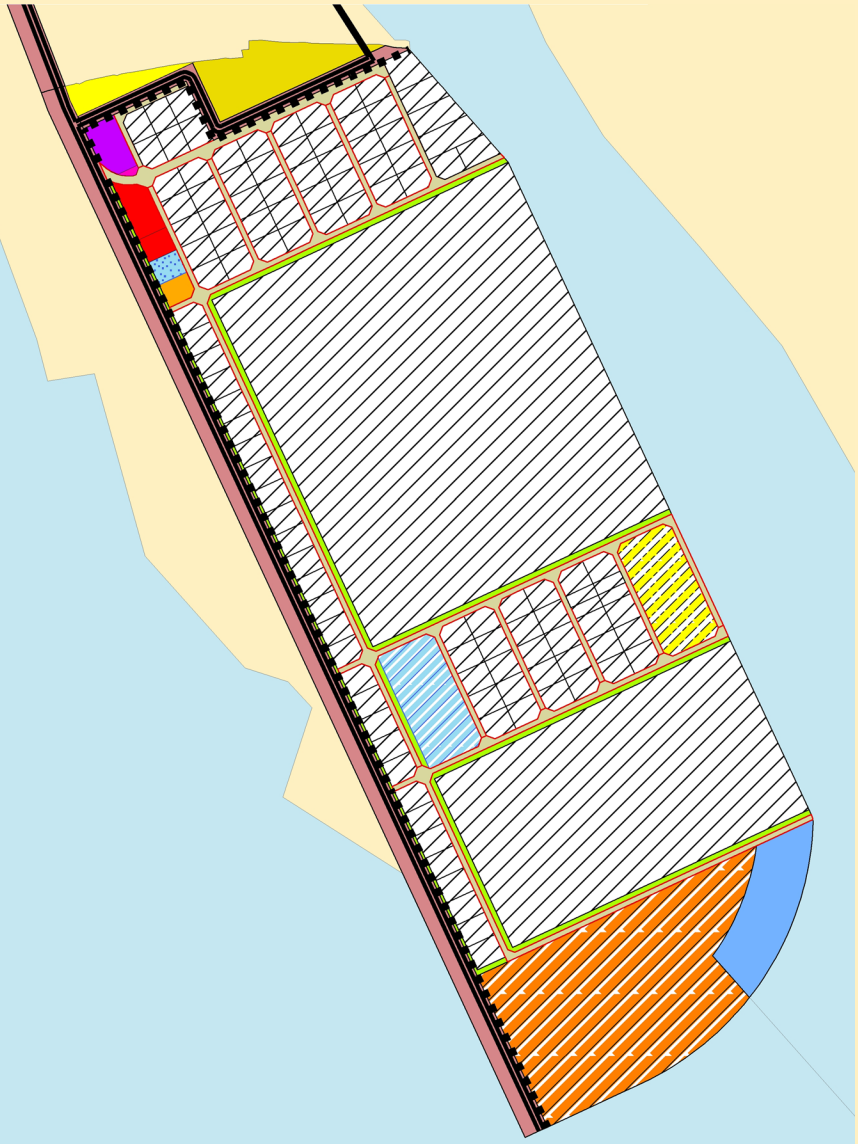
Government of the People's Republic of Bangladesh
Prime Minister's Office
Bangladesh Economic Zones Authority (BEZA)

Feasibility Study for ANWARA ECONOMIC ZONE

AUGUST, 2014



FEASIBILITY STUDIES FOR ECONOMIC ZONES
SUPPORT TO CAPACITY BUILDING OF
BANGLADESH ECONOMIC ZONES AUTHORITY PROJECT
UNDER PRIVATE SECTOR DEVELOPMENT SUPPORT PROJECT

Supported By the World Bank
Implemented By Bangladesh Economic Zones Authority (BEZA)
Under Office of Prime Minister, GoB.

Consultants

JDI Japan Development Institute
MAXWELL STAMP LTD
শেলটেক SHELTECH Since 1988

Executive Summary

1. The proposed Anwara Economic Zone (EZ) is destined to become the first specialized seafront EZ in the country. Current plans call for this ambitious development to unfold on 611.47 acres (247.56 hectares) of land. The Project Team is also proposing to include an additional 778.03 acres (314.99 hectares) of land to be reclaimed from the sea. Once agreed, the total project area would stand at 1,389.50 acres (562.31 hectares). The proposed Anwara EZ has the potential required to meet all the necessary conditions to become a successful EZ for the nation. Once the Anwara EZ site is established, it is expected that there will be a huge demand for industrial plots, from potential investors both inside and outside the country.

Site justification:

2. The main objective of the proposed Economic Zone is to create a safe ship-building and ship-related industrial base at Anwara, including the supporting industries, such as ship-building components and an electric furnace. This can be best achieved by the construction of a super dike, by land reclamation from the seashore, and by providing the necessary infrastructural facilities to support the development on a continuous and ongoing basis. The strategic location and the present market demand for plots are the main points that justify the selection of this site.

Location and Present Condition:

3. The proposed Anwara EZ is located at 39 Km south from Chittagong Sea Port, 28 Km south from Chittagong City and 46 Km south from Shah Amanat International Airport. The Chittagong Sea Port route is only 12 Km away from the proposed site by sea, while the railway station is 32 Km away from it by road.

4. The sea nearly surrounds the site on one side and is protected by a dike and on the other side from the encroachment of the Sangu River, forming a small peninsula. The site consists of unproductive agricultural low land where people mainly maintain their livelihood from fishing in the sea. Public land is raised from the sea, and as such, is not suitable for agriculture or residential development. The present infrastructure condition is as follows:

(i) No power transmission line
(ii) Only mobile telephone and no fixed lines
(iii) No gas supply
(iv) No piped water supply system
(v) Only one access road on the Bangladesh Water Development Board (BWBD) embankment which is mostly in poor condition.

Study Findings:

Assuming that the Anwara EZ will provide all necessary facilities, the OSS will provide the necessary services to Foreign Direct Investment (FDI) and Domestic Investment (DI). The demand for the Anwara plots is expected to be very high, well beyond the supply of land. The Study Team predicts that the plots/land in this EZ will be completely leased out by 2020. The results from comparative evaluation are sourced from aggregating seventeen (out of more than fifty) largely quantitative indicators on which information has been collected. Aggregated variables include price, capacity, and zone size variables, which have been appropriately standardized. VSIP, Anwara, and Amata City Bien Hoa in Viet Nam are rated to be the three most competitive industrial parks/economic zones, in that order.

Possible Industrial Mix and Schedule of Land Sale:

5. A demand survey on 107 sample industries have been done to ascertain the demand and industrial mix for serviced land at Anwara. The demand survey shows that, there is a demand for about 440 hectares of industrial land at this location. The highest demand has been found in ship-building industries, pharmaceuticals, and leather goods industries, etc.

6. The industrial mix has been prepared, taking into account the strategic location of the site and the potential market demand of the land derived from the demand survey. The proposed Anwara site will be very suitable for ship-building and ship-related industries. With the proposed suitable infrastructural facilities, this industry will, second only to the garment industry, turn into another potential export-oriented manufacturing industry for Bangladesh. The following table shows the possible industrial mix for Anwara EZ.

Sector	Area per investment (ha)	2015-2019	
		Number of Investors	Total area for investment (ha)
Shipbuilding	124.77	2	249.53
Shipbuilding Components	3.909	10	39.09
Steel Mills/Steel Products	6.94	1	6.94
Automobile Parts	1.94	1	1.94
Leather Goods	17.76	1	17.76
Pharmaceuticals	7.86	6	47.16
Total			**362.42**

Employment Estimate for Anwara Economic Zone:

7. It is expected that 27,780 jobs will be created by the shipbuilding yard and component industries using 712.89 acres (288.62 hectares) of land. It is also expected that the leather goods industry will employ about 7,104 and the pharmaceuticals industry about 9,432 workers employed on 43.87 acres (17.76 hectares) and 116.49 acres (47.16 hectares) of land respectively. Apart from these, employment in the automobile parts manufacturing industries, steel mill and products industries, power plant, residential, and commercial area is expected to be about 3,223 jobs. As such a total of 47,539 jobs directly related to the EZ development will be created at the initial stage, with an additional 23,770 indirectly related jobs. The total direct and indirect employment is expected to reach 71,309 workers. The average employment per hectare is expected to be 110, which is less than 18% that of Dhaka EPZ and 11% that of Chittagong EPZ.

Master Plan

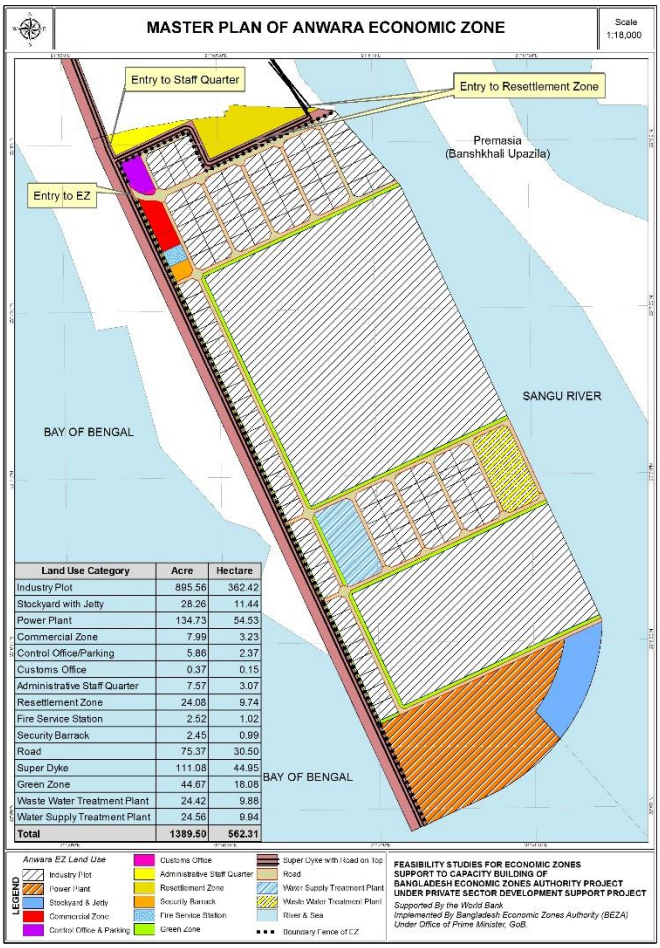
8. Of the total 611.47 acres (247.56 hectares) of land currently in the plan, 321.2 acres (130.04 hectares) is privately owned and hence needs to be acquired before the initiation of any development works on the EZ. The impoverished fisherman and farming community living currently at site are willing to relinquish the land for establishment of the envisaged EZ. The land is not very productive due to saline water intrusion and therefore is of minimum value. So, the problem of land acquisition may not arise in this zone. The proper mechanism for swift land acquisition and grievance redress of the affected people is addressed in detail in Chapter 4 of the report. The remaining 290.27 acres (117.52 hectares) in the plan is owned by the government and can be used without engaging in any acquisition process.

9. Summary of distribution of this land under different uses is estimated to be as follows. Detail can be found in Chapter 3.

Sl. No.	Land Use Heads	Total Land		Percentage
		Acre	Hectare	
1.	Leasable Land	1,066.56	431.62	76.76
2.	Land for Administrative Purposes	18.77	7.59	1.35
3.	Land for Infrastructure Development	235.43	95.28	16.94
4.	Land for Green Zone & Others	44.67	18.08	3.21
5.	Resettlement Zone	24.08	9.74	1.73
	Total	**1,389.50**	**562.31**	**100.00**

*Land area includes the reclaimed land of 778.03 acre (314.99 hectare)

The Master Plan is shown in figure below.



10. A wide green area is planned along the boundary between the shipbuilding yard and other supporting industries. A unique eco-design has been prepared for energy conservation systems and water recycling. Rainwater will be recycled for the water supply system and treated. Finally, water from the waste water treatment plant will be reused to maintain the green areas. The salinity problem of the Sangu River will be solved by collecting fresh water via an off-site 26 Km long water transmission main from upstream of the site. Anwara EZ will be planned as a shipyard and components manufacturing EZ with a 6 metre deep channel and a 250 MW coal-fired power plant in order to supply sufficient power to the zone. "A Safe and Clean Shipbuilding Zone" is the development concept recommended for recognition as a future industrial development model for Bangladesh. The industrial area will be divided into 1 hectare (2.47 acres) plots.

11. The feasibility study is carried out within 2015. Zone approval, land acquisition, and detailed design will be done within 2016. The construction of the whole area will start in 2017 and will be finished by the end of September 2020 in a single phase.

12. The construction cost estimates are prepared for the single phase (2017 – 2020). The Anwara Economic Zone requires BDT 12,753,287,419 (USD 159,416,093) for the onsite infrastructure and BDT 5,371,255,610 (USD 67,140,695) for the offsite infrastructure in the single phase. The 844.72 acres (341.99 hectares) and 221.39 acres (89.63 hectares) of land will become the subject of the leasehold agreement in late 2018 and late 2019 respectively.

13. Utility demand per hectare per day has been ascertained from the demand survey of 107 industries. Using this number the utility demand for the zone has been estimated. It was found that the total power demand in 2023 is expected to be 105.68 MW and water demand is expected to reach 37,108.51 m^3/day. These numbers have been used to finalize the capacity of the electric supply system, natural gas control point, water supply treatment plant, and waste water treatment plant in the Master Plan.

14. Building guidelines are prepared for the site and they include Architectural Plans, Compulsory Open Space Requirements, Compulsory Exterior Requirements, Utility Connections, and Approval of the Contractor. Specific figures are proposed for designating the high quality standard of the economic zones.

Possible Environmental Impact:

15. The Initial Environmental Examination (IEE) covers existing environmental conditions and provides a qualitative assessment of the environmental impacts of land filling activities and associated economic zone project components, including recommended mitigation measures and environmental monitoring. The physical environment focus is on climate, topography and soil, geology, water resources, water quality, flooding and drainage, and the diversity of flora and fauna. The EMP, which will deal with mitigation measures, implementation responsibilities and monitoring plans, will result in minimal adverse impacts. The Project will have an overall beneficial impact.

16. However, preliminary impacts of the proposed Project have been identified as follows:

- Erosion and accretion process posing possible threat to the EZ site
- Loss of paddy land and marshy areas due to the proposed EZ location
- Minor risk of degradation of aquatic habitat due to chemical pollution from the proposed shipbuilding yards and other industrial operations in the EZ
- Contamination of surface and ground water
- Leaching and disposal
- Effects on the natural environment.

17. In order to determine the impacts more precisely, a detailed Environmental Impact Assessment (EIA) is recommended. This will include monitoring and mitigation of a wide range of important environmental components for project sustainability, covering aspects such as (a) Further exploration and assessment of the physical behaviour of the Sangu River and the dynamic morphological process along the estuary to justify the suitability of the site for the Project; (b) Identification, quantification, and valuation of impacts to ensure appropriate monitoring of parameters; (c) Finding suitable land reclamation and bank protection methods; (d) Generating reliable data and further analysing the same to serve as a supplement to results and data from other sources; and (e) Assessing implications of other existing and proposed projects and studies, including the impact of a coal burning power plant.

Social Assessment:

18. The social analysis is done considering the World Bank's policies on involuntary resettlement, gender and tribal issues, physical and cultural resources, and also considering the Land Acquisition and Requisition of Immovable Property Ordinance, 1982. Potential social impacts on people living on the EZ site and affected by off-site infrastructure development for the EZ are also assessed in the study. During the field visit and survey, it was found that 913 households will be affected by the establishment of the EZ and will need to be resettled. The project plans to resettle these households adjacent to the EZ area with modern amenities. However, the population that will enjoy the great benefits and positive impacts of 47,539 jobs being created by the advent of this zone will not be limited to the immediate Upazila, but include adjacent communities as well.

Institutional and PPP Scheme:

19. The institutional structure and PPP Scheme needs to be tailored to accommodate the existing conditions and achieve project development objectives. Considering all aspects, the "concession PPP model" is recommended. The detail of this model has been discussed in the report. In order to implement the EZ program successfully, BEZA should follow a workable legal framework and implementation process. Though the legal framework is present, the Authority has yet to formulate detailed guidelines and regulations in all major areas, which should be completed prior to operation of the EZ.

20. Capacity building of BEZA officials is essential for successful supervision and operation of the proposed PPP Scheme. The concern is that the present land regulation limiting the term of long multi-year leases to 30 years risks reducing the attractive force of the potential EZ development to private developers/investors. The Government needs to increase the lease period up to 99 years or at least 50 years and give permission to transfer the leased-in properties. Details of this have been given in the body of the report. One-Stop Service (OSS) is to be practiced properly, while a Steering Committee is recommended for efficient and successful operation of the EZ.

Financial and Economic Analysis of the Project:

21. The total cost of the Project is estimated to be US$186.21 million, excluding off-site costs. The off-site cost stands at US$67.14 million, which constitutes around 27% of the total project cost. Revenue will mainly be generated from the long term lease of land. The total amount of revenue generated from the lease of industrial and commercial land is estimated to be US$258.69 million. Revenue will also be generated from full charge for the provision of water supply, the waste water treatment plant, and service charges for electricity and maintaining the EZ.

22. Based on the estimated costs and revenues; the IRR of the Project in the base case and alternative scenario-2, using the VGF equivalent to 15% of the project costs, stands at 34.67% and 27.65% respectively. Both of these scenarios have been prepared assuming the cost of the power plant to be borne by an Independent Power Producer (IPP). Another scenario has been prepared by including the cost of the 250MW power plant, which has resulted in FIRR of 21.63% in the base case and 22.23% in an alternative scenario, where off-site costs are included in the financial analysis. The Project IRR implies that the above IRR could be achieved by funding all capital expenditures through cash rather than debt.

23. In the case of Anwara, the project is financially viable but comes along with high costs of off-site infrastructure amounting to US$67 million to be borne by Govt. It is not financially viable when considering off-site costs as compared to other two sites, while economic viability is quite high. Instead of providing large off-site costs, the Govt. provides the VGF equivalent to 15% of capital costs as a grant to the private developer alternatively in the second scenario. The VGF will then be US$36.66 million only for the government contribution of 15% of capital costs. Not only the govt.

bears lower costs in providing VGF but also this will ensure the implementation of the provision of an off-site super-dike by the private developer.

24. The Anwara EZ project is suitable for a PPP in which the private sector is expected to contribute equity with soft commercial debt arrangements having partial guarantees from government, as it could provide a rate of return (equity IRR) of 124.82% in the base case and of 138.15% in scenario-2 using a VGF of 15% of capital costs to equity investors higher than targeted/benchmark equity IRR of 18-20 percent for the investment.

25. BEZA should provide support in terms of: (1) acquisition of land, and (2) soft long term commercial loans partially guaranteed by the GoB and (3) arrangement of the VGF of 15% of capital costs from the government as a grant instead of bearing off-site costs of US$67 million by the Government of Bangladesh (GoB). The study considers lease-on-sale rather than lease-on-rent having a lease term of 30 years and transferability conditions, as well for the purpose of an SPV Company.

26. The Economic Internal Rate of Return (EIRR) of Anwara EZ is, in the base case, found to be 35.2%. The project is economically viable. That conclusion is found to be robust throughout the 'what-if' scenarios of (i) a 10% increase in all costs; (ii) a 10% rollback in all benefits; and (iii) a combination occurrence of (i) and (ii).

Conclusion and Recommendations:

27. The proposed Anwara site has some inherent difficulties. However, they can be overcome with the planned infrastructural development and the construction of a super dike to be built along the seashore to protect the site from the natural calamities. When all on and off-site infrastructural facilities are developed, the EZ may likely to become one of the best EZs in the country. It is recommended that the shallow seashore be reclaimed to make the best use of the land at the Anwara site.

28. Although this study was carried out within a short period as a preliminary Feasibility study & Master Plan, taking all the information collected and evidence into consideration; the conclusion may be drawn that the proposed site is likely to be viable for the establishment of an Economic Zone and recommend BEZA/Bangladesh Government coordinate the next steps such as (1) Land acquisition process; (2) Discussion with local residents who require relocating their houses; (3) Off site infrastructure provision; and, then, (4) Identifying a potential developer. Once the potential developer is identified, the study team should conduct further detail market survey, soil testing and hydrological survey, and review the feasibility study according to the detail survey results. Considering the severe shortage of well-equipped economic zones in Bangladesh and the potentially high demand for fully-serviced industrial land, the Anwara EZ project has a good chance to successfully implement within several years. However, the early benefits of the Project will greatly depend on how quickly and efficiently the proposed EZ moves toward realization.

Matrix Summary (Using Log-frame)

		Narrative Summary	Objectively Verifiable Indicators (OVI)			Means of Verification (MOV)	Assumptions
Development Hypotheses	If Purpose, Then Goal	**Project Goal:** • Enhancement of Industrial Production and National Export.	• Goods worth of US$1,500 million to be produced, out of which US$750 million would be exported by 2021.			• BEZA Project Record. • Record from Bangladesh Bank • Record from BBS	
		Project Purpose: • Anwara EZ operational.	• First shipbuilding yard functioning by 2021 with the second one operational by 2023. • One steel mill (electric furnace) and 6 No. Pharmaceutical companies functioning by 2022. • Total 10 Nos. shipbuilding component manufacturing factories operating by 2023. • Total 4 No. of other industries with different types of products operating by 2022			• BEZA Project Record. • SPV Company Record	• International market for ships from Bangladesh does not fall. • No work stoppage and unruly behaviour of workers. • No severe natural calamities. • The national growth rate of production and export remain constant.
Manageable Interest	If Outputs, Then Purpose	**Output:**	**Quality**	**Quantity**	**Time (Year)**	• BEZA Project Record. • Anwara Registry Office and AC Land Office Record • SPV Company Record	• Export growth rate of shipbuilding industry of Bangladesh does not fall. • No political disturbance like continuous blockade or hartal, etc. • Government of Bangladesh provides continuous support to BEZA and allows connection of power and gas from national grid during project operation time. • Onsite coal based power plant of 250MW with jetty and stockyard functioning within 2020.
		• Land Acquisition and Zone Approval by Government for EZ	Private Land Acquisition	321.2 acre (130.04 hectare)	2015		
			Public Land Under Control	290.27 acre (117.52 hectare)	2015		
			Zone Approval by Statutory Regulatory Order (SRO) publication.	1 SRO published.	2014		
		• Selection and Engagement of SPV Company.	Experienced Developer	1 No.	2016		
		• All infrastructure facilities developed.	Land Development, Road, Water Supply System, etc.	-	2020		
		(i) Land Reclamation & Development is complete	Site Clearing, Dredging (2m & 6m), Reclamation (789.5 Acre or 319.64 Hectare), Levelling	238.67 Acre (96.59 Hectare)	2018		
		(ii) Road Constructed	33 m wide Main Road (Bituminous Carpet),	1,558.7 m	2019		
			19.5 m wide Minor Road (Bituminous Carpet)	15,298 m	2020		
		(iii) Sheet Piling (Shipbuilding Yard) is completed	Pile length 10m width 30cm, Sheet thickness 12mm	2,168.61 rm	2017		
		(iv) Jetty and Stockyard Established	Sheet Piling (Pile length 10m width 30cm, Sheet thickness 12mm) Stockyard 122,646 m^2	Sheet Piling 1,608rm, Stockyard 122,646 m^2	2019		
		(v) Dike System (Super Dike) built	Super Dike, Dike with Carried Earth, Mechanical Compaction, MS Bar 40 MPa, Geo-textile, Form Work etc.	Super Dike 4204m	2018		
		(vi) Road on top of Dike is constructed	Bituminous Concrete Road with plantation	Road 4,204m, Plantation 7,500 Nos.	2019		
		(vii) Drainage System Developed	U-Drain inside (W= 70cm, 1.0m, 1.5m, 2.0m, 3.0m), Retention Pond	Inside 12,401 m, Retention Pond 160,000m^3	2019		
	If Inputs, Then Outputs	(viii) Plantation is done	Tall tree along the road& Green zone	8,208 trees.	2020		
		(ix) Water Supply System established	Treatment Plant (10,000 m3 Capacity), Pipe Work, Water Tower, Hydrant, Valve etc.	Treatment Plant 1 No, Pipe Work 16,200 m, Water Tower 1 No.& Others	2019		
		(x) Waste Water Collection and Treatment System installed	Pipe works, Tower, Treatment Plant etc.	Pipe works 40,614m, Tower & Pump 1 set.	2019		
		(xi) Electrical System developed	132/33 and 33/11 KV SS, 11/0.4 KV transformer, Internal Networking, Street Lighting, Testing & Commissioning etc.	132/33 and 33/11 KV SS 1 set, 11/0.4 KV transformer 6 sets, 22km Internal Network, etc.	2020		
		(xii) Telecommunications System installed	FTTc 512 subscribers, OFC Network, Router, ODF, Power System etc.	FTTc 1 set, Router 1 set, OFC network 16,676 metre.	2020		
		(xiii) Residential and Administrative Buildings constructed	Staff Quarter (2,500, 1,500, 1,000 & 600 sft Buildings), Control Office 4,000 m^2	Control Office 1 set. Staff Quarter Building 9 set	2018		
		(xiv) Fencing completed.	Fencing around the perimeter	Fencing 8,899m	2018		
		Land Leased out to local and foreign investors by SPV company	Local & foreign investors	Minimum 21 investors are allowed to setup their industries in EZ	2020		
		Inputs: Activities and Type of Resources	**Quality**	**Quantity**	**Time (Year)**	• BEZA Project Record. • Anwara Registry Office and AC Land Office Record • Record of SPV Company.	• Private land owners cooperate with BEZA and handover their land for EZ. • Land regulation is changed by the government (longer leasing period for a minimum period of 50 years and transferability condition) • Good response from local and foreign
		• Meeting of Board of Governors of BEZA arranged and decision to publish SRO for declaring proposed site as Anwara EZ	Meeting of Board of Governors of BEZA	1 meeting	2014		
		• Floating tenders for selection of SPV	Tendering Process	1 No.	2016		

		Narrative Summary		Objectively Verifiable Indicators (OVI)			Means of Verification (MOV)	Assumptions
		Company		Detailed Design	1 No.	2016		development companies. • Present level of attraction for Bangladesh as investment destination remains unchanged. • Capable and experienced independent power producer is interested to invest 20,000,000,157 BDT (250,000,002 USD) to construct a coal power plant with jetty and stockyard by 2020.
		• Development of Infrastructure						
		(i)	Land Reclamation & Development	Site Clearing, Dredging (2m & 6m), Reclamation (789.5 Acre or 319.64 Hectare), Levelling	BDT 3,950,930,048 (US$ 49,386,626)	2018		
		(ii)	Road	19.5 m and 33 m wide road	BDT 1,248,658,884 (US$ 15,608,236)	2020		
		(iii)	Sheet Piling (Shipbuilding Yard)	Pile length 10m width 30cm, Sheet thickness 12mm	BDT 223,690,572 (US$ 2,796,132)	2017		
		(iv)	Jetty and Stockyard	Sheet Piling (Pile length 10m width 30cm, Sheet thickness 12mm) Stockyard 122,646 m^2	BDT 1,414,097,092 (US$ 17,676,214)	2019		
		(v)	Dike System (Super Dike)	Super Dike, Dike with Carried Earth, Mechanical Compaction, MS Bar 40 MPa, Geo-textile, Form Work etc.	BDT 2,711,205,000 (US$ 33,890,063)	2018		
		(vi)	Road on top of Dike	Bituminous Concrete Road with plantation	BDT 133,197,050 (US$ 1,664,963)	2019		
		(vii)	Drainage System	U-Drain inside (W= 70cm, 1.0m, 1.5m, 2.0m, 3.0m), Retention Pond	BDT 248,869,588 (US$ 3,110,870)	2019		
		(viii)	Plantation	Tall trees along the road & Green zone	BDT 7,313,955 (US$ 91,424)	2020		
		(ix)	Water Supply System	Treatment Plant (10,000m3 Capacity), Pipe Work, Water Tower, Hydrant, Valve etc.	BDT 977,732,808 (US$ 12,221,660)	2019		
		(x)	Waste Water Collection and Treatment System	Pipe works, Tower, Treatment Plant etc.	BDT 857,411,185 (US$ 10,717,640)	2019		
		(xi)	Electrical System	132/33 and 33/11 KV SS, 11/0.4 KV transformer, Internal Networking, Street Lighting, Testing & Commissioning etc.	BDT 467,206,315 (US$ 5,840,079)	2020		
		(xii)	Telecommunications System	FTTc 512 subscribers, OFC Network, Router, ODF, Power System etc.	BDT 32,915,982 (US$ 411,450)	2020		
		(xiii)	Residential and Administrative Buildings	Staff Quarter (2,500, 1,500, 1,000 & 600 sft Buildings), Control Office 4,000 m^2	BDT 440,903,568 (US$ 5,511,295)	2018		
		(xiv)	Fencing	Fencing around the perimeter	BDT 39,155,372 (US$ 489,442)	2018		
		(xv)	Total Construction Cost	Cost of all on-site infrastructure	BDT 12,753,287,419 (US$ 159,416,093)	2020		

Note: Land regulations should be included into as one of the inputs, as it is a critical assumption.
Carefully choosing experienced and capable SPV Company and supervision and monitoring development works are needed.
Training of BEZA Officials is essential.
Offsite infrastructure cost is not included into the matrix. Total offsite cost is 5,371,255,610 BDT (67,140,695 US$). This cost should be borne by the government and have to start and should be completed simultaneously along with the project.

