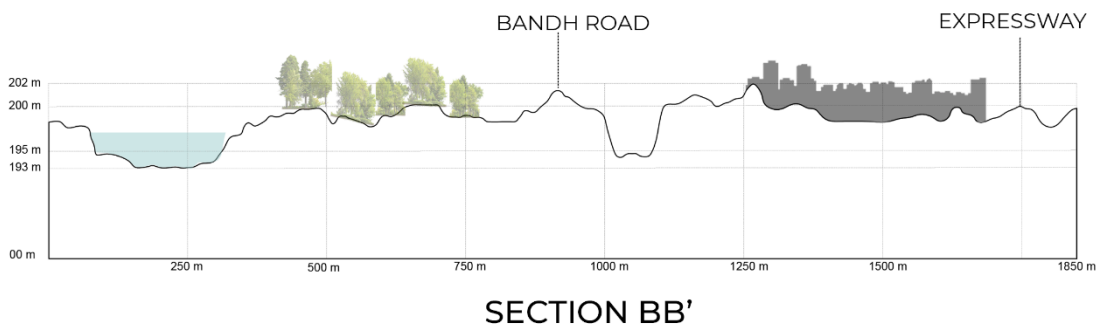


Figure 10 Site Section BB' (Source - Author)

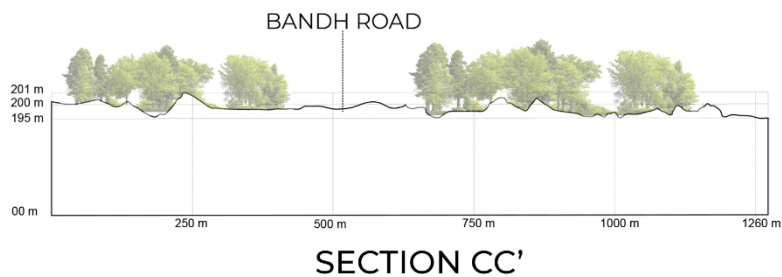


Figure 11 Site Section CC' (Source - Author)

The development of Yamuna Riverfront holds significant potential for transforming the urban landscape of the city. The project aims to enhance the public realm by revitalizing the riverfront and developing it into a vibrant, accessible, and sustainable space that benefits the diverse communities in the surrounding neighborhoods. The project envisions a riverfront that is safe, clean, and green, promoting ecological conservation and providing recreational opportunities for the residents. The development of the riverfront is also expected to promote economic growth by

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providing space for commercial activities, such as shops, cafes, and restaurants, along with cultural and entertainment activities. The project places significant emphasis on community participation, seeking to engage with local stakeholders and incorporate their ideas and feedback into the development plans. Overall, the Yamuna Riverfront Development project represents a significant opportunity for enhancing the quality of life for the residents while preserving the heritage and ecological value of the riverfront.

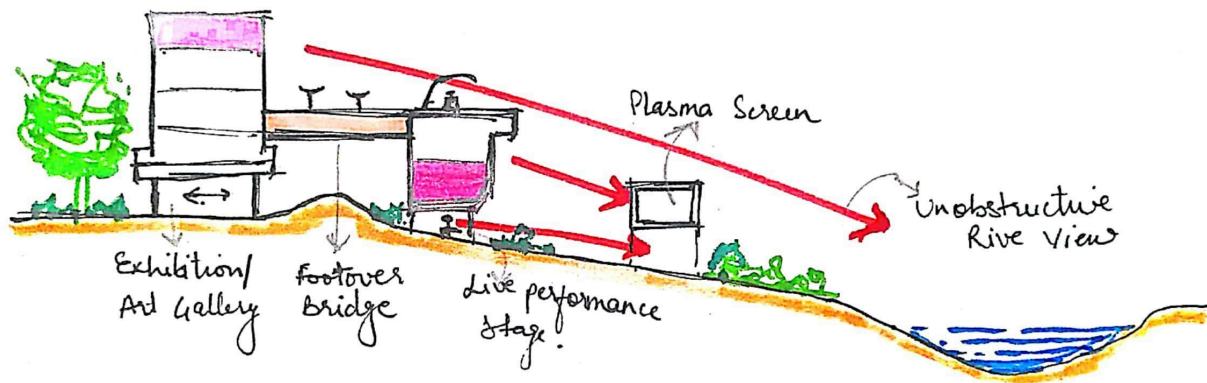


Figure 12 Conceptual sketch of site edge (Source - Author)

