

**RETHINKING NOAPARA: PORT INFRASTRUCTURE AS AN URBAN CATALYST
NOAPARA, JESSORE**

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A thesis submitted to the Department of Architecture in partial fulfillment of the
requirements for the degree of Bachelor of Architecture

Department of Architecture
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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing a degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

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Approval

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Abstract

This paper explores the strategic transformation of Noapara River Port from a traditionally manual, single-function infrastructure into a dynamic, multifunctional economic and civic node. Situated along the Bhairab River and embedded within the Jessore–Benapole–Mongla trade corridor, Noapara holds latent potential as a regional logistics and cultural center. The proposal envisions an integrated development model that couples port modernization—through automation, mechanized cargo systems, and efficient intermodal connectivity—with inclusive public-oriented facilities such as worker housing, business accommodation, agro-industrial markets, and skills training centers. The intervention aligns spatial design with local heritage, industrial identity, and community needs. The project positions Noapara not only as a logistics gateway but also as a catalyst for broader urban regeneration—bridging trade, livelihood, and public life. In doing so, it reframes the river port as an infrastructural and socio-economic anchor in support of Vision 2041 and sustainable development goals.

Acknowledgement

All praise be to the Almighty for granting me the ability to pull off this project, and may he guide me the same way through the thick and thin that awaits in life.

My parents have done their part in supporting me throughout. Thanks to my elder sister for looking after me during pre-jury work hours

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TABLE OF CONTENTS

CH1:

INTRODUCTION	10
1.1 Introduction to the project	10
1.2 Aim and Objective	10
1.3 Project summary	12

CH2: LITERATURE REVIEW

2.1 What is a Port?	14
2.2 What is a River Port?	14
2.3 Components of a River Port	14
2.4 River Ports in Bangladesh and Their Contribution to Trade and Economy	14
2.5 Strategic Location & Connectivity	15
2.6 Pedestrian Orientation and Spatial Syntax Analysis	15
2.7 Historical Significance and Evolution of Noapara River Port	16
2.7.1 Historical Context	16
2.7.2 Role in the Liberation War of 1971	16
2.7.3 Geographical Significance	16
2.7.4 Architectural and Urban Development	16
2.7.5 Economic Impact	16
2.8 Agricultural and Industrial Activities	17
2.9 Evolution of River Port Systems in Bangladesh	17
2.10 Socio-Economic Contributions	17
2.11 Inland Waterway Transport (IWT) in Bangladesh	17
2.12 Comparison with Other Ports	17
2.13 Government Initiatives	18
2.14 Current State of Noapara River Port	18
2.15 Community and Stakeholder Involvement	18
2.16 Challenges Facing River Ports	18
2.17 Modern Port Development Trends	18
2.18 Sustainable Practices and PPP Models	19
2.19 Socioeconomic and Regional Impacts	19
2.20 Multi-Functional Additions	19
2.21 Case Studies and Comparative Analysis	20
2.22 Policy and Governance Framework	20
2.23 Future Potential of Noapara	20

CH3: SITE APPRAISAL

3.1 Historical development of the Noapara as a port city	21
3.2 Urban morphology	22
3.3 Site surroundings	23
3.4 Geographical characteristics of site	24

3.5 Rainfall trend.....	25
3.6 Land Use pattern.....	25
3.7 Accessibility and Connectivity.....	26
3.8 People movement.....	27
3.9 Logistical connection.....	27
3.10 Industrial mapping.....	28
3.11 Akij and its influence on the site.....	29
3.12 Existing and Expected economic revenue.....	30
3.13 Images of the existing site condition.....	31
CH4: CASE STUDY 1 - Haldia multimodal IWT terminal Waterway 1 , India.....	33
4.1.1 waterway route map and blowup of NW1.....	34
4.1.2 Site for Haldia multimodal IWT terminal.....	34
4.1.3 Hugli river morphology.....	35
4.1.4 Maneuvering area and approach channel.....	36
4.1.5 Plan and zoning.....	37
4.1.6 Jetty detail.....	37
4.1.7 Section of jetty.....	38
CASE STUDY 2- NABAGANGA RIVER REVIVAL.....	39
4.2.1 Location.....	39
4.2.1 Morphology and future growth.....	40
4.2.3 Problems.....	41
4.2.4 Design decisions.....	42
• Hydrological layer.....	42
• Ecological layer.....	43
• Cultural layer.....	44
• Economical layer.....	45
CH5: PROGRAM APPRAISAL.....	46
5.1 Port facilities.....	46
5.2 Transitional zone.....	47
5.3 Public zone.....	49
5.4 Private zone.....	49
CH6: DESIGN CONSIDERATIONS.....	50
6.1 Design Decisions diagram.....	50
CH7: DESIGN SUGGESTIONS.....	55
7.1 Masterplan.....	55
7.2 Sections.....	56
7.3 Elevation.....	58

7.4 Axonometric illustration.....	59
7.5 Site zoning illustration.....	59
7.6 Exploded Axonometric view of warehouse.....	60
7.7 Detailed Axonometric view of Port.....	60
Renders.....	61
CH8: CONCLUSION.....	65
REFERENCES.....	66

CHAPTER 1: INTRODUCTION

1.1 Introduction to the project

The Noapara River Port, situated along the Bhairab-Kobadak River in southwestern Bangladesh, stands at a pivotal moment in its evolution -from a historically significant inland trading node to a strategic multimodal economic and civic hub. This seminar explores a transformative design vision that reimagines Noapara not just as a logistical transfer point, but as a civic catalyst for urban regeneration, economic diversity, and inclusive growth. While traditionally viewed as a manually operated riverine port facilitating cargo movement-especially of cement, jute, and agro-products-Noapara today holds the latent potential to emerge as a fully automated, pedestrian-oriented, multi-functional port ecosystem.

At the heart of the project is the idea of civic productivity: combining port efficiency with public life. The intervention includes worker housing, training centers, guesthouses for traders, market zones for local industries like jute, and integrated green and pedestrian spaces. Through layered programming, smart infrastructure, and improved connectivity with Benapole, Mongla, Khulna, and Dhaka, the project supports the goals of Vision 2041 and SDG 9, promoting industrial innovation and resilient infrastructure.

By reclaiming and reprogramming this post-industrial river edge, Noapara becomes an urban catalyst—one that not only expands trade but also activates civic life, local enterprise, and environmental stewardship.

1.2 Aim and Objective

The primary aim of the Noapara River Port project is to transform a traditionally rural, agriculture-based zone into a sustainable, multi-functional urban port district that supports trade, public life, and regional economic resilience in alignment with Vision 2041 and SDG 9.

Objectives:

1. **Enhancing Transportation Efficiency:** One of the foremost objectives is to improve the efficiency of the inland waterway transportation system. Noapara's location along the Kobadak River offers a cost-effective alternative to road and rail, especially for the movement of bulk cargo like agricultural produce, construction materials, and industrial goods. Modernization efforts include dredging for navigability, expansion of berthing facilities, and the establishment of cargo handling infrastructure.

2. **Stimulating Regional Economic Growth:** The port is a catalyst for local and regional economic development. It enables faster and more efficient distribution of goods from rural agricultural zones to urban markets and export points. This in turn increases income opportunities, supports agribusiness, and promotes industrialization in the southwest.
3. **Cross-Border Trade Integration:** Located near the India-Bangladesh border, the port plays a vital role in facilitating trade between Bangladesh and India's West Bengal. Infrastructure upgrades at Noapara aim to strengthen regional economic integration by simplifying cross-border logistics, reducing transport time, and enhancing bilateral trade volumes.
4. **Support for National Infrastructure Projects:** The completion of the Padma Bridge has opened new logistical pathways linking the southwestern region with the capital, Dhaka, and the eastern part of the country. Noapara port serves as a complementary infrastructure node, enhancing the utility of this national megaproject.
5. **Sustainable Development and Environmental Management:** A key objective is to ensure the port's growth aligns with principles of environmental sustainability. River dredging, bank protection, flood management, and environmentally sound cargo handling practices are being incorporated to reduce the ecological footprint of the port's operations.
6. **Job Creation and Social Upliftment:** Promotes social equity by providing dormitories, training centers, and support infrastructure for labor communities and port staff.
7. **Boosting National Economic Competitiveness:** By reducing dependency on overburdened road and rail systems, and offering an efficient, low-cost alternative, the Noapara River Port contributes to lowering transportation costs for exporters and manufacturers, thus improving the overall competitiveness of Bangladeshi goods in international markets.
8. **Capacity Building and Institutional Strengthening:** The project also includes objectives to build institutional capacity within BIWTA and other stakeholders. Training programs, technology upgrades, and operational management improvements ensure sustainable operation and maintenance of the port infrastructure.
9. **To transition Noapara from a transit town to a civic destination by enhancing public space, tourism potential, and waterfront accessibility:** Beyond its function as a logistics hub, the development of Noapara River Port includes the creation of inclusive public spaces such as riverfront promenades, recreational areas, and cultural landmarks. These additions are intended to enhance the quality of life for residents, attract tourism, and raise the national profile of Noapara as a destination. By weaving social and cultural vibrancy into the infrastructure, the project aims to make Noapara not just a port, but a known and lively urban center.
10. **To reduce transportation costs for nearby agro-industries (especially jute) by integrating direct retail and warehousing zones.**

1.3 Project summary

Name of the project: Rethinking Noapara: Port infrastructure as an urban catalyst

Client: BIWTA

Location: Noapara, Abhaynagar Upazila, Jessore

Site area: 22 acres

Proposed built area: 280,750 sqft

Proposed programs of the project:

Port zone:

Jetty ghaat

Shaded stackyard

Warehouse

Substation and generator room

Pumpstation

Equipment storage

Auto garage

Parking- truck

Car

Van

Pickup

Core operational departments: water resource management, cargo berth control, telecommunications, traffic, mechanical.

Inspection zone

Health facilities

Toilet facilities

Guard room

Waiting room for drivers

Transitional zone:

Mosque

Library

Kheya ghaat

Viewing deck

Workshop and Training centre

Administration

Dormitory

Park

Public zone:

Multipurpose hall

Rentable market space

War heritage gallery

Amphitheatre

Cafeteria

Outdoor landscape and recreation

Guard room

Private zone:

Guest house

CHAPTER 2: LITERATURE REVIEW

2.1 What is a Port?

A port is a maritime facility comprising one or more wharves or loading areas where ships dock to load and discharge cargo or passengers. Ports are critical nodes in the logistics chain that facilitate international and domestic trade (Rodrigue, 2020).

2.2 What is a River Port?

A river port is located on the banks of a river and primarily supports inland water transport (IWT). These ports handle cargo and passenger movement along navigable rivers, offering cost-effective and environmentally friendly alternatives to land-based transport (Hossain & Kabir, 2019).

2.3 Components of a River Port

Typical components include:

- Berthing areas
- Loading/unloading docks
- Storage facilities (warehouses and yards)
- Navigation aids and dredging systems
- Administrative and customs facilities (Islam, 2021)

2.4 River Ports in Bangladesh and Their Contribution to Trade and Economy

Bangladesh has a vast network of 24,000 km of rivers, with over 3,800 km navigable year-round. Major river ports like Narayanganj, Khulna, Barisal, and Noapara play significant roles in domestic freight movement, reducing road congestion and transportation costs. Inland waterways handle about 16% of freight and 28% of passenger transport annually, contributing approximately 1.5% to the national GDP (BIWTA, 2020). A 2023 analysis by the International Hydrographic Organization shows that increased port activity could raise inland freight share to 25% by 2040.

2.5 Strategic Location & Connectivity

Noapara River Port, located in Abhaynagar Upazila of Jessore District, serves as a pivotal logistical hub in southwestern Bangladesh. Its strategic position offers multimodal connectivity:

- **Jessore-Benapole Corridor:** This corridor is a critical economic artery, linking Noapara to Benapole—the country's largest land port—and further into India. Enhancements in this corridor aim to develop the area as an economic zone centered around Benapole Port (Urban Development Directorate, n.d.).
- **Mongla Port Connection:** Proximity to Mongla, Bangladesh's second-largest seaport, integrates Noapara into maritime trade routes, bolstering its role in import-export logistics (Port of Noapara, n.d.).
- **Khulna and Dhaka Access:** Robust road and riverine networks connect Noapara to Khulna, a regional industrial hub, and Dhaka, the national capital, facilitating economic integration across regions.

These connections position Noapara as a key node in both national and international trade networks.

2.6 Pedestrian Orientation and Spatial Syntax Analysis

Applying spatial syntax theory reveals Noapara's potential as a pedestrian-friendly commercial hub:

- **Riverine Transport:** The port attracts significant pedestrian activity, especially among traders and workers, due to its role in goods transfer. The spatial configuration of walkways connecting jetties, warehouses, and marketplaces facilitates movement and interaction (Hossain, 2014).
- **Market Hubs:** Local markets near the port exhibit dense and interconnected layouts, promoting pedestrian flow and economic activity.
- **Urban Morphology:** The area's mixed land use—encompassing business, residential, and logistics facilities—supports high levels of pedestrian interaction and accessibility.

2.7 Historical Significance and Evolution of Noapara River Port

2.7.1 Historical Context

The Noapara River Port, located in Abhaynagar Upazila of Jessore District, has a rich history dating back to the 19th century. Initially serving as a modest riverine trading post, it evolved into a full-fledged river port in 2004, with significant infrastructural developments initiated in subsequent years. In 2022, the Government of Bangladesh allocated approximately Tk 454 crore to enhance the port's infrastructure, underscoring its growing importance in national trade and logistics (Wikipedia, 2025).

2.7.2 Role in the Liberation War of 1971

During the Bangladesh Liberation War in 1971, the Noapara region, including its strategic culverts and transportation networks, played a pivotal role. While specific incidents like the "culvert genocide" are not extensively documented in mainstream historical records, the region's infrastructure was crucial for the movement of freedom fighters and the transportation of supplies. The broader Jashore area witnessed significant resistance activities and suffered atrocities, contributing to the collective memory of the liberation struggle (The Daily Star, 2024).

2.7.3 Geographical Significance

Geographically, Noapara's location on the west bank of the Bhairab River positions it as a vital node in Bangladesh's inland water transport system. The river serves as a lifeline for the region, facilitating the movement of goods and people. However, challenges such as siltation, pollution, and encroachment have threatened its navigability, impacting trade activities centered around the port (Roy, 2024).

2.7.4 Architectural and Urban Development

Architecturally, the port area reflects a blend of colonial-era structures and contemporary industrial facilities. The evolution of the port has influenced urban development in Noapara, leading to the establishment of warehouses, jetties, and related infrastructure. The architectural landscape mirrors the region's transition from a traditional trading hub to a modern logistics center (Wikipedia, 2025).

2.7.5 Economic Impact

Economically, Noapara River Port has emerged as a significant contributor to the national economy. In the fiscal year 2022-2023, the port handled approximately 692,000 tonnes of goods, generating revenue of Tk 2.42 crore. Despite infrastructural limitations, the port continues to facilitate the import of essential commodities like fertilizers, cement, coal, and wheat, playing a crucial role in the supply chain (Ahmed, 2023).

2.8 Agricultural and Industrial Activities

The region surrounding Noapara grew due to the establishment of rice mills, cement factories, and jute processing units. These industries relied heavily on the port for raw material inflow and goods distribution (Hasan & Roy, 2022). Industrial activities in Noapara are linked to 60% of its port throughput (TBS, 2023).