Abbreviations

AESIB	Association of Export Oriented Shipbuilding Industries of Bangladesh
BEZA	Bangladesh Economic Zone Authority
BG	Broad Gauge
BIFFL	Bangladesh Infrastructure Finance Fund Limited
BIWTA	Bangladesh Inland Water Transport Authority
BIWTC	Bangladesh Inland Water Transport Corporation
BOO	Build-Own-Operate
BOT	Build - Operate -Transfer
BR	Bangladesh Railways
BWDB	Bangladesh Water Development Board
CEPT	Central Effluent Treatment Plant
CPA	Chittagong Port Authority
CUFL	Chittagong Urea Fertilizer Limited
CWASSA	Chittagong Water Supply and Sanitation Authority
DBFOM	Design-Build-Finance-Operate-Maintain
DBFOOT	Design-Build-Finance-Own-Operate-Transfer
DC	District Commissioner
DG	Double Gauge
DWT	Dead Weight Ton
EPZ	Export Processing Zone
EZ	Economic Zone
FOC	Fiber Optic Connection
GCV	Gross Calorific value
GoB	Government of Bangladesh
HC	High Cube
HDPE	High Density Polyethylene
ICD	Inland Clearance Depot
ICT	Inland Container Terminal
IDCOL	Infrastructure Development Company Limited
KAFCO	Karnaphuli Fertilizer Company Limited
LHS	Left hand side
LGED	Local Government Engineering Department
LoC	Line of Credit
M or m	Metre/ Metre
MG	Metre Gauge
MPa	Megapascal
O&M	Operation and Maintenance / Management
OSS	One Stop Service
PDD	Power Development Board
PGCB	Power Grid Company of Bangladesh
POP	Point of Presence
PP	Power Plant
PPP	Public Private Partnership
PRG	Partial Risk Guarantee
RAP	Resettlement Action Plan
RHD	Roads and Highways Department

RHS	Right hand side
S&C EZ	Shipbuilding & Component Economic Zone
SPV	Special Purpose Vehicle
SS	Substation
Tk / TK	Bangladesh Taka
TMC	Terminal Management Company
TSC	Trouble Shooting Committee
VGF	Viability Gap Financing
UN-ESCAP	United Nations Economic Social Commission for Asia and Pacific
WB	World Bank

Table of Contents

Distance Table

Distance Table: Anwara

Distances (in Km)	Location (from Anwara)
12	Chittagong Port by sea route
20	Anwara Upazila
23	National Highway (Chittagong – Cox's Bazar)
28	Chittagong City
30	District Headquarter
32	Chittagong Railway Station
39	Chittagong Port
46	Chittagong Airport (Shah Amanat International Airport)

Exchange Rate used in this report	
US $ 1	BDT 80

CHAPTER 1

INTRODUCTION

1.1 Background

Bangladesh had achieved sustained annual GDP growth of approximately 6.3% during the Financial Year (FY) 2005-2009, even after the global financial crisis and global food price shock. This growth was underpinned by stable macro-economic and prudent monetary policies, rising industry and service outputs and a continued high level of exogenous remittances. Going forward, the objective of the Government of Bangladesh (GoB) is to develop a growth trajectory that will support an overall increase in the real GDP growth to 8% per annum and reduce poverty from 40% to 15% by 2021.

The uninterrupted growth in the number of Bangladeshis entering the labour force - nearly 2 million people/year - is an asset that simultaneously increases the country's vulnerability. Creating productive employment will largely depend on creating an environment conducive to private sector investment, particularly for establishing labour-intensive manufacturing and service industries.

The Government of Bangladesh (GoB) has successfully provided tailored infrastructure services and a business environment through the operation of the Export Processing Zones (EPZs). The Bangladesh Export Processing Zone Authority (BEPZA) was established in 1980. The EPZ Program was the first systematic initiative to provide fully-serviced land and a better business environment for investors, targeting establishment of large-scale export-oriented manufacturing industries in the country.

But, the hard fact remains that, Bangladesh's EPZ Model has its limitations, both in terms of generating cumulative positive impact and in terms of creating spill-over to the domestic economy. As an exporting enclave, EPZs have provided little in the way of creating linkage effects in the domestic economy, either up-stream or down-stream, resulting in low technology and spill-over, which usually accompany foreign investment. Investments in other sectors beyond the low capital investment oriented RMG segment have also not materialized.

The Government's objective is, therefore, to maximize potential direct and indirect impacts through a more modern, generalized regime for Economic Zones (EZs). The Government has launched an effort to establish a new EZ paradigm for Bangladesh drawing vastly on successful examples from around the world, as well as Bangladesh's positive experience with the EPZ model. The expectation is that, more spill-over will be harnessed by local firms from foreign direct investment and as such, additional investment will be encouraged within value chains, more local products will be procured, and better linkages will be established between commercial firms and educational institutions. A faster adaptation to international environmental and social practices in the private sector would also be encouraged through the new EZ policy.

The new EZ regime provides for a new approach, both in management and in investment. The policy allows the Government to develop and pilot an approach that is less reliant on Government subsidies, while leveraging comparative advantages and private sector capability wherever possible.

The Economic Zone Act was passed in the Parliament in August 2010, providing the overall framework for establishing EZs all over Bangladesh.

1.2 Objectives of the Project

Against the backdrop of the above scenario, the objective of the Project is to attract and leverage private investment in the development of the Economic Zones. These investors will act as the Zone developers or operators and in the provision of tailored infrastructure services, such as private provision of power, effluent treatment, etc. selected on a Public-Private Partnership (PPP) basis.

1.3 Objective of the Study

The objective of the study is to provide the necessary data, information, and analysis sufficient to determine the feasibility of the proposed Anwara EZ - one of the three initially selected locations for the study.

1.4 Scope of the Study

This feasibility study is specifically made for the Anwara site only. It comprises the following components.

- Component – 01: A Competitiveness Analysis, including Transport Assessment, Industry/ Market Assessment, and Demand Forecast;
- Component – 02: Master Planning, Infrastructure Requirements, and Environmental and Social Review;
- Component – 03: Institutional Framework; and
- Component – 04: Economic and Financial Modelling.

1.5 Study Methodology Adopted

The study will follow a market-driven approach and the methodology followed will consist of collection of both qualitative and quantitative data and information from both primary and secondary sources, as has been indicated in the 'Description of Approach, Methodology, and Work Plan' submitted in response to the Terms of Reference, with emphasis on the technical, economic, marketing, and financial soundness of the proposed Project site.

1.6 Stakeholders' Meetings and Workshops Organized

1.6.1 Organization of Stakeholders' Meetings:

During the interim period, stakeholders' meetings were held at the following places/locations/dates:

a) Meeting with UNO at Anwara Upazila on July 24, 2013 and on September 1, 2013
b) Meeting with the Union Council Chairman and local people on July 24, 2013 and September 1, 2013.
c) Chittagong Chamber of Commerce and Industry on September 2, 2013 (minutes of the meeting can be found in the annex report submitted with the Sherpur Interim Report)

1.6.2 Organization of Workshops

The first workshop was organized in Dhaka at the auditorium of Bangladesh Institute of Administration and Management (BIAM) on September 10, 2013. The Workshop was presided over by Mr Abul Kashem, Executive Member, BEZA, in which Mr Fakhrul Islam, Executive Chairman, BEZA, participated as the Chief Guest. The workshop agenda was as follows:

a) Addresses by the distinguished guests.
b) Presentation of the Project Inception Report by Dr. Shoichi Kobayashi, Team Leader of the Feasibility Study Project.
c) Open discussion.
d) Address by the chief guest

The second workshop was held on November 28, 2013 in the Ball Room of Ruposhi Bangla Hotel. The workshop was presided over by Mr Fakhrul Islam, Executive Chairman, BEZA while Mr Shaikh Md. Wahid-uz-Zaman, Principal Secretary, Prime Minister's Office; attended the workshop as the chief guest. The minutes of the meeting may be seen in the Annex-1. The agenda of the workshop was as follows:

a) Address by the distinguished guest & Project Director, BEZA office
b) Presentation on the feasibility study by Dr. Shoichi Kobayashi, Team Leader
c) Address by the Principal Secretary, Prime Ministers' Office and chief guest of the function
d) Question and answering session
e) Address by the BEZA Chairman& Secretary (in charge)

The third and final workshop was held on February 23, 2014 at the Ball Room of The Westin Hotel, Gulshan. The workshop was presided over by Mr. Fakhrul Islam, Executive Chairman (Secretary in Charge), BEZA whereas the Honorable Minister, Ministry of Housing and Private Works Engineer Mosharraf Hossain MP attended the workshop as the chief guest. Honorable Advisor to the Honorable Prime Minister Dr. Mashiur Rahman, Honorable State Minister, Ministry of Land Mr. Saifuzzaman Chowdhury (Javed), and Secretary Prime Minister's Office Mr. Abul Kalam Azad attended the workshop as special guests. Among others President, FBCCI & President, Chittagong Chamber of Commerce and Industry were also present. The agenda of the workshop was as follows:

a) Welcome address by the Executive Chairman, BEZA
b) Power Point presentation on the Draft Final Report by the team leader Dr. Shoichi Kobayashi.
c) Address of the special guests
d) Address of the Chief guest
e) Open discussion on the Draft Final Report
f) Vote of thanks by the Project Director

1.7 Location of Study Area/ Project Area

The project area, Anwara EZ, is located in Gahira Mouza[1] of Anwara Upazila in Chittagong District. It is at the mouth of the Sangu River. The next figure shows the location of Anwara EZ in Bangladesh.

[1] Mouza is the unit of cadastral survey of Bangladesh.

Figure 1.8-1: Location of Anwara EZ in Bangladesh

CHAPTER 2

COMPETITIVE ADVANTAGE AND INDUSTRY ASSESSMENT

(COMPONENT 1)

2.1 Competitive analysis of the Anwara Economic Zone (EZ)

The focus of the material presented earlier on in this section 2.1 is about the results of a competitiveness benchmarking exercise related to the proposed Anwara Economic Zone (EZ) project. Issues of national competitiveness have been discussed as part of the report on Sherpur EZ, and, there is no need to raise those same issues again here. The material is structured as follows: the next subsection 2.1.1 discusses the methods and data chosen to perform the benchmarking, presenting the detailed data, while an annex goes into some additional content about the sources used. Towards the end of that subsection, Table 2.1.1.3-1 shows the results from an exercise giving the ranks among the Economic Zones (EZs)/Industrial Parks (IPs) under examination. Section 2.1.2 is about the strengths of Chittagong region and also about the strengths, weaknesses, and threats for the site selected for the Anwara EZ. Section 2.1.3 presents the conclusions of the section. The final section highlights the central role of the provision of a large quantum of electric power needed for volume industrial production, especially to attract heavy industries, such as shipbuilding, manufacture of ship-plates, cement, etc.

2.1.1 Comparative Assessment

2.1.1.1 Methodology

The following comparative factors are utilized here:

(1) Size of each zone;

(2) Number of plots;

(3) The unit lease-price and fee on account of the maintenance of infrastructure;

(4) If land is leased or sold, or if a mix prevails;

(5) If the zone-developer offers pre-built facilities as well as land on the zone and unit costs of such facilities;

(6) Availability and access-costs of treated and piped water, ready and reliable power supply, a telecommunications network;

(7) Availability of treated waste-water;

(8) Solid-waste removal facilities;

(9) Piped supply of natural gas;

(10) The entire range of incentives defining the package for the economic zones;

(11) Wages of each of three categories of workers, i.e. management, skilled, and largely unskilled workers;

(12) Labour indicators (rigidity of working hours index, difficulty in hiring);

(13) International freight rates;

(14) Telecommunications rates;

(15) A comprehensive battery of zone-related economic and financial incentives (including the tenure of any agreed-to tax-holiday on the corporate income tax (CIT); the extent, if any, of CIT rate-relief after tax-holiday expiry; the extent of tax-relief, if any, accorded to export-oriented firms in the zone/park on account of imported materials and components; exemptions from import duties, in years; partial waivers of import duties, in years);

(16) A more comprehensive bundle of quality-of-life (QOL) factors including whether 24*7 security is provided by the zone-management or have to be tenant-arranged, the percentage of

open space (roads, parks, golf-course, etc.) in the total zone area; the existence and the proximity of educational facilities from the residential blocks.

The Choice of an Aggregator

Now that quite a good number of data fragments have been generated, a scheme for aggregation is needed. A number of quantitative variables are presented to support this aggregation exercise:

- ✓ Zone size;
- ✓ Lease duration;
- ✓ Power-charges;
- ✓ Water-charges;
- ✓ Waste-water charges;
- ✓ Land-lease charges;
- ✓ Cargo rates;
- ✓ Telecom rates;
- ✓ Wage rates.
- ✓ Water-treatment plant capacity per hectare;
- ✓ Waste-water treatment plant capacity per hectare;
- ✓ Existence of a high-quality school in the economic zone
- ✓ The length of the tax-holiday allowed in the tax-code of the country;
- ✓ Country rank per World Economic Forum's Global Competitiveness Index, 2013

The foregoing competitive indicators come in two categories. First, there are the unit charges that need to be paid, like the unit user-cost for using power. The lower they are, the more attractive is the EZ in question. In contrast, then there are the indicators, such as average capacity of the water-treatment plant per hectare of land in the EZ. The higher they are, the more attractive is the EZ in question.[2] The two kinds of indicators should enter into the averaging scheme differently from each other. More specifically, the indicators whose values correlate inversely with the degree of attractiveness ought to subtract from 1 before being inserted into the averaging scheme, whereas no similar compulsion exists for the other series of indicators.

Each price-like variable is standardized and expressed as a percentage difference relative to the highest value observed.[3] That is, each cost variable value is a measure of the cost-advantage it represents relative to the highest-cost zone. That advantage is measured as 0 for the highest-cost zone in a given case and it is the highest for the lowest-cost zone. In symbols,

$$\mathrm{I}_{ij} = \frac{X_{ij\_}\mathrm{Min}(X_{\mathrm{ij}})}{\mathrm{Max}(\mathrm{X_{ij}}) - \mathrm{Min}(\mathrm{X_{ij}})},$$

Where,I_{ij} is the I'th economic zone's value for the j'th attribute;
Where, $\mathrm{X_{ij}}$ is the index value i of country j;
Min is the smallest value in the sample;and,
Max the largest.
The top country in the sample has the value 1 while the worst performing country has the value 0.
The foregoing formulation is appropriate when attractive is a direct function of the I_{ij} above.Where the converse is the case, we need to invoke the expression of 1-I_{ij}.

[2]It might be asked that retaining both unit user-cost of treated water and WTP capacity per hectare might represent 'double-counting'. We respond that societies do not always succeed in pricing its industrial water resources rationally. Besides, at every given level of the user-charge, a large quantity of water-availability per unit of land carries with it an autonomous quotient of convenience-yield. Capacity might therefore be worth a weight for its own sake.

[3] This basic method is adapted here from UNIDO, "Viet Nam Industrial Competitiveness Report.", Vienna, 2011 available at http: (http://www.unido.org//fileadmin/user_media/Publications/Research_and_statistics/Branch_publications/Research_and_Policy/Files/Reports/Other_Reports/VICR2011%20final.pdf, box-1, page 25) accessed February 27, 2014)

$$\mathrm{I}_{ij} = 1 - \frac{X_{ij\_}\mathrm{Min}(X_{\mathrm{ij}})}{\mathrm{Max}(\mathrm{X_{ij}}) - \mathrm{Min}(\mathrm{X_{ij}})}$$

Aggregative competitiveness of i'th economic zone/industrial park is therefore average value of the two sets of I_{ij}s over a desired domain of attributes. In its most inclusive state, our domain of choice includes seventeen (out of a total of some fifty-one) attributes - all quantitative.

Both I_{ij} and 1-I_{ij} are mirror images of each other and have the same range of values, i.e. between 0 and 1. The index is calculated as the arithmetic mean of the standardized values of those two indicators, namely, the$\mathrm{I}_{ij}s$.and the 1-$\mathrm{I}_{ij}s$.Averaging can meaningfully be done because both indexes fall in the same range of values.All indicators are given equal weight.

2.1.1.2 Data

A diligent effort has been made to locate the information from the following sources: (i) a large number of web-sites, including those hosted by the authorities that run these compared industrial parks or special economic zones (SEZ) as the case may be; (ii) a quite exhaustive collection of research papers brought out by agencies as JETRO, JICA, UN ESCP; (iii) academic outputs that presented relevant scraps of information. The annex to this chapter provides greater detail. When the extensive Web-based research proved to be not entirely satisfactory, the initiative was taken of sending by email a questionnaire to each of the comparated IPs, with a request that the authorities return the courtesy by completing and sending back the questionnaires. Out of the respondents, the management of Amata, Vietnam, responded with full disclosure, while Mahindra World City's response is still pending at this stage. Despite reminders, none of the other EZs/IPs has responded to our questionnaire. The filled-in questionnaire from the AmataVietnam is attached in the Annex to this section. Despite the team's best efforts, there are still, as can be seen in the chart below, gaps in information.

A very large proportion of the data we use comprises quantitative ones, such as the unit leasing price of land per square-meter, for example. Units are always cited with regard to such quantitatively recorded data in the interest of complete transparency. Some of the data, however, also happen to be qualitative, for example: case in point is whether the economic zone in question provides for solid-waste removal, pipeline for natural gas, pre-built factories, an one stop service (OSS) in the EZ in question. The valid responses to such categorical questions happen to be '1', '0', and 'NA (not applicable)'. For such situations calling for qualitative answers, the domain of valid answers includes three values, 1 to denote unconditionally yes, 0 to denote no. NA denotes 'not available', which is a valid value.

Data related to the rigidity of the working hours index and difficulty of hiring index are both from *Doing Business*, for 2011, published by the International Finance Corporation (IFC) of the World Bank Group. The 2011 report of Doing Business did not include any information relating to the difficulty-of-firing index. A search was made for information on non-wage labour costs as a percentage of salary. With the exception of Vietnam, Thailand and Cambodia reported for the first two countries in, admittedly dated, sources - MIGA (2003) and New York Times (2012) respectively. The incidence of such non-wage labour costs is negligible in the other countries.

There have been reports that employers on Cambodian SEZs such as the Manhattan SEZ avoid paying such social security costs. In fact, as the authors of a report[4] show, the Taiwanese bicycle producer, Bestway Bicycle Factory, located on Cambodia's Manhattan SEZ, does not even pay the country's minimum wage of US$61 per month. It only pays US$31 to many of its workers. This is

[4] http://www.sciencespo.fr/coesionet/sites/default/files/GMS%20Capstone%20Report%20May%2017.pdf

probably because this particular Taiwanese firm does not allow its workers to form unions. Exceptions do exist, too, in some of Cambodia's other well-known SEZs. For example, the same authors report that yet another, large, Taiwanese exporter of ready-made garments to the United States located on the Phnom Penh SEZ, Evergreen Garments, pays US$61per month to their workers. We have not benchmarked our economic zones on the basis of social-security labour costs largely due to the unavailability of data for recent years.

The acronym NA, that stands for not available occurs at several places in the table. One of our respondents from AMATA Viet Nam, Ms. Kim (kim@amata.com) had this to write to us in an email, dated November 21, 2013: "Please kindly understand that there are several "Not Available" (NA) figures, which means cases in which our tenants contact the supplier and deal directly with them. Figures vary year by year. Thus, these figures are only valid this year." The acronym NA (Not Available) occurs at several places in the table.[5]

[5] In comments made by the World Bank, exception was taken to the use by the member of a JDI team, in an earlier draft, of 'personal communications', reproducing a part of an email message that was sent by a JDI correspondent in official capacity. As well as a very exhaustive desk- and Web-based research we also contacted authorities that had originally developed the seven Industrial Parks: a questionnaire soliciting all needed information was sent by email. Ms Kim alone filled in the entire questionnaire: no one else did. Her ownership in this World Bank sponsored study was stellar. Her testimony therefore was to be valued and disseminated. She shared an important *institutional* detail shedding critically-important light on how much to lean on the kind of data that we had solicited. How were we expected to cite her testimony? We quote guidance from the University of Chicago Press in its answers to frequently asked questions: "Q: Do I need to cite everything I use in the paper? A: Pretty much. Cite anything you rely on for data or authoritative opinions. Cite both quotes and paraphrases. Cite *personal communications* such as e-mails, interviews, or conversations with professors if you rely on them for your paper (italics added)" http://www.press.uchicago.edu/books/lipson/honestcollege/citationfaq.html. Many similar endorsement of our practice of citing Kim's testimony as 'personal communication' is being omitted due to space limitations. Out of our regard for the World Bank, the words 'personal communications' has been expunged from the narrative related to the testimony of Mr. Kim. In sum, the JDI team did everything humanly possible to comprehensively corrall the data needed for the competitiveness benchmarking exercise.

Table 2.1.1.2-1: Multivariate Competitive Evaluation Across Eight EZs/IPs

(All monetary values in this table are in US dollars)

Items Compared	Anwara[6]	Cambodia	India	Indonesia	Myanmar	Viet Nam		Thailand
		Phnom Penh	Mahindra City	MM2100	Mingaladon	Amata	VSIP	Amata
Size (ha)	436[7]	350[8]	607[9]	805[10]	90[11]	700[12]	500[13]	1,353[14]
No. of plots	123	NA	62[15]	336[16]	41[17]	112[18]	238[19]	695[20]
Jobs	47,539[21]	20,000[22]	131,000[23]	135,000[24]	NA	33,576[25]	96,367[26]	28,866[27]
Major economic characteristics								
Leased-tenure (yrs)	30	99[28]	99[29]	70[30]	49[31]	50[32]	50[33]	50[34]
Power-plant (MW)	0	15[35]	230 KV[36]	350[37]	20[38]	12.8[39]	173[40]	22 KV[41]
Power-supply nature	Limited	Unlimited[42]	Limited[43]	Unlimited[44]	Limited	Limited[45]	Unlimited[46]	Limited[47]

[6]All information in this column are sourced from elsewhere in this report.
[7]JDI/MSL/Sheltech Final Report for Anwara.
[8]http://www.skyscrapercity.com/showthread.php?t=1133119
[9]http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdfSize (ha)
[10]http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Ja2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf
[11]http://mingaladon.com/introduction.htm
[12]http://www.amata.com/eng/industrial_amatavietnam_factsheet.html
[13]http://www.vsip.com.vn/out-project/industrial-park/vsip-ii-binh-duong-vsip_project-9.html
[14]http://www.amata.com/eng/industrial_amatacity.html
[15]http://www.thehindubusinessline.com/markets/expectation-of-tax-sops-sends-mahindra-lifespaces-higher/article6119252.ece
[16]http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Ja2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf No. of plots
[17]http://mingaladon.com/land_use_plan_lease_terms.htm No. of plots
[18]http://www.amata.com/eng/industrial_amatavietnam_factsheet.htmlNo. of plots
[19]http://www.vsip.com.vn/out-project/industrial-park/vsip-ii-binh-duong-vsip_project-9.html
[20]http://www.amata.com/eng/industrial_amatanacity_factsheet.html
[21]JDI/MSL/Sheltech Final Report for Anwara
[22]http://www.nytimes.com/2013/04/09/business/global/wary-of-events-in-china-foreign-investors-head-to-cambodia.html?hpw&_r=1&
[23]http://www.mahindralifespaces.com/pdf/1_Mahindra_World_City_Developers_Ltd_2013.pdf
[24]http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Ja2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf
[25]Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[26]http://www.vsip.com.vn/out-project/industrial-park/vsip-ii-binh-duong-vsip_project-9.html
[27]http://www.amata.com/eng/industrial_amatanacity_factsheet.html
[28]http://www.sciencespo.fr/coesionet/sites/default/files/GMS%20Capstone%20Report%20May%2017.pdf
[29]http://www.thehindu.com/todays-paper/tp-national/tp-tamilnadu/cag-finds-irregularities-in-land-deals-involving-two-sez-properties/article4719483.ece
[30]http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf,
[31]http://mingaladon.com/land_use_plan_lease_terms.htm
[32]http://www.vsip.com.vn/out-project/industrial-park/vsip-bac-ninh-vsip_project-11.html
[33]http://www.vsip.com.vn/out-project/industrial-park/vsip-ii-binh-duong-vsip_project-9.html
[34] 'freehold' mentioned in http://www.amata.com/eng/industrial_utilities.html
[35]http://www.cambodiainvestment.gov.kh/investment-enviroment/cost-of-doing-business/utility-cost.html
[36]http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdf
[37]http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf,
[38]http://www.ide.go.jp/English/Publish/Download/Brc/pdf/06_chapter5.pdf
[39]http://www.amata.com/eng/industrial_utilities.html
[40]http://www.sembcorp.com/en/src/docx/usrdocx/FacilitiesAtAGlance.pdf
[41]http://www.amata.com/eng/industrial_utilities.html
[42]) http://www.opendevelopmentcambodia.net/tag/electricity-price/ about the Power- supply nature and electricity charges in Cambodia as of 2013
[43]http://www.mahindraworldcity.com/chennai_mwc_chennai_sustainable_initiatives.aspx
[44]http://www.balidiscovery.com/messages/message.asp?Id=9266

Items Compared	Anwara[6]	Cambodia	India	Indonesia	Myanmar	Viet Nam		Thailand
		Phnom Penh	Mahindra City	MM2100	Mingaladon	Amata	VSIP	Amata
Water treatment unit (m^3)	38,000	5,300[48]	22,932	72,000[49]	5,000[50]	30,000[51]	42,000[52]	18,000[53]
Wastewater TP (m^3)	30,400	4,000[54]	17,640	64,800[55]	5,000[56]	7,000[57]	18,000[58]	14,000[59]
Solid-waste removal	1	1[60]	1[61]	1	1[62]	0[63]	1	1
Natural gas	1	0	0	1[64]	0	0[65]	1	1[66]
Other gas	0	0	0	1[67]	0	1[68]	1	1
No. of tel. lines	512	530[69]	FOC backbone	10000[70]	300[71]	960[72]	6000[73]	FOC/ISDN[74]
Pre-built factories?	1	1[75]	1	1		1[76]	1	1[77]
Sewage-treatment (KLD)		1[78]	9000			1(NA)[79],[80]	1[81]	
Land price	60[82]	60[83]	65	175[84]	58	90	117	125

[45] http://www.amata.com/eng/industrial_utilities.html
[46] http://www.sembcorp.com/en/src/docx/usrdocx/FacilitiesAtAGlance.pdf
[47] http://www.amata.com/eng/industrial_utilities.html
[48] http://www.cambodiainvestment.gov.kh/investment-enviroment/cost-of-doing-business/utility-cost.html
[49] http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf
[50] http://mingaladon.com/infrastructure_services.htm
[51] http://www.amata.com/eng/industrial_utilities.html
[52] http://www.sembcorp.com/en/src/docx/usrdocx/FacilitiesAtAGlance.pdf
[53] http://www.amata.com/eng/industrial_utilities.html
[54] http://www.cambodiainvestment.gov.kh/investment-enviroment/cost-of-doing-business/utility-cost.html
[55] http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf (page 50) Wastewater TP (m^3)
[56] http://mingaladon.com/infrastructure_services.htm
[57] http://www.amata.com/eng/industrial_utilities.html
[58] http://www.vsip.com.vn/out-project/industrial-park/vsip-ii-binh-duong-vsip_project-9.html
[59] http://www.amata.com/eng/industrial_utilities.html
[60] http://www.ppsez.com/the-zone/facilities-a-services.html
[61] http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdf
[62] http://www.uncrd.or.jp/env/3r_02/presentations/BG1/1-3%20Myanmar-2nd-3R-Forum.pdf
[63] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[64] http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf,
[65] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[66] http://amata.com/site/inside.php?m=utilities&p=9&sub=28
[67] http://www.mm2100.co.id/main_industrialtown.php?id=2
[68] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[69] http://en.wikipedia.org/wiki/Telecommunications_in_Cambodia#cite_note-CIA-Factbook-Cambodia-2013-1
for no. of fixed telephone lines.
[70] http://www.mm2100.co.id/main_industrialtown.php?id=2
[71] http://mingaladon.com/infrastructure_services.htm
[72] http://www.amata.com/eng/industrial_utilities.html
[73] http://www.vsip.com.vn/out-project/industrial-park/vsip-ii-binh-duong-vsip_project-9.html
[74] http://www.amata.com/eng/industrial_utilities.html
[75] http://www.phnompenhpost.com/business/made-here-owned-there
[76] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[77] http://www.pattayapropertynews.com/thailand-property-news/eia-approval-amata-for-its-3500rai-expansion-in-thailand
[78] http://www.ppsez.com/the-zone/infrastructure.html
[79] http://www.sembcorp.com/en/src/docx/usrdocx/FacilitiesAtAGlance.pdf
[80] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[81] http://www.vsip.com.vn/out-project/industrial-park/vsip-ii-binh-duong-vsip_project-9.html
[82] Unit land lease price over the four years for Anwara ranges between 60-70 US$/m^2. In this table we're only using 60 US$/m2 for presentational purposes. That said, in our detailed calculations, preparatory to ranking we used a weighted average of 60 US$/m2 (This is shown in the Excel spreadsheet submitted with this report).
[83] http://www.emergingfrontiers.com/2013/04/26/cambodias-first-dairy-plant/#more-14002