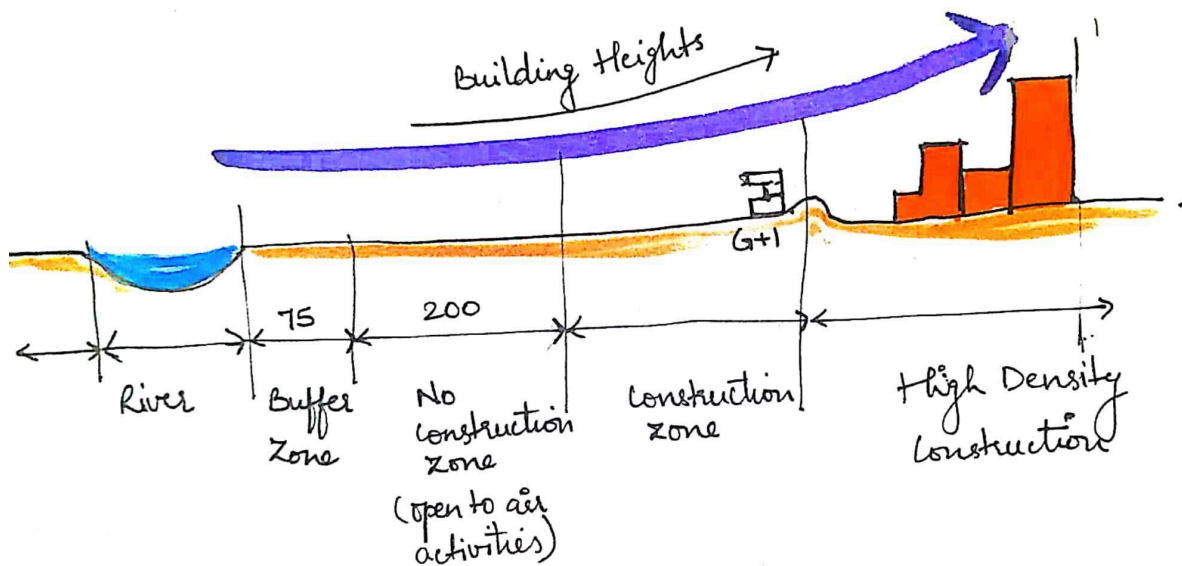


Figure 13 Zone distribution (Source - Author)

Based on the site analysis, a conceptual design is developed to provide a vision for the project. The design is sensitive to the natural context and reflect the cultural heritage of the area,

Table-3 Vision and Agenda (Source - Author):

CITY LEVEL	AREA LEVEL	SITE LEVEL
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Connection- River edge and city	Introducing new modes of connection- waterways, roads, parking, etc.	Promenade, pedestrian, connection from neighborhood, bicycle paths.
Restoring the ecology of river	Retaining open spaces	Defunct open spaces
Redeveloping and identification of dense areas	Encroachment Redevelopment, defines spaces	Bird feeding, workshops, art galleries, etc.
Economic activities	Commercial stretches, new activities	Drive in theatres, fair ground, restaurants, etc.
Infrastructure and services	Planning growth and strategy, parking, security.	

Urban Precinct Analysis:

The surrounding area is predominantly industrial with various manufacturing plants, warehouses, and factories located in the vicinity. There are also several institutional and residential areas nearby, catering to the workforce employed in the industrial sector. However, the area lacks proper planning and infrastructure, with poor roads, limited public transport, and inadequate sanitation facilities.

A comprehensive urban precinct analysis of the area is needed, focusing on improving the basic infrastructure, creating better transport connectivity, and developing a sustainable plan for the industrial and residential areas. Additionally, measures need to be taken to protect the Okhla Bird Sanctuary and restore the ecosystem to its natural state. It will involve a participatory approach involving all stakeholders, including the local community, industry representatives, environmental experts, and government authorities.