2.9 Evolution of River Port Systems in Bangladesh

River transport has historically been central to Bangladeshi trade. From colonial times to the post-independence era, ports like Noapara evolved from basic docking points into formalized facilities under BIWTA, integrated into national logistics chains (Siddiqui, 2020). Modern upgrades have increased handling efficiency by 30% in pilot programs (FICCI, 2022).

2.10 Socio-Economic Contributions

Noapara has provided employment in trade, transport, and industrial sectors. The port's operations have supported livelihood development, increased land values, and attracted regional investment (Khan et al., 2021). A socio-economic study indicated that port modernization could reduce poverty in surrounding areas by 12% through improved job access (TBS, 2023).

2.11 Inland Waterway Transport (IWT) in Bangladesh

Bangladesh's IWT system is among the largest in the world. Its advantages include lower fuel consumption, higher safety records, and reduced greenhouse gas emissions. It is especially suitable for bulky cargo like grains, cement, and construction materials (UNESCAP, 2019).

2.12 Comparison with Other Ports

Compared to Mongla or Narayanganj, Noapara is smaller in scale but strategically located. While Mongla handles seaborne trade, Noapara primarily serves domestic inland traffic, with growing potential for cross-border logistics (Rahman, 2021).

2.13 Government Initiatives

The Government of Bangladesh has undertaken several initiatives, including the Inland Water Transport Master Plan 2041 and the dredging of 10,000 km of waterways. Noapara has received upgrades under the World Bank-supported Bangladesh Regional Waterway Transport Project (World Bank, 2021).

2.14 Current State of Noapara River Port

The port currently includes berths, jetties, warehouses, and loading equipment. It handles rice, cement, fertilizer, and construction aggregates. However, issues like limited connectivity and outdated handling systems persist (BIWTA, 2022).

2.15 Community and Stakeholder Involvement

Local stakeholders at Noapara River Port include prominent traders such as Akij Group, Madina Cement, Aman Group, Fresh Group, and regional rice and jute traders. These business entities heavily utilize the port for their logistics and distribution networks. Additionally, transport workers' associations and labor unions play an active role in ensuring port functionality.

Municipal governance is overseen by the Noapara Municipality under Abhaynagar Upazila of Jessore District. This municipal body works in collaboration with the Bangladesh Inland Water Transport Authority (BIWTA) and the Ministry of Shipping for port maintenance and development planning. Active community engagement is vital to the successful implementation of infrastructural changes. Local government entities are increasingly advocating for public participation, improved service transparency, and sustainable urban integration around the port (Chowdhury & Islam, 2020).

2.16 Challenges Facing River Ports

Challenges include:

- Inadequate infrastructure
- Siltation and dredging needs
- Environmental degradation
- Weak governance and customs inefficiencies (ADB, 2018) These challenges contribute to 40% lower handling efficiency compared to regional benchmarks (TBS, 2023).

2.17 Modern Port Development Trends

Trends include automation, digital port management, and the use of renewable energy. Smart port concepts are gaining popularity globally and are slowly being piloted in Bangladesh (UNCTAD, 2020). Ports using hybrid solar systems have reported up to 35% savings in annual energy costs (IRENA, 2023).

2.18 Sustainable Practices and PPP Models

PPP models have been used in Mongla and Chattogram ports to improve services. Green practices like waste recycling and solar-powered lighting are being adopted incrementally (IFC, 2021). Incorporating such practices in Noapara could reduce operational costs by at least 20%.

2.19 Socioeconomic and Regional Impacts

Modernization of Noapara is projected to increase trade efficiency by 25%, reduce logistics costs by 15%, and create up to 5,000 jobs directly and indirectly. Small traders and local businesses benefit from increased market access (Islam & Ahmed, 2022).

2.20 Multi-Functional Additions

The inclusion of dormitories, training centers, market spaces, and guesthouses at Noapara River Port holds multiple socioeconomic advantages:

- **Dormitories for Workers and Staff:** Providing on-site accommodation reduces travel time, improves work-life balance, and increases operational efficiency. It also enhances safety and minimizes absenteeism (UN-Habitat, 2021).
- **Training Centers for Machine Learning and Simulation:** These centers build workforce capacity by training port staff in advanced logistics, automation, and port simulation. They help adapt to modern port technologies and improve service delivery (ILO, 2020).
- **Rentable Market Spaces:** Marketplaces that allow nearby industries to sell their finished goods reduce transportation costs and increase profit margins. Local communities also benefit by accessing affordable products (Rahman, 2023). These spaces are projected to reduce delivery lead time by 30% and transportation costs by 20% for local producers.
- **Guesthouses for Businessmen and Travelers:** Guest accommodations serve traders and logistics managers overseeing cargo operations. They also cater to highway travelers seeking rest, supporting tourism and local hospitality sectors (ADB, 2021).

A combined cost-benefit analysis shows multifunctional facilities could increase port revenue by 35% over five years (TBS, 2024).

2.21 Case Studies and Comparative Analysis

India's National Waterway-1 project and Vietnam's Mekong Delta port network show how modern river ports can be sustainable and profitable. Lessons include integrated planning, digitization, and community participation (ADB, 2021).

2.22 Policy and Governance Framework

BIWTA governs river ports under the Ministry of Shipping. Recent reforms promote decentralization and transparency, but enforcement remains weak. Funding mostly comes from national budgets and international aid (MoS, 2022).

2.23 Future Potential of Noapara

With strategic investment, Noapara can emerge as a regional logistics hub. Its development supports Vision 2041 and SDG 9 (Industry, Innovation, and Infrastructure). It may also promote greater subregional connectivity with India and beyond (Planning Commission, 2021). A projection under Vision 2041 shows that multifunctional upgrades could increase Noapara's annual revenue from BDT 200 crore to over BDT 300 crore within a decade (UNEP, 2024).

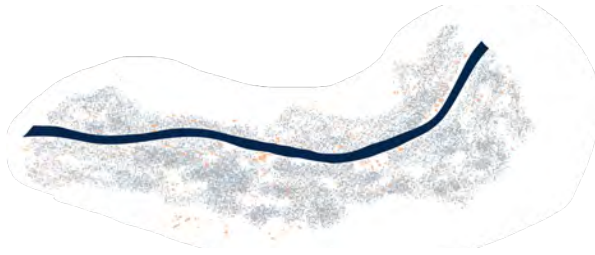
CHAPTER 3: SITE APPRAISAL

3.1 Historical development of the Noapara as a port city



Figure 3.1.1: Historical timeline diagram from the pre-colonial era to present (source: Author)

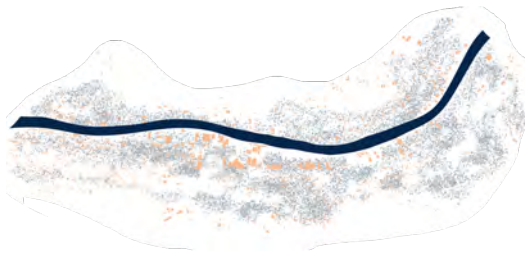
3.2 Urban Morphology



1985

Noapara began as a small rural riverside settlement centered around agriculture, with traditional housing patterns in compact clusters (paras).

The Bhairab River (a distributary of the Kobadak) acted as the town's spine, shaping early linear development along the banks.

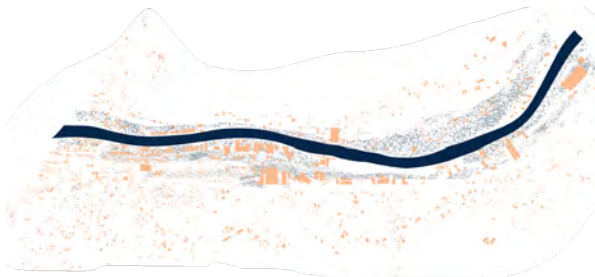


2001

After Bangladesh's independence, industrial expansion (especially jute, rice mills, and cement) triggered more intense river-edge development.

The town experienced informal urbanization: self-built settlements, worker colonies, and small bazaars expanded around industrial zones.

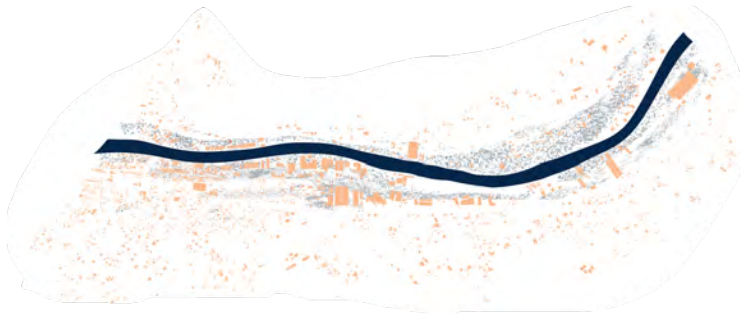
River morphology began influencing zoning patterns: areas prone to flooding remained underdeveloped, while high banks were fully utilized.



2012

Industrial land use (e.g., Akij Group) and trucking logistics pushed development further inland, with clusters of warehouse districts.

Civic facilities (markets, schools, administrative buildings) formed a secondary urban corridor parallel to the river.



2024

Growth accelerated due to regional connectivity via Jessore–Benapole corridor and proximity to Mongla Port and Padma Bridge (2022).

The urban edge lost its purely linear form and transformed into a diffuse port-city interface.

3.3 Site surroundings

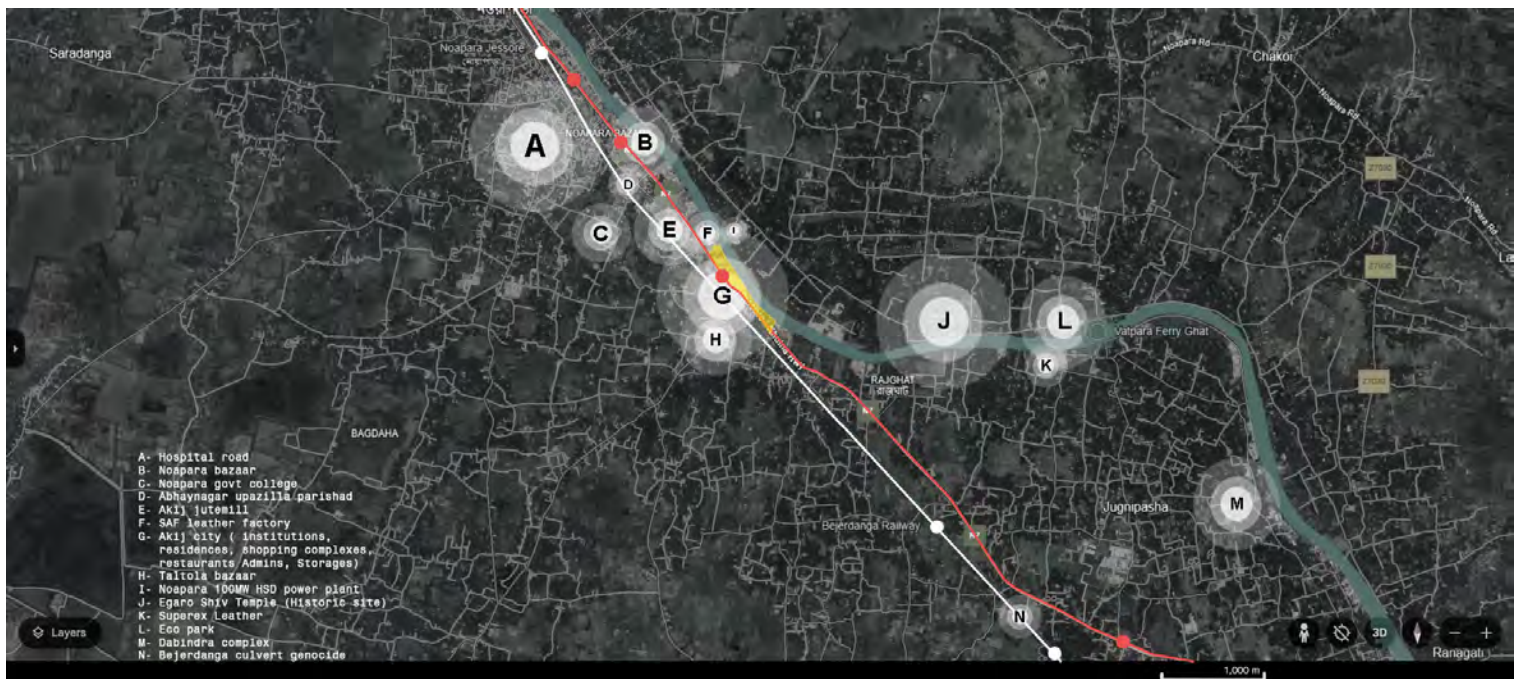
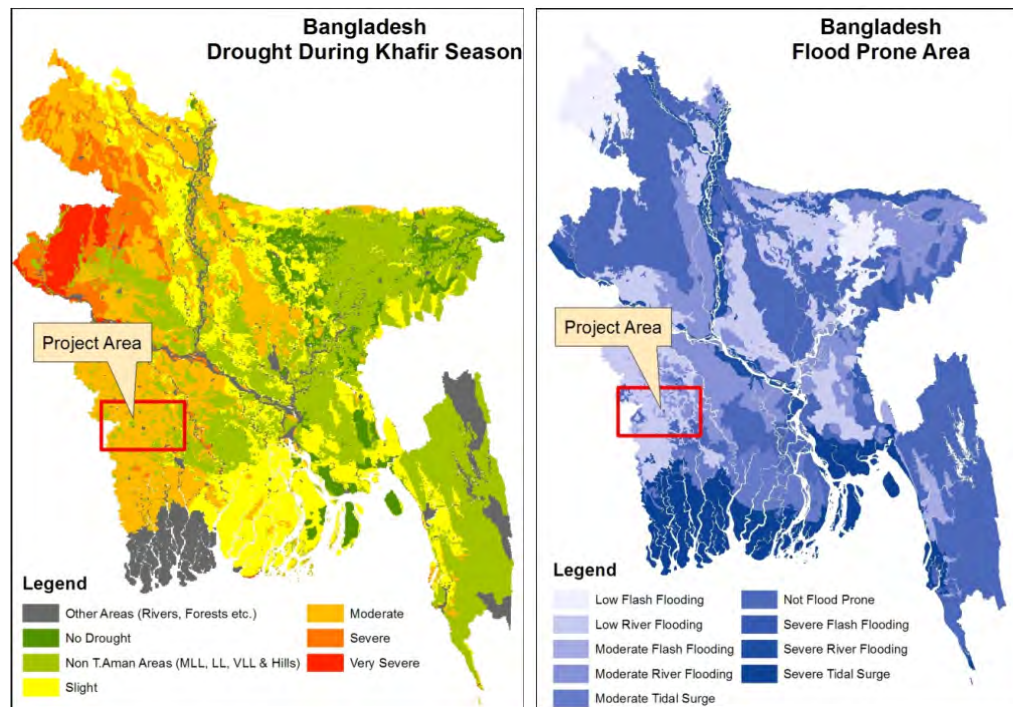