Items Compared	Anwara[6]	Cambodia	India	Indonesia	Myanmar	Viet Nam		Thailand
		Phnom Penh	Mahindra City	MM2100	Mingaladon	Amata	VSIP	Amata
Maintenance charge/m2/month	0.17	0.06+10% VAT[85]		0.06[86]		0.08[87]	0.07	0.047
Infrastructure								
Distance(1)	36	226[88]	57	30	50[89]	25[90]	16	27[91]
Distance(2)	28	20[92]	50	32	23[93]	30[94]	20	114[95]
Distance(3)	46	20[96]	36	50	7[97]	35[98]	20	99[99]
Electricity (/kWh)	0.066	0.28	0.105	0.1354	0.12	0.077[100]	0.078	0.15
Water (/cu.-m)	0.30	0.30	0.60	0.40[101]	0.05	0.218[102]	0.310	0.65
Waste-water (/cu.-m/mth)	0.35	0.26	0.01	0.55[103]	NA	0.28[104]	0.190	0.233
Government policy								
Corporate tax rate (%)	28	20[105]	34	25[106]	30[107]	22[108]	22[109]	20[110]
VAT (%)	15	**10**[111]	**NA**[112]	10		10[113]	10[114]	0
OSS	1	1[115]	1	1	1[116]	1[117]	1[118]	1[119]

[84] http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf
[85] http://www.sciencespo.fr/coesionet/sites/default/files/GMS%20Capstone%20Report%20May%2017.pdf
[86] http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf
[87] http://www.amata.com/eng/industrial_utilities.html
[88] http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf
[89] http://mingaladon.com/location_map.htm
[90] http://www.amata.com/eng/industrial_amatavietnam_map.html
[91] http://amata.com/site/inside.php?m=locations&p=7
[92] http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf
[93] http://mingaladon.com/location_map.htm
[94] http://www.amata.com/eng/industrial_amatavietnam_map.html
[95] http://amata.com/site/inside.php?m=locations&p=7
[96] http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf
[97] http://mingaladon.com/location_map.htm
[98] http://www.amata.com/eng/industrial_amatavietnam_map.html
[99] http://amata.com/site/inside.php?m=locations&p=7
[100] http://www.miga.org/documents/asiareport.php
[101] http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf,
[102][102] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[103] http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf,
[104] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[105] http://www.pwc.com/th/en/publications/download/south-east-asia-web.pdf
[106] http://www.deloitte.com/assets/Dcom-Indonesia/Local%20Assets/Documents/Tax/Taxation%20&%20Investment%20Guide%20Indonesia%202013.pdf (page 7)
[107] http://www.rd.go.th/publish/fileadmin/user_upload/AEC/AseanTax-Myanmar.pdf
[108] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[109] http://www.vsip.com.vn/assets/uploads/myfiles/files/Leaflet/Brochure/VSIP-brochure-English-Vietnam-2014.pdf (page 2)
[110] http://asiafoundation.org/in-asia/2013/01/30/thailand-adopts-nationwide-minimum-wage-policy-amid-controversy/
(1) [111] http://www.tax.gov.kh/en/bvat.php

[112] http://www.mahindraworldcity.com/docs/chennai/special_economic_zones.pdf
[113] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[114] http://www.gbs.com.vn/index.php/en/faq/business-registration/597-vietnam-vat-value-added-tax-rates
[115] http://www.ide.go.jp/English/Publish/Download/Brc/pdf/06_chapter1.pdf
[116] http://mingaladon.com/infrastructure_services.htm
[117] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[118] http://www.vsip.com.vn/investment-guide/one-stop-service.html
[119] http://www.ide.go.jp/English/Publish/Download/Brc/pdf/06_chapter1.pdf

Items Compared	Anwara[6]	Cambodia	India	Indonesia	Myanmar	Viet Nam		Thailand
		Phnom Penh	Mahindra City	MM2100	Mingaladon	Amata	VSIP	Amata
Incentives								
Tax h'day (yrs)	10	9[120]	5[121]		5[122]	0[123]	4[124]	8[125]
Lower tax rate (yrs)	0	3-6[126]	5[127]		3[128]	0[129]	9[130]	5[131]
Industrial percentages, where available, calculated relative to total built-up area								
Most dominant	Shipbuilding	Apparels & Accessories[132]	IT[133]	Automotives (30)[134]	Garments (32.2)	Chemicals / plastics/ paint[135] (23)	Apparel	Steel/metal/plastics (32)
Next	Pharmaceuticals	Footwear[136]	Autos[137]	Logistics (10[138])	Optical lenses (23.8)	Auto/machinery parts, steel, metal[139] (18)	Engineering	Auto-making (24)
Next	Ship-building parts-making	Electronics[140]	Apparel[141]	Electronics (7)[142]	Foodstuff (16.2)	Textiles/apparel[143] (16)	Automotive	Consumption goods (18)
Next	Leather-goods	Food items[144]	Gems/ [145]Jewellery	Metals[146] (7)	Shoes (9.1)	Electric[147] (11)	NA	Electronics (14)
Next	Steel products	Plastics goods[148]		Steel[149] (6)	Watch-dial (6.49)	Beverage [150](7)	NA	Service and Infrastructure

[120] http://www.opendevelopmentcambodia.net/briefing/special-economic-zones-2/
[121] http://commerce.nic.in/annual2006-07/html/chapter6.html
[122] http://mingaladon.com/investment_incentives.htm
[123] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[124] http://www.vsip.com.vn/investment-guide/investment-incentives.html
[125] http://www.amata.com/eng/why_economic_%20incentives.html
[126] http://www.pwc.com/en_KH/kh/publications/2012/assets/cambodia-tax-book2012-05042012.pdf
[127] http://www.mahindraworldcity.com/docs/mwcsezbooklet.pdf
[128] http://mingaladon.com/investment_incentives.htm
[129] Annex-3 to this section based on responses by Ms. Kim to the questionnaire sent to this *industrial park* by JDI team
[130] http://www.vsip.com.vn/investment-guide/investment-incentives.html
[131] http://www.amata.com/eng/why_economic_%20incentives.html
[132] http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf
[133] http://www.mahindraworldcity.com/chennai_business_overview.aspx
[134] http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf
[135] http://www.amata.com/eng/industrial_amatavietnam_factsheet.html
[136] http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf
[137] http://www.mahindraworldcity.com/chennai_business_overview.aspx
[138] http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf
[139] http://www.amata.com/eng/industrial_amatavietnam_factsheet.html
[140] http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf
[141] http://www.mahindraworldcity.com/chennai_business_overview.aspx
[142] http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf
[143] http://www.amata.com/eng/industrial_amatavietnam_factsheet.html
[144] http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf
[145] http://www.mahindraworldcity.com/chennai_business_overview.aspx
[146] http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf
[147] http://www.amata.com/eng/industrial_amatavietnam_factsheet.html
[148] http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf
[149] http://www.ubs.com/microsites/ib-

Items Compared	Anwara[6]	Cambodia	India	Indonesia	Myanmar	Viet Nam		Thailand
		Phnom Penh	Mahindra City	MM2100	Mingaladon	Amata	VSIP	Amata
								(7)
Next	NApp	NA	N.A	Food-beverages [151] (6)	Electronics (3.99)	Miscellaneous [152](14)	NA	Chemicals (4)
Next	NApp	NA	NA	Printing[153] (4)	NApp	NApp	NA	NApp
Individual operating costs[154]								
Mgmt wage rates	578	700[155]	1510	995	600	1146	1146	1565
Skilled wage rates	251	180[156]	607	414	145	521	521	641
Semiskilled wage rates	78	120[157]	264	209	92	128	128	286
Min. wage	39	61[158]	120	167	68	111	111	230
Rigidity of working hours[159]								
Premium-1	0	30	0	0	N.A	30	30	0
Premium-2	0	100	0	0	N.A.	100	100	0
Difficulty in hiring workers[160]								
Curbs on hiring-1	1	0	0	1	N.A.	0	0	1
Curbs on hiring-1	NL	24	NL	36	N.A.	72	72	NL
Curbs on hiring-1	23.2	41.0	24.1	105.9	N.A.	40.7	40.7	78.9
Curbs on hiring-1	0.30	0.3	0.16	0.38	N.A.	0.33	0.33	0.33
Non-labour wage% of salary	0	10[161]	6	5	N.A.	20[162]	20	20
Operating costs								
Cargo rates-1[16]	900	1500	979	800	1600	500	500	1162
Cargo rates-2[164]	3675	4000	2817	2600	6500	2600	2600	3863
Telecom rate (/line)[165]	24	15[166]	9.3	69	2000	22	22	106

conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf

[150] http://www.amata.com/eng/industrial_amatavietnam_factsheet.html

[151] http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf

[152] http://www.amata.com/eng/industrial_amatavietnam_factsheet.html

[153] http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf

[154] Board of Investment, Bangladesh, Annual Report, 2012, citing results about many capitals of Asian countries

[155] http://www.sciencespo.fr/coesionet/sites/default/files/GMS%20Capstone%20Report%20May%2017.pdf

[156] http://www.sciencespo.fr/coesionet/sites/default/files/GMS%20Capstone%20Report%20May%2017.pdf

[157] http://www.sciencespo.fr/coesionet/sites/default/files/GMS%20Capstone%20Report%20May%2017.pdf

[158] http://www.ssez.com/en/company.asp?Ilt=4&Ione=2

[159] International Finance Corporation (IFC), *Doing Business, 2011*, background tables

[160] International Finance Corporation (IFC), *Doing Business, 2011*, background tables

[161]; http://www.nytimes.com/2013/04/09/business/global/wary-of-events-in-china-foreign-investors-head-to-cambodia.html?hpw&_r=1&

[162] http://www.miga.org/documents/asiareport.pdf

[163] Board of Investment, Bangladesh, Annual Report, 2012, citing results about many capitals of Asian countries

[164] Board of Investment, Bangladesh, Annual Report, 2012, citing results about many capitals of Asian countries

[165] Board of Investment, Bangladesh, Annual Report, 2012, citing results about many capitals of Asian countries

[166] http://www.cambodiainvestment.gov.kh/investment-enviroment/cost-of-doing-business/telecommunication-cost.html

Items Compared	Anwara[6]	Cambodia	India	Indonesia	Myanmar	Viet Nam		Thailand
		Phnom Penh	Mahindra City	MM2100	Mingaladon	Amata	VSIP	Amata
Use (/min)	1.12	5	21	6.28	0.15	1.05	1.05	3.16
Logistics perf. (score)	2.74[167]	2.56[168]	3.08[169]	2.94[170]	2.37[171]	3.00[172]	3.00[173]	3.18[174]
Quality-of-life (QOL) ratings								
Security (24*7)	1	1[175]	1[176]	1[177]	1[178]	1[179]	1	1[180]
Open-space (%)	17.0		30			14		
Entertainment	0	0[181]	1[182]	1[183]	0	1	1	1[184]
Golf-course	0	0[185]	0[186]	1[187]	0	0	0	2[188]
Qty Housing	1	1[189]	1[190]	1[191]	0	1	1[192]	1[193]
High school	0	0[194]	1[195]	0	0	1[196]	1	1[197]
University	0	0[198]	0[199]	0	0	1[200]	1[201]	0

Note: The sources of the information presented in the cells of the foregoing table are, wherever available, presented here in this table. The one stop service (OSS) is evaluated in terms of qualitative answers to whether an OSS exists in the EZ in question, or not. The domain of valid answers includes three values, 1 to denote unconditionally yes, 0 to denote no. NA denotes 'not available' - which is a valid value. FOC denotes fiber-optics cabling. ISDN denotes International Subscribers' Digital Network.KLD denotes kilo-liter per day.

Distance(1) is about distance from nearest sea-port or deep-sea port, measured in kilometres; distance (2) is about distance from the largest commercial metropolis, in km; distance(3) is about distance from the largest airport in the country, in km. Land-price is for industrial land and measured per sq.-meter. The destination port with respect to the cargo rate-1 is Yokohama in Japan, and that for cargo rate-2 is Los Angeles. Both rates relate to the shipping rates per tonne by sea.
Logistics performance is measured using quantitative scores published by the World Bank in its Logistics Performance Survey, 2012. NA denotes 'Not available despite a very diligent search'. NApp denotes 'Not applicable.' Virtually all sources for the information in the cells in the above table are shown as footnotes that attach specifically to those cells.

[167]World Bank, Logistics Performance Survey, 2012.
[168]World Bank, Logistics Performance Survey, 2012.
[169]World Bank, Logistics Performance Survey, 2012.
[170]World Bank, Logistics Performance Survey, 2012.
[171]World Bank, Logistics Performance Survey, 2012.
[172]World Bank, Logistics Performance Survey, 2012.
[173]World Bank, Logistics Performance Survey, 2012.
[174]World Bank, Logistics Performance Survey, 2012.
[175]http://www.ppsez.com/the-zone/facilities-a-services.html
[176]http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdf
[177]http://www.mm2100.co.id/main_industrialtown.php?id=3
[178]http://mingaladon.com/infrastructure_services.htm
[179]http://www.amata.com/eng/industrial_standard.html
[180]http://amata.com/site/inside.php?m=utilities&p=11
[181]http://www.ppsez.com/the-zone/facilities-a-services.html
[182]http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdf
[183]http://www.mm2100.co.id/main_industrialtown.php?id=3
[184]http://www.amata.com/site/inside.php?m=locations&p=7&sub=28
[185]http://www.ppsez.com/the-zone/facilities-a-services.html
[186]http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdf
[187]http://www.mm2100.co.id/main_industrialtown.php?id=3
[188]http://www.amata.com/site/inside.php?m=locations&p=7&sub=28
[189]http://www.ppsez.com/about-us/overview.html
[190]http://www.mahindraworldcity.com/chennai_living_residential_zone.aspx
[191]http://www.mm2100.co.id/main_industrialtown.php?id=3
[192]http://www.vsip.com.vn/out-project/industrial-park/vsip-ii-binh-duong-vsip_project-9.html
[193]http://www.amata.com/site/inside.php?m=locations&p=7&sub=28
[194]http://www.ppsez.com/the-zone/facilities-a-services.html
[195]http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdf
[196]http://www.amata.com/eng/industrial_amatavietnam_factsheet.html
[197]http://www.amata.com/site/inside.php?m=locations&p=7&sub=28
[198]http://www.ppsez.com/the-zone/facilities-a-services.html
[199]http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdf
[200]http://www.amata.com/eng/industrial_amatavietnam_factsheet.htmlUniversity
[201]http://www.vsip.com.vn/assets/uploads/myfiles/files/Media/Location%20Map.pdf

2.1.1.3 The Comparative Evaluation Results for Anwara EZ

VSIP, Amata City Bien Hoa in Viet Nam, and Anwara are rated to be the three most competitive industrial parks, in that order. This is regardless of the inclusiveness of the aggregation. That Anwara is only overtaken by VSIP and Amata City Bien Hoa, Viet Nam, may stretch credulity to some (since the Anwara EZ does not yet exist), as essentially their initial expectations about Bangladesh might have been diminished by Bangladesh's dismal ranking by the World Economic Forum or the World Bank. However, it is important to bear in mind that land is going to be offered at a strategic price of only US$60 per sq.-metre[202] when comparable prices for Amata City, VSIP, and MM2100 are US$125, US$175 and US$117, respectively.

There is also the fact that power costs for tenants at Anwara, at less than seven cents, compare favourably with 15 and 14 cents, in Thailand and Indonesia, respectively.

Anwara is more attractive than several other options considered due to its strategic land pricing and cheaper international shipping rates. By comparison, in the more mature capitalist economies of Thailand and Indonesia, land prices are between two-and-a-half times to almost three times more expensive.

In short, Anwara occupies the third most competitive location as an economic zone.

Table 2.1.1.3-1: Competitive Ranking of the Eight Economic Zones/Industrial Parks

Serial No.	SEZ/EZ/IP	Average of standardized values over all indicators		Average of standardized values over all indicators, except land area of the EZ/IP	
		Quantitative Score	Rank	Quantitative Score	Rank
1	Anwara	0.529	3rd	0.554	3rd
2	Phnom Penh SEZ	0.518	4th	0.549	4th
3	Mahindra World City	0.477	6th	0.497	6th
4	MM2100 Industrial Park	0.457	7th	0.473	7th
5	Mingaladon Industrial Park	0.51	5th	0.542	5th
6	Amata Bien Hoa IP Vietnam	0.537	2nd	0.559	2nd
7	VSIP	0.552	1st	0.579	1st
8	Amata City Thailand	0.421	8th	0.423	8th

Source: WB study team's calculations based on the calculations presented in the spreadsheet in Annexure-1

[202]Initial land price. Detail on land price can be seen in section 6.1.6 (Chapter 6).

2.1.2 Comparative Assessment at the Regional Level

The objective of this section is to present an inventory of the strengths of the greater Chittagong region.

2.1.2.1 Strengths of the Chittagong Region: its Economic Geography

Agriculture, fishing, and forestry are the economic staples of the Chittagong region. The district does not have the advantages of high soil fertility, inviting soil textures, or high water-retention capacity of its soil.

Chittagong is a deficit farm district which needs to import a whole array of farm goods - both subsistence and commercial.

Chittagong is second largest among the manufacturing hubs of Bangladesh, after Dhaka and its satellite areas. It accounts for some 28% of the manufacturing enterprises and 30% of manufacturing employment of the country. If the ready-made garments industry is excluded, the percentage of employment to the credit of Chittagong actually rises to 36%.

The RMG industry is perceived as substantively ready for take-off into relatively higher-end product categories, according to McKinsey & Co, in spite of the current turbulence. That will mean that Chittagong will also maintain its second position in terms of manufacturing employment and other relevant economic measures.

If proper EZs are developed with reliable power, water and telecommunications, plus gas at some EZs, this will quickly change the investment environment of the EZ site area.

Table 2.1.2.1-1 presents these and some other economic and geographic attributes of the Chittagong region, to which we now turn.

Table 2.1.2.1-1: Chittagong Region's Endowment of Commercial Resources

The main resource	Stages of processing	Narrative
Resources that contribute towards industrial development of Chittagong region		
Manufacturing	Production	Chittagong is also home to a disproportionate share of the production of the following manufactured goods; (i) edible oil; (ii) yarn and fabrics; (iii) garments accessories; (iv) mild steel rods (deformed bars), angles; (v) galvanized iron (GI) sheets; (vi) corrugated iron (CI) sheets; (vii) shipbuilding; (viii)cement; (ix) paper and paper-based products; (x) resin and artificial leather; (xi) footwear; (xii) iodized salt; (xiii) industrial acids and gases; (xiv) engineering and light-engineering; (xv) electrical and electronics goods; (xvi) fish feed; (xvii) plastics and polymer. Bangladesh's most well-branded shipbuilder is headquartered in Chittagong, along with several other lesser-known ones. Gahira, in the Anwara Upazila, has already established the ship-yard number 2 of another shipbuilder, namely, FMC Dockyard Limited.
	Financial intermediation	The City of Chittagong is Bangladesh's second most important finance hub. All of Bangladesh's scheduled banks, non-bank financial institutions and majors from micro-finance industry, are well represented in Chittagong. At any given time, Chittagong accounts for a large proportion of Bangladesh's formal-sector debt portfolio. Unlike for some other commodities, the City of Chittagong rings up a surplus in terms of the assets-liabilities on the scheduled-banks' books.
	Fwd. linkage	Some of the manufacturing activities of Chittagong generate forward

The main resource	Stages of processing	Narrative
		linkages with other segments of the economy. Thus, for instance, the fatty acid released by refining of crude gummed soya bean oil (CDSO) is used in soap-making. This is a case of forward linkages that is triggered by what Chittagong is good at doing.
Trade facilitation		With 80% of Bangladesh's sea-borne trade passing through Chittagong port, the port enjoys over-arching importance from the standpoint of the logistics and trade facilitation infrastructure. Trade facilitation infrastructure in Chittagong certainly could do with improvement. But, even so, its chief strength is that they improve the export performance of Bangladesh. The level of development and quality of the port, the ShahAmanat Airport, the road network and the rail infrastructure available in Chittagong is adequate, but not ideal, to foster the development of exports from the district. Information and communications technology (ICT) is being increasingly mainstreamed into enhancing the extent to which the port and the Shah Amanat Airport use information and communications technology to improve efficiency and productivity as well as to reduce transaction costs. This observation is based on measuring a few indicators on the availability, use, absorption, and government prioritization of ICT, especially in the Chittagong Port Authority (CPA). The level of efficiency of customs and domestic transport that is reflected in the time, cost and number of documents necessary for export and import procedures in the Chittagong ports, though still unfavourable by international best-practices' standards, are improving slowly. The level of development of regulations and transparency still leave something to be desired, as measured on indicators of irregular payments, favouritism and government transparency.
Human resources		The region is home to three public universities including Chittagong University, the Chittagong University of Engineering & Technology and the University of Veterinary & Animal Sciences. The first two universities turn out every year between four to five hundred civil, mechanical, electrical, and telecommunications engineers and bachelors of business administration. As well, it is home to seven private universities, a Marine Academy where an officer corps and marine engineers for merchant navies are trained to seek employment in a global market.
Rubber		The region is home to some 7,000 acres of rubber plantation, located within the estates. Yield per acre of latex averages 250 kg a year. Total production in the region of latex is thus roughly estimated at 3,500 tonnes a year. Much of this output is exported to factories producing entry-level sandals, rickshaw tires, shoe-soles, tube well-washers and some very rudimentary auto-parts (which need rubberized accessories).
Tea	Processed tea	At about 4,500 hectares, the area allocated to tea production in the Chittagong region is small and accounts for about 9% of the area planted to tea plantation in Bangladesh.
Cement		Chittagong is home to a sizeable portion of the country's capacity to produce cement. Clinkers, limestone, fly-ash, gypsum, slag are needed to produce cement.

Note: The words fwd. and bkwrd. stand for forward and backward, respectively.
Source: Various secondary data sources.

It has already been pointed out in the Sherpur EZ feasibility study report, that there are four attributes that are especially powerful investment factors - broad infrastructure, industrial infrastructure, labour costs, and country risk. A variation on that theme is that, as the American Chamber of Commerce in Malaysia points out, the top-ten locational factors are as follows:

- ✓ Political and social stability;
- ✓ Cost of doing business;
- ✓ Electricity availability;
- ✓ Availability of industrial land;
- ✓ Proximity to container port;
- ✓ Availability of skilled and technical workers;
- ✓ Availability of suppliers and vendors;
- ✓ Availability of production workers;
- ✓ Total unit manufacturing costs;
- ✓ Availability of management talent.

(Source: http://www.amcham.com.my/index.php/news-resource/news-highlights/business-news/519-made-in-myanmar-manufacturing-site-location-considerations-in-asia-s-final-frontier-economy)

In the case of Anwara, several of these enablers, are available in and around the city of Chittagong. This would particularly apply in the cases of the proximity to the container port, skilled workers, production workers, the dense presence of suppliers and vendors and availability of management talent. As the home-base of Bangladesh's shipbuilding, shipping, basic-metal, and cement industries, Chittagong's cachet as the focal-point of the supply-chain of quite a number of production inputs and skills complementary to the industrialization of Anwara is considerable.

2.1.2.2 Anwara's Location on the Sea-Coast: a major Source of Competitiveness Over the Medium Term

Strengths

Anwara boasts its location on the coast, where the draft in the sea rarely exceeds 1 metre. Shipbuilding companies have already checked Anwara out, as have private power-generating companies who burn coal cleanly. One shipbuilding company has already set up its second base at Gahira, Anwara and Ananda Shipyard has, for a while, been considering buying land there (private communication). On June 27, 2012, the Orion Group signed an agreement with the Bangladesh Power Development Board for building three coal-fired power plants for a total of 1,105MW within 36-45 months. Of these, one, with a capacity of 282.67MW, was planned to be set up in Anwara, Chittagong. The establishment of a power-plant and the lure of a stable and adequate supply of clean electricity at an affordable price (of less than seven cents per KWh), will very likely spur Anwara's potential value as a strategic location and will increase her cachet in the near future.

- A peninsular location on the sea-coast is always a major draw, as it includes a long coastline. It is practicable, through the building of high-durability access roads and dikes that increase the environmental safeguards and careful positioning of landscaping, to increase the experiential value of a peninsular location in bringing planned industrialization to fruition. Anwara has this built-in site-specific advantage. Unlocking the economic potential of Anwara is largely only limited by the planner's imagination, BEZA's 'political will,' institutional and coordination skills, and the private developer's implementation capability. There is precipitate 'over-development' of dense industrial clusters around Dhaka and Chittagong cities and overheating of the land-price in the prized Dhaka-Chittagong corridor. This will drive the demand for industrial land towards the coastal areas offering reasonably good road access and credible safeguards against the occasional natural calamity. That is why ship-builders, cement-makers, power-generation plants, will locate in the coastal corridor within easy reach of downtown Chittagong and the Chittagong International Airport.

- Much of the land earmarked in Anwara is owned by the Government. It is *khas*-land. This fact is likely to presage a relatively expeditious acquisition of land.
- The relatively low draft makes reclamation of land, and further adding to the draft in the sea, economically more feasible.

Weakness

Compared with inland locations, and, like all sites on the eastern coast of the Bay of Bengal, Anwara is more vulnerable to loss of property and lives arising from the periodic cyclones and storm surges. If and when, as happened on 29 April, 1991, a category-4 cyclone hits the eastern coastline of the Bay, hundreds of thousands of vulnerable people, mostly living on the islands, could perish. However, it would be quite inappropriate to call that a site-specific weakness. It is true of all sites on the Eastern Bay of Bengal. There has not been a revisit of the 1991 super-cyclone in the last 23 years.

Opportunity

Provided the supply of affordable and dependable electricity and proactive and expeditious interventions by BEZA are reasonably guaranteed, the location of Anwara on the coast and within a close range from Chittagong is Anwara's key to abundant economic opportunity.

Threats

Ship-building, steel-making, the burning of coal to produce much-needed electricity all have heavy environmental footprints.

2.1.3 Major Conclusions

- The synergy between a coastal location with the added attraction of a fully-fledged economic zone and the lure of clean, stable, and adequate electricity comprise a triumvirate of attractive force for Anwara.
- Even so, in the short-run, Anwara's attractiveness to foreign direct investment originators will be somewhat average, as can be seen from its third position on the comparison table. Its cachet with domestic investors could, however, be greater.
- Close proximity to the very active communications and logistics hub of Chittagong is another economic attraction of Anwara.

Electricity Supply in Bangladesh

Electricity is a key for industrialization and EZ development in Bangladesh. Bangladesh has achieved a 10,000 MW power supply capacity in 2013. There is, however, a large supply deficit overall. Per capita electricity consumption of Bangladesh in 2011 was 259 KWh, 1/10 of Thailand's, 1/5 of Vietnam's, 1/3 of India's and Indonesia's. In order to industrialize, Bangladesh must increase the electric power supply faster than currently planned - 24,000MW by 2021.

Table 2.1.3-1: International Comparison in Terms of Energy Consumption, South and Southeast Asia

Country	Electricity Consumption/per person In KWh	Energy Consumption/per person In Kg Oil equivalent
Bangladesh	257	205
Cambodia	164	365
India	684	614
Indonesia	684	857
Vietnam	1,073	697
Thailand	2,316	1,790
China	3,298	2,029
Myanmar	110	

Source: World Band Data Bank

Why is only RMG Prospering but No Other High-Value Industries?

RMG is one of the most labour-intensive industries (cost of labour is over 50%) and use of electricity is about 2-3% of the total production cost. Therefore, the RMG industry can operate in Bangladesh profitably. Other value-added industries, such as machinery processing, require stable and sufficient clean electric power.

If Bangladesh is to become a middle income country by 2021, rapid growth of the industrial sector is required and electric power supply is likely to be one of the key factors which will determine the achievement of the vision for Bangladesh.

Important Strategy Implication for EZs

Economic Zone (EZ) development is also one of the key factors for achieving the country's vision and goals. Since EZs will not function without stable electric power, the key strategy should be a packaged development of EZ, power, and jetty together.

Electric power can be generated from (1) hydropower, (2) natural gas, (3) renewable power or (4) imported coal power.

Item (1), above, and (3) offer rather limited opportunity in Bangladesh. Natural gas (2) may be high in potential but finding and producing natural gas typically takes a long time (7-10 years minimum). Therefore, coal power using imported coal and new clean coal power technology seems to be the best alternative for Bangladesh.

Considering the industrialization level of other Asian countries, in order to achieve the middle income level by 2021, electric power per capita Kwh should be at the level of Vietnam which is at about 5 times the current electricity consumption of Bangladesh. This implies that the electric power capacity should be increased to at least the 50,000 MW level by 2021.

Possible Strategy for Rapidly Increasing Electric Power Supply Capacity in Bangladesh.

- Proactively using an internally consistent strategy of building economic zones offering state-of-the-art infrastructure, jetties designed to integrate those zones in practical shipping and maritime commerce and, finally, the building of clean-coal power stations along coastal landing areas and along major rivers.
- Independent power plants (IPP) for generating as much power as possible and transmission lines should be by public funding mainly using aid money.

Implications of Anwara EZ and Mirershorai EZ

Based on the EZ and power development strategies, both Anwara and Mirershorai EZ are meeting the Economic Development and Power development strategic directive because they are able to construct a jetty for unloading imported coal being delivered from the Cox's Bazar coal depots by barge fleets of 4,000 to 5,000 tons. Several barges can be pulled by a powerful tug boat carrying 20,000 to 50,000 tons of coal at once - economizing on the transportation cost.