Sponsored Thesis Project Competition on "RE-IMAGINING URBAN RIVERS" (Season- 2)
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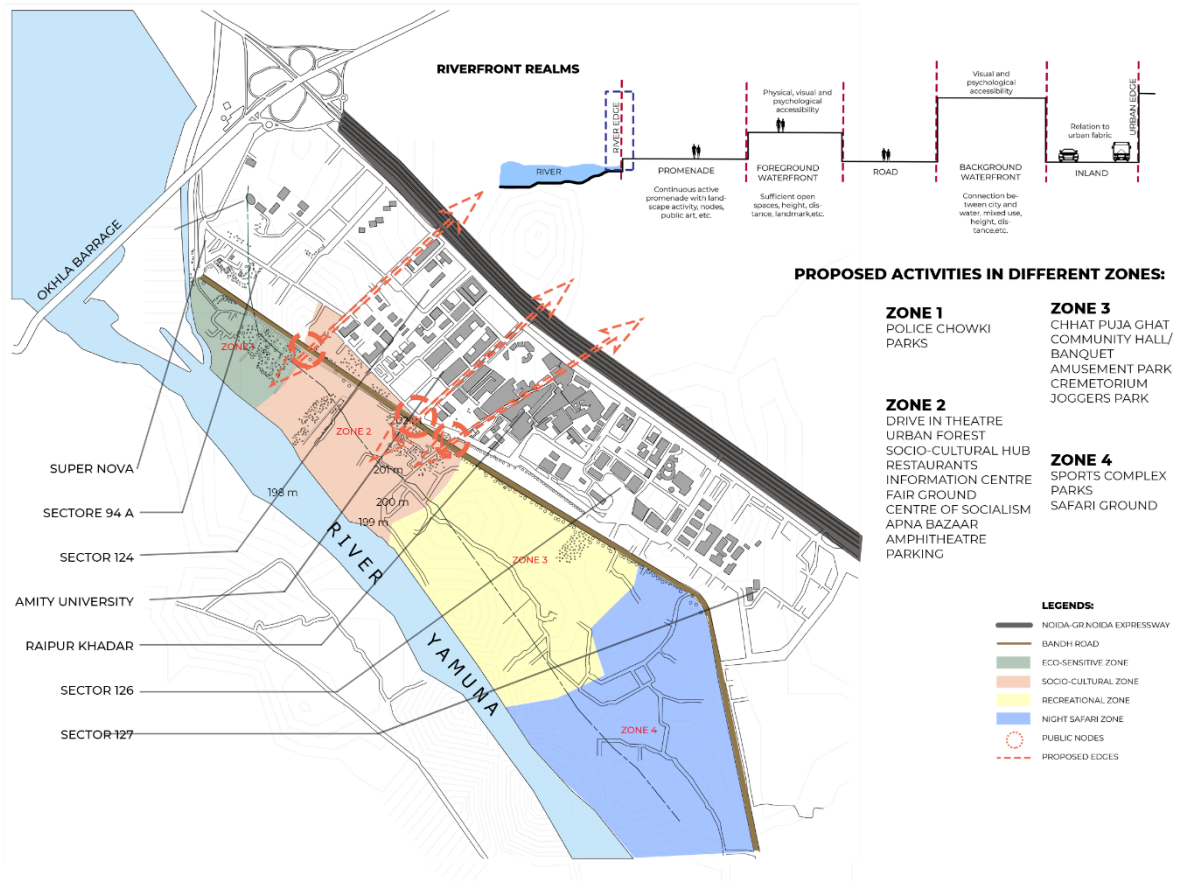


Figure 14 Parametric Evaluation Criteria (Source - Author)

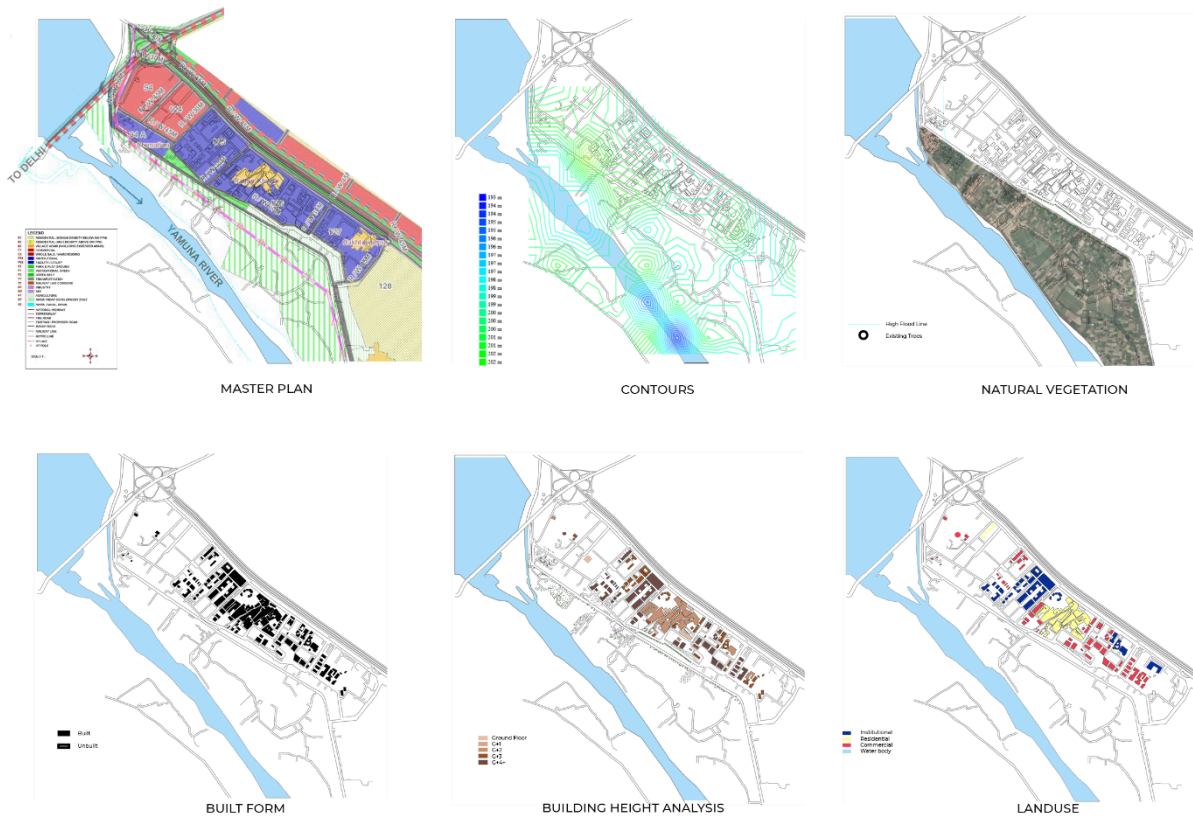


Figure 15 Existing Site Condition (Source - Author)