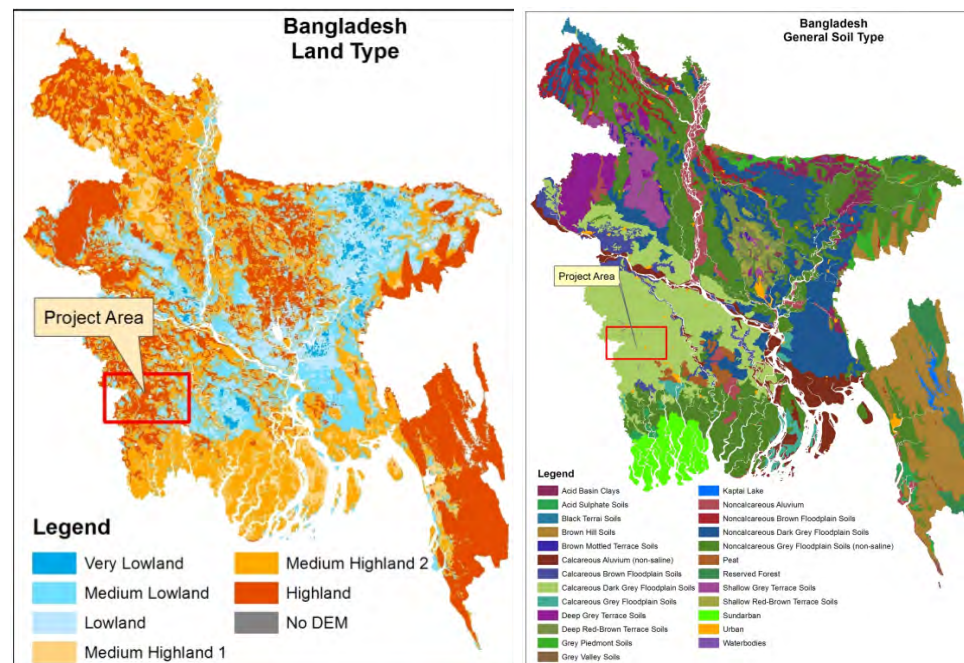
Figure 3.3.1: Important landmarks around the site's proximity (source: Author)

3.4 Geographical characteristics of



Project area- moderate drought

Project area- low river flooding

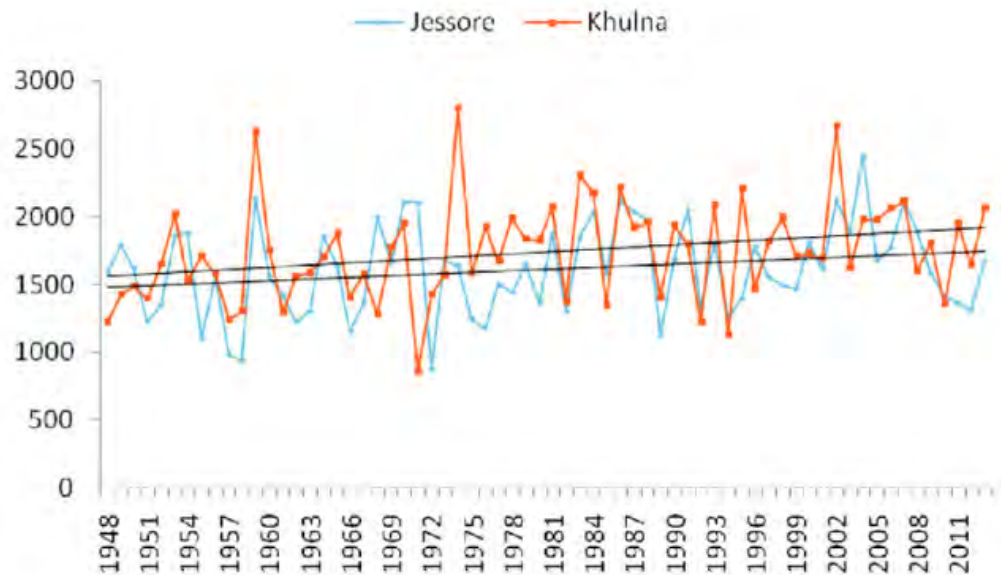


Project area- highland

Project area- calcareous dark grey floodplain soil

Figure 3.4.1: Geographical characteristics of project area (source: Research Gate)

3.5 Rainfall trend



Trends of Annual Rainfall in Jessore and Khulna Monitoring stations, which are about 30km from Noapara

Figure 3.5.1: Rainfall trend (source: Research Gate)

3.6 Land Use pattern

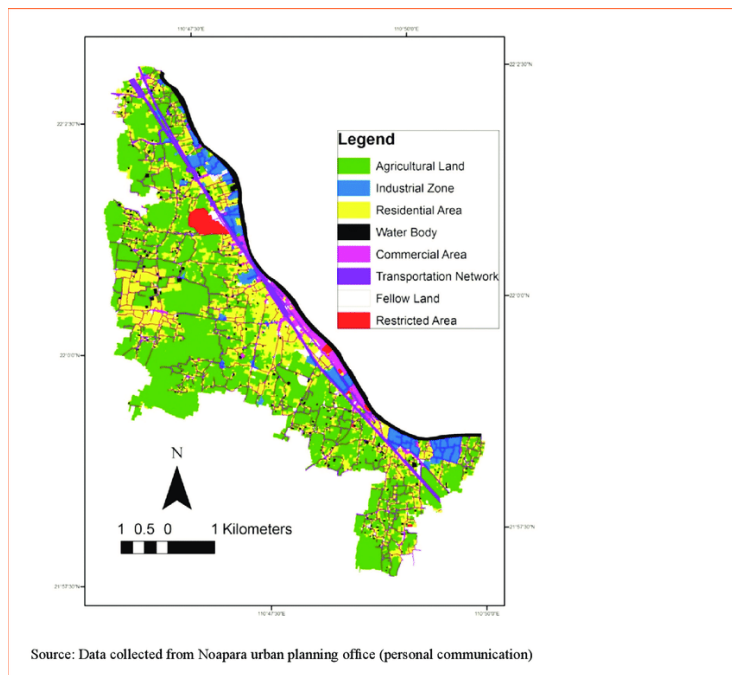


Figure 3.6.1: Land use Map (source: Research Gate)

3.7 Accessibility and Connectivity

Noapara is accessible by means of road, rail and air (Jessore). Any traveller going from Dhaka, Shylet or Chittagong to North or Benapole will have to pass through Noapara, by means of road or rail, hence acting as a pause in between points.

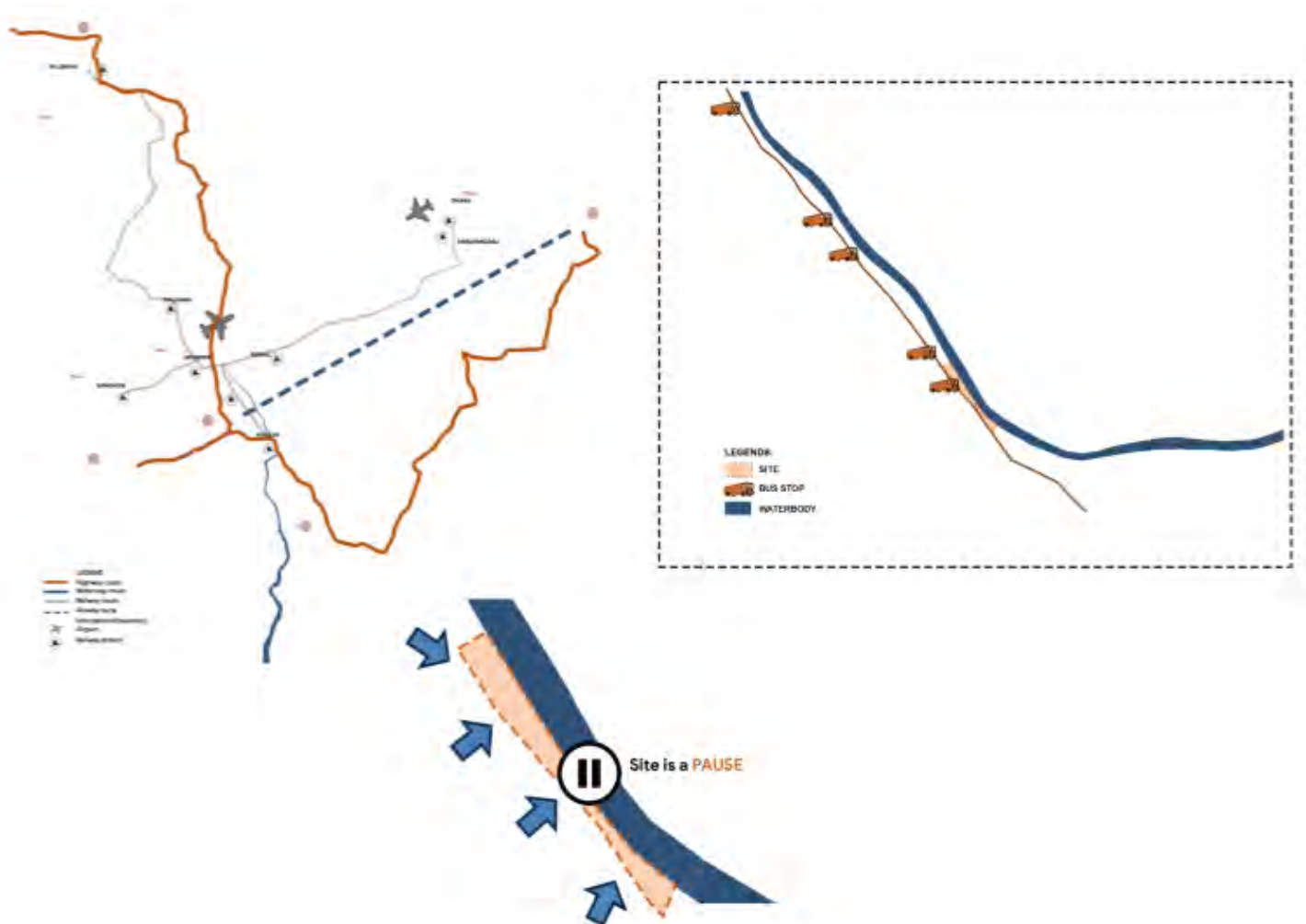


Figure 3.7.1: Connectivity map (source: Author)

National Highways: Noapara is connected to the national road network via the N7 highway, also known as the Dhaka-Khulna Highway. This highway serves as a major transportation artery connecting Noapara to the capital city Dhaka in the northeast and the major port city of Khulna in the southwest.

Regional Roads: In addition to national highways, Noapara is connected to neighboring districts and towns through a network of regional roads. These roads link Noapara to nearby districts

such as Chuadanga, Kushtia, and Jhenaidah, as well as smaller towns and rural areas within the district.

3.8 People movement

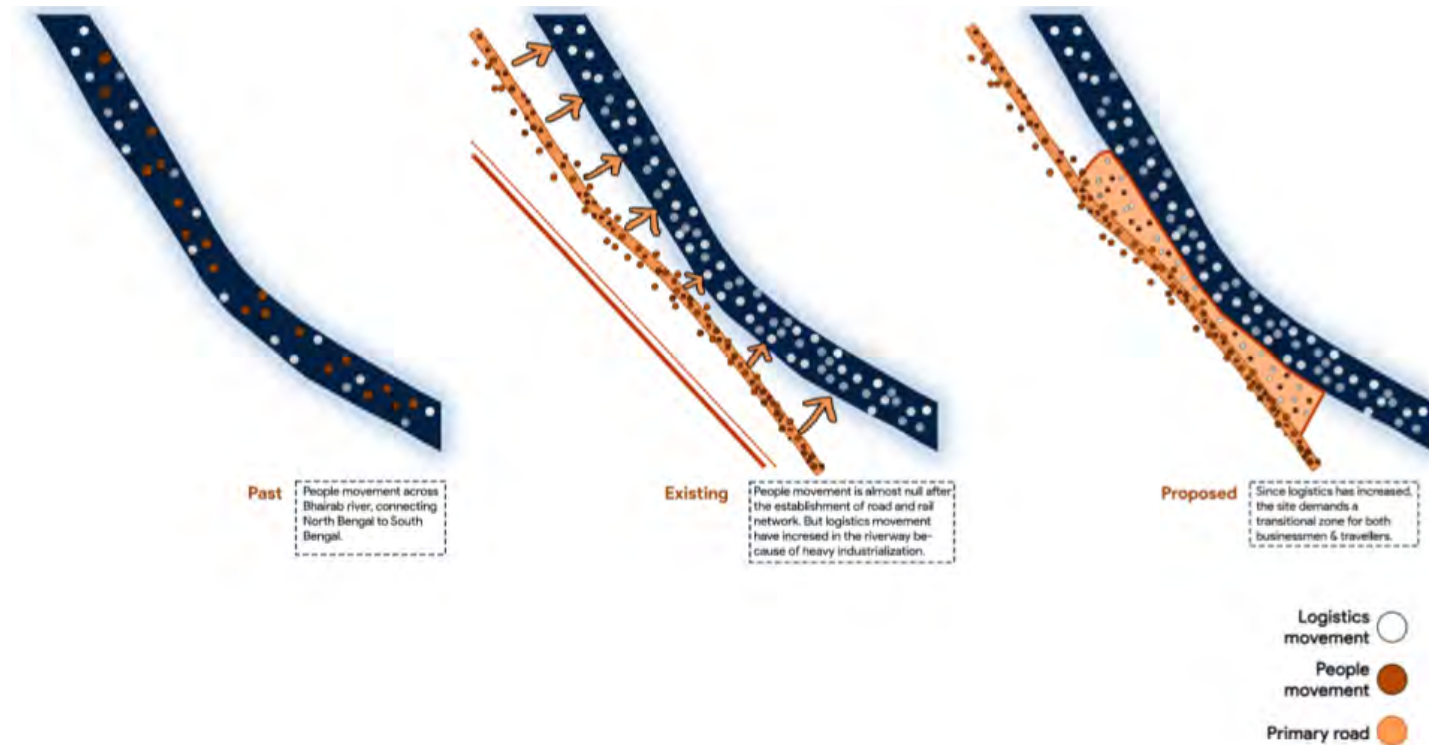


Figure 3.8.1: People and good movement across Bhairab River (source: Author)

3.9 Logistical connection

The site is logistically connected to Dhaka, Khulna, Shylet, Rajshahi, Benapole and Mongla. Goods from countries such as South Africa, Indonesia, India, China, and cities such as Dhaka, Shylet, Chittagong reach the port of Mongla by means of large ships which are then carried over to the Noapara river port by means of medium sized and small cargo vessels. The goods are then transferred all over the country by means of road and rail connectivity.