The depth of the jetty can be of draft 6 metres and therefore it is easy to construct along the coast and along the major rivers of Bangladesh. In addition to this, land reclamation is a useful tool in creating new industrial land next to the jetty. Both Anwara and Mirershorai EZs use the land reclamation method to create new industrial land.

2.2 Industry Assessment

2.2.1 Overview

2.2.1.1 Current Status

Led by the strong growth in the export of readymade garments (RMG) and large remittances from overseas workers and emigrated Bangladeshis, Bangladesh experienced rapid economic growth over the last two decades. The RMG sector, nearly non-existent at the beginning of 1980s, blossomed in the last few decades and accounted for around 80% of total national exports by 2010. This sector contributed to growth in various related sectors and a wide range of economic activities. With this growth in the RMG sector, the export to GDP ratio increased from 6.8% in 1991 to 17.2% in 2010. The manufacturing sector now accounts for around 18% of the Bangladesh economy.

Table 2.2.1.1-1: Manufacturing Sector of Bangladesh

Item/Year	1981	1991	2001	2010
Export (% of GDP)	4.10%	6.80%	10.60%	17.20%
Manufacturing of Total Export	65.50%	78.90%	92.10%	90.90%
RMG of total export	0.10%	38.90%	56.10%	77.10%
Manufacturing Sector of GDP	13.70%	13.40%	15.60%	17.90%

Source: Sixth Five Year Plan (SFYP)

The table below looks at major manufacturing sectors from the value-added perspective. The garment and garment-related sector is the largest manufacturing sector in terms of added value, followed by machinery products, food processing, and chemical fertilizer sectors. The garment sector accounted for 6.8% of GDP in 2011.

Table 2.2.1.1-2: Industrial Sectors of Bangladesh in 2011

Sectors	Share*
Manufacturing	18.20%
Textile and Clothing	6.80%
Machinery Products	5.20%
Food Processing	2.50%
Chemical Fertilizer	2.00%
Leather Products	0.90%
Petroleum Products	0.80%
Other Manufacturing	1.20%
Construction	8.20%
Other Industries	2.30%
Total Industries	28.70%

Source: Sixth Five Year Plan (SFYP)
**Estimated figures from SFYP. Addition of subsections does not match total manufacturing 18.2%. Reasons are unknown.*

Over the period from 2006 to 2011, RMG exports increased at 20% per annum for knitwear and at around 16% for woven garments. Home textiles which account for only 3.4% of total exports grew more than RMG at an average annual rate of around 37%. Dwarfed by the growth of those sectors, however, exports of pharmaceuticals and frozen food also increased at the rate of over 9% and over 6%, respectively. Others which are reported at the growth of nearly 14% include ceramic table ware and agricultural products such as vegetables and tobacco. Many sectors emerged and are growing in export markets, following the big success of RMG.

Table 2.2.1.1-3: Merchandise Exports of Bangladesh

Sectors	2006		2011		Average Growth
	(US$ Million)	Share	(US$ Million)	Share	
Leather	257	2.40%	298	1.30%	3.00%
Frozen Food	459	4.40%	625	2.70%	6.40%
Woven Garments	4,084	38.80%	8,432	36.80%	15.60%
Knitwear	3,817	36.30%	9,482	41.40%	20.00%
Home Textiles	165	1.60%	789	3.40%	36.70%
Pharmaceuticals	28	0.30%	44	0.20%	9.50%
Others	1,716	16.30%	3,254	14.20%	13.70%
Total	**10,526**	**100.00%**	**22,924**	**100.00%**	**16.80%**

Source: Export Promotion Bureau

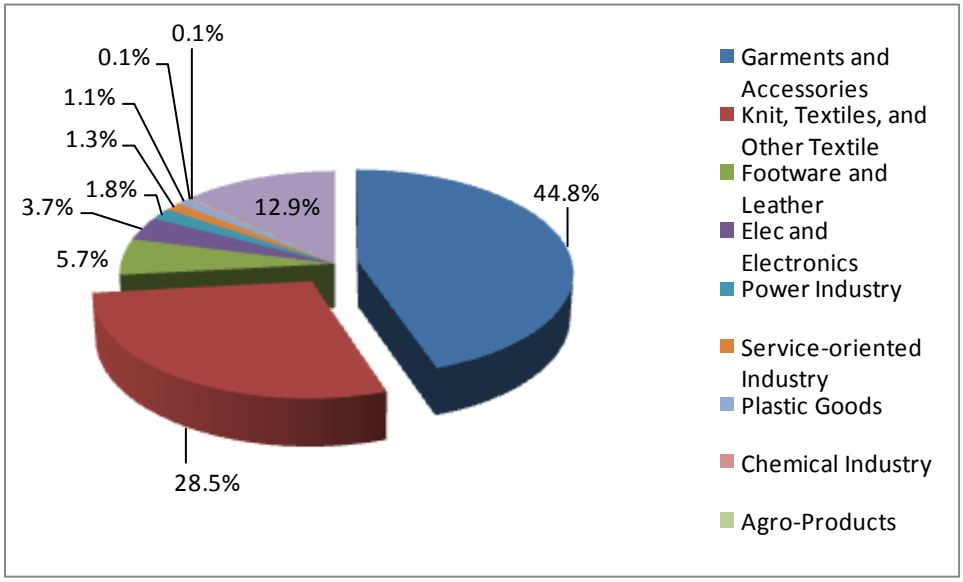
This export led growth has had a significant positive impact on domestic economic activities. Recently it was reported that per capita income surpassed US$1,000 according to the revised national statistics. During this course of growth, domestic market oriented sectors have grown significantly. They include, among others, the construction sector, suppliers of construction materials, food processing, the light engineering sector (bicycles, rickshaws, and motorcycles), electric and electronic appliances and so on. These sectors will play further important roles as the country approaches the middle income status envisaged in Vision 2021.

Dhaka and Chittagong are the venues for the growing manufacturing sectors. Dhaka attracts all kinds of business investment during the course of growth and formed clusters of many manufacturing sectors including garment and textiles, pharmaceuticals, ceramics, food processing, and so on. Chittagong is the location of the country's heavy industries like steel making, shipbuilding, urea fertilizer production, oil refining, and others. Of course, Chittagong, as the second largest city, has a wide range of export sectors, but the magnitude of each sector producing export products is small as compared to each corresponding sector in Dhaka. The corridor connecting the two cities is also economically flourishing to host various growing sectors like steel, cement, garment and so on. The other regions, which cover the vast territory of Bangladesh, are still predominantly rural areas with economic activities limited to agriculture and fishery.

In the light of aggregate investment by manufacturing industry up to 2012, a large amount of investment emanates from the garment and textile industry, followed by footwear and leather, electric appliances and electronics, etc. The garment and textile industry accounts for 73.3% of total investments into the Export Processing Zones (EPZ). The share of the EPZ investments for footwear and leather and electric appliances and electronics is 5.7% and 3.7%, respectively[203].

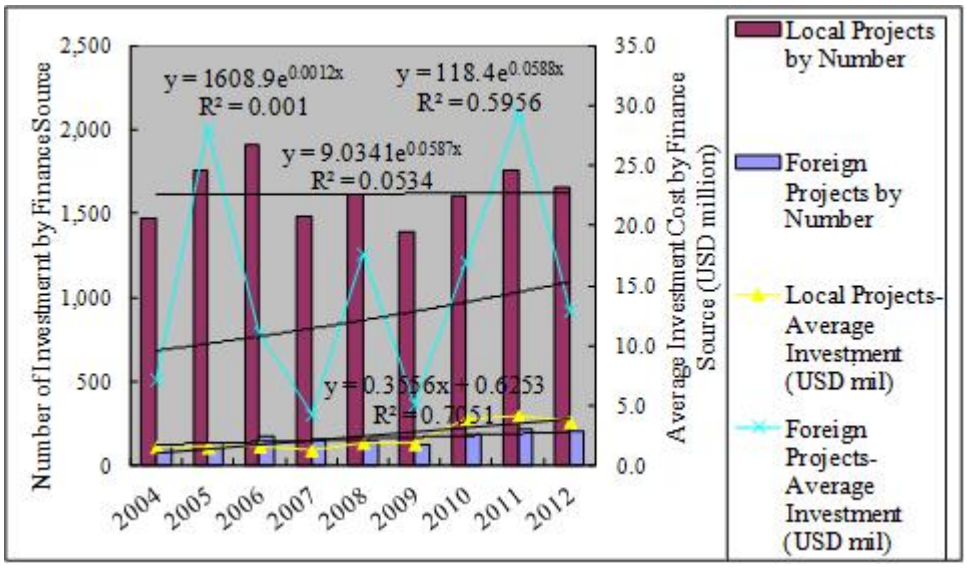
[203] Source: The Ministry of Finance, Finance Division, *Economic Review,* 2013, p. 133

Figure 2.2.1.1-1: EPZ Investment by Industry up to July 2012



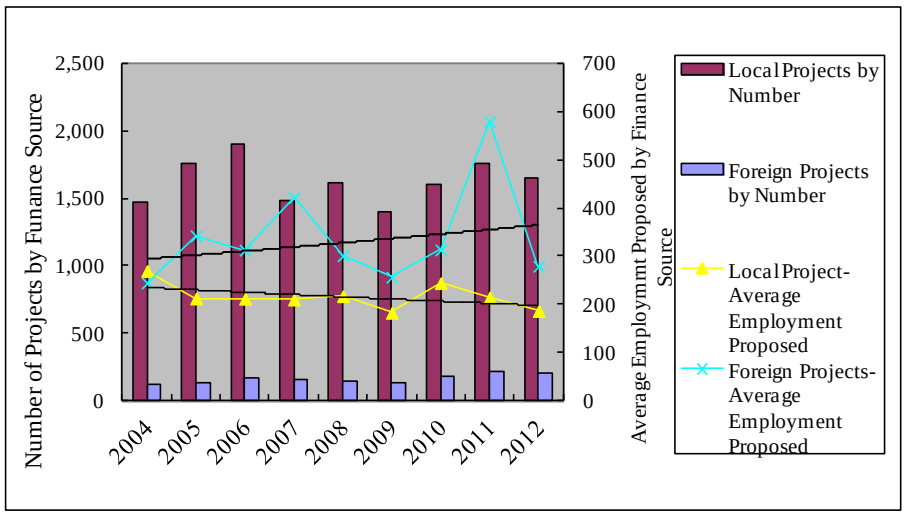
Both local and foreign firms and their joint ventures registered at the Investment Board of Bangladesh revealed a profound and steady evolution of growth by number and investment value as well as by employment in the last decade. During this period, local and foreign firms posted average annual growth rates of 11.1% and 7.6%, respectively in terms of investment value, subject to somewhat periodic fluctuations. The number registered at the Board increased at 6.7% for foreign firms and 1.5% for local firms annually. These chronological transitions are shown in Figure 2.2.1.1-2, where the exponential approximate equations are derived as $y = 1{,}608.9e^{0.0012x}$ ($R^2 = 0.001$) for foreign firms and $y = 118.4e^{0.0588x}$ ($R^2 = 0.5956$) for local firms.

Figure 2.2.1.1-2: Number and Average Investment Costs by Registered Local and Foreign Firms



Likewise, the growth trends of employment proposed to be created by both foreign and local firms were steady, as depicted below as Figure 2.2.1.1-2, where the exponential approximate equations are derived as $y = 239.63e^{-0.022x}$ (R^2 =0..2416) for foreign firms and $y = 286.03e^{0.0269x}$ ($R^2 = 0.076$) for local firms.

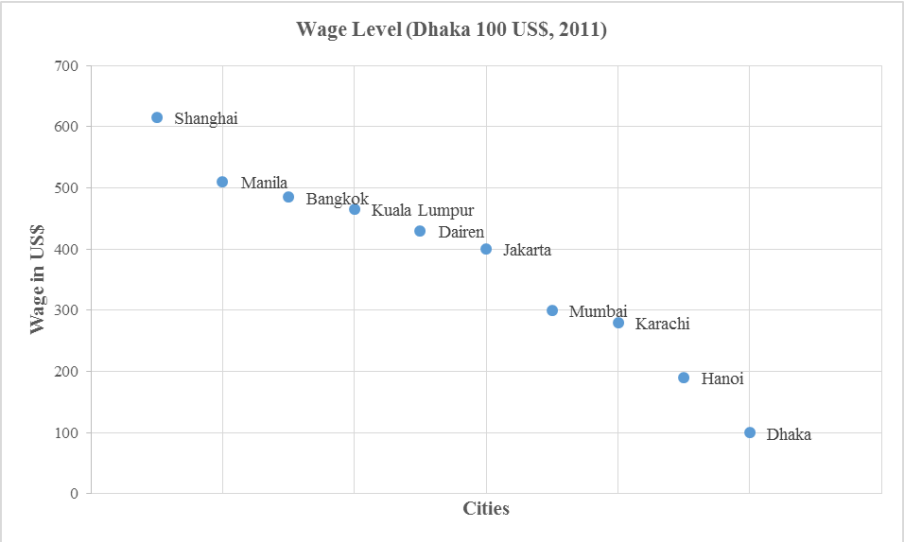
Figure 2.2.1.1-3: Number and Average Employees by Registered Local and Foreign Firms



2.2.1.2 The Next 20 Years

Bangladesh's wage level is one fifth of that of China and is the lowest among ASEAN countries other than Myanmar. All indications point to the relative wage competitiveness of Bangladesh to China, India, and the ASEAN countries remaining the same over the next two decades. Consequently, Bangladesh is expected to continue to attract export oriented labour intensive industries which are expected to increase both in volume and in types of business.

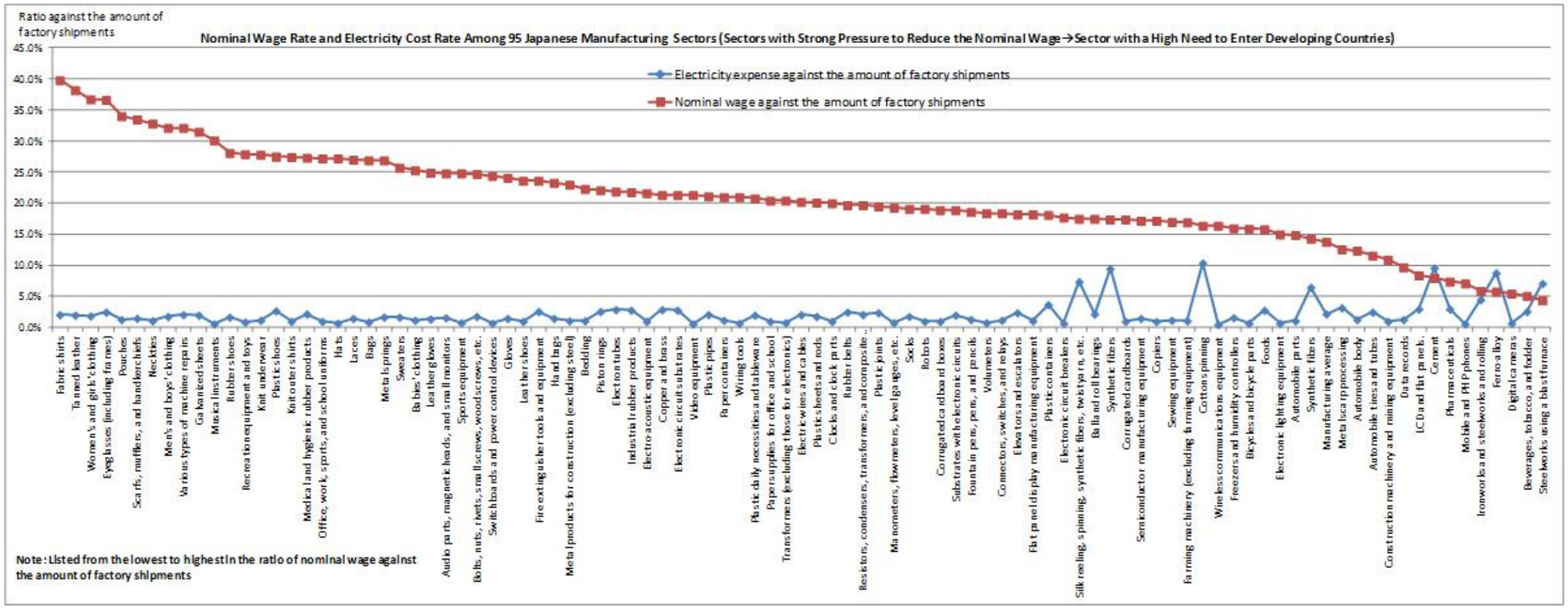
Figure 2.2.1.2-1: Wage Level among Major Asian Cities (2011)[204]



This export growth will be fed back to the country's economic activities through the following three channels: import substitution of materials, parts and machinery, production expansion of domestic market oriented sectors, and.introduction of new types of business requiring higher skills and more sophisticated technologies. This chain reaction of industries is already visible in many areas of business. The scope and scale of this interaction are on the path of expansion and intensification in the next two decades, involving energy, capital, and knowledge intensive sectors. The figure below shows a wide variety of Japanese industries in terms of usage of electricity and labour.

[204] Source: JETRO, Comparison of annual actual wages in major cities in Asia in 2011

Figure 2.2.1.2-2: Wage and Electricity to Total Factory Shipment Cost of Representative Japanese Manufacturing Sectors



Based upon the current situation of Bangladesh industries and experiences learned from the cases of industrialization in ASEAN countries, the types of industries envisaged for the Bangladesh economy are summarized in Figure 2.2.1.2-3 in five year intervals over the next two decades. The garment industry will continue to dominate Bangladesh economic scenes. But other sectors such as pharmaceuticals, ceramics, and IT related sectors will become important emerging sectors in overall Bangladeshi exports. Construction materials and food processing will continue to expand under a rapidly growing economy.

Per capita income was reported recently to have surpassed US$1,000 in Bangladesh and it could reach over US$2,500 (passing the current income level of the Philippines) in the next twenty years if it grew at the current rate[205]. In the second five year interval starting from 2020, manufacturing of motorcycles, electric appliances and other consumer durable goods will be intensified to meet rapidly increasing demand. Similar things will happen for the sectors of automobile parts and components, precision machinery, and other parts and machinery. These sectors will not be confined to local markets for their operation, but are expected to invest and expand production in their strategies for regional and global markets. International automobile assemblers will invest in Bangladesh from the same perspective in the middle of the second five year interval. During the same timeframe, ship builders will come to construct medium-size vessels for export market.

The automobile industry will be an important driving force to change the industrial structure of Bangladesh, destined to become a middle income country sometime during the third interval starting in 2025. Various metal fabrications and steel making will start to supply products to the automobile industry and others, using imported steel and metal products. And then those imports will be replaced by domestic production. Basic materials such as non-ferrous metals and chemicals will be produced on a large scale to meet increasing domestic demand. Many other industries, which did not exist in Bangladesh and therefore required the reliance on import, will have emerged by then. In the final stage of the next two decades, Bangladesh will produce steel from imported iron ore through a blast furnace process. By that time, the steel consumption of Bangladesh will exceed Thailand's current demand.

[205] The per capita income is extrapolated based upon the current US$1,000, assuming the real economic growth of 6.0% and the population growth of 1.2%.

Figure 2.2.1.2-3: Major Manufacturing Sectors of Bangladesh from 2015-2034

Sectors/Year	2015 – 2019	2020 – 2024	2025 – 2029	2030 – 2034
Garment & Textile	←	—	—	→
Leather Products	←	—	—	→
Pharmaceuticals	←	—	—	→
ICT	←	—	—	→
Tableware/ceramics	←	—	—	→
Construction Materials	←	—	—	→
Food Processing	←	—	—	→
Light Engineering	←	—	—	→
Ship Breaking	←	—	—	→
Shipbuilding - Small Vessels	←	—	—	→
Shipbuilding - Medium Size Vessels		←	—	→
Shipbuilding - Large Vessels			←	→
Steel Making - Induction Furnace	←	—	—	→
Steel Making - Blast Furnace				↔
Bicycle & Motorbike	←	—	—	→
Automobile Parts		←	—	→
Precision Machinery		←	—	→
Automobile Assembly			←	→
Non-ferrous Metals			←	→
Chemicals			←	→

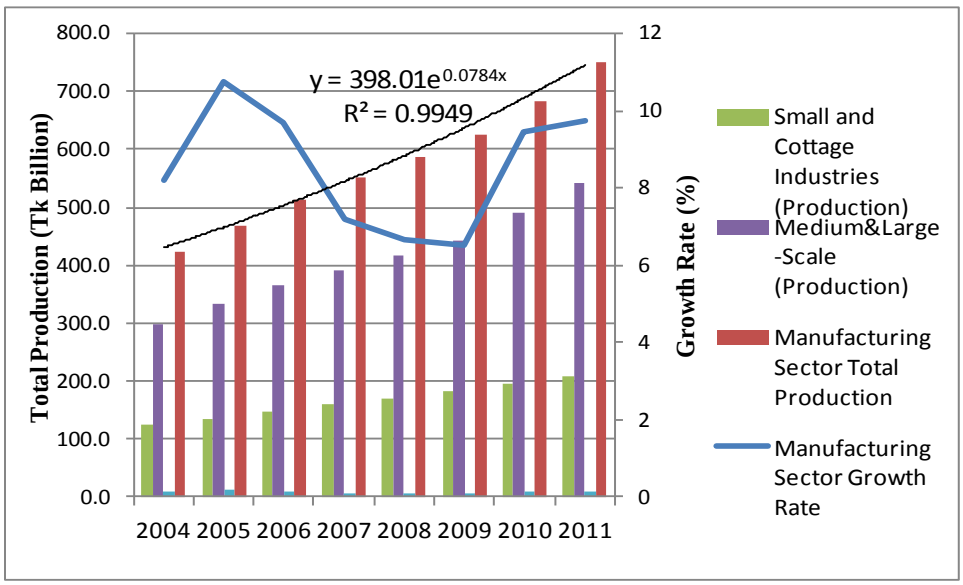
Many constraints and obstacles need to be eliminated to realize this scenario of industrial development. Basic physical infrastructure such as roads, jetties, power generation and transmission facilities, among others, need to be developed to sustain expanding economic activities. The various forms of soft infrastructure of doing business with fluidity will need to be in place. Strategies and policies need to be formulated and implemented to promote foreign direct investment and allocate limited resources to priority sectors. Through this series of actions, Bangladesh will further climb the ladder of industrialization.

2.2.1.3 Envisaged Growth of the Manufacturing Sector and Export Processing Zones (EPZ)

Evolution of the manufacturing sector (small and cottage industries, medium and large scale industries and the aggregate) over the past 7 years (FY 2004-11) are depicted in Figure 2.2.1.3-1, where the approximate exponential equation is derived as $y = 398.01e^{0.0784x}$ ($R^2 = 0.9949$) for the total sector production[206]. With this, the growth rate of the manufacturing sector would remain at around 7.8 % in the future, on a *Ceteris Paribus* basis)

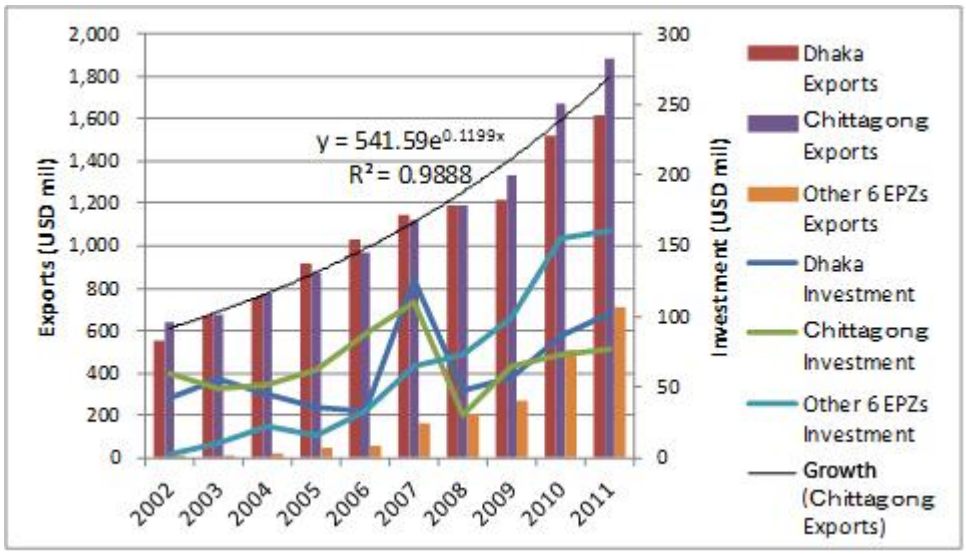
[206] Source: The Ministry of Finance, *Op., Cit,* 2013, p. 117

Figure 2.2.1.3-1: Manufacturing Sector Nominal Production and Growth (2004-2011)



Likewise, Dhaka and Chittagong EPZs posted the annual average growth of manufacturing goods exports at 11.9 percent ($y = 541.59e^{0.1199x,}$ $R^2 = 0.9888$) and 11.3 percent ($y = 541.84e^{0.1129x,}$ $R^2 = 0.9666$), respectively[207].

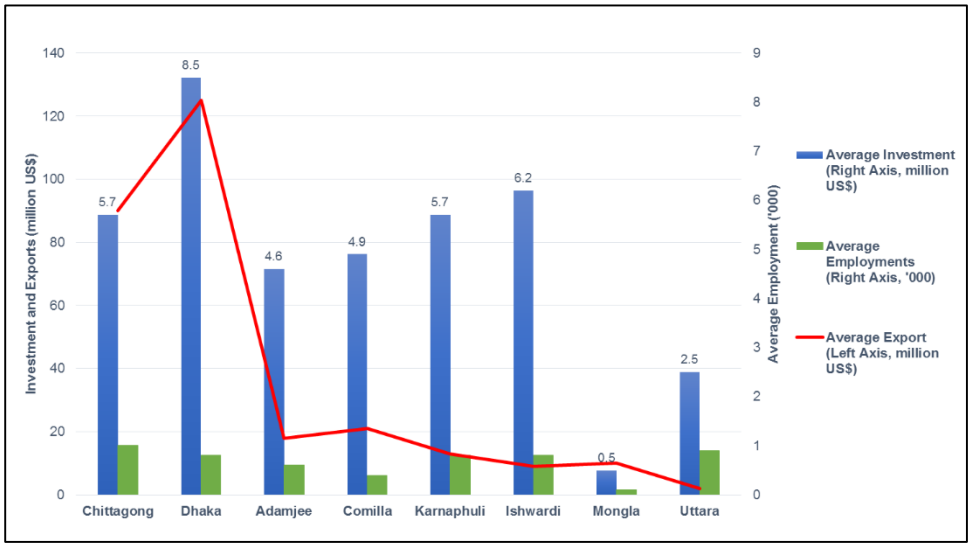
Figure 2.2.1.3-2: Manufacturing Sector Exports from and Investment Growth in EPZs (2002-2011)



Note that up to June 2012, the average investments, exports and employment per operating unit (406 units in 6 EPZs) are USD 6.1 million, USD 73.0 million and 0.8 thousand, in that order[208].

[207]Source: The Ministry of Finance, *Op., Cit*, 2013, p. 134
[208]Source: The Ministry of Finance, *Op., Cit*, 2013, p. 133

Figure 2.2.1.3-3: Average EPZ Investment, Export and Employment in Aggregate (2002-2011)



2.2.1.4 Brief Description of Major Sectors

The current situation of major manufacturing sectors and their future prospects are briefly described below in the context of relevance to the three special economic zones.

Garment and textile sectors

Bangladesh is the second largest exporter of garments in the world with its share of 4.8%. China, still the market leader with over 37% of world trade, is now facing rapidly rising labour costs, which have already reached the level for garment companies to consider shifting manufacturing bases. If garment manufacturing, equivalent to 5% of the world garment trade, shifts from China to Bangladesh, garment production in Bangladesh will double by the simple arithmetic in a very brief timeframe. This is not a remote "if." It is the fact now well under way.

Fabrics for knitwear are almost all made domestically, but woven fabrics remain mostly imported. Domestic production will supply around 40% of woven fabric consumed in the garment sector. There are around 100 large textile mills whose land usage exceeds 20 ha. Although they have huge potential demand in front, they are not able to expand production as they are constrained by the inavailability of land with good access to power and natural gas. Large companies are ready to expand if such land were available.

Garments and textiles produced in Bangladesh have been mainly concentrated in low end products. The companies are eager to produce more value added products, which would cause an increase in labour cost[209]. During the process of garment manufacturing shifting from China to Bangladesh, thecompanies intend to not only seize greater market share in terms of sales volume for their low end products for 15-20 years, but also penetrate into the highend product market. This might improve profitability of their investment.

[209]Labour cost in the case of EOS Textile Mill in the Dhaka Export Processing Zone increased by around 10% annually over the last five years: Daily wage increased from BDT 70 in 1998 to BDT 300 in 2013. The current pay check for workers including basic salary, allowance and fringe benefits is BDT 5,000 (USD 64) for unskilled workers, BDT 11,000 (USD 142) for supporting staff and BDT 30,000 (USD 386) for professional staff. Wage increases are being accelerated recently due to the rising demand for workers in the sectors.

Ceramics

The Bangladeshi ceramic sector produces export quality porcelain. Monno, the industry leader in table ware with a 50% domestic market share, is exporting its products to over 150 countries. There are fifteen ceramic table ware manufacturers in Bangladesh, geographically concentrating mainly in the Dhaka region with a few factories in Chittagong. FARR Ceramics is another major manufacturer in this sector with a domestic market share of around 25%. Shinepukur Ceramics produces mainly for export markets.