The proposed development for the stretch adopted a node-based configuration, with major nodes forming the approach to the riverfront, thereby creating distinct segments along the stretch. These segments would be better able to cater to the local needs and function as an economic resource platform and promotional ground by responding to the present physical characteristics of the area. The different platforms for various activities would overlap with each other, creating a fusion of different spaces that would enhance the vitality of the area and make it a vibrant environment for pedestrian activities and recreational grounds, thus, attracting more people to the area and making it a hub for the city.

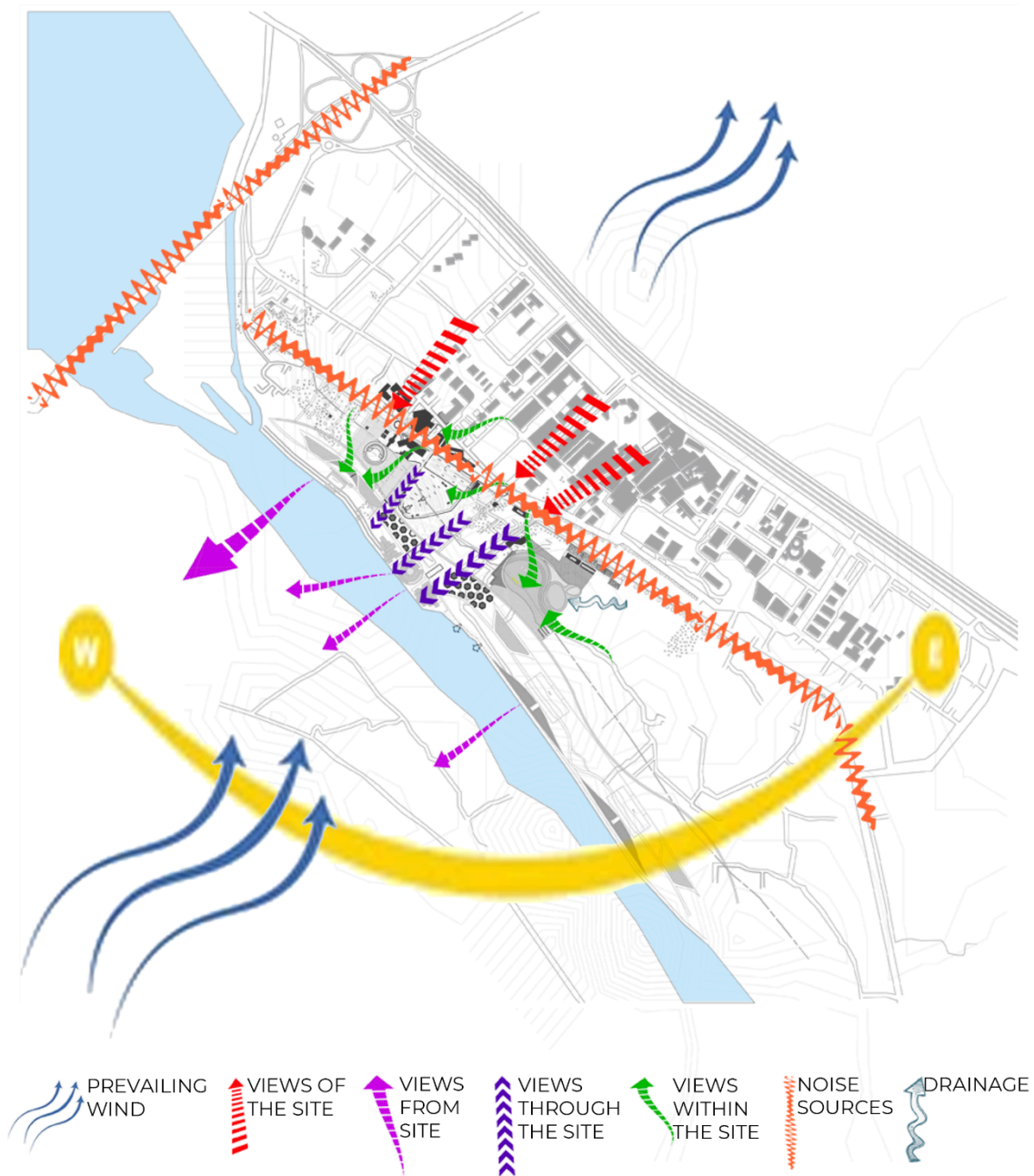


Figure 16 Climate and Sensory (Source - Author)

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The project focuses on finding ways of feeling and associating with water at different levels:

- Through sight (vision)
- Touch
- Essence of water

The proposal is expected to cover the following agendas:

- i. Establishing the social and physical linkage with the city.
- ii. Generate activities that support social and economic upliftment of the society.
- iii. Utilizing river edge to showcase the real life as a theatre that is visible through different levels, portraying the lively ambience of people and the nature.