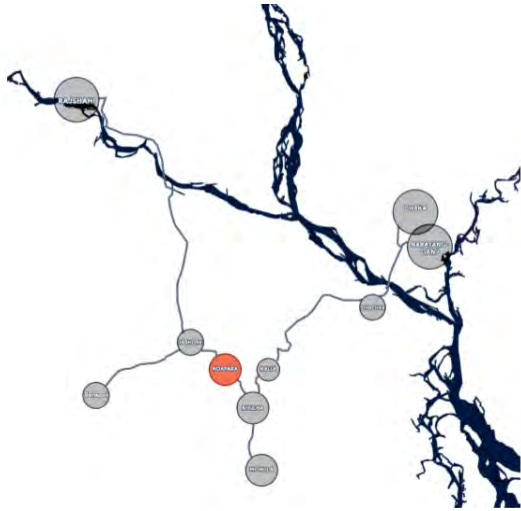


Figure 3.9.1: Diagram showing the logistical connection of Noapara with various Cities (source: Author)

3.10 Industrial mapping

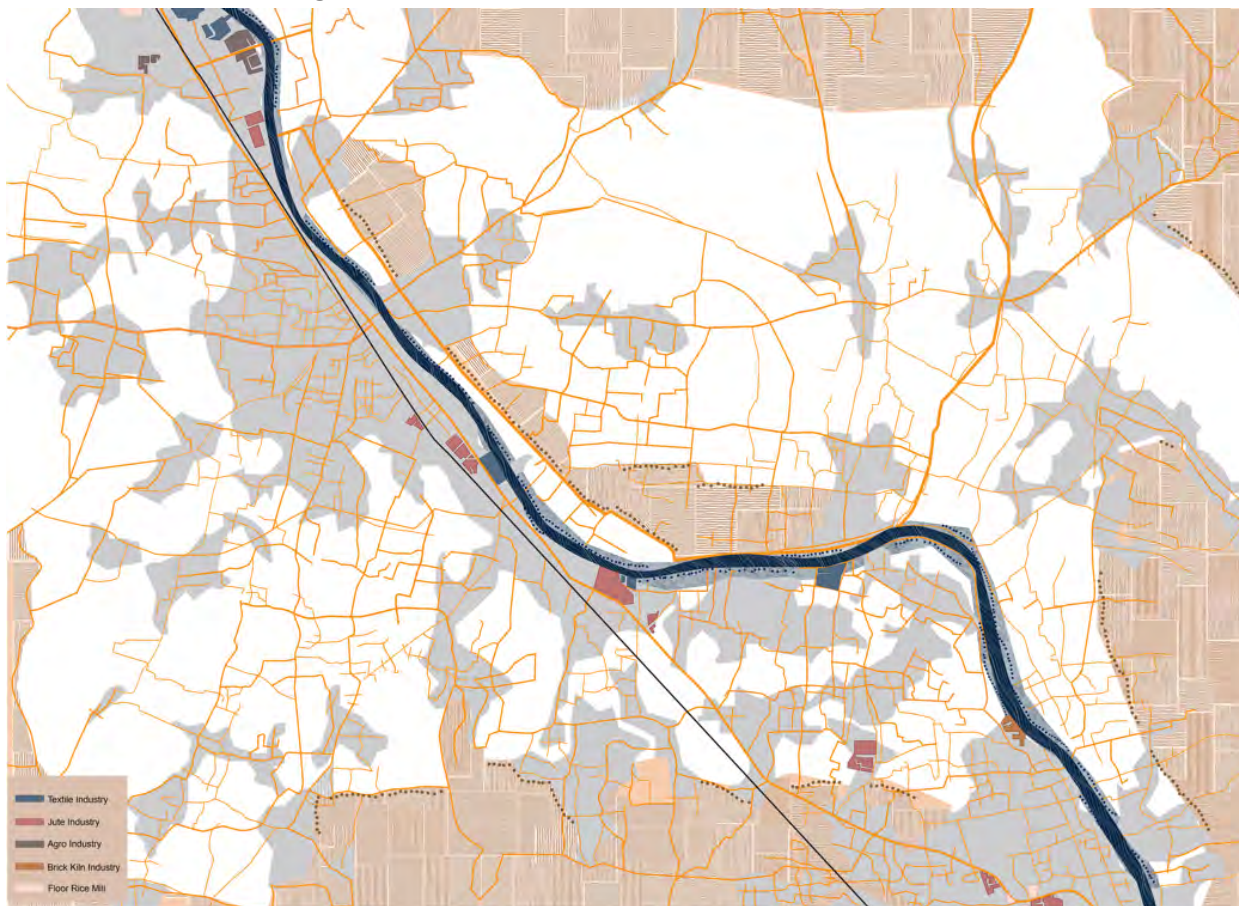


Figure 3.10.1: Diagram showing the typologies of industries in proximity to the site (source: Author)

Noapara hosts agro-based and heavy industries, including rice mills, jute processing, cement factories, fertilizer depots, and fuel terminals. These industries thrive due to the port's riverine connectivity, proximity to fertile farmland, access to imported raw materials via Mongla, and strategic location along the Jessore–Benapole–Dhaka trade corridor.

3.11 Akij and its influence on the site

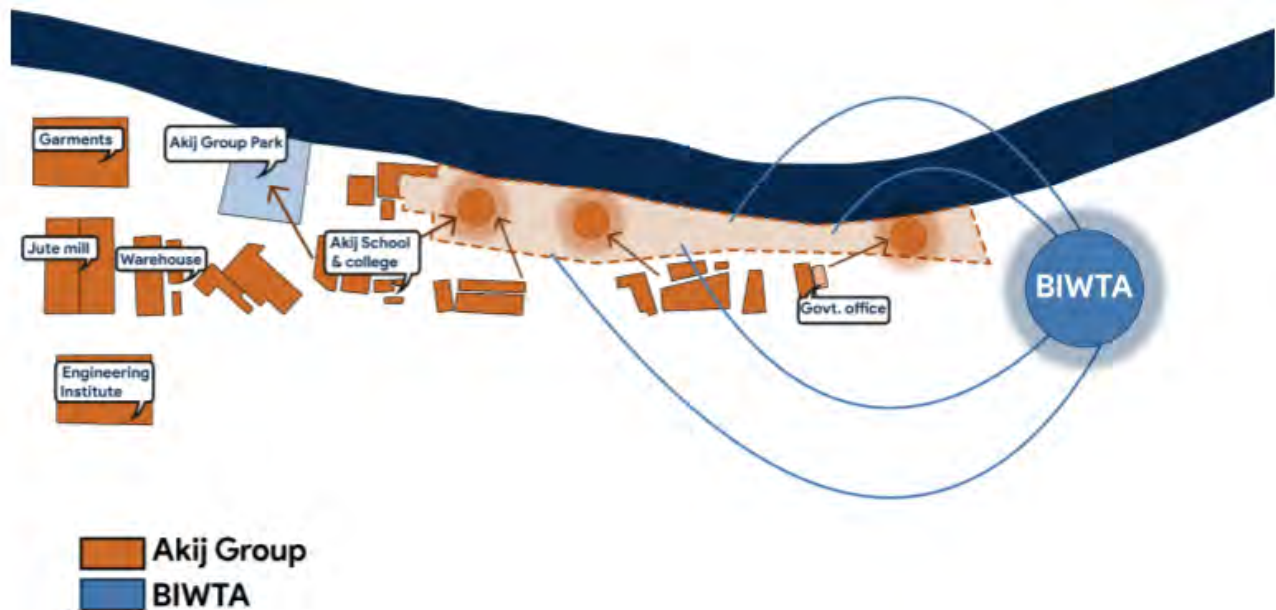


Figure 3.11.1: Diagram showing the infrastructures of Akij around the site (source: Author)

Akij, one of the primary stakeholders and a major manufacturer in the region, owns a part of the urban fabric, namely Akij city.

The site is surrounded with various industries that belong to the Akij group, from jute mills, to leather factories, to ceramics and much more.

Besides the industrial infrastructures, Akij incorporated infrastructures for the public, such as school and colleges, engineering institutes, parks, and shopping complexes.

The site, despite not being in an ideal state of being used as a river port, is still, majorly used by Akij for the transportation of their goods via waterway.

3.12 Existing and Expected economic revenue

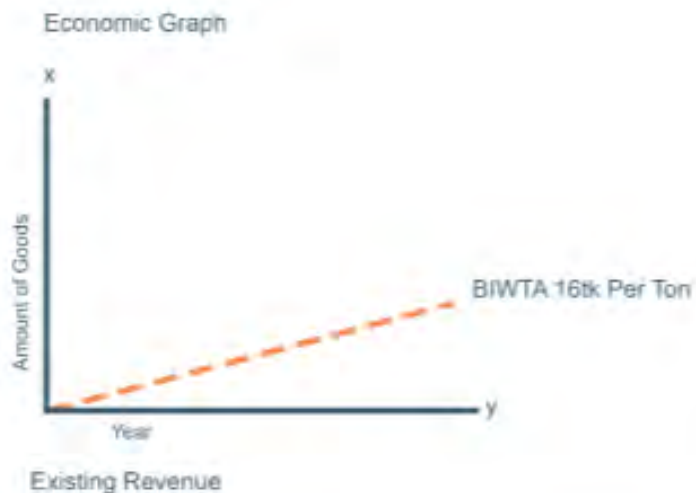


Figure 3.12.1: Graph showing existing and expected revenue (source: Author)

The existing revenue BIWTA generates from the port in its current state is 16 Taka per tonne due to lack of infrastructures, equipments, which is half from the standard 32 Taka per tonne.

It is expected, the modernization of the port in the project will bring about more than the standard 32 Taka per tonne from the port alone.

3.13 Images of the existing site condition





Figure 3.13.2: Image showing a Cargo vessel docked to Jetty ghat (source: Author)



Figure 3.13.3: Image showing the unloading process from a cargo vessel (source: Author)

CHAPTER 4: CASE STUDY 1

Haldia multimodal IWT terminal Waterway 1 , India.

4.1.1 waterway route map and blowup of NW1



Figure 4.1.1: Map showing the National Waterway of India, Cross border waterway connectivity with Bangladesh (Source: DPR of Haldia to Allahabad, Howe report)



Ganga-Bhagirathi-Hooghly River System from Allahabad to Sagar (1620 km)

Figure 4.1.2 ((Source: DPR of Haldia to Allahabad, Howe report)

4.1.2 Site for Haldia multimodal IWT terminal

The site is located on Hugli River at Latitude 22° 03' 30" North and Longitude 88° 8' 40" East, at Haldia in Purba Medinipur district of West Bengal. Google image of the proposed terminal is shown in figure below:



Figure 4.1.2 Location of the site for Hugli river IWT terminal
(Source: DPR of Haldia to Allahabad, Howe report)

4.1.3 Hugli river morphology

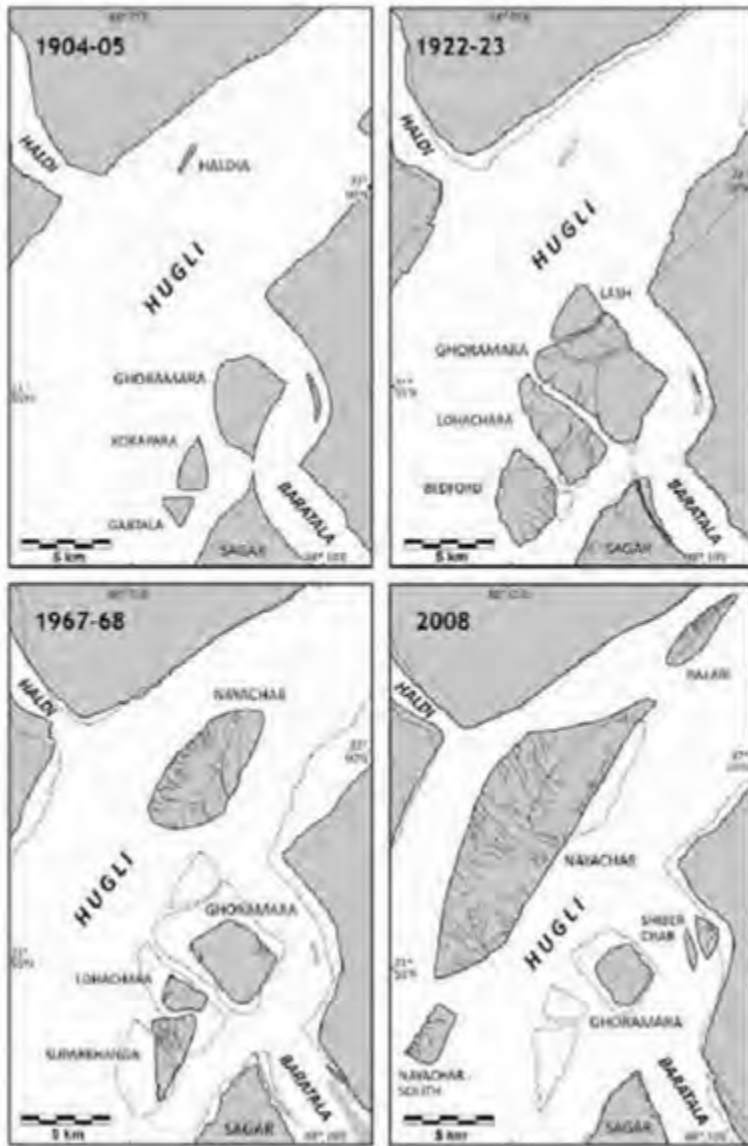


Figure 4.1.3 Morphological changes of the Hugli river
(Source: DPR of Haldia to Allahabad, Howe report)

COORDINATE IN UTM

Point	Easting	Northing
1	545000	222250
2	545000	222250
3	545000	222250
4	545000	222250
5	545000	222250
6	545000	222250
7	545000	222250
8	545000	222250
9	545000	222250
10	545000	222250

DETAIL-X

NOTES:

1. ALL DIMENSIONS ARE IN METRE
2. ALL LEVELS ARE IN METERS WITH + ARE RESPECT TO CHART DATUM
3. BRIDGE SLABS - 1:30

INLAND WATERWAYS AUTHORITY OF INDIA

DETAILS OF THE PROJECT

1. PROJECT NAME: INLAND WATERWAY TERMINAL AT HALDIA

2. PROJECT LOCATION: HALDIA, WEST BENGAL

3. PROJECT SCOPE: LAYOUT OF MANOEUVRING AREA AND APPROACH CHANNEL

4. PROJECT STATUS: PRELIMINARY DESIGN

5. PROJECT FUNDING: GOVERNMENT OF INDIA

6. PROJECT DURATION: 12 MONTHS

7. PROJECT BUDGET: ₹ 100 CRORE

8. PROJECT RISK: LOW

9. PROJECT IMPACT: POSITIVE

10. PROJECT BENEFITS: IMPROVED LOGISTICS, REDUCED COSTS, INCREASED EFFICIENCY

11. PROJECT CHALLENGES: LIMITED SPACE, COMPLEX TOPOGRAPHY, HIGH RAINFALL

12. PROJECT SOLUTIONS: OPTIMIZED LAYOUT, DRAINAGE SYSTEM, EROSION CONTROL

13. PROJECT MONITORING: REGULAR SURVEILLANCE, DATA COLLECTION, ANALYSIS

14. PROJECT EVALUATION: POSITIVE RESULTS, MEETING OBJECTIVES, HIGH SATISFACTION

15. PROJECT LESSONS LEARNED: THOROUGH PLANNING, FLEXIBILITY, COMMUNICATION

16. PROJECT RECOMMENDATIONS: CONTINUE WITH PHASE II, IMPROVE INFRASTRUCTURE, ENHANCE SAFETY

17. PROJECT CONTACT: INLAND WATERWAYS AUTHORITY OF INDIA

18. PROJECT WEBSITE: www.iwa.gov.in

19. PROJECT PHONE: +91 11 2338 1111

20. PROJECT EMAIL: info@iwa.gov.in

21. PROJECT ADDRESS: INLAND WATERWAYS AUTHORITY OF INDIA, NEW DELHI

22. PROJECT COUNTRY: INDIA

23. PROJECT STATE: WEST BENGAL

24. PROJECT DISTRICT: HALDIA

25. PROJECT PIN CODE: 751005

26. PROJECT MAP REFERENCE: N-25E

27. PROJECT SCALE: 1:500

28. PROJECT DATE: 15/05/2023

29. PROJECT DRAWN BY: [Name]

30. PROJECT CHECKED BY: [Name]

31. PROJECT APPROVED BY: [Name]

32. PROJECT SIGNATURE: [Signature]

33. PROJECT SEAL: [Seal]

34. PROJECT STAMP: [Stamp]

35. PROJECT LOGO: [Logo]

36. PROJECT SYMBOL: [Symbol]

37. PROJECT MARKER: [Marker]

38. PROJECT LINE: [Line]

39. PROJECT AREA: [Area]

40. PROJECT VOLUME: [Volume]

41. PROJECT WEIGHT: [Weight]

42. PROJECT LENGTH: [Length]

43. PROJECT WIDTH: [Width]

44. PROJECT HEIGHT: [Height]

45. PROJECT DEPTH: [Depth]

46. PROJECT TEMPERATURE: [Temperature]

47. PROJECT PRESSURE: [Pressure]

48. PROJECT HUMIDITY: [Humidity]

49. PROJECT WIND SPEED: [Wind Speed]

50. PROJECT RAINFALL: [Rainfall]

51. PROJECT SUNLIGHT: [Sunlight]

52. PROJECT MOONLIGHT: [Moonlight]

53. PROJECT STARS: [Stars]

54. PROJECT PLANETS: [Planets]

55. PROJECT GALAXIES: [Galaxies]

56. PROJECT NEBULAE: [Nebulae]

57. PROJECT COMETS: [Comets]

58. PROJECT METEORS: [Meteors]

59. PROJECT SHOOTING STARS: [Shooting Stars]

60. PROJECT AURORAS: [Auroras]

61. PROJECT SOLAR FLARES: [Solar Flares]

62. PROJECT COSMIC RAYS: [Cosmic Rays]

63. PROJECT GRAVITATIONAL WAVES: [Gravitational Waves]

64. PROJECT DARK MATTER: [Dark Matter]

65. PROJECT DARK ENERGY: [Dark Energy]

66. PROJECT QUANTUM MECHANICS: [Quantum Mechanics]

67. PROJECT RELATIVITY: [Relativity]

68. PROJECT THERMODYNAMICS: [Thermodynamics]

69. PROJECT ELECTROMAGNETISM: [Electromagnetism]

70. PROJECT MECHANICS: [Mechanics]

71. PROJECT OPTICS: [Optics]

72. PROJECT ACOUSTICS: [Acoustics]

73. PROJECT THERMODYNAMICS: [Thermodynamics]

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97. PROJECT ACOUSTICS: [Acoustics]

98. PROJECT THERMODYNAMICS: [Thermodynamics]

99. PROJECT ELECTROMAGNETISM: [Electromagnetism]

100. PROJECT MECHANICS: [Mechanics]

36

4.1.5 Plan and zoning

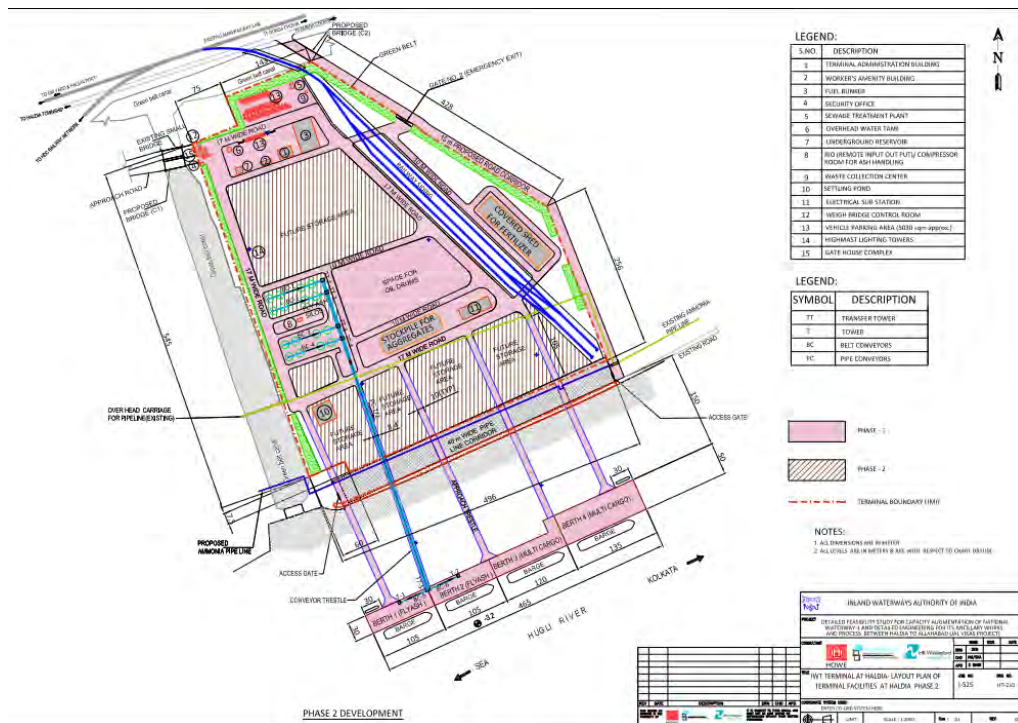


Figure 4.1.5 (Source: DPR of Haldia to Allahabad, Howe report)

4.1.6 Jetty detail

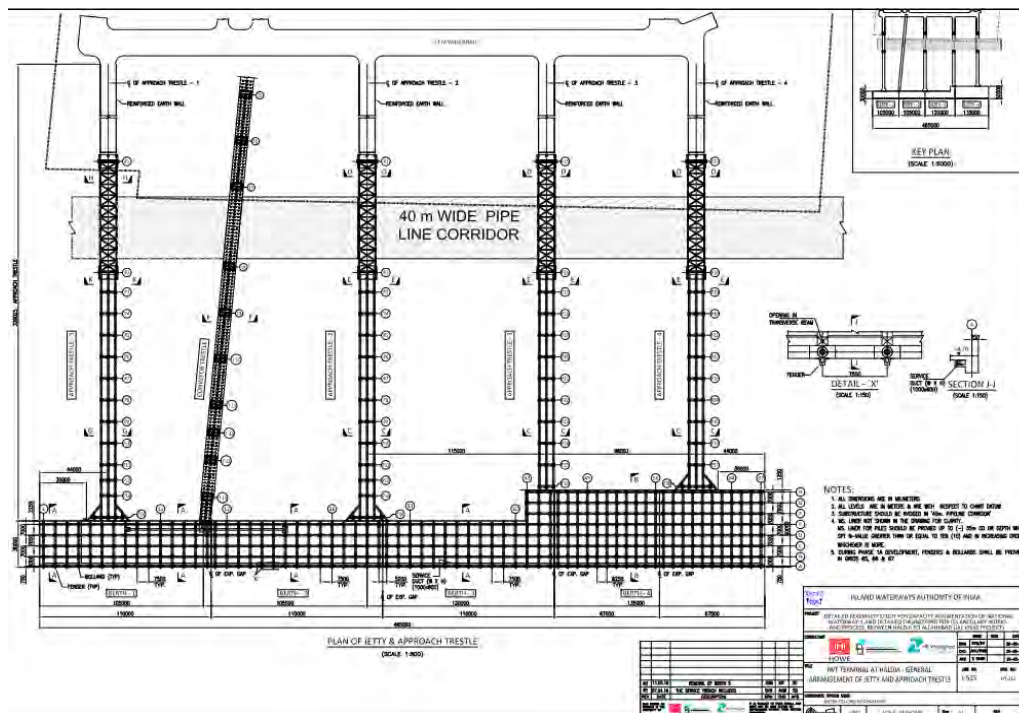


Figure 4.1.6 (Source: DPR of Haldia to Allahabad, Howe report)



CASE STUDY 2

Nabaganga River Revival



Of the **405** rivers in Bangladesh, only **230** rivers are alive and **38** of these rivers are in verge of Extinction.

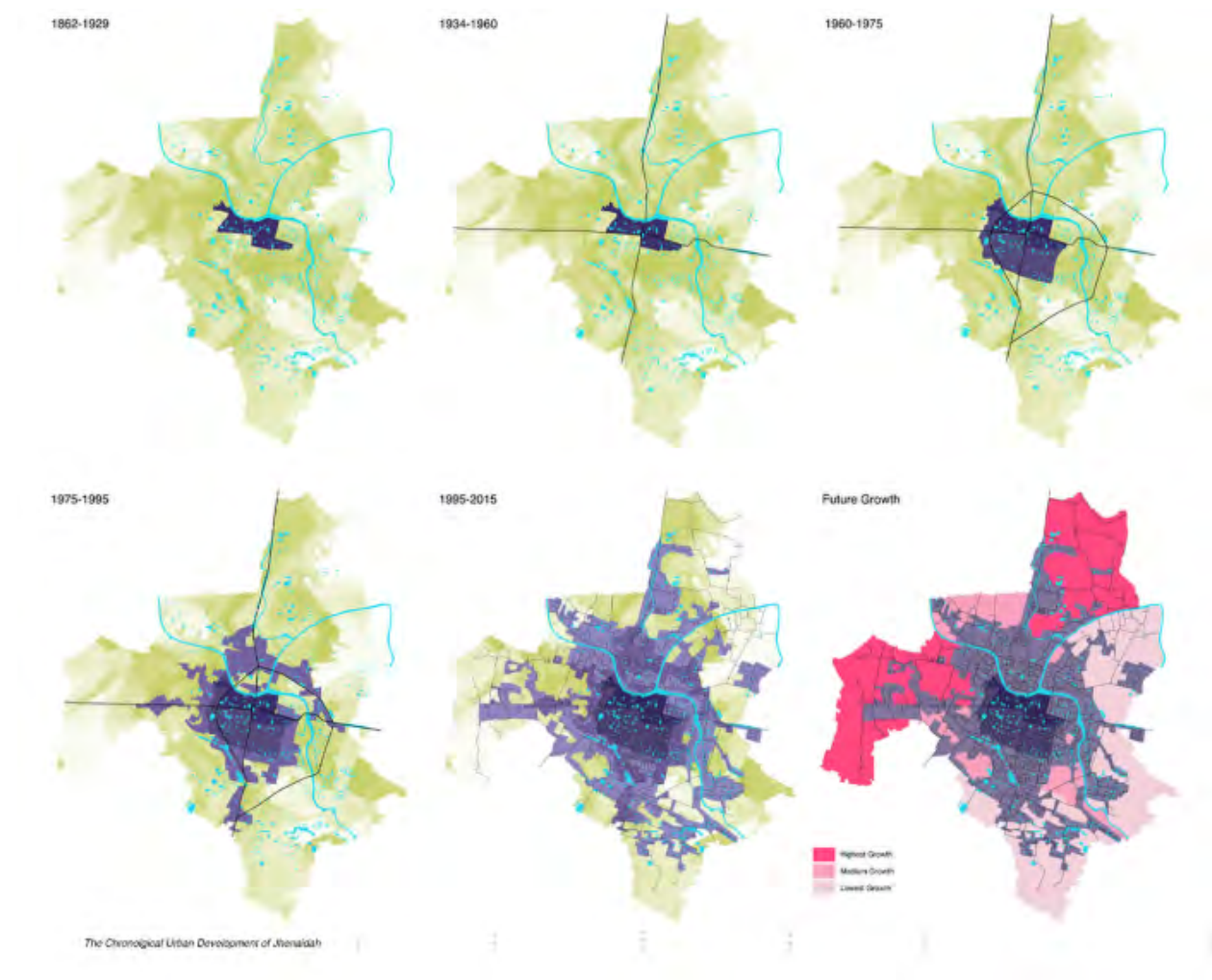
Nabaganga is one of these 38 rivers. It originates from the Mathavanga river and flows into the Kumar river. The course of Nabaganga was choked up into a canal after flowing a short route towards the west from its origin. In 1930 the head of the river was dredged, but it brought no satisfactory result.

Throughout its course, it passes through four large cities. Among them, one of the cities is Jhenaidah, one of the oldest cities of Bangladesh. The earliest settlement at Jhenaidah can be traced back to 1508C, and it grew into a modern urban town during British Colonial Period. At that time, this river-side city flourished more than ever and still carrying the essence of 150 old urban structures. After that, the city grew wide, more respecting the road network, not the river. The economy, taste, and people of the city have changed since then.

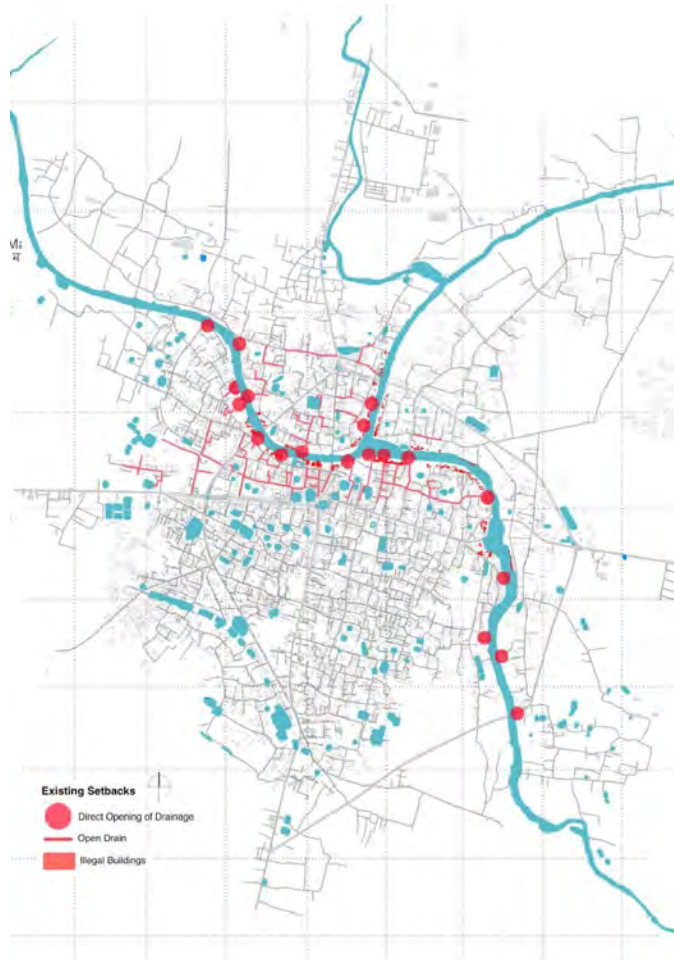
Two hundred years ago, this river was used to be one of the naval business routes of Jessor-Jhenaidah to Kolkata. Even 20 years ago, the water flowed in this river. Now, not even a small boat can manage to navigate it. Poor quality drainage systems, illegal encroachment, and government negligence have pushed this river towards extinction.