The competitive edge of ceramic table ware is low price for quality products which is derived from low cost skilled labour and natural gas. Major companies are carrying a backlog of orders and therefore they are ready to expand production capacity. However, the availability of a large plot of land and natural gas becomes a serious constraint for expansion.

Other major subsector of ceramics covers tiles and sanitary ware. Bangladesh has 14 manufacturers in this sector, geographically concentrating mainly in the Dhaka region with a few factories in Chittagong. Leading companies are RAK Ceramics, Star Ceramics and AKIJ. Their products are predominantly tailored to domestic markets. Facing rapidly increasing domestic demand, many companies of this sector have a strong appetite for new plots of land with good access to natural gas. Star Ceramics was established in 2012. After construction of Star's ceramic factory, no construction of ceramic factory has been reported in Bangladesh due to the new government order restricting new gas connections for industrial use in Bangladesh.

Food processing

Frozen food, primarily shrimp, has been a large export item after garments and textiles. Bangladesh is also exporting various food processing products worldwide including juice, jam, jelly, bakery, mustard oil, etc. The food processing sector is finding more market opportunities in domestic markets as the country's income has been increasing. In this business environment, many food processing companies emerged and have grown to large scale companies. Major food processing companies are Pran Foods, ACI Food, and Square Consumer Products, etc.

Capturing this opportunity, food processing companies plan to further increase sales at domestic markets as well as overseas markets. Many companies are now looking for land and raw materials for their expansion.

Shipbuilding

Bangladesh has a long history of shipbuilding because of the extensive water networks running through the country. This generated a large body of skilled workers in shipbuilding, who find opportunities to work in overseas dockyards in Singapore, Middle East, and India. This sector used to serve domestic markets alone. However, after Ananda Shipyard & Slipways (Ananda) successfully delivered two 2,900 DWT multipurpose vessels to Danish Stella Shipping in 2008, Western Marine Shipyard (WMS) followed with an order soon thereafter. Ananda has been shifting its attention and associated resources to overseas markets. So far twenty vessels have been exported from Bangladesh with a value of over US$100 million.

Ananda and WMS are the only ship builders which have exported vessels so far. But there are other ship builders along the Karnaphuli River that are capable of producing export quality vessels. They formed the export oriented ship builders association which has ten members at present. If the eight other members follow Ananda and WMS's lead in exporting vessels, it is not unrealistic to achieve the association's current objective of capturing 1% of the $200 billion global small vessel market.

Export-oriented ship builders are now constrained by the inavailability of land to achieve this objective. The banks of The Karnaphuli River where ship builders are concentrated are fully occupied and no land is available for their expansion. It is an imminent task for shipbuilding companies to find new sites to expand operations. Many large ship builders envisage building middle size vessels in the medium term. But to do so, they need to find some place along the Bengal Bay since the middle size vessels cannot pass the Shah Amanat Bridge, which is the first bridge from the mouth of the Karnaphuli River.

Although several ship builders started ventures to manufacture shipbuilding components, all steel sheets and almost all shipbuilding components are imported from various countries such as Japan, Korea, China, Singapore, etc. at present. Stock management and transportation cost in connection with the import of these shipbuilding components cause significant cost to shipbuilding companies to offset certain advantages created by the low cost skilled labour available in Chittagong. The export-oriented shipbuilding industry is facing challenges to reduce reliance of imported components. This is the important issue to overcome along with another challenge to procure working capital at a reasonable cost so that the shipbuilding industry will grow to form an export-oriented shipbuilding cluster in the future.

Steel products

The steel demand in Bangladesh is estimated at around 3 million tons per year, mostly MS bars. A leading steel company is BSRM with the production capacity of 0.7 million tons, followed by KSRM (0.4 million tons) and AKS (0.4 million tons). BSRM will increase its capacity to 1 million tons in 2014. The main source of scrap steel comes from ship breaking which is conducted on the north shore of Chittagong. All major steel makers are located near Chittagong.

Pharmaceuticals

Bangladeshi pharmaceutical companies now supply nearly 100% of generic drugs consumed domestically. Accumulating technologies and expertise through the development, some of the companies started exporting generic drugs in 2006. Those companies see further business opportunities in overseas markets and expand their operation in the coming period when many patents for highly used drugs will expire.

Foreseeing hard competition with India which is currently providing active pharmaceutical ingredients (API), key materials for generic drug makers, to Bangladeshi pharmaceutical companies, the pharmaceutical association recently entered into an agreement with the government to develop a 200 acre API park in Munshiganj, 50 Km south of Dhaka. The pharmaceutical sector is expected to grow at an annual rate of 15% to 20% for the coming decade. Pharmaceutical companies need to find locations for their capacity expansion. This will be likely to occur in the Dhaka region since highly educated and skilled manpower, the key to the sector, will be available only there in the timeframe envisaged for the project. The business outsourcing process in the IT industry, another knowledge intensive sector expecting high growth, will also be forced to find venues for their expansion in the Dhaka region from the same reasons.

Motorcycles

The number of registered motorcycles is reported at 1 million as of September 2013 according to the Bangladesh Road Transport Authority (BRTA). It has doubled over the last four years. The ownership of motorcycles is still very low at just over 6 vehicles per 1,000 persons, as compared to the cases of ASEAN countries with a range of 200 to 300 vehicles per 1,000 persons. As the number of middle income people increases and their disposal income rises, annual sales is expected to increase remarkably from the current level of 0.2 million to 1.4 million in the near future.

The motorcycle market used to be dominated by imports of Indian made products such as Bajaj and Hero-Honda. Responding to rapidly growing demand and huge potential markets, Walton, a manufacturer and retailer of electric appliances, started motorcycle production in 2008 and already captured 7% of the domestic market. Runner is another local motorcycle manufacturer in Bangladesh. Many foreign motorcycle manufacturers are interested in development of the Bangladesh motorcycle market. Honda planned to start motorcycle production in Bangladesh in 2013. Suzuki and Mahindra recently announced their intention to step into the local market. Many more foreign direct investments are expected to come in this sector.

Automobile

The number of registered automobiles in Bangladesh is 249,900 for passenger cars and 55,500 for pick-ups as of September 2013. Registered automobiles are mostly of Japanese make, in which Toyota has the dominant share. Over 80% of registered vehicles are reconditioned (used) ones. The overall tariff structure is currently favourable for importation of used cars rather than new ones.

Table 2.2.1.4-1: Number of Registered Motor Vehicles in Bangladesh

('000)

Vehicle Type	Total as of end 2009	Annual Registration			Total as of September 2013
		2010	2011	2012	
Private Passenger Car	196.9	23	13	9.2	249.9
Pick-up	23.3	9	10.5	7.6	55.5
Bus	26	1.8	1.8	1.4	31.9
Truck	73.3	9.5	7.3	4.3	98.4

Source: Bangladesh Road Transport Authority (BRTA)

The current car ownership in Bangladesh is less than 2 vehicles per 1,000 persons, 186th in the world. This is very low as compared to 18 vehicles for India, 30 vehicles for the Philippines, and 165 vehicles for Thailand. Appling comparable indicators in the projection for future demand, the total number of automobiles is calculated at 3.4 million at the end of 2024 in Bangladesh. Bangladesh's annual sales of automobiles are expected to be over 0.3 million in 2014. This calculation is based upon the assumption that Bangladesh will be able to prepare urban road infrastructure at the same level of India and other comparable countries. If this is achieved, annual automobile sales will increase more than ten times over the next decade. However, this size of the market is still too small for foreign automobile companies to seriously consider investments for Bangladesh domestic markets alone.

Bangladesh has one small state-owned knockdown plant of PRAGOTI near Chittagong. It assembles fewer than 1,000 units/year of Mitsubishi Pajero and minibuses of Tata and Eicher. There are no automobile parts manufacturers in Bangladesh and thus all parts and components required for repair and maintenance of automobiles have to be imported. Mitsubishi announced a plan of manufacturing Mirage type small cars for local markets. Walton also announced a plan to manufacture pick-ups and small-size vehicles in 2015. The level and types of their investments would be unlikely to lead to automobile clusters which can be found in Thailand. International automobile companies have to come to Bangladesh in full force.

Given the size of Bangladesh's domestic market, international companies would come only if those investors see manufacturing in Bangladesh from the perspective of the manufacturing base for the regional or global markets. In order to make this happen, figuring out a viable development policy for the automobile industry with well-considered market goals will play a critical role indetermining any eventual success. There are already good precedents for this in the countries like Thailand, South Africa, etc. By implementing the development policy successfully, Bangladesh would be able to establish automobile clusters, which will bring fundamental changes to the industrial structure of the country.

Electrical Appliances

Bangladesh has witnessed rapid growth of consumer electrical appliances as the number of middle income people increases. But the ownership level is still very low and there is huge potential demand to be realized in the coming decade. The ownership per 1,000 persons is 1.4 refrigerators and 0.5 air-conditioners at present. Based upon the figures of comparable countries, the number of both refrigerators and air-conditioners is calculated to increase fourfold over the next decade: 0.8 million refrigerators and 0.3 million air-conditioners at the end of 2024.

To capture the increasing markets, Walton started manufacturing refrigerators in 2008 and air conditioners in 2010. Utilizing its extensive dealer network, Walton successfully increased sales in domestic markets. Its market share of refrigerators was reported to have reached 70% of the domestic market in 2012. Currently key parts and components of electric appliances are all imported. As its production increases, Walton is expected to increase the ratio of local manufacturing in electric appliances to reduce manufacturing costs and to increase value addition.

2.2.1.5 Next 20 year Industrial Land and Economic Zone Land Demand

Current Investment Trend of Bangladesh

Table 2.2.1.5-1: Investment & FDI for a recent 10 year Period

Financial Year	Number of Local Investors	Amount US$ (million)	Number of FDI & JV	Amount US$ (million)	Number of Registered Companies	Amount US$ (million)
2001-02	2,875	1,531	89	302	2,964	1,833
2002-03	2,101	2,027	104	359	2,205	2,386
2003-04	1,624	2,356	130	460	1,754	2,816
2004-05	1,469	2,319	120	864	1,589	3,183
2005-06	1,754	2,730	135	3,794	1,889	6,524
2006-07	1,930	2,825	191	1,711	2,121	4,536
2007-08	1,615	2,798	143	785	1,758	3,584
2008-09	1,336	2,467	132	2,123	1,468	4,509
2009-10	1,470	3,931	160	890	1,630	4,821
2010-11	1,746	7,748	196	5,104	1,942	12,852
2011-12	1,735	6,679	220	4,470	1,955	11,148

Source: BOI Annual Report of 2012

The investment used to be from $3 to $5 billion per year from 2003 to 2009 but the investment jumped in 2010 to over $10.0 billion and remains at a high level until now. Taken as an average of the two years (2010 and 2011) as the base for understanding - local investment was $7.2 billion and FDI was $4.8 billion

Among the total investment, the manufacturing sector was 76% of local investment and 11% of FDI investment respectively. Therefore, the total manufacturing investment in 2012 is estimated as $6.0 billion.

Industrial sector growth is 9.5% for the 2011-2012 period, and, the Study Team assumes that trend will continue through 2015. The manufacturing investment will reach $7.8 billion by 2015.

Assuming the Economic Zone (EZ) program will start during 2014-2015; the manufacturing investment will increase from the current 9.5% to 12% for the period 2015-2020, 15% during 2021-2025, and 15% during 2026-2030 and slow down a bit to 12% in the years 2031-2035.

Investment in manufacturing will increase to $13.74 billion by 2020, $27.64 billion by 2025, $68.40 billion by 2030 and $137.6 billion by 2035.

Average investment of the EPZ is $6.1 million; land requirement is 1.5 hectare with 800 workers and export of $73 million/year. Land demand for the manufacturing sector will be estimated.

Development Scenario for Bangladesh Manufacturing (2015 to 2035)

Base Case: Assuming the stability of the Bangladesh economy continues, and that the Economic Zone Program constructs several coal-fired power plants assuring stable power from 2015, and rapidly expands developing 50 EZs by 2030, the growth of the manufacturing sector will continue the past trend of 9.5% for 2013-2015, but start to accelerate to 12% for 2016-2020, and reach 15% for the 10 years between 2021-2030. After the peak period of 10 years, the growth will slow down to 12% during 2031-2035 and to 10% during 2035-2040.

Pessimistic Case: Assuming the stability of Bangladesh economy continues, but that the Economic Zone Program fails to develop any power plants, a stable power supply will be available from 2015, but the program will expand slowly reaching only 10 EZs by 2030, the growth of the manufacturing sector will continue the past trend of 9.5% during the period 2013-2015, but start to increase to 10% during 2016-2020 and reach 12% during the period 2021-2030. After the peak period of 10 years, the growth will slow down to 10% during 2031-2035 and to 10% over the years 2035-2040.

Optimistic Case: Assuming the stability of Bangladesh economy continues, and that the Economic Zone Program constructs over 10 coal-fired power plants assuring stable power from 2015 onward and successfully expands, reaching 100 EZs by 2030, the growth of the manufacturing sector will continue the past trend of 9.5% for the period 2013-2015, but will jump to 13% during 2016-2020 and reach 16% during 2021-2025, peaking at 18% during the years 2026-2030. After that peak period of 5 years, the growth will slow down to 16% during 2031-2035 and to 13% over the years 2035-2040.

Table 2.2.1.5-2: Basic Assumptions for Three Manufacturing Development Scenarios

Period	2012	2015	2020	2025	2030	2035
Base Case	9.5%	12%	15%	15%	12%	10%
Pessimistic	9.5%	10%	12%	12%	10%	10%
Optimistic	9.5%	13%	16%	18%	16%	13%

Base Case

Table 2.2.1.5-3: Manufacturing Investment and EZ Land Demand in Hectare for Base Case

Period	2012 (Base)	2015	2020	2025	2030	2035
Manuf. Invest. (Bil.US$) Base Case (%)	6.0 9.5%	7.8 12%	13.74 15%	27.64 15%	68.4 12%	137.6 10%
Factory No Land Demand	984 1,476	1,278 1,917	2,252 3,378	4,529 6,794	9,110 13,665	16,052 24,078
Share of EZ		50%	60%	80%	80%	80%
EZ Demand (Ha)	738	959	2,027	5,435	10,932	19,262
EZ Land D for 5 year period (Ha)	2012-15 1697	2016-20 7,465+(849) 8314 () is back log of 5 y	2021-25 18,655	2026-30 40,917	2031-35 75,485	

(1) Number of factories: 984 in 2012, 1,278 in 2015, 2,252 in 2020, 4,529in 2025, 9,110 in 2030 and

16,052 in 2035.

(2) Industrial land demand (Assuming an average factory is 1.5 ha) is 1,476ha in 2012 and increase to 1,917 ha by 2015, 3,378 by 2020, 6,794by 2025, 13,665ha by 2030 and 24,078 ha by 2035.

(3) Assuming the share of EZ is starting 50% and gradually increases to 80% by 2025 and remains at 80% as other ASEAN countries.

(4) Then, EZ land demand is estimated to be 738 ha in 2012, 959 ha by 2015, 2,027 ha by 2020, 5,435 ha by 2025, 10,932 ha by 2030 and 19,262 ha by 2035.

(5) For a 5 year period land demand is estimated taking average of 5 years multiplied by 5. For 2015, it was considered that backlog of EZ land demand (849 ha) is 50% of the 2012-2015 period, EZ land demand to be added due to the backlog which was not implemented due to shortage of suitable EZ or other industrial land.

(6) Based on the above assumptions, the EZ land demand for 2015-2020 is estimated to be 8,314 ha, for 2021-25 - 18,655 ha, 2026-30 - 40,917 ha, and for 2031-35 - 75,485 ha respectively. Even now in the 2012-2015 period, 1,697 ha is the potential demand for EZ. It is urgent for Bangladesh to seriously take necessary actions to implement the EZ Program as soon as possible.

Pessimistic Case

Using the same methodology, the pessimistic case is estimated below:

Table 2.2.1.5-4: Pessimistic Case Manufacturing Investment and EZ Land Demand in Hectare

Period	2012 (Base)	2015	2020	2025	2030	2035
Manuf. Invest. (Bil.US$) Growth (%)	6.0 9.5%	7.8 10%	13.74 12%	27.64 12%	68.4 10%	137.6 10%
Factory Number Land Demand	984 1,476	1,278 1,917	2,059 3,089	3,628 5,442	6,392 9,588	10,298 15,447
Share of EZ	50%	50%	60%	80%	80%	80%
EZ Demand PS (Ha)	738	959	1,853	4,354	7,670	12,358
EZ Land D for 5 year period (Ha)	2012-15 1,697	2016-20 7,030+(849) 7,879 () is back log of 5 y	2021-25 15,518	2026-30 30,060	2031-35 50,070	

Optimistic Case

Using the same methodology, the pessimistic case is estimated below:

Table 2.2.1.5-5: Manufacturing Investment and EZ Land Demand in Hectare

Period	2012 (Base)	2015	2020	2025	2030	2035
Manuf. Invest. (Bil.US$) Growth	6.0 9.5	7.8 13%	13.74 16%	27.64 18%	68.4 16%	137.6 13%
Factory Number Land Demand	984 1,476	1,278 1,917	2,354 3,531	4,943 7,415	11,310 16,965	23,752 35,628
Share of EZ	50%	50%	60%	80%	80%	80%
EZ Demand OP (Ha)	738	959	2,119	5,932	13,572	28,502
EZ Land D for 5 year period (Ha)	2012-15 1,697	2016-20 7,695+(849) 8,544 () is back log of 5 y	2021-25 20,128	2026-30 48,760	2031-35 105,185	

Summary of the projected three cases of EZ land demand in Bangladesh for 2015-2035 is shown in the Table 2.2.1.5-6 below. For our EZ land demand for 2015-2035, we shall use the base case as the most likely scenario.

Table 2.2.1.5-6: Economic Zone (EZ) Land Demand in Hectare

Year	2012-2015	2016-2020	2021-2025	2026-2030	2031-2035
Pessimistic	1,697	7,879	15,518	30,060	50,070
Base Case	1,697	8,314	18,655	40,917	75,485
Optimistic	1,697	8,544	20,128	48,760	105,185

Source: WB Study Team

2.3 Site Specific Industry Assessment

2.3.1 Current Situation

The Anwara site is designed to be a shipbuilding economic zone because the location was identified as suitable for a water front industrial zone and recommended to be in the first batch of candidates for special economic zones by the Association of Export-oriented Shipbuilding Industries of Bangladesh (AESIB). This section focuses only on export-oriented shipbuilding and its related sectors.

Established in 1999, Ananda is a shipbuilding company with the capacity to produce ten 10,000 DWT type vessels annually. It has a ship breaking operation in its yards and also on the north shore of Chittagong. It started manufacturing certain marine equipment and navigational aids for its own vessels. WMS started shipbuilding activities in 1994 under Western Marine Group. It became a separate legal entity with its own slipway in 2000. WMS has five slipways of 10,000 DWT size. It formed a joint venture with the Danish companies, Dan Sea and AS Scan, to start manufacturing hydraulic systems.

Although the two companies started ventures to manufacture shipbuilding components, all steel sheets and almost all shipbuilding components are imported from various countries such as Japan, Korea, China, Singapore, etc. at present. Stock management and transportation costs in connection with the import of these shipbuilding components cause significant costs to shipbuilding companies which offset certain advantages created by the low cost skilled labour available in Chittagong. The export-oriented shipbuilding industry is facing challenges to reduce reliance on imported components. This is an important issue to overcome along with the other challenge of procuring working capital at a reasonable cost so that the shipbuilding industry can grow to form an export-oriented shipbuilding cluster in the future.

The accumulated value of national exports was around US$100 million as of mid-2012 and the national shipbuilder order increased to US$500 million in 2013. Taking advantage of the low cost skilled labour, it is envisaged that the industry will be able to increase vessel exports to US$2 billion over the next ten years - the equivalent of 1% of the US$200 billion world small vessel market. In order to achieve this objective, the sector needs to find large areas of land. The existing shipyards and slipways are reaching full capacity and have little room to expand along the banks of the Karnaphuli River. The Anwara site will provide ship builders with a good location. An expert in the shipbuilding industry said to the Team, “There cannot be any better place in Bangladesh other than Anwara for export-oriented shipbuilding.”

2.3.2 The Future Demand for Domestic Vessels

With the opening of Pangaon ICT (Inland Container Terminal), 3 ships were placed in the Pangaon ICT– Chittagong circuit with a capacity of 128 TEUs each. In the private sector, Ananda Group along with the Rupayan Group, Kumudini Welfare Trust, AK Khan and Company, and Cemcor have received approvals for development of 5 ICTs. These river terminals also need feeder vessels to serve and connect with the Chittagong Port. (5 x 5 = 25 Feeder ships required in addition to 5 more feeder ships for Pangaon = 30 ships in next 2-3 years). Besides the Pangaon ICT, 5 more similar ICTs are planned in the future, which is likely to expand the demand for container and bulk cargo ships.

In the near future, Ashuganj will soon have a multipurpose transit terminal (under Government of India assistance) for handling domestic as well as transit cargo heading for Karimganj through Zakiganj. Again, this terminal shall require induction of at least 7-8 feeder ships for carrying containers and another 5 - 10 ships/barges for carrying general cargo. (12-13 ships in the next 5- 10 years).

In addition, there is a growing demand for passenger launches (ships) to serve between passenger terminals (Ghats) on the riverfront. Though difficult to project exact figures, looking at the benefits of river transport (accessibility, cost, time), a projection of demand could easily reach 10 passenger vessels every three years.

Due to the severe power crisis in Bangladesh, the immediate option is coal-fired power plants at several nodal intervals along the river. Carrying the coal from the stock yards in the ports in and around Chittagong to these power plants upstream will require many barges. These coal carrying barges will be smaller in size (say with capacity of about 2,500 tons) but many in number. It can be assumed that the requirement of such small barges will be the average of 230 per year in the coming next 10 years (based on the development of 10,000MW coal power plants). If the total capacity of power plants upstream is 10,000MW, requirement of coal to feed for these power plants will be 50 Million/ton/year (Required coal is assumed to be 5 million tons of coal per 1,000MW). Assuming using 2,500 ton barges, required round trips will be 20,000. If the round trip requires 7 days, each barge can makes 7.8 round trips per year. Therefore, required barges will be 2,364 vessels in the coming 10 years.

Table 2.3.2-1: Total Projected Demand in the Next 10 Years

Vessel Type	Number of Demands
Container vessels	100-150
General Cargo barges	30-50
Coal carrying barges	2,800
Total	2,930-3,000

Source: WB Study Team

2.3.3 Target Sectors

The Anwara site is on the tip of a small peninsula surrounded by the Sangu River on the east and the Bay of Bengal to the west. The site was identified and recommended as a candidate to be a special economic zone by AESIB, which was looking for large plots of land for expansion and new ventures. There is no infrastructure such as access roads, electricity and water supply at present. The area is prone to cyclones. However, this current waste land can be turned into a water front industrial zone by constructing a Super Dike surrounding the peninsula and dredging a channel to connect to the sea directly, constructing a 250MW coal-fired power plant and improving the road to the Chittagong highway will make the waste land of the Anwara peninsula into an attractive waterfront Economic Zone.

In addition to AESIB's plan to expand shipbuilding operations, it intends to invite a large number of shipbuilding components companies from Japan, Korea, Germany, and other countries. AESIB envisages those companies, based in Anwara, will export their shipbuilding components to other countries, taking advantage of the low-cost skilled labour available in Chittagong. Through those investments, export-oriented ship builders will be able to reduce shipbuilding costs and contribute to further vessel exports. This cycle will create a shipbuilding cluster in Anwara. The Team sees that the plan is challenging but achievable if basic infrastructure is put in place. This is a challenge to overcome as Bangladesh will transform itself into a middle income country.

Besides shipbuilding and its components, the following four sectors have been selected for the Anwara zone: coal-fired power plant, jetty, electric furnace and cement. Chittagong is worse than any other urban areas of Bangladesh in terms of access to natural gas and electricity due to the situation of the Bakhrabad gas fields whose reserves are reported to be in decline with no substantial new discoveries. This situation is getting so serious that KAFCO, a urea fertilizer plant, had to stop operations occasionally this year due to the lack of availability of natural gas. The main source of power generation in Bangladesh is natural gas. Given the situation of natural gas in the region, Chittagong did not have any construction of large scale power plants over the last decade at least. The availability of electricity is straining industrial activities in Chittagong as its economy grows rapidly.

Therefore, the Anwara zone has to have power generation facilities and its feedstock would be coal. Currently, a 1,200 MW coal-fired power plant is planned in Matarbari near Cox's Bazar with the assistance of the Japan International Cooperation Agency. The project includes construction of a coal storage centre and a deep sea port (14 metre deep) for unloading imported coal. It is scheduled to commence in 2020. After this project starts operation, the Anwara coal-fired power plant will be able to procure coal from this coal storage centre. But until such time, it has to find a way to secure coal from other countries.

A small jetty is also indispensable in the Anwara zone. It will provide for the unloading of imported coal to the power plant. It would also serve the sea transportation of, materials and machinery from Chittagong for the operation of the zone. An electric furnace is included as a target sector since scrap steel will be easily available from the ship breaking site nearby north of Chittagong, as well as from shipbuilding operations in Anwara. A cement plant is included to better utilize ash produced from the coal-fired power plant. The majority of cement plants in Bangladesh are located on the waterfront since the availability of limestone is limited and therefore cement production relies on imported clinkers. The location of Anwara is suited for that purpose and a jetty will be used to unload scrap steel and clinkers.

2.3.4 Other Industries Suitable for the Waterfront Industrial Zone of Anwara EZ

Waterfront Industries: Candidates

Waterfront industries are normally either exported or imported products and relatively costly to transport raw materials or finished products.

Obviously ships are in this category but other products are not so obvious.

Therefore, we start from the major exported and imported products and analyse these products in terms of volume and nature and select a short list of candidates and then check the physical, logistic, and environmental aspects of Anwara EZ area and finalise the candidates.

Assuming the construction of a coal-fired power plant of 250MW and jetties, the Anwara EZ area is an attractive site for a cement industry since one of key raw materials of fly ash from the coal power plant will be available plus a jetty will enable the easy import of clinker and gypsum to the site. Plus,

transporting cement to key markets of Dhaka and other cities along the rivers and coastal area will be easier and less expensive, using small ships directly from the Anwara production site.

1. Step one: Long List of Industries for Anwara EZ

   Export and Import Major Products

   Export & Import have been growing rapidly in the past 5 years at 15% annually from 2006/07-2011/12.Imports reached $34.8 billion in 2011/12 and exports expanded to $24.3 billion in 2006/07 to 2011/12. The trade deficit was about $10 billion. However, overseas worker remittances were more than $10 billion in the same year compensating for the trade deficit.

Table 2.3.4-1: Export-Import Information

Year	Import (Billion US $)	Export (Billion US $)	Year	Import (Billion US $)	Export (Billion US $)
2001-02	8.54	5.99	2006-07	17.16	12.18
2002-03	9.66	6.55	2007-08	20.37	14.11
2003-04	10.90	7.60	2008-09	21.44	15.57
2004-05	13.15	8.65	2009-10	33.66	16.20
2005-06	14.75	10.53	2010-11	35.52	22.92
			2011-12	34.81	24.30

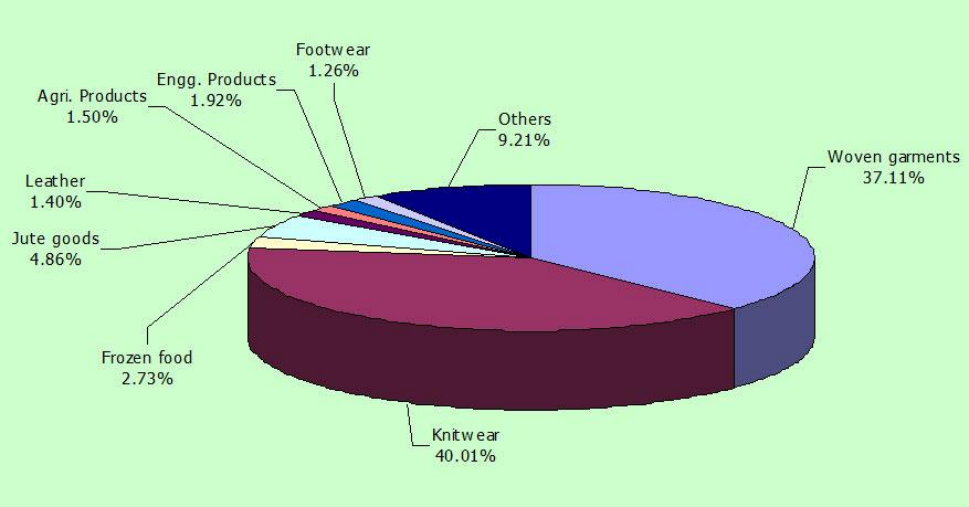
Source: Foreign Exchange Policy Department, Bangladesh Bank, CCI&E and EPB

2. For Export, nearly 77.12% is from garments and followed by jute (4.89%), frozen food (2.73%), Engineering Products (1.92%), agricultural products (1.5%), Leather products (1.4%), and footwear (1.26%).