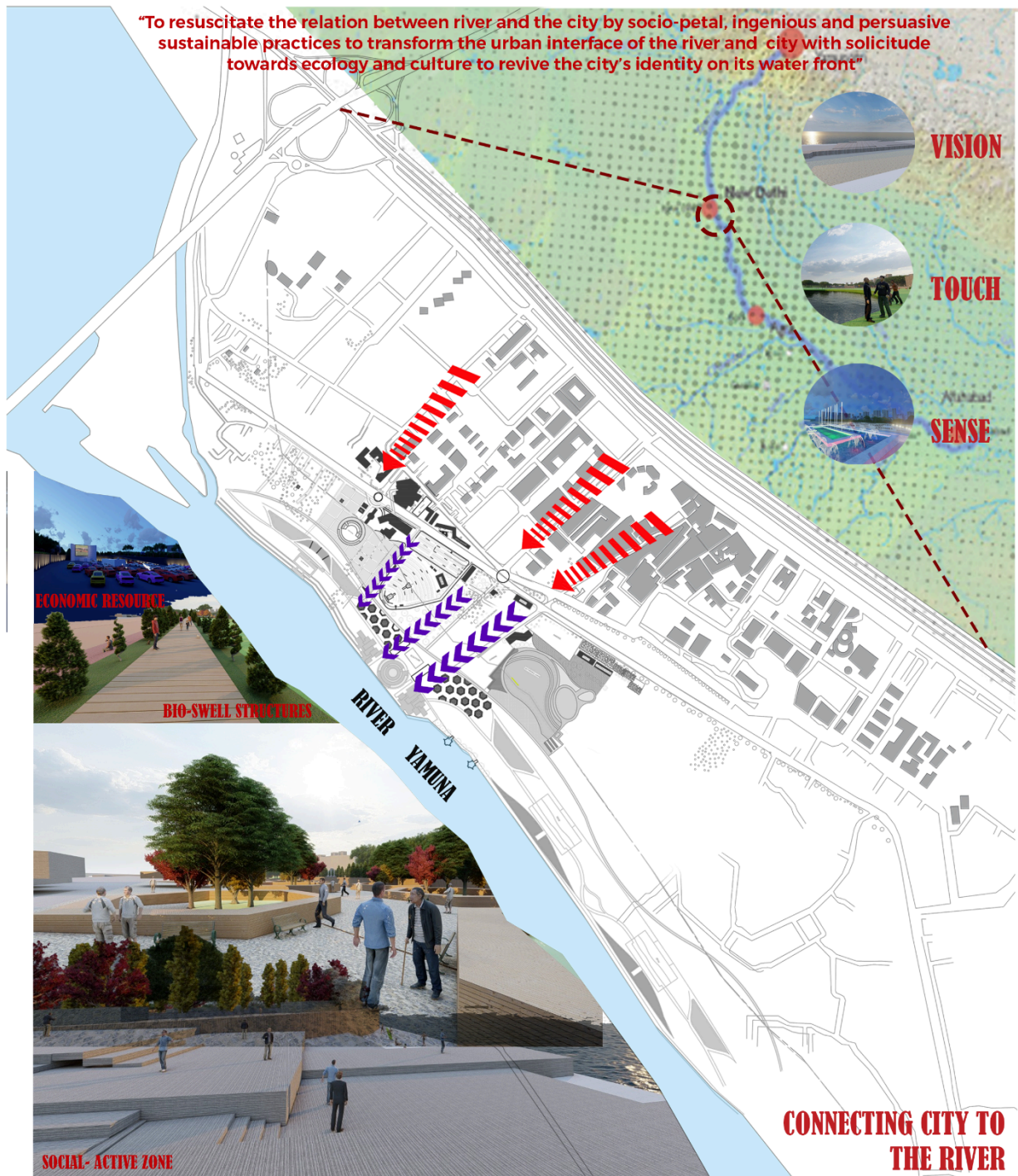


Figure 17 Approach to riverfront (Source- Author)

Character Zoning:

Restoring the essence of River Yamuna, the proposed building blocks derives its inspiration from the architecture of Vrindavan. The expected outcome are the active waterfront edge for the local communities and to attract tourists.