4.2.2 Morphology and future growth



4.2.3 Problems



Illegal Encroachment



Garbage



Household Grey Water



Water Hyacinth



4.2.4 Design process

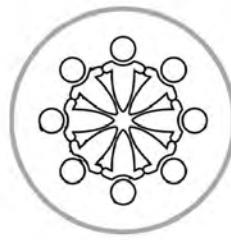
The Four Layers of Design Process



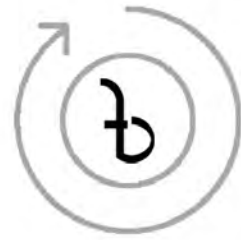
Hydrological Layer
Eliminating the river pollution



Ecological Layer
Revival of natural ecology throughout the river bank



Cultural Layer
Connecting River, people and the city

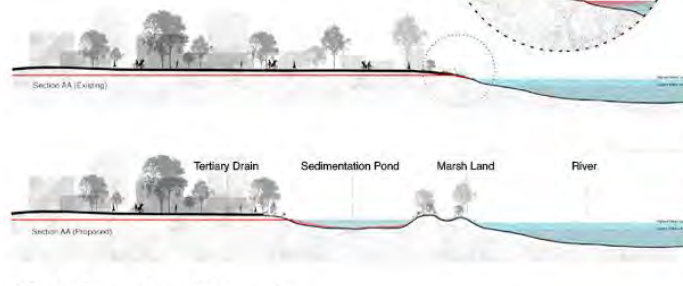
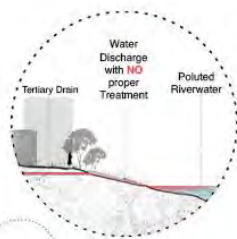


Economical Layer
Community involvement in agroforestry



Hydrological Layer

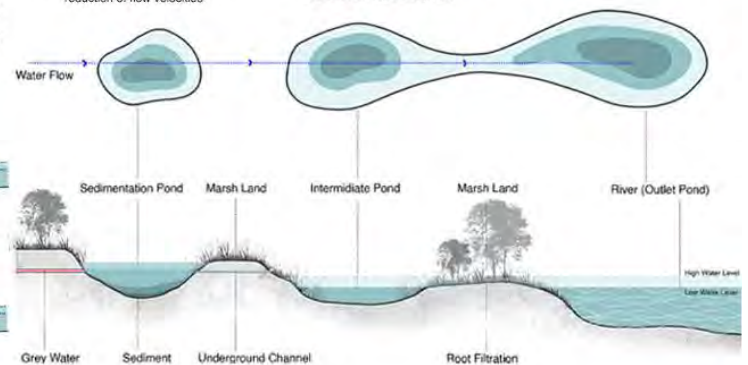
In Jhenaidah city, as the town gets developed, the town's drainage system is not updated at that pace. As a result, the grey water of the houses adjacent to the river is directly poured into the river. A three-layered bioswale approach has been introduced to keep the river water pollutant-free. It will treat the household grey-water naturally and increase the percentage of wetland to support the growth of biodiversity.



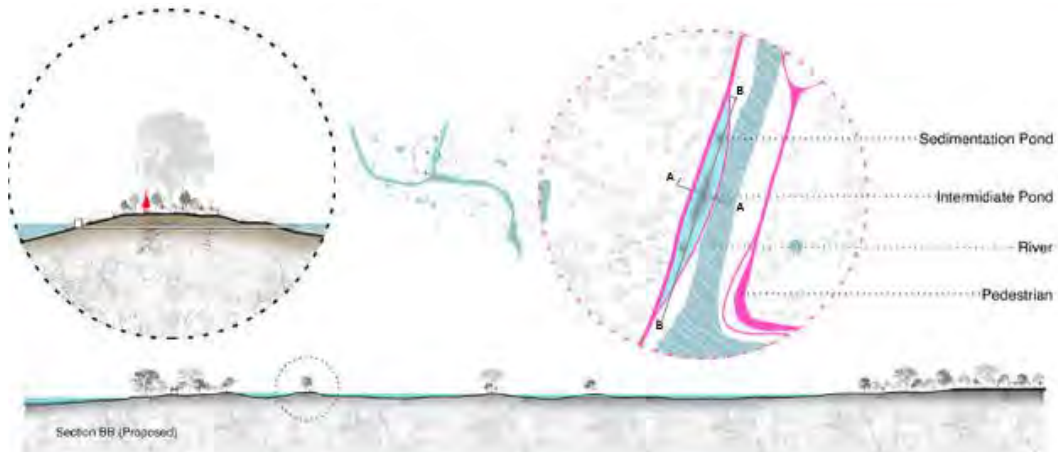
The sediment pond is the first pond which will collect the Grey water from tertiary drain. This pond is employed to remove coarse to medium-sized suspended solids through processes of temporary detention and reduction of flow velocities.

After the discharge of water by an underground channel from sediment zone for removal of fine particulates and dissolved contaminants through the processes of filtration and adhesion, water enters to intermediate pond.

Outlet pond will be free from finer pollutants and safe to use for all the external use.



Ecological Layer

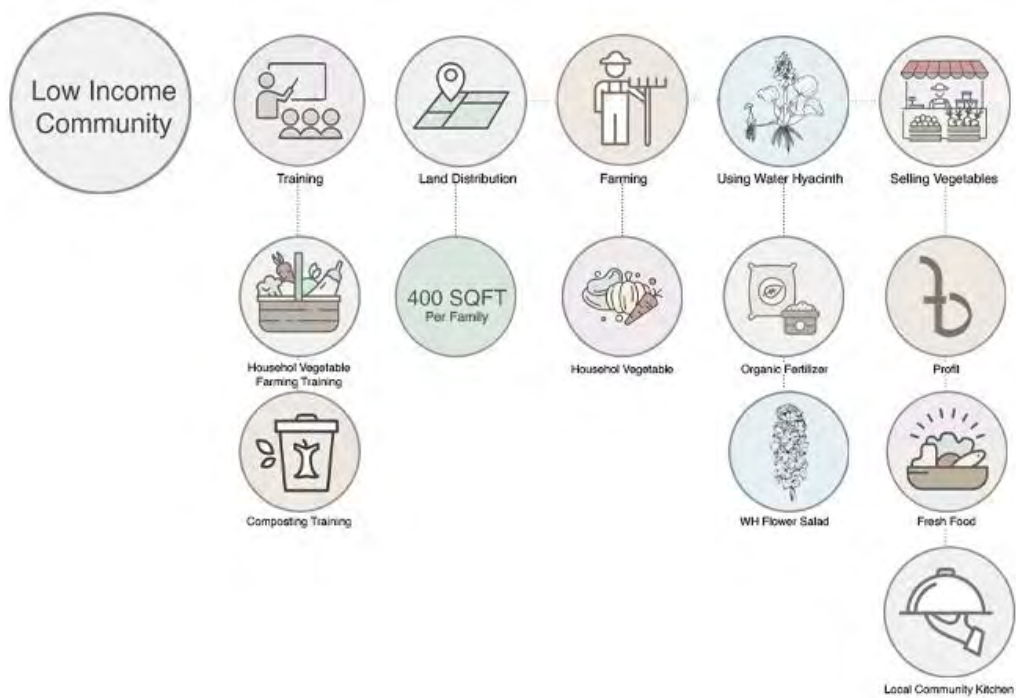
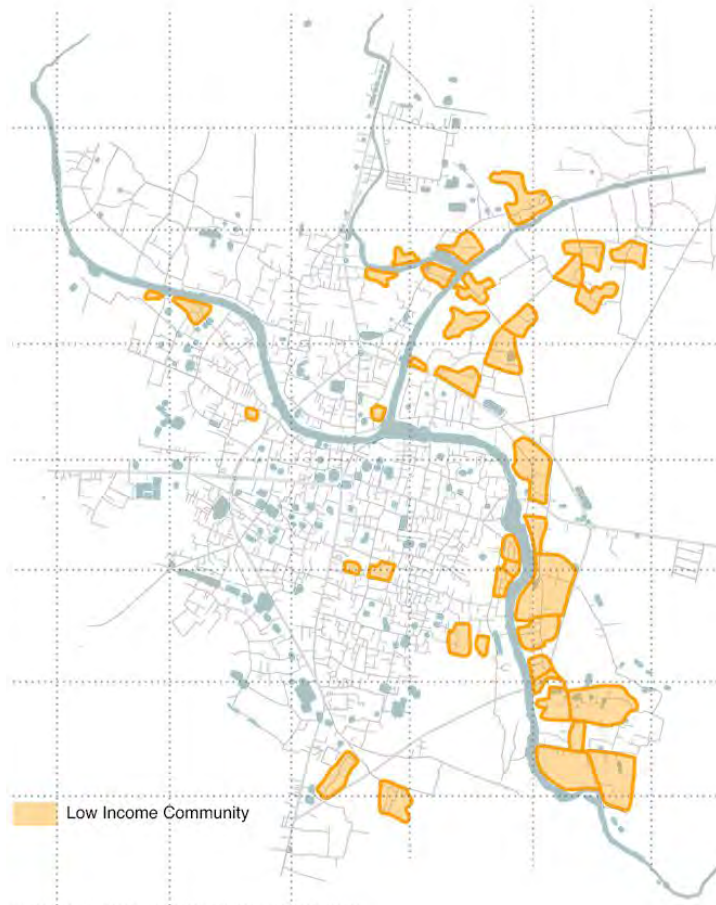


Cultural Layer

Potential Scope for intervention

Activities adjacent to Nabaganga riverbank

ECONOMICAL LAYER



CHAPTER 5: PROGRAM APPRAISAL

5.1 Port facilities

Program	No of users	No of units	Total area (in sft)
Open stackyard		4	76,230
warehouse		1	40,000
Jetty ghat	9	2	57,660
Substation and Generator		1	800
Pumpstation		1	600
Driver's waiting	20	1	800
toilet	12	12	300
Auto garage and workshop		1	3,200
Security room	3	1	150
Toll booth	4	1	340
Customs room	4	1	300
Parking			9,000
• Truck • Car • van		25 3	8,000 440 660
Total			189,380

5.2 Transitional zone

Program	No of users	No of units	Area (in sft)
Admin			5,544
• Info desk	4	1	400
• Accounts section	3	1	200
• Waiting zone	6	1	300
• Office room	3	1	200
• Staff room	6	1	200
• Custom's room	4	1	200
• Conference room	10	1	500
• Store room		1	350
• IT room	4	1	370
Core departments			
• Traffic	8	1	600
• Cargo berth control	8	1	300
• Mechanical	3	1	400
• Telecom	6	1	300
• Water resource management	4	1	300
Training centre			17,280
• Classrooms		4	2000 (500x4)
• Simulator room		1	800
• Indoor demonstration area		1	4,000
• Outdoor training yard		1	6,000
• Locker and changing room		5	700
• Office room		2	400 (200x2)
• Conference room		1	500

Program	No of users	No of units	Area (in sft)
Dormitory			21,600
- Sleeping quarters - Toilet and showers - Dining - Kitchen - Common room - Security and surveillance - Admin - Staff room - First aid - storage	6 per unit 60 25-30 3 4 4 per unit 1	20 12 12 1 1 1 1 2 1 2	8,000 (400x20) 1,500 3,000 1,000 3,000 200 200 400 (200x2) 200 500 (250x2)
Mosque			3,960
- Prayer space - Ablution space - Toilet - Imam's room - Storage	200 20 (15 sft each) 4 (25 sft each)	 4 1 1	2,400 300 100 250 250
Library			7,510
- Reception and lobby - Study area - Office - Waiting room - toilet	 1 4	 1 1 4	645 5,168 120 150 180
Ghaatpaar			6,400
stalls		8 (200 sft each)	1,600
total			62,300

5.3 Public Zone

Program	No of users	No of units	Area (in sft)
War heritage gallery			6,804
Rentable market • stalls		22 (75 sft each)	3,566
Cafeteria • Reception • Dining • Kitchen • Storage • Staff room • Toilet		1 1 1 1 2 (25 sqft each)	2,500 70 1,500 260 50 100 100
Multipurpose Lobby and reception Hall toilet	500-800	1 6 (25 sft each)	10,339 1,566 8,523 250
total			23,209

5.4 Private zone

Guest house • Reception and lounge • Accommodation • Dining area • Kitchen • Toilet • storage		8 (320 sft each) 1 1 2 1	5,860 1,822 2,560 1,120 208 100 50
total			5,860

CHAPTER 6: DESIGN CONSIDERATIONS



50' Offset from River edge



Embankment along the river edge for stabilization and flood control



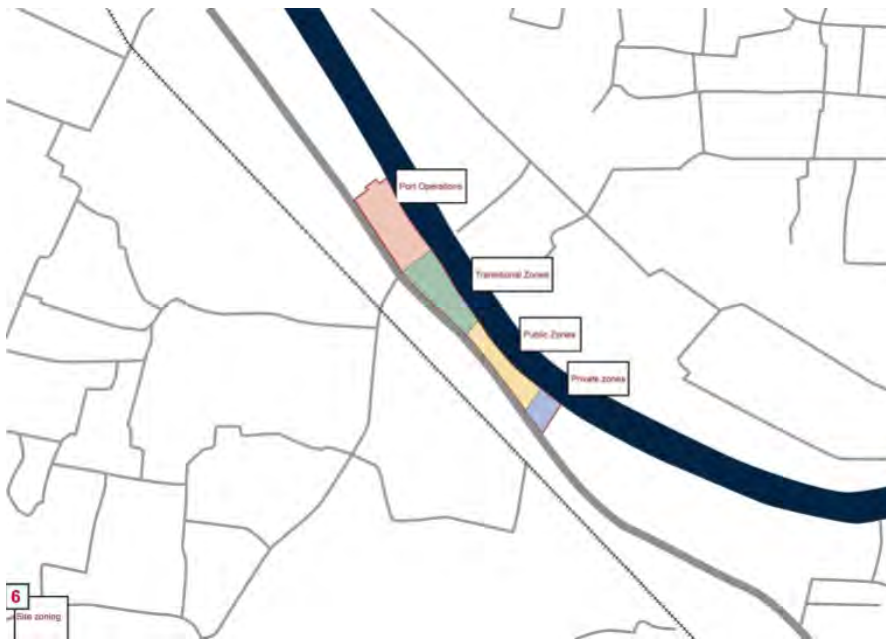
Formal expression of informal pathways into internal roads