Figure 2.3.4-1: Export Percentage of Different Sectors

2009-10

01.	Woven Garments	37.11%
02.	Knitwear	40.01%
03.	Frozen Food	2.73%
04.	Jute Goods	4.86%
05.	Leather	1.40%
06.	Agri Products	1.50%
07.	Engineering Products	1.92%
08.	Footwear	1.26%
09.	Other	9.21%



Among the exported products which are mostly the output of light industry, not necessary to be located near the port, perhaps only frozen fish as a product line is a possible candidate. All other products are easy to locate anywhere in the country (foot free industries). Although the shipbuilding business is still small (about $100 million) and does not appear in the statistics, the shipbuilding industry is a possible candidate. If heavy industries like shipbuilding and its component are proposed then the food processing industries will not be a part of the zone.

2.3.5 Major Import Products to Bangladesh

Table 2.3.5-1: Major Import of Bangladesh in million US$

Commodity	2009-10	2010/11	Share (%)
Petroleum	2,021	3,260	9.2
Chemical	972	1,271	3.58
Plastic & Rubber	966	1,319	3.71
Cotton	1,440	2,718	7.65
Yarn	719	1,412	3.98
Textiles	1,986	2,716	7.65
Iron & Steel	1,453	2,032	5.72
Machinery	1,594	2,359	6.64
Grain	837	1,932	5.44
Edible Oil	1,050	1,080	3.04
Total	**33,600**	**35,520**	**100**

Source: Bangladesh Bank, CCI & E and EPB

Major import products are (1) energy (oil), (2) chemical and plastic raw materials, (3) raw materials for Textiles/Garments, (4) Iron & Steel, (5) Machinery, (6) Food raw materials (Grain and Edible Oil) and (7) Others (Cement raw materials and Pulp/paper, etc.).

Import substitution can be possible in a short term and in long term.

1) Petroleum, Chemicals, and Plastic are relatively capital intensive and heavy industries, therefore, not suitable for import-substitution in a short term.
2) Yarn & Textiles are good candidates for import substitution immediately but do not necessarily need to be located at the water front since there are relatively easy to transport and major users are located near big urban areas of the Dhaka and Chittagong industrial corridor.
3) Steel products may be also a good candidate for import-substitution since Bangladesh has 3 million tons of raw steel from the ship breaking industry.

4) Machinery/Automobile is also a good candidate and suitable for a large EZ such as Mirershorai EZ rather than the smaller Anwara EZ, but shipbuilding is most suitable for the waterfront EZ at Anwara.
5) Wheat and confectionary products from imported grain, edible oil from imported palm oil or soybean are also possible candidates for the water front EZ.
6) Cement from imported clinker is also a possible candidate.
7) Paper from imported pulp is a possible candidate in the water front EZ as well.

Table 2.3.5-2: Candidates for Import-Substitution Industries for Waterfront Industrial Zn

No	Import Value 2010-11 $Mil	Suitability of Import Sub-St	For 2015-2025	2026 After	Suitability for Anwara *
Petroleum	3,260	Yes	NO	Yes	NO
Chemical	1,271	Yes	NO	Yes	NO
Plastic & Rubber	1,319	Yes	Yes	Yes	NO
Cotton	2,718	NO	NO	NO	NO
Yarn	1,412	Yes	Yes	Yes	NO
Textiles	2,716	Yes	Yes	Yes	NO
Iron & Steel	2,032	Yes	Yes	Yes	Yes
Machinery (Heavy Industry)	2,359	Yes	Yes	Yes	Yes
Grain	1,932	Yes	Yes	Yes	Yes
Edible Oil	1,080	Yes	Yes	Yes	Yes
Cement,	15,420	Yes	Yes	Yes	Yes
Pulp/Paper		Yes	Yes	Yes	Yes
Total	3,552	12 (Yes)	13 (Yes)	13 (Yes)	6 (Yes)

*Source: WB Study Team * Anwara EZ will be equipped with a 250MW coal-fired power and shall accommodate small to medium sized ships of up to 20,000 tons.*

Based on the analysis for import-substitutions from imported products, six categories - (1) Steel Products, (2) Machinery, (3) Grain processing, (4) Edible oil processing, (5) Cement industry, and, (6) Paper processing industry - are possible candidates.

The table below shows the determinant factors for hosting the target sectors and the often cited industrial sectors in Bangladesh. The shipbuilding sector will be the core target industry in Anwara.

Table 2.3.5-3: Determinant Factors for Selecting Industries for Waterfront Anwara

Industries	Access to Sea	Power Requirement	Linkage to Shipbuilding	Market Availability	Environmental Concern	Land Logistic Requirement	Suitability
Shipbuilding	◎	○		◎	△	△	Yes
Steel	◎	◎	◎	○	○	○	Yes
Machinery	△	○	△	○	△	○	NO
Grain Processing	◎	○	△	○	△	○	NO
Paper	○	◎	△	○	○	○	NO
Frozen Food	○	◎	△	○	△	○	NO

Note: ◎ Indispensable, ○ relevant, △ not relevant
Source: WB Study Team

- Electric Steel Furnace with raw material of scrap and producing steel sheets & other products and casting products will be suitable. The most important factor is that Anwara EZ will have sufficient power supply which is the main input of the Electric Steel Furnace.
- Shipbuilding and ship repair industry will be suitable at Anwara. Ship breaking will be located at

the Sitakunda area with up-grading technology (as per Hong Kong Convention)

- Food processing from imported grain & vegetable oil (Not suitable to mix with heavy industry because of hygiene issues)
- Mixing Fish-processing industry is not also suitable with heavy industries.

Recommended Industry Mix for Anwara based on the Water Front Suitability

- Shipbuilding & ship repair for both domestic and export
- Shipbuilding parts & components for shipbuilding industries and for exports.
- Steel Furnace using electricity from the coal-fired power plant (250MW). Steel products shall be used mainly for shipbuilding for domestic consumption as well as for exports.
- Leather products, automobile parts, pharmaceuticals due to the close proximity of port and huge market demand.

2.4 Market Assessment

2.4.1 Anwara Economic Zone (EZ) Land Demand by Macro Approach

Industrial land demand for Anwara EZ was projected using the investment trend and three scenarios.

Table 2.4.1-1: EZ Land Demand (Hectare) of Chittagong Region and Anwara EZ

Period	2016-2020	2021-2025	2026-2030	2031-2035
Pessimistic	7,879	15,518	30,060	50,070
Base Case	8,314	18,655	40,917	75,485
Optimistic	8,544	20,128	48,760	105,185
Chittagong D Share %	20%	20%	20%	20%
Shear of EZ %	30%	30%	20%	10%
(Anwara EZ Share)	6%	6%	4%	2%
Pessimistic Case	473	931	1,202	1,001
Base Case	499	1,119	1,637	1,510
Optimistic Case	513	1,207	1,950	2,103

Source: WB Study Team

Potential Anwara EZ land demand for the base case is estimated to be 499 hectares for 2016-2020 and 1,119 hectares for the period of 2021-2025. Assuming several EZ projects will be initiated in Chittagong Division in the future; the Anwara EZ is expected to have a few competitors reducing the share of Sherpur EZ land demand for 30% in the 2015-2020 and keep 30% in the 2021 to 2025 period. Yet, the sufficient demand for Anwara EZ is likely to be available and if BEZA/Developer is able to construct a fully serviced EZ with all necessary infrastructure such as a super dike, reclaimed land, channel, power plant, water supply, access road, and telecommunications system, based on the Macro Demand Approach, the Anwara EZ will be able to attract investors to fill up the Anwara EZ within the first 8-year period of 2017-2025. Especially the proposed 250MW coal-fired power plant with captive jetty and coal stockyard is likely to attract shipbuilding & related investors. Actual development & marketing schedule of the Anwara EZ land will determine the actual filling up of the Sherpur EZ. The Macro Approach demand analysis indicates that sufficient potential land demand for Anwara EZ (499 hectares for 2015-2020 and 1,119 hectares for 2021-2025 for the Base Case) exist well above (4 times) the projected EZ land marketing schedule of 440 hectares from 2017 to 2025.

2.4.2 Demand for development land at Anwara

What follows is an analysis of the demand for developed land at Anwara economic zone. We have embedded our presentation of the composition of the demand survey in a context of an ongoing discussion of Anwara's place in the future of the industrialization of the broader Chittagong region. As has already been alluded in some of the preceding discussion, the success factors that drive Anwara's catchet as an investment destination are its proximity to the mega-city of Chittagong, its coastal location, the fact of its already non-negligible accretion of investment by some of Bangladesh's most well-known shipbuilders and power-generation companies and, above all, the close access of some of the industrial icons for Anwara to the ruling elites of Bangladesh. One shipbuilding group of industries has already set up its second yard at Gahira, Anwara. Ananda Shipyards---one of Bangladesh's two largest ship-builders-----has already settled on Anwara as the centre of its own future plans. Bangladesh Marine Academy----the only educational institution in Bangladesh producing trained human resources for the global merchant navies---including naval architects, and ship-hands of various competencies----is located in Chittagong. More than six decades of experience as Bangladesh's busiest sea-port means that Chittagong is Bangladesh's shipping capital, and its catchet naturally reflects on Anwara, creating a kind of bandwagon effect.

Not surprisingly, therefore, shipbuilding enjoys a chart-topping position as a source of demand for Anwara's land. When account is taken of the demand originating from the makers of ship-building parts and components, the dominance of the broader industry of shipbuilding is further accentuated. The evidence is irrefutable that shipbuilding and industrial infrastructure----via the generation of power-----is absolutely key to the viability of Anwara zone.

The prospective demand sourced from merely a sample of businesses is hereby found to be very high then the supply of land (demand is 440 hectares). It goes without saying that the totality of demand for developed land on the Anwara zone will be significantly much larger than merely sample-based estimates. We conclude therefore that JDI's projections of sales of saleable land at Anwara are, if anything, underestimates of the true prospective demand.

2.4.3 Demand Forecast

2.4.3.1 Major Assumptions

The following are assumed in making demand projections for the Anwara zone:

1. All proposed land (public and private land) should be acquired for the project by the end of 2016;
2. All permits including, among others, access rights to water supply and license to generate electricity and to connect power transmission lines will be granted by the end of 2016;
3. A private entity (Anwara Economic Zone Company) will be selected for investment of the zone and the investment agreement between such entity and the government will be entered into by the end of the first half of 2016;
4. A jetty 6 meters deep and 200 meters long will be constructed by the end of 2019;
5. A 250 MW coal-fired power plant will be constructed and commence operation by the end of 2020;
6. The policy of promoting foreign direct investment in shipbuilding components sectors (the Shipbuilding Components Sector Development Policy) should be in place by the end of 2018;
7. The initial unit price of land may start at be $60 per square meter; and the land price may be increased as more demand start pick up as the most of SEZ projects are practiced.
8. The resettlement land should be made before the construction start.
9. However, any reasons, the above tasks are delayed; the implementation should be delayed as much the initial delay as any other projects.

2.4.3.2 Micro Approach for Demand Projections

Based on the Market Demand Survey of 148 interviews, 24 companies with 425 hectares are interested to lease the Anwara EZ plots within 2-5 years. The Macro Demand estimation for the Anwara for the period from 2016-2020 is 473 hectares in the Pessimistic case. Both Macro and Micro Demand Survey indicate that the demand for Anwara EZ is larger than the available leasable land of 430 ha. Based on the Market Demand Survey, the base case demand forecast is projected and summarized in the table below. According to this, all the plots of land (430 hectares) are likely to be sold out within the first four years after the commencement of land sales. Land sales for shipbuilding, shipbuilding components and steel sectors will be completed for the first two years to 2017 while plots for paint, paper, and pharmaceuticals and food processing will be sold over three years to 2020. The timing of investment in the table indicates the signing of an investment agreement, not the completion of factory construction, which normally takes 1 to 2 years.

Under the above assumptions, the base case demand forecast is projected and summarized in the table below. According to this, all the plots of land will be sold out within the first five years after the commencement of land sales. Investors for the small jetty and the coal-fired power plant will have been decided when the sale of lots for other sectors starts. Ship builders will invest and fill the

planned area shortly after construction of key infrastructure is initiated. Investments in cement and an electric furnace will follow. The base case sees that investments from foreign components companies will start as investments from the proceeds of ship builders and will be completed as planned, before 2020. The Shipbuilding Components Sector Development Policy will play an important role for investment from that sector.

2.4.3.3 Specific Industrial Demand Projection

Macro level industrial demand indicates sufficient demand for the Anwara EZ. Anwara will be transformed from the current swampy low land into a safe and dependable water front industrial land by developing a super dike system along with the 250MW power plant and jetties. The depth of the channel will be 6 metres initially and is likely to be deepened in the future.

The main industries are likely to be shipbuilding and related components industries due to the higher export and domestic demand for small ships and components.

The development of the Anwara EZ will depend heavily on two factors: (1) 6 metre channels with jetty and (2) 250MW coal-fired power plants.

Assuming the two key facilities will be developed with a super dike system, several industries that require water front industrial land are likely to be attracted. Among possible water front industries, the shipbuilding industry is likely to be the best candidate based on the trade, investment, and interview survey. The projected demand by these industries is shown below:

Table 2.4.3.3-1: Possible Industrial Demand for Anwara EZ (in ha)

Sector	Area per investment (ha)	2015-2019	
		Number of Investment	Total areas for investment (ha)
Shipbuilding	124.77	2	249.53
Shipbuilding Components	3.909	10	39.09
Steel Mills/Steel Products	6.94	1	6.94
Automobile Parts	1.94	1	1.94
Leather Goods	17.76	1	17.76
Pharmaceuticals	7.86	6	47.16
Total			**362.42**

Source: WB Study Team.
** Various Waterfront industries*

Based on the market demand survey of 107 industries, the expected demand for land at Anwara EZ will focus on the shipbuilding and component industry, likely to dominate all other industries occupying 67% of the entire saleable land of 431.62 ha, followed by power plant/jetty of 15%, pharmaceuticals at 11%, and the leather product industry at 4%.

As the Bangladesh economy starts to grow, various waterfront industrial lands will be required and Anwara EZ is only able to accommodate small number of potential investors. Since there is no alternative water front industrial land in the Eastern Coast area, an additional water front EZ should be developed including the Eastern side to the Anwara EZ after successful implementation of the Anwara EZ.

2.5 Employment Assessment

Based on the planned land use of Anwara, the estimated employment created will be for 47,539 workers when the EZ is fully occupied. Once the 47,539 jobs are created in the zone, an additional 23,770 indirect jobs (normally about 50% of direct employment) are likely to be created in the Anwara area also mainly various services such as transport, retail, health, food, and housing services. The total employment of direct and indirect employment may reach 71,309 workers. Average employment per hectare is anticipated at 110 - which is less than 18% that of Dhaka EPZ and 11% that of Chittagong EPZ.

Table 2.5-1: Employment Estimate for Anwara Economic Zone

Industry & Com	Land Area (Ha)	Employment /Ha	Job Sub-totals
Shipbuilding	249.53	80	19,962
Shipbuilding Components	39.09	200	7,818
Steel Products	6.94	100	694
Automobile Parts	1.94	350	679
Leather Goods	17.76	400	7,104
Pharmaceuticals	47.16	200	9,432
Commercial Zone	3.23	200	646
Power Plant	54.53	20	1,090
Coal Stock Yard	11.44	10	114
Total	**431.42**	**110 (Average)**	**47,539**

Source: WB Study Team
** is estimated from the Bangladesh Industry Examples*

We have checked the Bangladesh employment condition of existing EPZ and found out that due to the limited number of EPZ/Industrial Parks in Bangladesh, occupying factories are economizing on space. As a result, employment figures are much higher than the other countries of South East and South Asian countries. Taking into the special condition of Bangladesh, we estimated the employment estimation based on the final Master Plan and type of industries.

Table 2.5-2: Average employment of existing EPZ and Proposed Three EZs

EPZ	Total Area (ha)	Employment (Jobs in 2013)	Jobs/hectare
Dhaka EPZ	142.48	88,536	621
Chittagong EPZ	183.37	186,064	1,014
Comilla EPZ	108.28	14,966	138
Karnaphuli EPZ	83.6	41,659	498
Sherpur EZ*	88.68	25,446	287
Anwara EZ*	431.42	47,539	110
Mirershorai EZ*	1,705.33	476,678	280

*Source: WB Study Team * - proposed estimation.*

Sherpur and Mirershorai EZ are expected to produce 287 jobs per hectare and 280 jobs per hectare respectively - still well below that of the Dhaka and Chittagong EPZ figures. Anwara EZ is being planned to be more specialized in Shipbuilding & related industries. Therefore, the employment per hectare figure is a bit lower at 110 at the fully occupied and matured stage (normally requiring 10 to 15 years of time).

It has been demonstrated in many cases of other Asian countries that a special economic zone (SEZ) is a strong policy tool to break through the complicated situation of various constraints and obstacles. This study is the first attempt at providing a design of an SEZ and analysing the types and magnitude of potential investors in the selected sites. Learning from other countries' experiences, Bangladesh could have 100 economic zones for its economic development over the next two decades. The area

required for the zones will be 50,000 hectares - approximately 0.03% of the total agricultural land of the country. If achieved, such a magnitude of economic zones could create 10 million new jobs.

Table 2.5-3: Planned Economic Zones and Job Creation

Items/Year	2015	2020	2025	2030	2035
Number of Economic Zones	1	10	40	70	100
Land Area to be Developed (in hectares)	200	5,000	20,000	35,000	50,000
Job Creation	4,000	1,000,000	4,000,000	7,000,000	10,000,000

**all figures are accumulated ones*
***figures are calculated under the assumption that an average size of EZ is 500 hectares and an average job creation is 100,000 persons per zone*

2.6 Evidence of the Strong Potential Demand for Fully Serviced & Efficiently Operating Economic Zones (EZ) Land in Bangladesh

The first three sections (Competitive Analysis, Industry Assessment, and Marketing Assessment) showed much strong evidence, here and there, for the potential demand for fully serviced Economic Zones in Bangladesh. We consider it as the most important assessment of the possible market demand of EZs since the viability of three EZs depends on the possible market demand from all possible angles and factors and not just one or two sources. The major evidence for strong demand for EZ land is summarized as below.

(1) Interview survey result is overwhelmingly positive for EZ development.

The study team made market surveys in Dhaka, Chittagong, Thailand, and Japan for possible EZ land demand by conducting (1) 107 personal interviews, (2) 7 interviews with industrial associations, (3) 3 with EPZs and BEPZA headquarters, (4) with Investment Promotion Agencies (as BOI, JETRO and JICA) and 5 with Local Chambers of Commerce. Nearly all interviews and meetings indicated that fully serviced industrial land is very scarce in Bangladesh since several years and all, without exception, requested BEZA to develop fully serviced industrial land as soon as possible. The most important request/message is delivery of "fully serviced EZs" as soon as possible!

(2) Every month, more than 100 potential investors have been visiting BEPZA asking for additional EPZ industrial land plots. Requests have been increasing every year. BEPZA is now allowing factory expansion vertically upwards into multi-story building as no additional EPZ land is available.

(3) JETRO has been receiving more than 200 inquiries per month in their Dhaka and Tokyo offices for possible investment into Bangladesh. These enquiries were received in 2013 especially for relocation of factories from China and Thailand to Bangladesh.

(4) JICA's survey of Japanese companies (179 companies are seeking relocation from China out of 1,462 Companies), that are operating factories in China, indicates 8% of those companies are interested in relocating their factories to Bangladesh in 2013. This evidence is significant since Bangladesh never appeared on the destination list previously. JICA is now proposing to support the EZ Project by carrying out a Feasibility Study/Master Plan as soon as possible.

(5) Macro Demand Approach indicates 3 to 7 times the requirement of the planned three EZ industrial lands available:

(a) Sherpur EZ: 574 ha during 2016-2020 and 645 ha during 2021-2025,
(b) Anwara EZ: 499 ha during 2016-2020 and 1,119 ha during 2021-2025 and
(c) Mirershorai EZ: 831 ha during 2016-2020 and 1,866 ha during 2016-2025.

In order to expand the industry sector, additional industrial land is essential and the result of the demand analysis show how badly additional fully serviced industrial land is needed in Bangladesh.

(6) All EPZ Land Plots have been nearly occupied recently (by 2013):

Some years back, three remote EPZs (in Uttara, Ishwardi and Mongla), had difficulty in attracting investors. However, since 2010, nearly all the plots in the three remote EPZs have been leased out (93% leased out!) at the end of 2013 - indicating a strong demand for industrial land even in faraway remote locations!

(7) A new phenomenon of multi-story factory buildings in the EPZs and major cities of Dhaka and Chittagong has been taking place over the past several years - indicating a severe shortage of industrial land. The factory buildings have been raised to 5 stories and in some cases to even 10 stories which created the structural collapse problem of some poorly built factory buildings as occurred in the tragedy of Rana Plaza case in 2013. Speedy development of the three EZs is likely to reduce this type of tragedy by guiding factories to build in safer EZ locations.

(8) Increase in the demand of fully serviced EZ land in Bangladesh due to the global economic changes:

Besides the much internal evidence, due to the global economic changes made, Bangladesh, as a possible investment destination of international companies - especially labour intensive industries from Japan, Korea, Taiwan, Thailand, and even from China in the recent years - mainly due to (1) the rapid increase of wages in Asian countries and China in particular, and, (2) policy change of Japan & other Western/Asian countries for investment policy shifting from China to other countries due to the political risk factor. Many companies are looking at countries which have a lower production cost than China or Thailand. Naturally, Bangladesh is one of lowest wage countries and the potential demand has increased dramatically in the past few years.

(9) Several SEZ/EZ international developers and operators are showing keen interest in the EZ business. So far potential developer/operators from UAE, Japan, China, Korea, Malaysia, and Singapore have shown keen interest in investing in EZ project if proper conditions are met. The main reason is that these potential developers smell a business opportunity in the EZ business by the new EZ Act and the global economic changes favouring Bangladesh - especially highly competitive wage levels due to a large labour force and limited employment opportunities in Bangladesh.

(10) Comparative Analysis of various factors indicate that if BEZA/developers are able to develop fully serviced EZ at the proposed cost, (1) Mirershorai EZ is ranked No 1, (2) Sherpur EZ is ranked No 2, (3) Anwara EZ is ranked No 5 out of 7 well known SEZs in Asia and India. The reason is the wage cost of Bangladesh is far lower than any competitor along with planned fully serviced EZ infrastructure with relatively lower cost than other countries. The lower ranking of Anwara EZ is due to the high cost of construction of a Super Dike and reclamation/channel development cost pushing the overall development cost up.

(11) Japan emerged as strong destination for garment exports from Bangladesh:

The export of garments to Japan increased from $173 million in 2010 to $478 million in 2013 - a 2.76 fold increase in 4 years.

Table 2.6-1: Garment Export to Japan (in $ million)

Year	**2010**	**2011**	**2012**	**2013**
Export	173.3	247.5	403.6	478.5

Source: EPB

This rapid increase of garment export to Japan is due to two major factors. First, the cost of production in China, which had been a major garment supplier, increased drastically in the past several years. The average working wage in China is now 5-6 times higher than in Bangladesh (as of 2013). It is but a natural business decision to shift production of garments from China to Bangladesh. The second reason is the worsening of the Japan/China political relationship. The Japanese Government and Private sector initiated a China + 1 policy encouraging Japanese companies to shift supply of manufactured products from China to other Asian countries because of the political risk affecting economic affairs. For Example, Uniqlo Co., which is the biggest garment retailer in Japan, started ordering garment products from Bangladeshi suppliers since 2010. This action by Uniqlo paved way for many other companies to look at Bangladesh as a garment supply country. This trend is likely to promote investments from Japan. That is the reason that Sumitomo Trading Co. started searching for a possible EZ land in 2013 in Bangladesh since many Japanese companies are inquiring for possible investment sites (in EPZ or EZ). Due to the same reason, JICA also started to investigate for a possible EZ Project in Bangladesh in 2013. It is clear that if BEZA/Developers are able to develop fully serviced EZs; many Japanese companies are likely to come to Bangladesh to cope with the China +1 and Thailand +1 policy!

All of the above 11 pieces of evidence indicate that there is a strong demand for fully serviced EZ land by both domestic and foreign investors. The key point for strong demand is based on the fact that BEZA/private developers are able to deliver the promised fully serviced infrastructure with efficient OSS service. If BEZA/private developers are able to develop fully serviced EZ with an efficient OSS system at a competitive sales/leasing price of say$60 (Year 2018-2019) to $70 (Year 2020-2021) per square meters, the investors (both FDI and DDI) are likely to be attracted to the proposed three EZs and occupy the plots in a relatively short timeframe (3-5 years for Sherpur and Anwara EZ and about 10-15 years for Mirershorai EZ - due to the large size lead-time to develop and market). Based on overwhelming evidence for demand for fully serviced EZ land, BEZA should promote at least 10-15 more EZs in the coming years; not just implementing the proposed 3 EZs under the PPP scheme by mobilizing the private sector but also creating EZ land market where EZ land can be transferred freely as in any real estate transaction.

Considering the above strong evidence of potential demand for fully serviced EZ land, BEZA should finalize the “EZ Guidelines” for developer/operators and implement the proposed three EZs as soon as possible as the Pilot EZ projects of Bangladesh. Several more EZs should be considered ASAP even during the initial pilot project implementation because of large demand for fully serviced EZ land. These three EZ projects should be a test case for BEZA/developers to deliver fully serviced EZs quickly and operate effectively adopting an OSS system which is equal or better than Asian OSS standards.

Recognizing a strong potential demand for three EZs, a Master Plan will be prepared.

2.7 Marketing Strategy

In this chapter, an overview of the marketing strategy is presented, showing how Economic Zones in Bangladesh should be packaged and promoted, and the type of materials needed for their start-up. The four elemental questions on marketing strategy relate to:

- Overall strategy, timing, and implementation framework and responsibilities;
- Target markets, countries, and investor profiles;
- Types of promotional tools and materials required;
- Opportunities to coordinate with other promotional agencies in Bangladesh.

2.7.1 Overall Strategy

The term marketing is composed of several related concepts such as product, price, distribution, promotion, etc., but it embodies a task that carries a crucial responsibility, which is often un-focused, that of identifying whether there is a sure market in which to sell the products. The marketing strategist must, at the outset, answer the question – what is the product, and who is it for? In practice, therefore, the most important element in "marketing" is to provide both what the market needs and what the market demands, rather than what is already available in the market. In the Economic Zone project, even though full-fledged infrastructure and services are supplied in the Economic Zone, if there is no identified and/or prospective market for products to sell in Bangladesh, no customer will be interested in investing. Consequently, a demand-side approach, rather than a supply-side approach becomes crucial. More than physical development or legal systems in an Economic Zone, creation of a business environment where market needs for investors are addressed, is the most fundamental element to be considered in a successful marketing strategy. Create a place that embodies uniqueness of purpose. To attract investment, be uniquely attractive in producing a commercial environment that is economically sustainable, socially and environmentally responsible, and politically inspiring for the host country.

Deciding on the contents of the marketing strategy and a timetable for implementation, it is clear that the length of time taken to implement the marketing strategy will vary according to the following three elements:

- The type of marketing strategy
- The number of activities involved
- Their resources available

Strategy is regarded as "a method or plan to attain and maintain a position of advantage over rivals through the successive exploitation of available or evolving resources rather than committing to any specific fixed plan designed at the outset." As the global economy and industrial development have been dramatically changing in structure, the type of strategy to be employed for the marketing of Economic Zones in Bangladesh should be elastic and reflectional in choosing the ideal context for pursuing marketing targets. In order to capture the ever-changing business and industrial environment, phased elements with multiple 'rounds' of feedback should be embedded in the flexible marketing strategy to provide room for updates and additions. The strategy should incorporate reflection on the current changes in the surrounding industrial and business environment.

Figure 2.7.1-1: Diagram of Market Strategy

Therefore, the following chapters include the implementation framework outlining the marketing activities to be employed and the extent of involvement of resources in the context of Bangladesh, together with the investment promotion agencies' responsibilities. In this study, the proposition is in line with the reference from OECD investment promotion and facilitation guidance, which contains international best practices of investment promotion. Success in promotion of the Economic Zone requires a careful calculation of how to employ resources most effectively. It also requires consideration of how to organize investment promotion and marketing activities within the government so that the overriding goal of economic development through improvements in the investment climate remains at the forefront of policymaking.

2.7.1.1 Requirements for BEZA for Formulation of the Marketing Strategy for Economic Zones

A successful marketing strategy to promote investment in each economic zone, the following factors need to be elaborated within BEZA.

- Information gathering (what ways, how effective, improvement measures)
- Stakeholder consultations (policy formulation process to have feedback from relevant stakeholders and government agencies; efficiency and transparency of the process; improvement measures; implementation; gathering of public comments; electronic dissemination tools; timely feedback; availability of an appeals process from business communities)
- Inter-government communication
- Clear, up-to-date information provision on laws and regulations
- Up-to-date database of the target marketing industries

Information gathering - Marketing strategy formulation requires a responsible agency having various sources of information in relation to investment. This task can be accomplished even if new routes of information sources were not established, but many other government agencies like BOI and BEPZA should have the conventional route of information gathering sources. So an information sharing channel must be established for effective use of information sources. Then improvement measures for gathering and using information and a feedback system must be employed, within BEZA.

Stakeholder consultations–A system of regular contact with business communities would enable BEZA to spot business and industrial needs and trends early and begin taking necessary action. Through this system, the need for a change in marketing strategy would become clear and the process of renewing the strategy could be carried out efficiently. The strategy should be sufficiently flexible to allow the responsible stakeholder, which includes other government agencies, to respond to new developments in the Economic Zones.