The selected patch is divided into 4 major zones based on the neighborhood and existing physical condition of the site:

Zone 1 is **ECO ZONE**, which is in the close proximity to the Okhla Bird Sanctuary. Hence, this zone is sensitive towards the natural vegetation and to avoid hindering the existing bird watch trail. This zone includes:

Police Station, Ticket Counter, Existing Nursery

Zone 2 is in close proximity to institutional areas. Therefore, this zone includes spaces and activities, which attracts the students the most. Hence, is the name **Socio- Cultural Zone**. The proposed spaces in this zone are:

School of Arts, Socio-cultural Hub, Apna Bazaar, Cafeteria, Fair Ground, Centre of Socialism, Urban Forest, Drive in Theatre, Amphitheatre, Light show, View Deck.

Zone 3 lies in front of the residential area. It is called **Neighborhood Recreation**. This zone focuses on improved neighborhood interaction, which is missing in metropolitan cities. Therefore, the proposal for this zone includes:

Gathering Lawn, Visarjan Ghat, Promenades, Banquet Hall, Amusement park, Jogger's park, Existing crematorium and cemetery.

Zone 4 faces industrial growth and also comprises of illegal farmhouses.

Due to availability of plenty of flora and fauna in the region, it can be turned into **Night Safari Zone**. This zone can be utilized for future expansion with:

Urban agriculture, Horticulture farming, Sports Complex, Resort clubs.

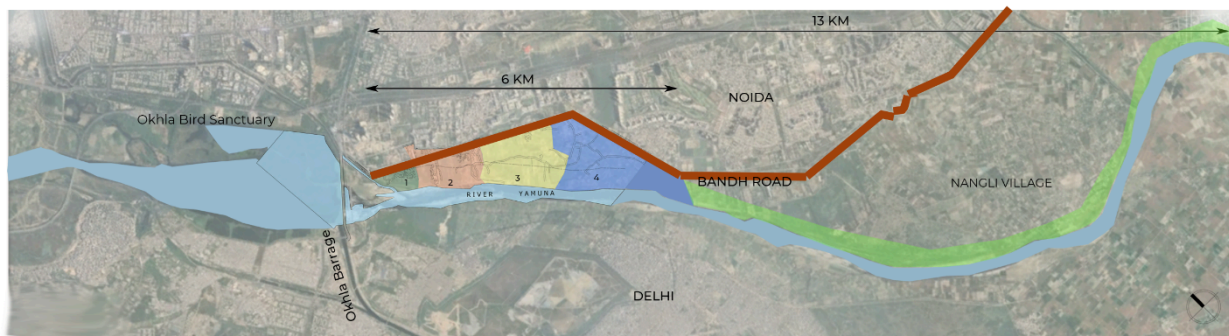


Figure 18 Character Zones (Source – Google earth)

The existence of River Yamuna had been considered a humorous myth by the people of Noida as it had no entry to the riverfront. The design is initiated by providing entry to this visual beauty before any functional aesthetics are added to it. The selected route used by illegal farm owners, land grabbers, etc. is shown to require urgent strengthening based on initial studies, surveys, observations and their analysis. The potential nodes approaching the river bank can be developed into routes, which will be zoned based on physical characteristics and sensitivity to the affected neighborhood, in order to meet the needs of the community as an economic resource. By providing benefits and advantages of the resources to the users, responsibility for the cleanliness of the space can be increased. The vitality of the place can be increased to enliven the surrounding area for various activities and recreational areas, making it an attraction for the city.

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Several open spaces are envisaged to serve the purpose of catering to the many visitors at the same time, as shown in the master plan. The spaces are used appropriately depending on seasonal variations and occasion. The fairground will be the site where exhibitions and cow pastures run by local traders and gaushalas in the nearby sectors will be accommodated. A common roof will be provided by different infrastructure provided for local artisans, academicians, and students from nearby institutions to exchange valuables, with performing stages available. The requirement of all age groups, irrespective of profession and general interest, will be catered to.



Figure19 Master Plan (Source - Author)

The importance of the physical, visual, and essence of the environment has been considered as an integral part of the ecosystem, and therefore, a fundamental concept is included in the design to address all three impacts.