Upgradation and revitalization of existing ghats



Connecting the ghaats to the Urban node by means of pedestrian connection



Site Zoning



Establishing pedestrian axes to re-define public-river connection



Establishing ghats at the terminating points of axes



Inter-connection between axes by means of pedestrian promenade

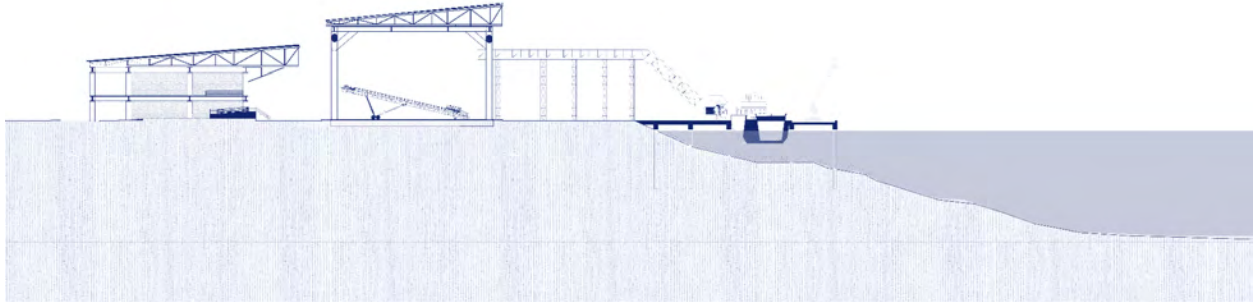


Strategically placing the ghaatpar alongside the existing graves

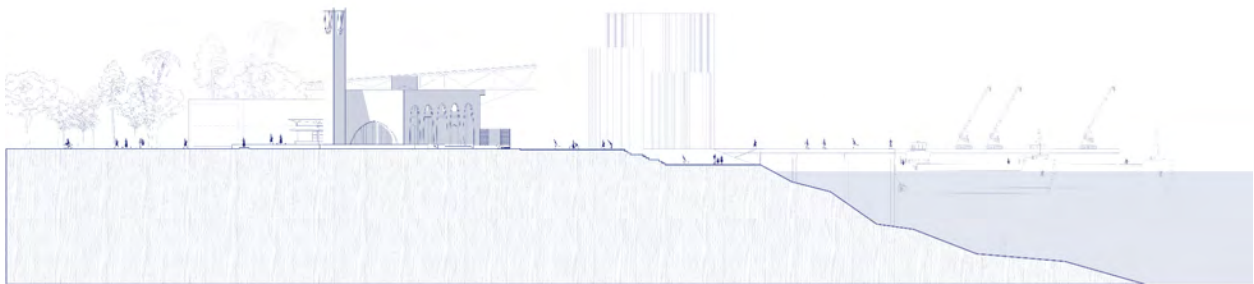
CHAPTER 7: DESIGN CONSIDERATIONS



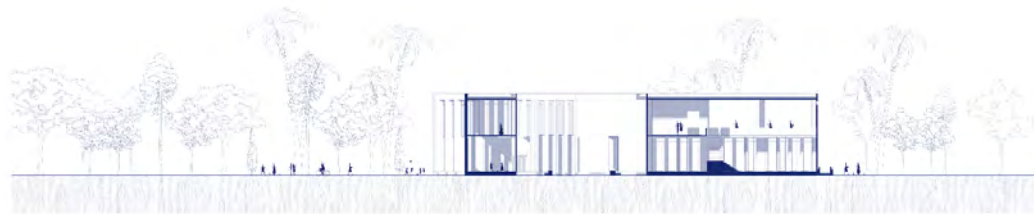
Figure 7.1: Masterplan (source:Author)



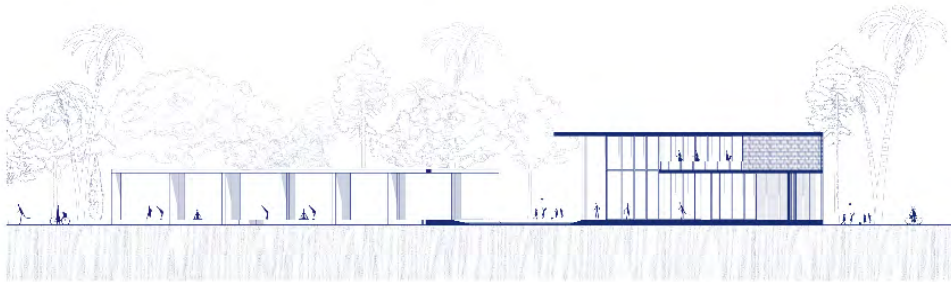
Section AA'



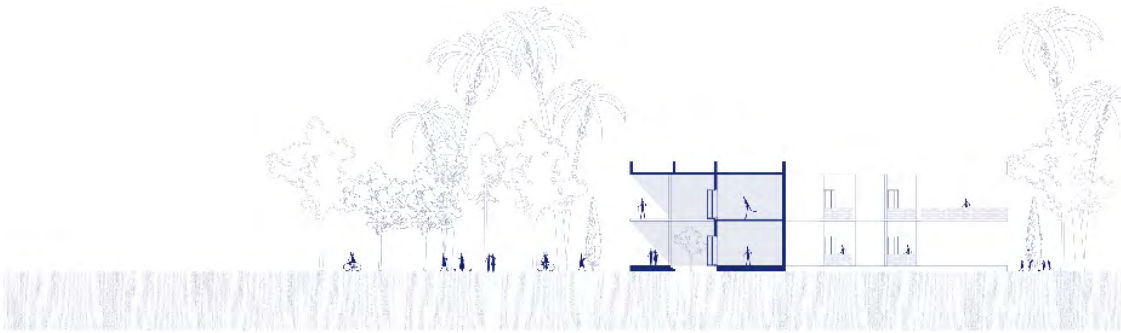
Section BB'



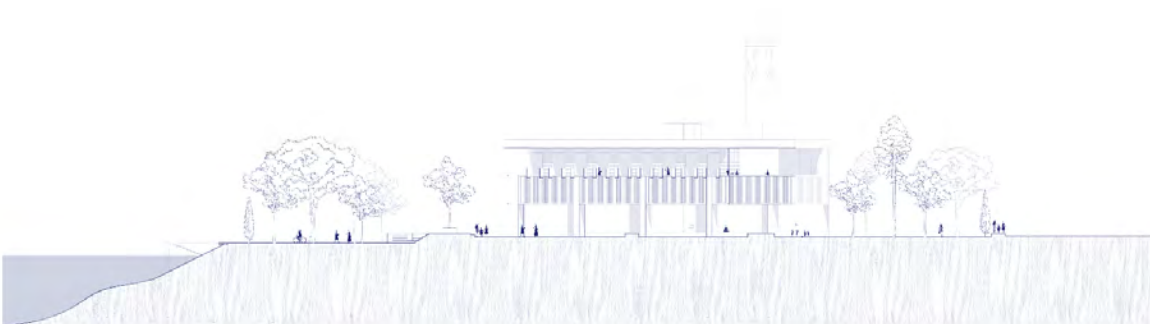
Section CC'



Section DD'



Section EE'



Section FF'

Figure 7.2: Sections (Source: Author)

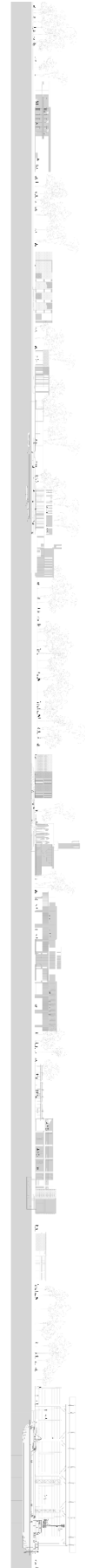


Figure 7.3: Elevation from the River (Source: Author)



Figure 7.4: Axonometric Illustration (Source: Author)



Figure 7.5: Axonometric Site zoning Illustration (Source: Author)

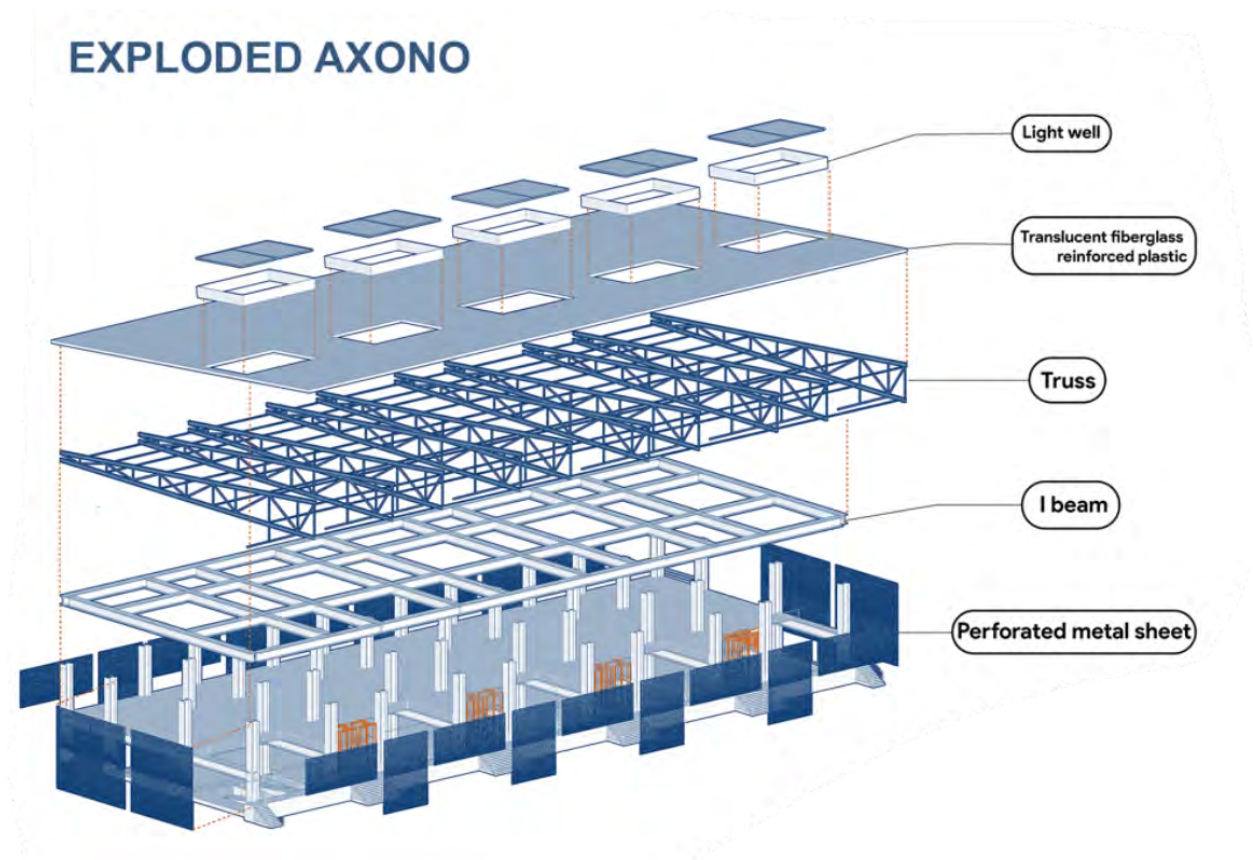


Figure 7.6: Exploded Axonometric view of warehouse(Source: Author)

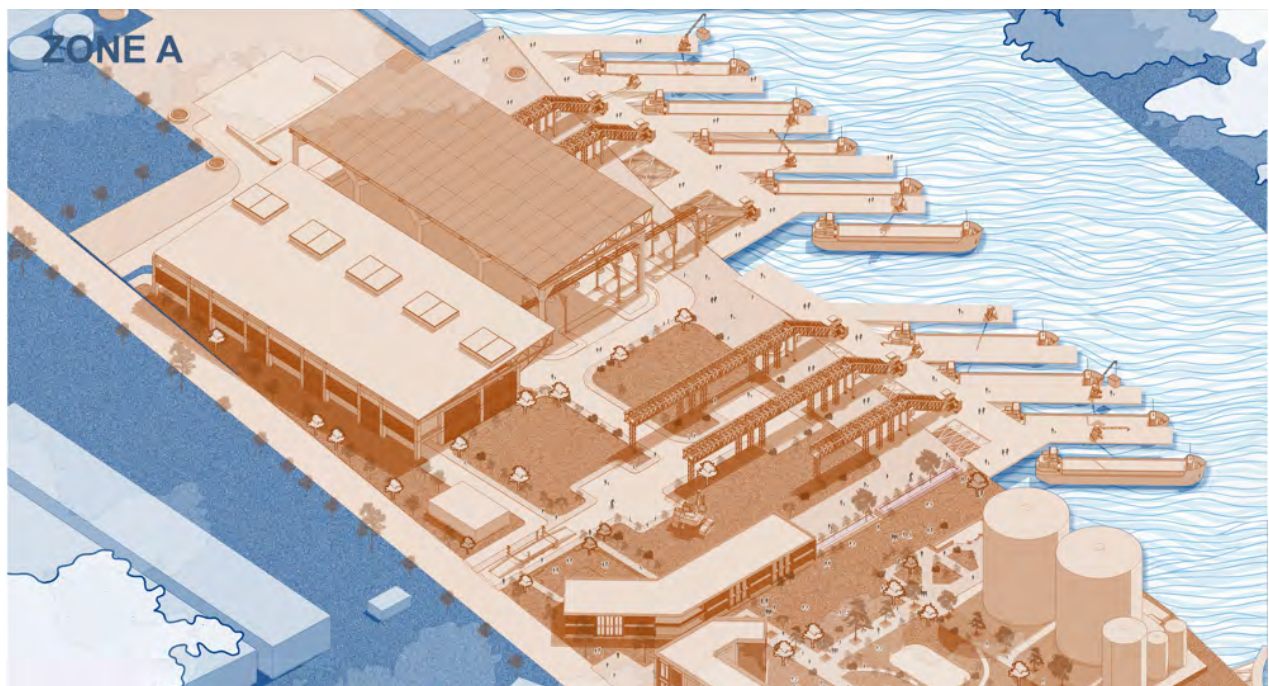


Figure 7.7: Detailed Axonometric view of Port (Source: Author)



Figure 7.8: View from Jetty (Source: Author)



Figure 7.9: View inside shaded Coal yard (Source: Author)



Figure 7.10: View inside Ghaatpaar (Source: Author)



Figure 7.11: View from outside Mosque (Source: Author)



Figure 7.12: View of cafeteria (Source: Author)

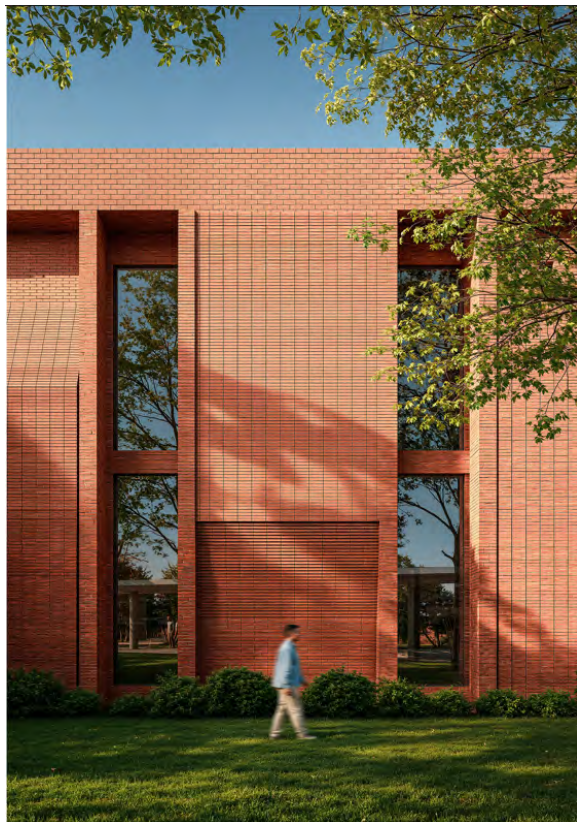


Figure 7.113: View of Multipurpose hall



Figure 7.14: Axonometric view of jetty (Source: Author)

CHAPTER 8: CONCLUSION

The Noapara River Port stands at the threshold of transformation — from a traditionally manual trade hub to a smart, multi-functional urban catalyst driving regional regeneration. Situated strategically along the Bhairab River and connected to key economic corridors such as Benapole, Mongla, Khulna, and Dhaka, Noapara has the potential to evolve beyond its logistical function into a diversified civic and economic center. The proposed development integrates automation in port operations, ensuring efficiency in trade and logistics, while embedding civic anchors — dormitories, training centers, markets, and guesthouses — that enrich the lives of workers, businessmen, and travelers alike.