Inter-government communication - BEZA's ability to resolve problems effectively, in communication with other government agencies, is related to its legal status, mandate and location within government. Political support is critical in overcoming vested challenges, in the provision of leverage for BEZA to impose Economic Zone policy on line ministries and other government agencies. BEZA should be given clear responsibility on behalf of the Prime Minister's Office, as well as other ministries, to develop and perform a sound strategy for investment and to create streamlined procedures for dealing with various business and administrative affairs.

Clear up-to-date information provision on laws and regulations - Laws and regulations may frequently have unintended consequences and confuse business operation. If this is the case in the development of Economic Zones, the situation may become dynamic and sometimes obstructive for prospective investors. Framing good regulatory responses to business activities in the Economic Zones requires clear, up-to-date information provision, including through direct communication with existing and potential investors.

Up-to-date database of the target marketing industries - BEZA should maintain an up-to-date database of the various representative bodies and major players in each industrial and business market. Sufficient time is needed for interested parties to study the situation and trends properly and for BEZA to consider all inputs and comments of concerned business parties.

2.7.1.2 Activities and Implementation Framework

International experience suggests that the following four main elements should be considered as the marketing activities of the implementation agency.

1. **Policy advocacy** among government bodies to seek necessary approvals or urge the removal of obstacles to investment
2. **Image building** through attending trade fairs, organizing seminars, information dissemination via website and publications (advertising and promotional materials) to the business community in the country as well as abroad, promoting the country as an investment destination
3. **Investor servicing or facilitation** to help solve problems faced by existing or prospective investors
4. **Targeting investment generation** by actively seeking out investors based on national development plans or other criteria

Policy advocacy–Since the implementation agency, leading investment promotion and marketing strategy, will be the focal point of contacts from investors, coordination among many ministries concerned with business affairs, and regulation surely remains in the hands of the implementation agency. Different agencies have different points of view and responsibilities and hence might not all see investment proposals in the same way. However, when obstacles arise in the path of investment projects, the implementation agency must act as a diplomat within government, conveying to government the concerns of business and balancing these against the different regulatory imperatives in different agencies. Clear responsibility and power should be assigned to the implementation agency to streamline regulatory procedures for dealing with regular business and management issues.

Image building – Marketing strategy should be reflected in the mission of the implementation agency, with image building, which includes advertising, producing promotional materials and attending trade fairs, etc. The implementation agency often does not have as much funding and outreach staff as they might desire, so establishing priorities for image building is important. As the investment climate becomes sound, attracting investors will require less effort in image building and the need for promotion, servicing and targeting can be reduced at a later stage.

Investor servicing or facilitation - The implementation agency is in the front-line in hearing about adverse perceptions or practical business problems from investors and thus should have a role as

advocate/solution provider for investors within government. Therefore, the implementation agency should seek approval of permits and request fundamental changes to laws and regulations for the good of the investment climate.

Targeting investment generation–The implementation agency's prime role is to attract and promote investment to the country. Arrangement of meetings with each individual potential investor is an important activity, but it may make sense to prioritise such meetings toward strategic sectors focused on, or that can immediately target existing and prospective markets. The set of priority sectors ought to be agreed widely within the government but allow flexibility for investors to explore market accessibility. Also, the gathering investors in one meeting through investment seminars or tours would be cost effective.

The responsibilities of each marketing activity are described below.

2.7.1.3 Responsibilities of Marketing Activities

The responsibility for each marketing activity should lie with respective implementation agencies, required fund and budget allocation, performance evaluation and improvement with supporting measures. Each of the described activities is examined, but in each case of different Economic Zones, different levels of responsibilities even among provincial implementation agencies need to be addressed.

Policy Advocacy - BEZA has responsibility for the dissemination of new EZ developments in registration and legality among different but concerned government ministries and agencies. Different authorities concerned with business administration may at an early stage of implementation hesitate to co-operate with the implementation agency in streamlining the business administration, since they feel their privilege is taken by BEZA. In relation to this, political intervention must be employed to impose the new set of registration and regulatory framework, which shall only bring advantage in Economic Zones. Sustaining this political interest has proved to be a challenge, especially under changing political circumstances. In practical terms, international experience suggests that to be most effective as an advocate within government and to be able to remove obstacles to particular investments, an implementation agency should report directly to the prime minister. In this way, performance evaluation and improvement measures for investment projects are directed and supported by the top political leader of the country. Exchange of experience with other countries to learn about effective advocacy reform and maintaining good relations with government departments, can be accessible through peer networking of investment promotion agencies. This is presented in a later chapter.

Image building - While policy advocacy is an internal affair within the government, image building is an external affair addressing business and industrial communities both at home and abroad. BEZA should employ qualified staff with sufficient training in presentation and investor relations to conduct seminars, trade fairs, international conferences, and media broadcasting. This activity is rather time-consuming but should be a continuous process. A large cost will be involved. Hence the definition of cost and benefit analysis and evaluation should be carefully developed so that selective image building approaches can be planned with funds and budget allocation. The best practices in other countries involve great use of electronic and media instruments in a cost effective manner. Collaboration with other investment promotion agencies should have a positive effect on image building.

Investor servicing or facilitation - BEZA is pledged to establish itself and act as a one-stop-shop for approvals and licensing, but investment projects often require approval from many government agencies and sub-national governments in such areas as land use, labour practices, safety, taxes and customs and environmental impact. In relation to this, BEZA is expected to help expedite decisions in these cases and to offer investment counselling services in (i) securing raw materials; (ii) market access (national or regional); (iii) seeking efficiency; and, (iv) gaining strategic elements for investors

that may need to be integrated. These are important marketing activities for Economic Zones. A One-stop-shop should aim to cater for the needs of both prospective (prior to implementation of project) and already-settled investors (after implementation) on access to information on investment permits and licenses, clearance formalities, application forms and other business administration affairs such as tax, labour and environment clearance. At this stage in the functioning of the one-stop-shop at BEZA, service provision is not necessarily meant to be one-stop-clearance-shop. Due to the pending legal jurisdictional set-up among other departments and authorities, delegation of power to the one-stop-shop at BEZA seems to be still in the processing stage. The competency level of staff at BEZA would need to be further upgraded to perform such clearance functionality. However, the unique institutional structure and mandate given to BEPZA can be referred to as the relevant model for the functioning of a one-stop-shop in Bangladesh. In relation to this, BEZA should, at first, focus on the provision of investor services at headquarters. This would provide a single window of information provision and facilitation and monitoring of business administrative applications on EZ related affairs. To withdraw the delegation of power upon BEZA, remarkable juridical backups on BEZA is required. Then it would only make it possible to appoint representatives situated in either BEZA headquarter or each EZ local office for provision of one-stop-clearance-service. However, this function would depend on the volume of applications and requests from investors. Investors see BEZA as their mediator for proceeding with required business administration. BEZA should comply with its promise to complete all investment approvals within a certain time of license provisions. And, a system to meet the promise should be installed.

Institutional set-up and coordination- There are several government institutes, which have been performing marketing activities for investment into Bangladesh since before the establishment of BEZA. Those institutes are, namely, the Board of Investment (BOI) and the Bangladesh Export Processing Zone Authority (BEPZA). In fact, their experience in marketing activities and networking among peer investment promotion agencies are better than the status of BEZA. As a member of the World Association of Investment Promotion Agencies (WAIPA), BEPZA has good exposure to the investor market through interaction with the community of investment promotion agencies. Furthermore the staff member of BOI and BEPZA have been trained in the field of marketing service provision through participating in overseas business missions, training programs provided by the peer network association and going through actual and practical interactions with prospective and already-settled investors.

Co-operative institutional coordination among BEZA, BOI and BEPZA is required to maximise opportunities for promotion and marketing of EZs and to minimise the duplicate mandate for investment promotion through redundant marketing activities, considering the limited resources available. First of all, a training program for BEZA staff should be considered. Having a good exposure to the networking of peer investment promotion agencies and being a nodal point of contact for investors, BEPZA would be a good organisation for BEZA staff to transfer to temporarily, for training. Acquisition of the sense of an investor-centred work ethic through this kind of orientation is invaluable for the staff of EZ management and operation. The role of the BOI should continue as it is, but should incorporate effective marketing activities for the EZ. BEZA should focus on dissemination of information about EZs among BEPZA and BOI and then perform as the nodal point of contact for prospective investors.

Targeting investment generation - This activity is directly linked with how effectively BEZA uses image building channels, plays an intermediary role between the government and targeted investors and how successfully it helps to streamline administrative procedures involved in both establishment and operation phases of investment. But effective target marketing is technically based on a continuous effort of gathering business and industrial needs, trends and information through exchanging views with prospective and existing investors. Investors come to the country not because of the good investment environment as perceived by the government but because of the actual business chances and market needs, which can be enhanced by the investment environment. Government's efforts to improve the investment environment should be accompanied with provision of information where such needs for the market lie and how government can assist investors with

target policies to satisfy them. BEZA also needs to understand that the efforts are always exposed to international competition and can be improved by feedback of the views from investors.

Funding - Operation of an effective implementation agency is expensive. Hiring well-qualified staff, ideally with private sector experience and active engagement in image building through communications programs and attendance at advertising and trade fairs, is expensive. How BEZA is funded and the budget allocation decided is the crucial element in carrying out effective marketing activities. BEZA needs well qualified staff who can only be hired with the salary range those identical individuals could command in the private sector. It is the responsibility of the government to ensure the conditions which provide enough motivation for the staff of the investment agency.

Regular evaluation is needed of investment agency performance in terms of attracting investment. The performance of BEZA in marketing activities can be evaluated with the following factors; 1) overall investment flow, 2) the form of investment, i.e. portfolio investment, exposition of existing projects, investment in sales and marketing facilities and greenfield projects, 3) investment by sector, 4) job creation, 5) linkages and additional purchase of inputs and services, 6) technology transfer and 7) net tax benefits from corporate taxes, customs duties, and employment taxes paid. This evaluation process should be linked with incentive and salary for staff members of BEZA, so that continuous improvement efforts can be expected.

2.7.1.4 Timing of Marketing

For the implementation timing of the marketing strategy, it is important that staff within BEZA have a clear understanding of how to divide their time between advocacy work (and its associated research), image building and promotion, servicing and targeting activities. At different Economic Zones, the proportion of time spent on each activity may change and the particular tactics and coordination within government should be taken into account.

2.7.2 Target Markets, Countries, and Investor Profiles

In the marketing strategy, selection of target markets should be based on a factual study and analysis of the current situation, the investment environment and its opportunities and challenges. Clear, reasonable and realistic target sectors should be identified for marketing for investment in each Economic Zone. Clear goals and sectoral targets need to be defined so that BEZA staffs know their priorities. Sufficient and appropriate numbers of staff and resources need to be identified to achieve these goals.

In order to screen the marketing target of industries, countries and companies, a study was conducted on the investment environment using SWOT analysis, conducting a series of interviews with prospective investor enterprises in Bangladesh and selective overseas countries. These comparative analyses directly support the next steps in decision-making on positioning and strategic policy alternatives of each Economic Zone. Accordingly, surveys of prospective investors are at the core of identification of target markets.

The shortlisting of the companies for interview was conducted taking into consideration industry and market assessment of each of the three Economic Zone sites. Moreover the methodology of shortlisting was expected to expedite the process of identifying target markets in relatively large numbers of the study population. The shortlisting took into consideration both national and international companies operating in Bangladesh as well as abroad. This exercise was carried out for the identification of companies and their motivation for wishing to invest in EZs. In this sense, the extent of their interests and expectations can be enhanced with provision of relevant information and with efforts to meet their requirements. The shortlisted companies were visited by the marketing expert together with a local consultant and interviews conducted to find out the intent of the companies and to evaluate their prospects as investors in Economic Zones.

Criteria for selection of target markets

After visiting the shortlisted companies, the project team proposed the following criteria for evaluation and selection.

1. Willingness: whether the industrial group/companies are willing to consider investment in Economic Zones and to expand/shift their factories onto Economic Zones.
2. Readiness: whether the industrial group/countries are going to be ready to invest in Economic Zones within time frame of Economic Zones development scheduling.
3. Capacity: whether the industrial group/companies have enough capacity to expand/shift their factories.
4. Potential: whether the industrial group/companies have potential to grow their business after expanding/shifting their factories in Economic Zones.
5. Demonstrative: whether the industrial group/companies can be a demonstrative case to other companies in and outside Bangladesh after investing in Economic Zones.

Selection of the target market was conducted in discussion within the consultant group together with BEZA officials. The shortlisted companies were evaluated after field surveys and personal interviews with those responsible for business development and marketing of the companies. The above criteria was agreed to be important in formulation of an appropriate marketing strategy and for the success of the Economic Zone project. Since BEZA policy is to include some involvement of private enterprises in E Z development and operation, interviews with potential Economic Zone developers were also carried out. The target group of industries is discussed in the market strategy for each Economic Zone.

2.7.3 Type of Promotional Tools and Materials Required

Required promotional tools and materials for marketing of Economic Zone should match the needs of investors. Furthermore, due to the lack of knowledge about investors, investment promotion agencies sometime tend to present too much unnecessary information while providing little on what potential investors really want to know. For example, a typical presentation structure of an investment promotion mission contains the main economic indicators and statistics on FDI, ODA, trade and tourism. Bilateral information featuring the country they are visiting is also given, including the types of investment (wholly foreign owned, joint venture, or business cooperation contract), the number of invested projects, registered capital, number of jobs created by the investment from that country and so on. Such information can be useful to potential investors, but they need more specific information on how they can start a business operation in the countries, what incentives they are given, how the government assists them to solve difficulties in doing business, etc. This kind of information is not usually provided in presentation materials. Moreover, very useful international comparisons in labour cost, business start-up cost and utilities cost between rival countries, is rarely provided. If the implementation agency just presents the country profile, policy and potential of its own, it will be too much and too little. The implementation agency must understand the needs of investors and promotion tools and marketing materials must be produced with clear concepts of the following; 1) what products they are going to market (Product), 2) the relative strength and weakness of the products in comparison with competitors' products (Positioning), 3) the target group of customers (Target Audience), 4) the services provision to be involved together with marketing the products (Scope of services), and, 5) how the strength of the products can be conveyed to the target group (Scope of Communications). The explanation of the five strategic marketing attributes is given under.

Product - The product of BEZA is not the land of the Economic Zone itself but the investment environment of the Economic Zone.

Positioning - For effective positioning, BEZA must objectively know the present strengths and weaknesses of the Economic Zone vis-à-vis those in rival countries and define a realistic direction toward which Bangladesh can proceed in order to dramatically improve its investment environment in the minds of investors. "Appropriate positioning" is more important than "high positioning." Setting goals that are too ambitious will reduce feasibility in implementation and credibility to the prospective investors.

Target Audience - Since national and foreign investors are not uniform, they must be categorized into different groups. These groups can be divided by country of origin, by industry, by company type (MNCs or non-MNCs), or by the strategy they follow (domestic market-oriented versus globally-oriented). The government cannot satisfy all investors at the same time. The benefits of the investment environment should be addressed to the targeted national and foreign investors.

Scope of services - The scope of services should be understood as the investment services where facilitation of investors' business start-ups and implementation of their investment projects in Economic Zones should be addressed.

Scope of Communications - The scope of communications is how and where positioning is delivered to the target audience. As noted above, foreign investors consist of different groups. After deciding on the target audience, the government should work out a communication program that delivers its message regarding the investment environment to the target audience. Communication programs must be consistent with and supportive to the positioning statement. Referring to the best practices of Asian countries, the attitude of pro-activeness, rather than passively waiting for investors to come to the authority office, must be employed.

Furthermore, investors are very demanding in terms of detailed information of not only the physical infrastructure of the EZ but also many other socio-economic related information including availability of labour forces, international schools, hospitals, shopping area, amenities, legal and regulatory framework etc. Pricing of Economic Zone land (sale, lease, and rent) is an important negotiation item. In order to promote Economic Zones and appeal to the potential investors, the overall advantages of the Economic Zones in Bangladesh compared with other countries especially with potential competitors such as Cambodia, Myanmar, India, and Vietnam, must be shown clearly in the promotional tools with facts and objective figures. Therefore, we intend to prepare a list of contents to be required in promotional tools and materials to comply with the best practices of other countries for each of the three Economic Zones.

2.7.4 Opportunities to Coordinate with Other Promotional Agencies in Bangladesh

Many international organizations work with investment agencies to facilitate the exchange of the best practices on investment promotion strategies and assist in building capacity. These advisory services can be extremely useful in improving the effectiveness of investment promotion but should not divert attention from the broader policy environment in which the implementation agency operates.

In order to perform effective and timely investment promotion, we consider the establishment of an international investment promotion network to be crucial and we propose that BEZA join the OECD (Organisation for Economic Co-operation and Development) Investment Promotion Association - World Association of Investment Promotion Agencies (WAIPA). They should also make contacts with the other investment promotion offices, United Nations Industrial Development Organization (UNIDO), United Nations Conference on Trade and Development (UNCTAD), IFC, Multilateral Investment Guarantee Agency (MIGA), ADB and other international agencies dealing with investment promotion directly and indirectly. BEZA should also be able to establish good peer networks with bilateral investment promotion agencies such as JETRO, Trade and Development Agency (TDA), Malaysian Investment Development Authority (MIDA), Indonesia Investment

Coordinating Board (BKPM), BOI of Thailand and Philippines etc. We consider this network would become a valuable resource for BEZA. JETRO has already shown a preliminary yet positive response to establishing a peer relationship with BEZA for investment promotion and marketing of EZs in Bangladesh and Japan.

Also a bilateral chamber of commerce would also provide an important and unique network for promotion of investment into EZs. The Bangladesh German Chamber of Commerce & Industry is one of the active bilateral business and investment promotion agencies in Bangladesh and it has an investment promotional office in Berlin to promote investment from Europe to Bangladesh. The Nordic Chamber of Commerce and Industry (NCCI) is another chamber of commerce in Bangladesh, which is also promoting investment from Nordic countries. Both chambers have shown interest in cooperating with BEZA on promotion of European investors to EZs.

Various organizations can assist BEZA, however simply joining a network does not guarantee that Bangladesh derives the full potential benefit. BEZA also needs also to ensure that they have adequate funding and staff to make membership meaningful. Networks provide a variety of conferences, referral services and best practise guides. Using these effectively requires that the agency dedicates staff to studying best practices and to reaching out to peers and policy advisors.

2.7.5 Investment Promotion is Different from the Textbook

Business marketing is, in reality, different from the general information found in textbooks. The competence required for business marketing is rather specific and unique depending on the nature of the individual enterprises and must also be comprehensive. The issues currently facing the investor for optimal operation in Economic Zones are mingled and interlinked with other issues. These range from resources management, logistics, manpower, materials, utilities, equipment or machines, manufacturing processes, customers, sales, claims, transports, cash, accounting to marketing, etc. There is a need to localise the real issues in the context of Economic Zones through exchange of information and interaction with executives of the prospective investment enterprises and sometimes employees. In this way, the real issues can be identified, confronted and appropriately addressed with trouble-shooting measures in the content of marketing tools, with a demand-driven approach.

2.7.6 Implications

One of the objectives of formulating a marketing strategy for Economic Zones is to enable BEZA officials to understand the true nature of the business administration and operation of the zones and to demonstrate the findings and trouble-shooting mechanisms involved. Yet another aspect of the objective is to enable BEZA officials to provide tailor-made professional services to investor enterprises, utilizing the BEZA officials' own business administration knowledge, experience and network.

With the presence of an international and national investment promotion network which has rich experience in coaching and marketing services for private companies in other counties, it is important for BEZA officials to absorb the marketing skill and knowhow and become performers of on-site lively marketing and to gain confidence as a business marketing agency. Consequently it should be our ultimate aim after providing a marketing strategy, that BEZA officials have enough competence to perform marketing services for investor enterprises, in turn investor enterprises would recognize the value of their marketing service. In other words, recipient enterprises can be prospective clients for BEZA. Then the potential is there to create an investor-friendly environment in Economic Zones. Together with the mission approach of BEZA to extend their business administrative and operational capacity, the project can be regarded as a new venture for BEZA.

2.8 Marketing Strategy for the Anwara Economic Zone

The marketing strategy for the Anwara Economic Zone, Chittagong is presented below in consideration of its situation analysis, positioning to identify target markets and action programs together with strategic policy alternatives.

2.8.1 Situation Analysis

Anwara Economic Zone is situated along the coast and on the bank of the Sangu River. This illustrates that it has key characteristics in waterfront accessibility as an attraction to prospective investors. Anwara region has very little land used for industrial purposes and a poor land transport network creates an environment that is rather isolated from neighbouring industrial cluster developments in the Chittagong area. Consequently, its comparative advantages can be summarized in availability to the waterfront, which includes a jetty to be developed and seashore-based engineering facilities and its geographical location situated next to Chittagong. It has the potential to become a nodal point of production materials and supply chain and/or products market. There is no such distinctive investment so far made in the region, except in the north of the proposed EZ project site in Anwara. In the adjacent area jetty-based industries like fertilizer-production, cement, and shipbuilding industries are observed.

2.8.2 Positioning

After carrying out interview and literature surveys, the issue of availability of industrial land in close proximity to Chittagong port was clearly cited by industrial groups of interest. While there are a number of industrial houses which have their own properties around Chittagong port, industrial land with the status of river-front or seashore-front with a relatively large area of available space is limited in the land bank. The location of the Anwara Economic Zone in a place where industrial land can still be offered is of interest to investors who intend to use Chittagong port as the gateway for manufactured products. Furthermore, the location can offer accessibility to seashore structural facilities such as jetty and shipyard. This is another attraction of the Economic Zone, enabling investors to have an additional production base for diversification or expansion projects in maritime/ship related production. As readily available market demand in Bangladesh, shipbuilding and ship-repairing are a growing business, while the ocean going large vessel market has been in slow recovery mode. But the relatively small size up to 5,000 ton vessel is sustaining in its need in the country as well as in the region. The provision of large area of land in seashore location is of importance and scarce in availability to shipbuilding industries in Bangladesh.

Consequently, as a positioning statement for Anwara Economic Zone, the following is suggested:

1. Anwara Economic Zone aims to be the preferred expansion/relocation destination of the following industries in relation to water-front-based industries in Bangladesh. In the shipbuilding industry: construction of relatively small vessels for coastal shipping and ship-repairing and maritime engineering industries both for the domestic market and for overseas countries (Taiwan, China, and Korea). These may consider Anwara Economic Zone a location for manufacturing steel products and maritime equipment products for local and international markets.
2. Anwara Economic Zone shall provide the most reliable power supply in the region.
3. Anwara Economic Zone shall become the ideal shipbuilding cluster where favourable policy and fiscal facilities can be accessible for the related industries operating in the zone.

2.8.3 Strategic Policy Alternatives

A strategic policy alternative is regarded as a programme to describe and integrate the five strategic marketing attributes (product, positioning, target audience, scope of distribution and scope of communications). Several such alternatives must be constructed for consideration within BEZA. BEZA needs to conclude the one mutually agreed strategic policy alternative, then a concrete action program should be formed. The forthcoming policy advocacy and image building activities must comply with the positioning statement targeting t certain potential investors to the Anwara Economic Zone.

Table 2.8.3-1: Evaluation Criteria to be used for Making Marketing Strategic Policy Alternatives

Criteria	Positive norm	Negative norm	Marketing strategic policy alternatives
Land / location			
✓ Land	Waterfront area with low populated area is available. The area can be developed into industrial zone in relative short period of time.	Storm prone area where cyclone brings periodical high precipitation and strong wind to the area.	Industrial operations at waterfront with utilization of full-fledged utilities and maritime infrastructure can be of interest to investors. However flood protection water management system needs to be installed to guarantee continuous industrial operations in the zone.
✓ Location	Locating near to Chittagong as gateway of raw materials/intermediate goods as well as market can be an attraction.	Poor land transportation accessibility as well as isolation from national utility network.	Establishment of backward linkage and supply chain logistics between Chittagong can be of importance.
Utility service			
✓ Power	Captive jetty facility would become available at the zone for enabling coal based power generation.	There are no alternative energy sources nearby, hence dependence on imported coal.	Captive power generation plant at its own zone should be promoted.
✓ Water	Industrial water can be taken from upstream of the river	Flood control, storm water and surge protection measure must be properly installed. Salinity of ground water.	Accessibility to industrial water is one of the strong points, together with adequate flood control and risk management measures must be well presented
✓ Telecommunications	High speed data transaction is going to be provided	No major negative parameter	Backup system of telecommunications should be highlighted.
✓ Access	The zone is adjacent to river and sea	Access to road and highway transport are limited	Road connectivity and logistics channel must be well presented in comparison with the case between Dhaka and Chittagong
✓ Industrial waste water treatment	International standard industrial waste water treatment plant is going to	No major negative parameter	International standard waste water treatment is important for the products to be sold to international market

Criteria	Positive norm	Negative norm	Marketing strategic policy alternatives
	be available		
Accessibility to raw material			
✓ Accessibility to Raw material	Marine products can be locally accessible	Most of raw materials for industrial usages need to be supplied from Chittagong port or other area. Petro-chemical intermediate products and agricultural raw materials are not locally available	Procurement of raw materials with supply chain logistics management should be explained in consideration of time and cost by showing reference in comparison with other industrial hub in Dhaka area
Workers class			
✓ Management class	Residence, social welfare and recreation facilities are available in nearby Chittagong area	Though the standard of facilities in Chittagong is inferior to the ones in Dhaka	Recreation facilities need to be offered for management class / expatriates
✓ Factory workers	There are nearly 250,000 population in the region	Potential labour force in the region is engaged in fishery and agricultural activities, hence not familiar with industrial/manufacturing operations	Pre-occupational vocation trading may be required for the workers to the zone
Business environment			
✓ Licensing and administration	OSS shall be operated	Physical distance between central government in Dhaka is far	OSS should be properly functional, it must be appealing point to investors
✓ Customs clearance	Customs office shall be opened in the zone.	Physical distance between central government in Dhaka	Satellite customs operation must be functional
✓ Availability of finance	Fiscal incentive shall be granted for investors in zone	Average interest rate for business is rather high in Bangladesh	Banking system in zone may need to be relaxed

Investment promotion agencies like BOI, BEPZA and BEZA should agree on a formulated positioning statement and run integrated national marketing campaigns for targeted potential investors. Each agency should have coherent and clear information for investors to plan their investment decisions. Needless to say, all this must be done consistently with the national framework set and co-ordinated by the Prime Minister's Office and other ministries.

As an example of the strategic policy alternative at Anwara Economic Zone, the policy can be illustrated as follows.

The investment environment of Anwara Economic Zone is positioned as one of the most ideal destinations in Bangladesh for diversification and/or expansion, targeted to shipbuilding, ship repair and maritime equipment manufacturing factories investors. This can be communicated in Bangladesh and ASEAN countries by workshops and seminars in Dhaka, Singapore, Seoul, Taipei, and Shanghai; advertisements in business newspapers, TV commercials and reportage on international broadcasting like CNN; investment promotion website linked to websites of counterparts countries; and brochures distributed through current factory operators in Bangladesh. Investors can register their investments online or at the Bangladesh embassies in respective countries, or at the investment representative's office in these cities. The Bangladesh government ensures that investors can commence investment projects in Anwara Economic Zone within 45 days of the date of receiving applications. The Bangladesh government guarantees to effectively provide necessary utilities services and continues to improve the legal and business administration system and its offsite infrastructure.

2.8.4 Action programs

Action programs should be designed with each step of the activities along with policies necessary for attracting investors and tasks and responsibilities of implementation agencies should be specified. Policies must be clear, tangible, proactive and mutually-agreed among investment promotion agencies. The following table presents the necessary content of investment promotion action programs for Anwara Economic Zone.

Table 2.8.4-1: Investment Promotion Action Programs

Part 1. Policy advocacy	
1. Policy Advocacy	- Creating image on investment environment - Attaining political leaders supports - Organizing workshop for EZ development - Learning best practices from other countries from a peer network
2. Coordination and cooperation	- Establishing cordial relations with licensing authorities in both central and provincial governments. - Streamlining numbers of licenses required for newly invested projects - Reducing amount of time for processing business licenses - Having dialogue with the Indian government for international trade and market potentials
Part 2. Image building	
3. Image building measures	- Preparing investment brochure, video, and a website for Anwara EZ in line with five strategic marketing attributes (product, positioning, target audience, scope of distribution and scope of communications) - Planning and proceeding media exposure of EZ development (newspaper, international business/industrial magazines, exhibition screen at airport and etc.) - Building constructive relationships among enterprises, organizations and governments - Organizing and attending overseas investment seminars and forums - Developing proactive investment promotion peer network
Part 3. Investor servicing or facilitation	
4. Investment service measures	- Coordinating policy dialogue between policy makers and businesses - Making business directories of private companies like names, business field, address of offices, person directly involved in, products list and future business plan for business match-making - Conduct coordinating with local and international financial entities - Providing and improving business support facilities - Assisting investors for acquiring licenses
Part 4. Targeting investment generation	
5. Investment generating measures	- Focusing on investors who are already in Bangladesh, - Meeting with target audience set forth in strategic policy alternative
6. Representative offices of other countries and international organizations in Bangladesh	- Disseminating EZ development through representative office in other countries and through international organization in Bangladesh, which bilateral chamber of commerce
7. Overseas offices of Bangladesh organizations and bodies	- Identifying business and industrial trend through dialogue with international investors who can be accessible through overseas offices of Bangladeshi organizations and bodies (Information to be collected would be names, functions, head of office, person directly involved in FDI, current cooperation, direction for future coordination)
Part 5. Funding	
8. Fund generation and allocation measures	- Conduct coordination with Prime Minister's office together with Ministry of Finance for budget allocation for activity implementation and for collaborative organizations networking

Part 6. Regular evaluation		
9.	Measurement and adjustment by implementing organizations	- Consulting with BOI, BEPZA, Prime Minister's Office and other related ministries for criteria, results, causes of success and failure - Conducting survey of newly emerging factors and conditions and supportive tools to be continued

Possible Schedule for the Action Program is shown in the next page.