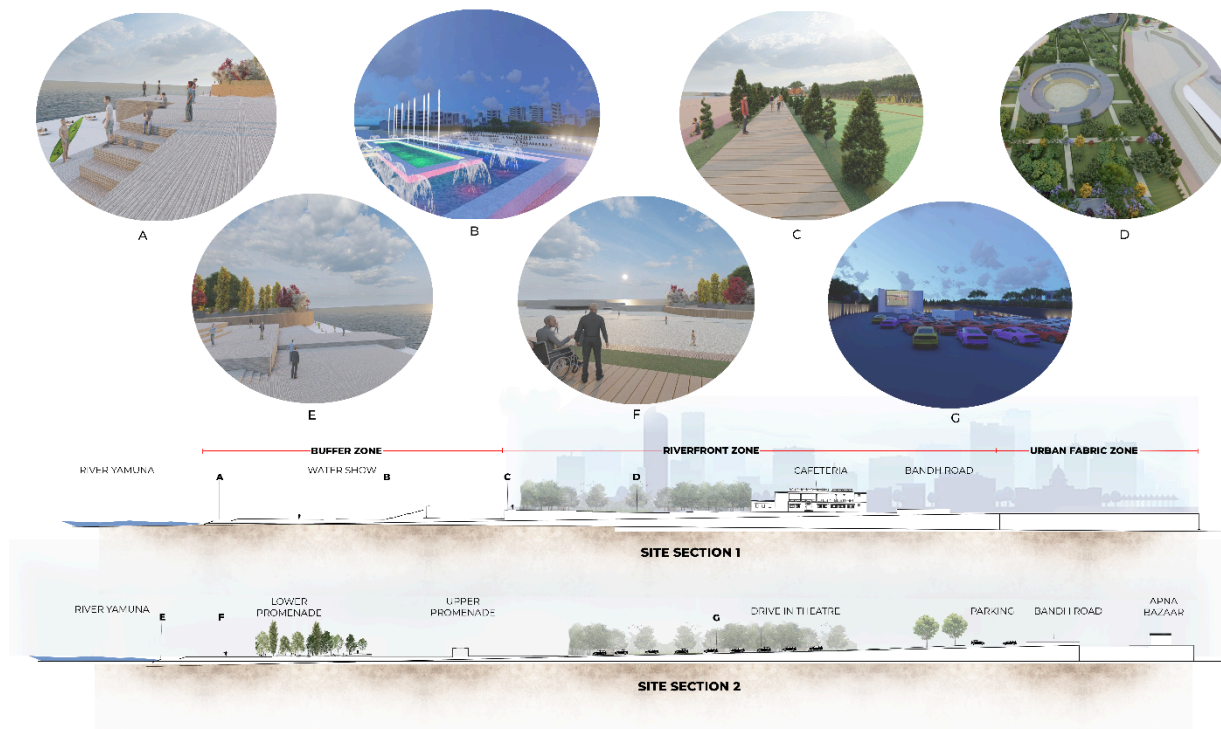


Figure 20 Site Sections (Source - Author)

Design Study:

This design proposal outlines a comprehensive plan for sustainable development and rehabilitation of the riverfront, aimed at providing environmental protection, community engagement and aesthetic a it is a perfect mix of beauty. The proposed project seeks to transform the existing riverfront into a thriving urban area that promotes environmental balance, recreation and cultural enrichment. This proposal brings together new technologies, green infrastructure and community engagement to achieve a multifaceted riverfront vision. It aims at providing separate vehicular and pedestrian circulation. Creating new nodes to enhance the entry to the space. Focusing on creating interaction spaces at different levels using existing contours of the site that provides gateway to collect artificial water bodies. The proposal aims to create model for riverfront development that can be replicated in other urban areas.



Figure 21 Design Proposals (Source - Author)

Landscape And Vegetation:

Forest (>50% canopy cover): Plant wherever possible; provides shade, recreation, riparian habitat, storm water and erosion control, loud mitigation and water quality treatment.

Woodland (<50% canopy cover): Plant wherever views are desired through trees; provides most benefits of forest and may be more acceptable in developed areas.

Scrubland: Plant to protect steep slopes and as natural fences for pedestrian/bicycle traffic control.

Meadow: Plant as a means of managing large open areas; provides riparian buffers and habitat for small mammals, insects and birds.

Lawn: Plant on relatively flat slopes only and active recreation zones; separate lawns from river edges with riparian buffer.



Figure 22 Zone development (Source - Author)

Strategy Tools :

Opportunities for resting (pedestrian) should be increased and provision for safe, secure and sheltered parking (cycling) should be increased. The resting spaces provided for the users largely depend on the functioning of a pedestrian route. The quality of the pedestrian environment is improved by shade and proper street furnishings. Multiple interjections are created in the walkways to create a sense of pause and provide seating spaces. A well-designed open space will be created which is part of an interconnected network to promote pedestrian and bicycle trips between open space and destinations. Buildings are meant to evolve and change; they are constantly changing and used as an extended platform. Building proposals of Centre of Socialism, Apna Bazaar, Cafeteria, Information Centre, etc., are sources to generate economic resources for maintenance. The drive-in theatre is the key attraction of the riverfront serving a dual purpose for the day and night. It can be transformed into the live performance ground when not in use for movies. The Visarjan Ghat acts as an alternative to serve the purpose of visarjan of

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idols and performing chat puja near the river. The proposed Kund is a result of contours analysis, which prevents the direct exposure of foreign elements in the river and can be cleaned with ease.

Area Program:

Serving as a guide for architects and designers to understand the scope of the project, including the purpose of the building, the intended users, the desired functions and activities to be accommodated, and any specific constraints or requirements. This area program is typically developed through a collaborative process involving the stakeholders, and design professionals, and it plays a critical role in ensuring that the final design meets the needs and goals of all parties involved.