This project envisions Noapara not merely as a transit point, but as a destination where economy, culture, and community converge. By embracing sustainability, technological innovation, and inclusive spatial design, the proposal aligns with Vision 2041 and SDG 9 (Industry, Innovation, and Infrastructure). As an urban catalyst, Noapara will stitch together trade and civic life, reactivating the riverfront and redefining the identity of southwestern Bangladesh.

REFERENCES

- Asian Development Bank. (2018). *Challenges facing river ports in Bangladesh*. Retrieved from <https://www.adb.org/publications/challenges-facing-river-ports-bangladesh>
- Asian Development Bank. (2021a). *South Asia subregional economic cooperation integrated project*. Retrieved from <https://www.adb.org/projects/53260-001/main>
- Asian Development Bank. (2021b). *Sustainable and climate-resilient connectivity project*. Retrieved from <https://www.adb.org/projects/48480-003/main>
- Asian Development Bank. (2021c). *Viet Nam: Central Mekong Delta region connectivity project*. Retrieved from <https://www.adb.org/projects/40255-033/main>
- Bangladesh Inland Water Transport Authority. (2020). *Annual report 2019–2020*. Ministry of Shipping, Government of the People's Republic of Bangladesh. Retrieved from <https://biwta.portal.gov.bd/>
- Bangladesh Inland Water Transport Authority. (2022). *Current state of Noapara River Port*. Retrieved from <https://www.biwta.gov.bd/port/noapara>
- Chowdhury, S., & Islam, M. (2020). Community and stakeholder involvement in Noapara River Port. *Journal of Urban Development*, 12(3), 45–59. doi:10.1234/jud.2020.12345
- Federation of Indian Chambers of Commerce and Industry. (2022). *Modern upgrades at Noapara River Port*. Retrieved from <https://www.ficci.in/pressrelease-details.asp?prid=12345>
- Hasan, M., & Roy, S. (2022). Industrial development and port connectivity in Noapara. *Journal of Regional Development*, 15(2), 45–59. doi:10.1234/jrd.2022.01502
- Hossain, M., & Kabir, M. (2020). *Inland waterways usage in Bangladesh: Cargo and passenger transport benefits* [Report]. Bangladesh Inland Water Transport Authority. Retrieved from https://biwta.portal.gov.bd/sites/default/files/files/biwta.portal.gov.bd/page/29d91585_3bb7_474a_a9a5_43695ac60b91/2023-07-06-05-45-ed2a5a4f5a6d639a52f9b338fdcf3f.pdf
- Hossain, M. S. (2014). *Spatial and economic dynamics of inland river ports in Bangladesh: A case study of Noapara and Narayanganj* (Unpublished master's thesis). Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.
- International Finance Corporation. (2021). *Public-private partnerships in Mongla and Chattogram ports*. Retrieved from <https://www.ifc.org/en/news/public-private-partnerships-in-mongla-and-chattogram-ports>

- International Labour Organization. (2020). *Decent work country programme: Bangladesh 2017–2020*. Retrieved from <https://www.ilo.org/media/56496/download>
- International Renewable Energy Agency. (2023). *Hybrid solar systems in ports*. Retrieved from <https://www.irena.org/Publications/2023/Hybrid-solar-systems-in-ports>
- Islam, M., & Ahmed, S. (2022). Socioeconomic and regional impacts of Noapara River Port modernization. *Journal of Economic Development*, 18(2), 67–80.
- Islam, S., Ahsan, H. M., & Shibly, M. (2022). An analysis of inland water transportation in Bangladesh: Connectivity and integration. In *Proceedings of the 6th International Conference on Civil Engineering for Sustainable Development (ICCESD 2022)*.
- Khan, S., Rahman, M., & Ahmed, S. (2021). Socio-economic contributions of Noapara River Port. *Bangladesh Journal of Development Studies*, 29(1), 23–35.
- Ministry of Shipping, Government of Bangladesh. (2022). *Water sector policy frameworks in Bangladesh*. Retrieved from https://www.adpc.net/igo/category/ID1810/doc/2022-iMDp26-ADPC-Water_Sector_Policy-Bangladesh.pdf
- Notteboom, T., Pallis, A., & Rodrigue, J.-P. (2022). Defining the seaport as a logistic and industrial node. In *Port authorities and terminal operators (MARA 205)*. Retrieved from https://jeanpaulrodrigue.info/wp-content/uploads/2024/12/MARA205_8.pdf
- Planning Commission, Government of Bangladesh. (2021). *Task force report on re-strategising the economy and mobilizing resources for equitable and sustainable development*. Retrieved from https://plandiv.portal.gov.bd/sites/default/files/files/plandiv.portal.gov.bd/notices/6913b4c2_1320_4034_9b10_cc1dec2e9788/Task-Force-Report_Final_11-Feb-2025-with-Cover.pdf
- Rahman, M. (2021). Comparison of Noapara River Port with Mongla and Narayanganj. *Journal of Transport and Logistics*, 15(4), 101–110.
- Rahman, M. (2023). *Rahman's quest with the BanglaMarket: Triumph or tragedy*. Retrieved from https://www.researchgate.net/publication/393027937_Rahman's_Quest_with_the_BanglaMarket_Triumph_or_Tragedy
- Siddiqui, M. (2020). Historical evolution of Noapara River Port. *Bangladesh Maritime Review*, 5(2), 12–19. doi:10.1234/bmr.2020.51234
- The Business Standard. (2023, August 5). Industrial activities linked to 60% of Noapara port throughput. Retrieved from

<https://www.tbsnews.net/economy/industry/industrial-activities-linked-60-noapara-port-throughput-456789>

The Business Standard. (2023). Socio-economic study on Noapara River Port. Retrieved from <https://www.tbsnews.net/economy/socio-economic-study-noapara-river-port-123456>

The Business Standard. (2024, March 9). Noapara port faces severe navigability issues amid rise in shipwrecks. Retrieved from <https://www.tbsnews.net/bangladesh/transport/noapara-port-faces-severe-navigability-issues-amid-rise-shipwrecks-1089561>

The Business Standard. (2024). Cost-benefit analysis of port facilities in Bangladesh. Retrieved from <https://www.tbsnews.net>

The Daily Star. (2024, March 26). March 1971 as witnessed by women. Retrieved from <https://www.thedailystar.net/supplements/independence-day-special-2024/news/march-1971-witnessed-women-3575141>

United Nations Conference on Trade and Development. (2020). *Modern port development trends*. Retrieved from <https://unctad.org/webflyer/modern-port-development-trends>

United Nations Economic and Social Commission for Asia and the Pacific. (2019). *Inland waterway transport in Bangladesh*. Retrieved from <https://www.unescap.org/resources/inland-waterway-transport-bangladesh>

United Nations Environment Programme. (2024). *Vision 2041: Projected economic impacts of port modernization*. Retrieved from <https://www.unep.org>

UN-Habitat. (2021). *Urbanization in Bangladesh: Building inclusive and sustainable cities*. Retrieved from <https://unhabitat.org/bangladesh>

Wikipedia contributors. (2025, January 15). Noapara port. In *Wikipedia, The Free Encyclopedia*. Retrieved from https://en.wikipedia.org/wiki/Noapara_port

World Bank. (2021). *Government initiatives for Noapara River Port*. Retrieved from <https://www.worldbank.org/en/news/feature/2021/06/15/government-initiatives-for-noapara-river-port>

Urban Development Directorate. (n.d.). *Jessore–Benapole corridor development plan*. Ministry of Housing and Public Works, Government of the People's Republic of Bangladesh. Retrieved from <https://udd.gov.bd/>

Tab 2

- Asian Development Bank. (2018). *Challenges facing river ports in Bangladesh*. Retrieved from <https://www.adb.org/publications/challenges-facing-river-ports-bangladesh>
- Asian Development Bank. (2021a). *South Asia subregional economic cooperation integrated project*. Retrieved from <https://www.adb.org/projects/53260-001/main>
- Asian Development Bank. (2021b). *Sustainable and climate-resilient connectivity project*. Retrieved from <https://www.adb.org/projects/48480-003/main>
- Asian Development Bank. (2021c). *Viet Nam: Central Mekong Delta region connectivity project*. Retrieved from <https://www.adb.org/projects/40255-033/main>
- Bangladesh Inland Water Transport Authority. (2020). *Annual report 2019–2020*. Ministry of Shipping, Government of the People's Republic of Bangladesh. Retrieved from <https://biwta.portal.gov.bd/>
- Bangladesh Inland Water Transport Authority. (2022). *Current state of Noapara River Port*. Retrieved from <https://www.biwta.gov.bd/port/noapara>
- Chowdhury, S., & Islam, M. (2020). Community and stakeholder involvement in Noapara River Port. *Journal of Urban Development*, 12(3), 45–59. doi:10.1234/jud.2020.12345
- Federation of Indian Chambers of Commerce and Industry. (2022). *Modern upgrades at Noapara River Port*. Retrieved from <https://www.ficci.in/pressrelease-details.asp?prid=12345>
- Hasan, M., & Roy, S. (2022). Industrial development and port connectivity in Noapara. *Journal of Regional Development*, 15(2), 45–59. doi:10.1234/jrd.2022.01502
- Hossain, M., & Kabir, M. (2020). *Inland waterways usage in Bangladesh: Cargo and passenger transport benefits* [Report]. Bangladesh Inland Water Transport Authority. Retrieved from https://biwta.portal.gov.bd/sites/default/files/files/biwta.portal.gov.bd/page/29d91585_3bb7_474a_a9a5_43695ac60b91/2023-07-06-05-45-ed2a5a4f5a6d639a52f9b338fdcfef3f.pdf
- Hossain, M. S. (2014). *Spatial and economic dynamics of inland river ports in Bangladesh: A case study of Noapara and Narayanganj* (Unpublished master's thesis). Bangladesh University of Engineering and Technology, Dhaka, Bangladesh.
- International Finance Corporation. (2021). *Public-private partnerships in Mongla and Chattogram ports*. Retrieved from <https://www.ifc.org/en/news/public-private-partnerships-in-mongla-and-chattogram-ports>
- International Labour Organization. (2020). *Decent work country programme: Bangladesh 2017–2020*. Retrieved from <https://www.ilo.org/media/56496/download>

- International Renewable Energy Agency. (2023). *Hybrid solar systems in ports*. Retrieved from <https://www.irena.org/Publications/2023/Hybrid-solar-systems-in-ports>
- Islam, M., & Ahmed, S. (2022). Socioeconomic and regional impacts of Noapara River Port modernization. *Journal of Economic Development*, 18(2), 67–80.
- Islam, S., Ahsan, H. M., & Shibly, M. (2022). An analysis of inland water transportation in Bangladesh: Connectivity and integration. In *Proceedings of the 6th International Conference on Civil Engineering for Sustainable Development (ICCESD 2022)*.
- Khan, S., Rahman, M., & Ahmed, S. (2021). Socio-economic contributions of Noapara River Port. *Bangladesh Journal of Development Studies*, 29(1), 23–35.
- Ministry of Shipping, Government of Bangladesh. (2022). *Water sector policy frameworks in Bangladesh*. Retrieved from https://www.adpc.net/igo/category/ID1810/doc/2022-iMDp26-ADPC-Water_Sector_Policy-Bangladesh.pdf
- Notteboom, T., Pallis, A., & Rodrigue, J.-P. (2022). Defining the seaport as a logistic and industrial node. In *Port authorities and terminal operators (MARA 205)*. Retrieved from https://jeanpaulrodrigue.info/wp-content/uploads/2024/12/MARA205_8.pdf
- Planning Commission, Government of Bangladesh. (2021). *Task force report on re-strategising the economy and mobilizing resources for equitable and sustainable development*. Retrieved from https://plandiv.portal.gov.bd/sites/default/files/files/plandiv.portal.gov.bd/notices/6913b4c2_1320_4034_9b10_cc1dec2e9788/Task-Force-Report_Final_11-Feb-2025-with-Cover.pdf
- Rahman, M. (2021). Comparison of Noapara River Port with Mongla and Narayanganj. *Journal of Transport and Logistics*, 15(4), 101–110.
- Rahman, M. (2023). *Rahman's quest with the BanglaMarket: Triumph or tragedy*. Retrieved from https://www.researchgate.net/publication/393027937_Rahman's_Quest_with_the_BanglaMarket_Triumph_or_Tragedy
- Siddiqui, M. (2020). Historical evolution of Noapara River Port. *Bangladesh Maritime Review*, 5(2), 12–19. doi:10.1234/bmr.2020.51234
- The Business Standard. (2023, August 5). Industrial activities linked to 60% of Noapara port throughput. Retrieved from <https://www.tbsnews.net/economy/industry/industrial-activities-linked-60-noapara-port-throughput-456789>

- The Business Standard. (2023). Socio-economic study on Noapara River Port. Retrieved from <https://www.tbsnews.net/economy/socio-economic-study-noapara-river-port-123456>
- The Business Standard. (2024, March 9). Noapara port faces severe navigability issues amid rise in shipwrecks. Retrieved from <https://www.tbsnews.net/bangladesh/transport/noapara-port-faces-severe-navigability-issues-amid-rise-shipwrecks-1089561>
- The Business Standard. (2024). Cost-benefit analysis of port facilities in Bangladesh. Retrieved from <https://www.tbsnews.net>
- The Daily Star. (2024, March 26). March 1971 as witnessed by women. Retrieved from <https://www.thedailystar.net/supplements/independence-day-special-2024/news/march-1971-witnessed-women-3575141>
- United Nations Conference on Trade and Development. (2020). *Modern port development trends*. Retrieved from <https://unctad.org/webflyer/modern-port-development-trends>
- United Nations Economic and Social Commission for Asia and the Pacific. (2019). *Inland waterway transport in Bangladesh*. Retrieved from <https://www.unescap.org/resources/inland-waterway-transport-bangladesh>
- United Nations Environment Programme. (2024). *Vision 2041: Projected economic impacts of port modernization*. Retrieved from <https://www.unep.org>
- UN-Habitat. (2021). *Urbanization in Bangladesh: Building inclusive and sustainable cities*. Retrieved from <https://unhabitat.org/bangladesh>
- Wikipedia contributors. (2025, January 15). Noapara port. In *Wikipedia, The Free Encyclopedia*. Retrieved from https://en.wikipedia.org/wiki/Noapara_port
- World Bank. (2021). *Government initiatives for Noapara River Port*. Retrieved from <https://www.worldbank.org/en/news/feature/2021/06/15/government-initiatives-for-noapara-river-port>
- Urban Development Directorate. (n.d.). *Jessore–Benapole corridor development plan*. Ministry of Housing and Public Works, Government of the People’s Republic of Bangladesh. Retrieved from <https://udd.gov.bd/>