SITE SPECIFICATIONS		PROPOSED SPACES	
SITE AREA	75 ACRES	SOCIO-CULTURAL HUB	8000
SITE DIMENSIONS	600m X450m	APNA BAZAAR	1150
MAJOR LANDMARK	AMITY UNIVERSITY, NOIDA	CENTRE OF SOCIALISM	3800
PERMISSIBLE F.A.R	0.5	CAFETERIA	650
MAXIMUM PERMISSIBLE BUILT-UP	151757 sqm	INFORMATION CENTRE	1400
ACHIEVED BUILT UP	30,000	SNACKS AND BAR	1200
MAXIMUM GROUND COVERAGE	5% of total area (15175 sqm)	TICKET COUNTER	125
MAXIMUM HEIGHT	G+2	SCHOOL OF ARTS	9000
PARKING	2% of total area (6070 sqm)		
		AMENITIES	
		POLICE STATION	125
		TOILETS	750
		CHANGING ROOMS	500
		BANQUET HALL	3000

Proposed Building blocks:

The main design criteria to construct buildings in composite climates is to reduce heat gain by providing shades and promoting heat loss. Plan the building around the Courtyard with water bodies, terrace gardens, light shelves, Reducing heat gain in the building through building envelope, using materials with high thermal mass, such as concrete or masonry, can be used to absorb and store heat during the day and release it at night, helping to regulate indoor temperatures.

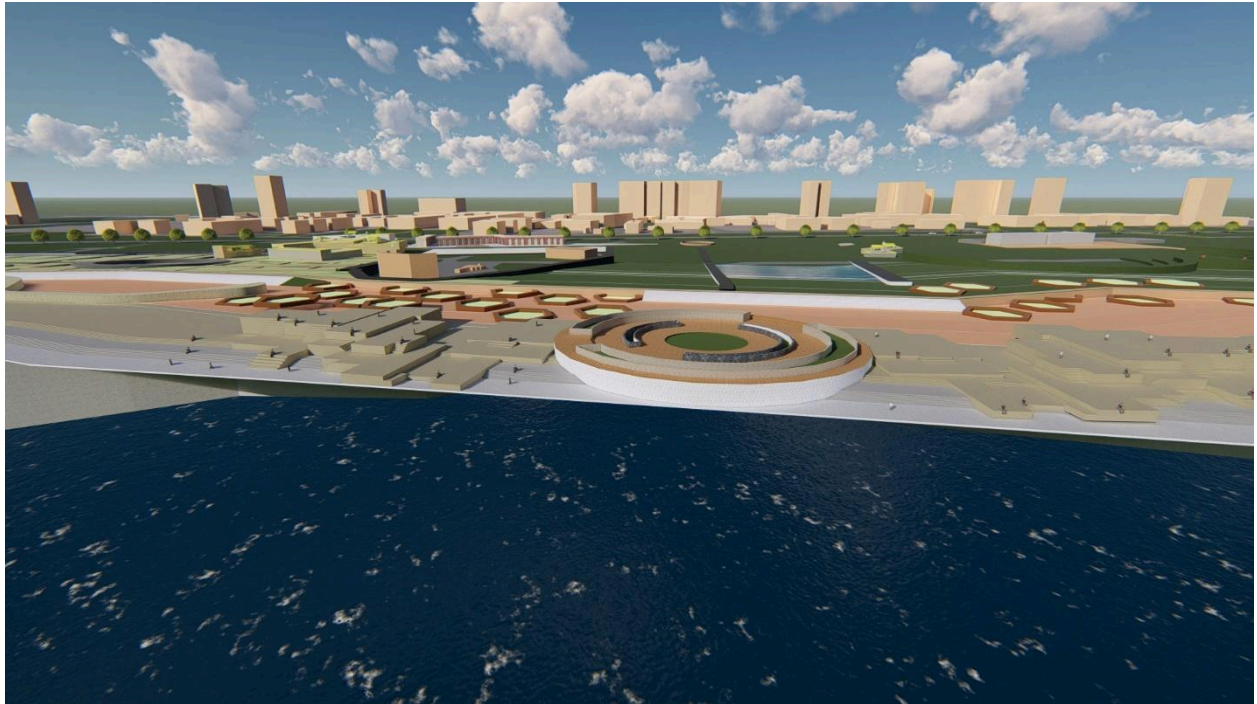


Figure 23 Riverfront realm (Source - Author)

Conclusion

Looking at the rich traditions associated with Indian Rivers, there is a visible necessity to address the current situation at Noida Riverfront. Therefore, social strengthening and intangible relationship between cities and rivers can be revitalized. Implications for revitalizing the ecological health of such urban rivers, ways of recharging ground water, promote growth of flora on the site while maintaining social value to human settlements in a more sustainable way. Wisely get public opinion on a cleaner and more readable environment along the river in the city.

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On the very onset of this thesis, author would like to extent the heartfelt and sincere obligations towards all the personages who helped in the endeavor. Without their support, guidance, encouragement and co-operation, the following report would not have been a successful outcome.

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Conflict of Interest

Authors has no conflict of interest to declare.

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