Figure 2.8.4-1: Possible Schedule for Investment Promotion Action Program

Project Schedule	1. Policy Advocacy	2. Coordination and cooperation	3. Image building measures	4. Investment service measures	5. Investment generating measures	6. Representative offices of other countries and international organizations in Bangladesh	7. Overseas offices of Bangladesh organizations and bodies	8. Fund generation and allocation measures	9. Measurement and adjustment by implementing organization
1Q 2015	Organise dissemination workshops at Dhaka on EZ development and operation among related lined ministries and	Establishing cordial relation with licensing authorities in both central and provincial government.	Having dialogue with representatives of bilateral chamber of commerce in Bangladesh to understand business trend and prospects on EZ development	Coordination of policy dialogue between policy makers and businesses					Consulting with BOI, BEPZA, Prime Minister's Office, and other related ministries for marketing activities
2Q 2015								Funding and allocation for marketing activities for a piscal year	
3Q 2015									
4Q 2015	Organize international training trips to other ASEAN or European countries to learn the best practices of marketing activities	Streamlining number of licenses required for newly invested projects		Development and opening of web site on EZ development and operation	Organise meetings with individual target audience set forth in strategic policy alternative	Dissemination of EZ development and operation among overseas representative offices of Bangladesh like embassies	Dialogue with international investors to identify business and industrial trend		Conducting survey of newly emerging factors, and conditions and supportive
1Q 2016									
2Q 2016									
3Q 2016									
4Q 2016	Organize international training trips to other ASEAN or European countries to learn the best practices of marketing activities	Opening of one stop window desk at BEZA, Dhaka							
1Q 2017			Planning and proceeding media exposure of EZ development Material preparation of marketing (power point presentation, image video, brochure, booklet of investment/ market information) Investment promotion seminar among key cities set forth in strategic policy alternative Developing proactive investment promotion peer network	Assisting investors for acquiring licenses					
2Q 2017									
3Q 2017									
4Q 2017	Organize international training trips to other ASEAN or European countries to learn the best practices of marketing activities								
1Q 2018									
2Q 2018									
3Q 2018		Development and operation of electronic single window application submission		Providing and improving business support facilities					
4Q 2018	Organize international training trips to other ASEAN or European countries to learn the best practices of marketing activities								
1Q 2019									
2Q 2019									
3Q 2019									
4Q 2019									
1Q 2020									
2Q 2020									
3Q 2020									
Detail Design									
Construction									

2.8.5 Promotional Tools and Materials

In the promotional tools and materials for Anwara Economic Zone, the following data and information set are expected to be integrated.

Table 2.8.5-1: Proposed Contents of Promotion Material for Anwara EZ

Products (Investment environment)	
✓ Message from *Hon'ble* Prime Minister	✓ Message from *Hon'ble* Minister of Finance
✓ Message from *Hon'ble* Minister of Industry	✓ Message from *Hon'ble* Minister of Commerce
✓ Message from Executive chairman of BEZA	
Positioning	
✓ Characteristics of Anwara EZ	✓ Land use / plan
✓ Price of land in comparison with other rival SEZs in Asia	✓ Comparison chart with other rival countries SEZs - the total cost and time required for approvals of business licenses and permits
✓ Distance and location between access to major logistics centres (major cities, port and airport)	✓ Incentives to be considered - system of investment incentives; tax concessions and customs duty waivers; work permits for foreign senior staff and technicians
Target Audience	
✓ Industrial growth outlook of textile/garment sector in Bangladesh	✓ Economic and market outlook of shipbuilding and ship-repairing in Bangladesh
✓ Electric power and water development prospect	✓ Specification description of wastewater treatment plant
Scope of services	
✓ Application procedure - The number and details of procedures for establishing a new investment project	✓ Time framework of the procedure - Average length of time required to complete a process
✓ General payment terms	✓ Permits from national and sub-national governments
✓ Utilities specification - electric power; water; telecommunications; wastewater treatment; access roads	✓ Function of OSS - Provision of enquiry point for information regarding the administrative procedures required to establish a new investment
✓ Utilities unit price indicators	✓ Business support facilities - including availability of social and recreation facilities; Provision of assistance/support for new investors if they are faced with difficulties during this process
✓ Process of EIA - environmental impact assessments and agreements on mitigating and monitoring environmental impacts	✓ Labour availability - Various facets of labour law and pension provisions
✓ Land titling process - Approvals to purchase or lease land or change the zoning restrictions on use of particular pieces of land	✓ Foreign exchange regulation or restrictions on capital and dividend repatriations
✓ Insurance regulations for transported goods	✓ Dispute resolution systems
✓ Investor's voice feedback system - Mechanism of integrating investor's complaints into the proposal or advocacy for reform	
Scope of Communications	
✓ Contact address of BEZA	✓ Contact address of Steering Committee - Hotline in the investment agency for registering complaints by established investors
✓ Contact address of other business related ministries and agencies - Cooperation mechanism with other relevant state agencies to address investor's complaints	✓ Website platform information - Website and interactive platform between investment agency and investors

2.9 Transport Assessment

Sandwiched from three sides by India on the North, West and partly on East (sharing 193 Km with Myanmar), Bangladesh has 4246 Km long land border line. On the Southern side is Bay of Bengal with 580 Km coastline. There are two ports handling international traffic, namely the Ports of Chittagong and Mongla, with Chittagong handling the majority of the Ex-Im trade. In the year 2011-2012, Chittagong port handled over 41 million tons of cargo including 1.34 million TEUs which is about 92% of the total maritime trade of Bangladesh.

To facilitate economic growth, an efficient transportation system is essential. This chapter discusses the current status of different modes of transport of Bangladesh and the existing road, rail, air, and port connectivity of Anwara as given. Each mode of transport is described separately. Constraints of the present transportation system are addressed, specific to the sectors - road, waterways, air, and gateway port and recommendations of the need in infrastructure is made. International multimodal transport concepts, advantages, systems, platforms, and their relevance to Bangladesh are also described in the following pages. Multimodal systems and options of cargo evacuation to/from the Anwara EZ are addressed. Competitive assessment of import/export container and air freight is provided and analysis made. In addition, review of the 40ft. containers traveling to/from Yokohama is also provided for reference, which also includes the freight to/from Dhaka.

It is relevant to note here that the concept of ICD has been localized in Bangladesh, whereby ICD generally refers to Inland Container Depot (as the Dhaka ICD that handles containerized rail traffic) and the term ICT (Inland Container Terminal) refers to a river port handling containers as the Pangaon ICT.

2.9.1 Current Status of Different Modes of Transport in Bangladesh

Road

Road transport has turned out to be the dominant mode of transport for carriage of freight and passenger traffic. Bangladesh has about 1.5 million motorised and over 3 million non-motorised vehicles[210]. Out of the motorised vehicles about 65% are 2 & 3 wheeler vehicles and the rest are vehicles of different categories such as cars, jeeps, buses, trucks, pick-up trucks, etc. The number of vehicles is steadily increasing along with the increase of road mileage. Traffic on Bangladesh roads is characterised by the presence of both motorised and non-motorised vehicles operating on all roads creating serious problems of traffic jams. Consequently the road network in the country is bisected by water courses. Either a bridge is built or a ferry system is provided to maintain the traffic flow on the road networks. Bangladesh has about 40,344 Km of paved roads and all the ports and important centres are connected by road.

There are 98,928 trucks, 3,422 tankers, 250,984 private passenger cars, and 31,991 buses registered in Bangladesh.[211] (as of October 2013). About 30% of the trucks run on CNG (mostly for shorter distance deliveries) and 70% on diesel. Petrol vehicles have the option of switching from CNG to petrol as and when required, but the trucks can only use either CNG or diesel. The price of diesel is Tk68.6 per litre, petrol costs Tk95 per litre, and CNG Tk30 per cubic metre (as in Nov 2013).

[210] http://www.unescap.org/ttdw/common/Meetings/TIS/EGM-Roadsafety-2011/Status/Countries/Bangladesh-Add-Info-1.pdf
[211] http://www.brta.gov.bd/images/files/bangladesh_1.13-10.13.pdf

Rail

Bangladesh Railways (BR) is the state-owned rail transport agency of the nation. It operates and maintains the entire railway network of the country. BR is controlled by the Directorate General of Bangladesh Railways under the Ministry of Railways along with Bangladesh Railway Authority (BRA) which works for the policy guidance wing of BR.

Key features of BR are the coexistence of several gauges, broad gauge, metre gauge, and dual gauge, and the separation of the system by the Jamuna River (Brahmaputra) into a Western and Eastern Zone of operations with only one bridge, the 2003 - Jamuna Bridge, connecting the two zones. Bangladesh Railways employs 34,168 people and operates international, inter-city, and suburban rail systems on its multi-gauge network. It also owns coach production facilities.

Bangladesh Railways had a total of 2,877 route Km at the end of 2011-2012. The Eastern Zone has 1,273 route Km of MG and 35 route Km of DG track; and West Zone has 535 route Km of MG, 659 route Km of BG and 375 route Km of DG track. The total length of running track including track on double line, in the yards and sidings is 3,976 Km[212].

In the Eastern Zone, 8 goods trains are placed in the circuit, out of which 4 dedicated trains, used for carrying containers, are placed in the Dhaka – Chittagong Container circuit (called Container Express trains); and 4 Tank Special Trains between Chittagong Port Yard and Sylhet, Sreemangal, Parbatipur and Dhaka Cantonment. In the Western Zone, 7 Express Goods trains are serving various inland destinations between Khulna – Parbatipur; Darshana – Ishwardi; Khulna – Ishwardi; Noapara – Darshana; Ishwardi– Santahar; Santahar – Parbatipur; and Ishwardi, Rohanpur. All these trains follow a fixed schedule[213] as detailed in the annex.

In the Container Express trains operating between Chittagong and Dhaka, 32 wagons are attached to the locomotive requiring about 12 hours for the run. There is always a backlog of import load from Chittagong to Dhaka.

Railways Expansion and Modernisation Projects

Under a Line of Credit (LoC)[214] from the Government of India, the following railway equipment is being procured for expansion, upgrade, and modernisation of the Bangladesh Railways. The current status and price is given below:

i. 180 BG tank wagons and 6 brake vans (US$17.38 million) - procured
ii. 50 MG flat wagons and 5 brake vans for carrying containers (US$2.9 million) -procured
iii. 10 BG diesel locomotive (US$21.29 million) - procured
iv. 81 MG tank wagons and 5 brake vans (US$7.43 million) - procured
v. 170 MG flat wagons and 11 brake vans for carrying containers (US$9.49 million) – transaction to be completed by April 2014
vi. 30 BG diesel locomotives (US$60.95 million) – to be completed by April 2014

Besides the above, contractors have been appointed for construction of a Dhaka – Tongi Rail Line, a Khulna – Mongla Port Rail Line, and a 2nd Bhairab Bridge and a 2ndTitas Bridge with approach rail lines.

[212] Bangladesh Railway – Information Book 2012
[213]http://www.railway.gov.bd/good_tsrain_schedule.asp.
[214] Excerpts from "*Contract for all 13 projects under LoC awarded*"- Financial Express, 22nd November 2013

Air

Bangladesh has 3 International airports (Hazrat Shahjalal International Airport in Dhaka, Shah Amanat International Airport in Chittagong, and Osmani International Airport in Sylhet). Hazrat Shahjalal International Airport is the principal airport of the country. In addition, there are 12 domestic airports out of which 5 are operational at Cox's Bazar, Rajshahi (Shah Makdum), Jessore, Saidpur and Barisal. Regular international flights from South, East, and South East Asia, the Middle East and Europe are directly connected to Bangladesh by 17 international carriers.

There are regular flights from these airports to international destinations world-wide. Domestic air travel is served by Biman Bangladesh Airlines, Novo Air, GMG, United Airways connecting with Jessore, Cox's Bazar, Rajshahi, Saidpur and Barisal, Ishwardi and Chittagong.

All of the top 10 international routes are served by at least two carriers with the Kolkata market particularly competitive, as all three Bangladeshi carriers are joined by Air India Express and Jet Airways. Low-cost airlines have a presence at the airport as Air Asia which is one of five airlines serving Kuala Lumpur and Air Arabia that operates a daily flight to Sharjah. Other carriers operating at the airport include Afriqiyah (to Tripoli), China Eastern (to Kunming), China Southern (to Guangzhou), Druk Air (to Bhutan), Etihad (to Abu Dhabi), Gulf Air (to Bahrain), Malaysia Airlines (to Kuala Lumpur), PIA (to Karachi), Qatar Airways (to Doha), Saudi Arabian (to Dammam, Jeddah and Riyadh), Singapore Airlines (to Singapore) and Thai Airways (to Bangkok). Analysis of the schedule data for Dhaka airport reveals that Dubai is the busiest route with Emirates offering 17 weekly departures. Biman Bangladesh, GMG Airlines and United Airways Bangladesh also serve the Dubai route. United Airways flights carry on to London Gatwick[215].

Hazrat Shahjalal International Airport in Dhaka is designed to handle 8 million passengers per year. The airport handles about 99.5% of all import and export load and about 6 million passengers every year. This airport has a dedicated cargo terminal (called cargo village) with a floor area of 200,000 square feet managed by Biman Bangladesh Airlines. Almost all of the air freight shipments destined for/from Bangladesh arrive at/depart from this terminal. (Refer to the box below for excerpts on the Cargo Villages).

Excerpts from *The Bangladesh Monitor on Cargo Village, HSJIA*

The freight side of the aviation industry has over the years, assumed great importance, because of its significant contribution to the profitability of the airlines. The future of market potential of airfreight is also considered to be really great. In Bangladesh the rate of growth is comparatively very healthy. Hazrat Shah Jalal International Airport (HSJIA, Dhaka) is virtually the only airport, handling entire volume of air freight through international passenger flights and some scheduled and chartered freighter flights. This only gateway of the country this far-- is achieving nearly double digit growth every year on an average-7.77% between 1991 and 2005. In 2006-2007 HSJIA handled 69,302 tons of export cargo.

In 2007-2008 the volume increased by 68.33% to 1, 16,660 tons. Due to global recession, the volume of cargo increased to 1,21,127 tons in 2008-2009-- a growth of modest 3.82%. With import air cargo of 48,738 tons, HSJIA handled 1,69,865 ton of cargo in fiscal 2008-2009.

Market share

Of the total export air cargo in 2008-2009, Biman enjoyed a market share of only 16.74%. It was followed by Saudi Arabian Airlines with 13.88%; Emirates with 12.40%; Qatar Airways 9.07%; Etihad with 8.91% and all other carriers 39%. Of the imported cargo Biman carried only 7.75% and the rest 92.25% was carried by foreign airlines.

[215]http://www.anna.aero/2010/04/07/bangladeshs-main-airport-and-airline-begin-2010-with-new-name-and-look/

Poor Ground handling

It may be recalled that Biman Bangladesh Airlines Ltd. is providing Ground Handling facilities in the entire airport in Bangladesh and to all the airlines since 1972. It is enjoying monopoly to handle both passenger and cargo-- operating on commercial basis.

Until 2003 Dhaka airport was serviced by passenger aircrafts. Cargo was sharing belly capacities with passenger baggage. There was no scheduled freighter operation to and from Dhaka. During peaks some shippers and freight forwarders used to bring chartered freighters to help exporters save from cancellation damage.

In recent year's capacity situation from Bangladesh has witnessed significant improvement due to increase in frequency of foreign airlines and resulted in significant boost of belly hold capacity as well as operation of scheduled freighters by a number of airlines. Saudi Arabian Airlines is operating twice weekly Boeing 747 freighter with 110 ton capacity each. Emirates operates thrice weekly freighter with 40 ton each. Etihad and Qatar also operates freighter similar to Emirates-both in frequency and capacity. British Airways, Singapore Airlines, and Malaysia Airlines operate once a week freighters with 40 ton capacity each. Cathy Pacific operates a twice weekly freighter with 110 ton capacity each. The freighter operation of Air France is now suspended. In addition there are non-scheduled chartered freighters serving air cargo sector in Bangladesh

Apart from lack of modern cargo handling facility, the cargo complex is also suffering from shortage of critical equipment. The pallet build-up area is insufficient. There is no stack yard for container. There is no dedicated space for buildup cargo.

With no infra-structure, logistics and adequate proper equipment, Biman as a ground handling agent is facing tremendous problems. The working condition is bad-very bad indeed. There is acute shortage of space. The entire cargo complex is in a mess. Due to inadequate waiting space at Cargo Complex, before handing over to airlines, shipments are kept under open sky exposed to sun and rain.

Sometimes, even that open space becomes insufficient. Theft and pilferages are rampant at cargo complex. Shippers and forwarders are the ones paying claims for such pilferages or losing business.

As the ground handler, the national flag carrier is earning solid revenue from cargo operation. Biman earned BDT 2.07 billion in 2004-2005; BDT 2.43 billion in 2005-2006; BDT 2.30 billion in 2006-2007; BDT 2.58 billion in 2007-2008 and BDT 2.98 billion in 2008-2009. The actual revenue earnings in all these years are much higher than the target.

Despite ever growing substantial income, the condition in cargo complex has remained bad-real bad in terms of working condition and proper handling of cargo.

Source: The Bangladesh Monitor, Nov 16 -30 (Volume: XXIII, Issue No. 07)

Inland Waterways

Bangladesh has one of the largest inland waterway networks in the world. Situated in the lower end of 3 great rivers namely the Brahmaputra, the Ganges, and the Meghna, Bangladesh is situated in a flood plain criss-crossed by a network of several rivers and their tributaries. About 800 rivers including tributaries flow through Bangladesh making it a riverine country. A network of important rivers of which the Padma, the Jamuna, the Teesta, the Brahmaputra, the Surma, the Meghna and the Karnaphuli and their tributaries numbering 230 constitutes around 24,140 Km. Total inland navigational area is about 24,000 Km varying during monsoon (5,986 Km) to dry season (3,865 Km)[216]. Navigability of rivers in Bangladesh has been deteriorating steadily. The withdrawal of water beyond the border and within Bangladesh for irrigation and other purposes has resulted in decreased navigability of rivers during the dry season resulting in gradual channel decline.

[216]http://cmsdata.iucn.org/downloads/navigation.pdf

The river network connects almost all the country's major cities, towns and commercial centres. Moreover, being cheap, safe and environmentally friendly, inland water transportation is often the only mode that serves the poor, proving especially useful during periods of widespread flooding.[217]

The third port, Paira Seaport, was inaugurated by the Prime Minister on 19th November 2013. It is on Rabnabad channel - which is 31 Km from the sea boundary, 316 Km from Chittagong, 130 Km from Mongla port and 340 Km from the capital. This port shall have draft of 8 -10 m when in operation.

Currently, container feeder service is available from Chittagong Port to Port Klang (daily); Port of Singapore (daily); and Colombo Port (every 2-3 days) for connecting the mother vessels serving international destinations. More than 5 feeder vessel operators with vessels capacity of 100 -1500 boxes (containers) have deputed their feeder vessels in this circuit. The transit time is about 3-4 days from /to Chittagong Port to the hub ports. All international Shipping Lines have their presence in Bangladesh and some even operate their own feeder vessels.

Chittagong Port mainly handles food grain, cement clinker, sugar, salt, fertilizer, general cargo, iron materials, chemicals, coal, and edible oil etc., as import commodities and readymade garments, knitwear, fertilizer, jute & jute products, hides and skins, tea, naphtha, molasses, frozen foods etc. make up the general export.

Due to the steady growth in traffic volume, Chittagong Port performs well on the financial front. It is financing its 3rd Port development project at Paira Bandar with its own resources. Statistics of Cargo handled at the Chittagong Port is given in the annex.

In addition to the Pangaon ICT, the Government of Bangladesh granted approval to establish a container port on the bank of the Meghna River in Narayanganj District to the Ananda Group in November 2013. It will be the fifth inland container terminal (ICT) in the private sector. Approvals for establishing ICTs have already been granted to the Rupayan Group, Kumudini Welfare Trust, AK Khan and Company and Cemcor. Meanwhile, the Ministry of Shipping, GoB, is finalising a draft of guidelines for establishing ICTs under private sector investment[218].

[217] http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/EXTSARREGTOPTRANSPORT/0,,contentMDK:20674801~menuPK:868784~pagePK:34004173~piPK:34003707~theSitePK:579598,00.htm

[218] Ref to article in the Financial Express of 21st November, 2013: Ananda Group gets approval for building container port.

2.9.2 Existing Conditions of Anwara

Road

Anwara EZ site is located on the mouth of the Sangu River facing the Bay of Bengal on the west. The nearest national highway (Chittagong – Cox's Bazaar Highway) is located at a distance of 23 Km from the site, the district headquarters at 30 Km and Chittagong city at about 28 Km. Anwara Upazila is located at about 20 Km from the site. No direct access is available at site for the zone. A road on top of a dike is present which discontinues about 3 km away from the site. A proper road network with strong dike should be the key for establishing EZ in the site.

Anwara: Google earth map (Top Sangu River and Bottom Bay of Bengal)

Unpaved road leading to site

Dirt road leading to site where only 4WD vehicles can navigate

Narrow dirt road leading to site

Landslide mitigation work going on at site (facing the Bay of Bengal)

Status of dikes and road on top leading to the tip of the Peninsula

Photo of dike with washed road on top (LHS –Bay of Bengal; RHS -Site)

Tip of Anwara Peninsula

Villagers joining the consulting team at site for discussion

Field team crossing the water body to access the dike from village

Rail

Chittagong Railway Station is about 32 Km from the site. Presently no railway network exists at or near the site.

Air

Chittagong Airport is about 46 Km from the site. Access to the highway leading to the airport is by using the 23 Km dirt road.

Port

The proposed Anwara peninsula area is located in the middle of the sea and river Sangu. By sea, Chittagong Port is only about 12 Km from the site.

Table 2.9.2-1: Summary of existing transportation connectivity in Anwara

Site Name	Road Connectivity	Rail Connectivity	Air Connectivity	Port Connectivity
Anwara EZ	• Highway @ 23 Km • District Headquarter @ 30 Km • Chittagong city @ 28 Km • Anwara Upazila @ 20 Km	Chittagong Railway Station @ 32 Km	• Chittagong International Airport @ 46 Km	• Chittagong Port @ 39 Km by road • Chittagong Port @ 12 Km by sea

2.9.3 Constraints

Roads

- As roads play the most vital role in transportation in Bangladesh, their relevance need not be mentioned. Constant traffic jams and restrictions on movement due to limited roads and an increasing number of vehicles makes it almost impossible to guarantee travel time of passengers and goods. In addition, the slow progress in development of the construction of the Dhaka – Chittagong Highway (the main artery) makes travelling to Dhaka or Chittagong time consuming. Even the roads inside the 2 major cities are mostly congested with long queues of vehicles.
- The limitation in the number of pumps providing CNG forces vehicles to line up for hours to fill up. Though the vehicles have the provision of using other fuel such as petrol and diesel, they do not use it due to the current price which is about 2 - 3 times the cost of CNG[219].
- The trucking industry needs a further injection of modern trucks and trailers as the current fleet is limited to old trucks and trailers mostly unsuitable for carrying containers.

Port and Waterways

Waterways

- The limitation for using riverine routes for larger cargo vessels is further constrained due to the limitation of drafts and lack of dredging of the channels. For the handling of containers, only one riverine port is constructed and operational at Pangaon. This opened very recently. The opening of this ICT may soften the current pressure on the Chittagong Port where import cargo is stranded for 10 -15 days awaiting its turn to catch the train to Dhaka.
- Though blessed with such large rivers, transportation by river is not a common means of transport. Among many reasons, the frequency of service, easy availability of ferry services, the status of the river jetties and the limited riverine ports (Chittagong and Mongla) and the adjoining road connectivity to reach the main destinations make it less attractive for users.
- Though 5 private ICTs are being developed by the private sector, they are yet to be opened for traffic handling. Though the government has given approval and is currently working on the guidelines, there may be delay as the guidelines should have been drafted first and then approval given.
- Another problem may be the deputation of the number of container feeder vessels between CPA and these 5 private ICTs. Vessels required for inland waterways movement is yet to be seen

[219] Price of CNG: BDT 30; Diesel: BDT 68.6 and Petrol: BDT 95 -99 (for Octane)

except for the 3 deputed by CPA and in operation between the Pangaon ICT and CPA. In the case of Pangaon, though the ICT was developed in early 2013, it had to wait for about six months before the opening of the terminal for business. The CPA had the resources for purchasing the 3 feeders, but in the case of the private ICTs, it is yet to been seen how they will operate and manage their terminals.

- Though Pangaon ICT opened in early November, it remains idle due to many reasons. Many likely users and institutes have their own versions of why it could not be used, but primarily it seems that lack of awareness, security in the waterways, non-mention of 'Pangaon" as final delivery destination in the shipping document, insurance coverage issues, seaworthiness and the number of vessels deputed in the Chittagong – Pangaon circuit along with lack of guarantee of time and cost could be the major factors.

Port

- The GoB is yet to sign an inter-governmental agreement on "dry ports" to promote international recognition, facilitating investments in their infrastructure, improving operational efficiency and enhancing the environmental sustainability of transports. In the first round of signing in Bangkok (at UN- ESCAP on November 7 – 8, 2013) 14 countries signed including Armenia, Cambodia, China, Indonesia, Iran, Lao PDR, Mongolia, Myanmar, Nepal, Republic of Korea, Russia, Tajikistan, Thailand and Vietnam. Failing to sign this agreement has compelled the identified and potential Dry Ports of Bangladesh (Akhaura, Brahmanbaria, Benapole, Jessore, Bibirbazar, Comilla, Burimari, Lalmonirhat, Hili, Dinajpur, Kamlapur ICD, Dhaka, Sonamasjid, Chapainawabganj, Teknaf, Cox's Bazar, Banglabandh, Panchagarh) short of international recognition. Hence these destinations cannot be mentioned in the shipping documents as the "final place of delivery" and in turn are losing out on the advantages of through movement of the consignment.
- As Chittagong Port is the key gateway for access to overseas markets, its relevance is crucial and discussed at length. Traffic jams on most of the highways, including within cities, are frequent and all those transporters interviewed complained about the slow speed of road expansion. Shipping lines and freight forwarders revealed the following facts associated with the operations at Chittagong Port.
- Shipping lines (commercial operations) were facing the problem of sharing the channel with the Bangladesh Navy. This causes unnecessary delay in the delivery and pick-up of containers from Chittagong Port. The channel is narrow, with lots of meandering byways and the Naval Vessels are given priority. A possible solution would be for naval vessels and the commercial vessels to be given dedicated channels.
- The following are the drafts and the deficiencies of each of the container berths:
  - GCB (General Cargo Berth) – draft 8.53 Metres: As this berth lacks Gantry Cranes, only those vessels with their own gears can berth for unloading and loading. Hence vessels without gears have to wait their turn for berthing at CCT.
  - CCT (Chittagong Container terminal) – draft 9.15 Metres: Though there are 4 Gantry Cranes here, there is insufficient back-up area/ facility.
  - NCT (New Mooring Container terminal) – 9.15 Metres: Here too, this berth lacks Gantry Cranes and so only those vessels with their own gears can berth for unloading and loading. Hence vessels without gears have to wait their turn for berthing at CCT.
- During the time of declaring national budget, the port is under pressure, as there are large shipments of Import causing Port congestion and delays. The current delay for import containers for Dhaka ICD is about 10 - 15 days. (For transportation of containers by train from CPA to Dhaka ICD).

- Though there are 19 Off-Dock (CFS, ICDs operated by Private Sector) facilities surrounding the Port, these dedicated places are only allowed to handle 29 import items(ref to annex for the list of items) In the month of August 2013, all the depots combined handled about 35,000 TEUs of export load and about 15,000 TEUs of import load. Some of the ICDs are closed (Iqbal enterprise and Saved Timber Container Yard) due to supply - demand imbalance in the trade. The government has already withdrawn restrictions on 29 items (imported) to be handled at the off-docks. For the rest of the cargo, the Chittagong Port must be used.
- Out of 100% of the Import Cargo, 60% is de-stuffed inside the Port, only about 30% sent to the Off-docks for de-stuffing and the balance 10% is sent to the Merchant's/ Importer's Premises and to Dhaka ICD (which is under the purview of the CPA – Chittagong Port Authority). Due to availability of limited cargo for Off-dock facilities, some of them are closed. Active Shipping Lines in Bangladesh include Maersk, APL, Hapag Lloyd, MSC, Hanjin Shipping, Hyundai, K-Lines, MOL and OSK Lines etc.
- No time line specified for de-stuffing of delayed boxes: Though the Customs rules states that if a box/container is not de-stuffed after 30 days of arrival, the Customs has the authority to de-stuff the box/container and release the boxes/containers to the liners. Though in real practise, this is not happening. Currently about 3000 TEUs are lying idle. The problem is more rampant in case of Reefer boxes as the Port charge on supplying electricity (@ US$9 per day) that is levied up to the time when the boxes are released. This charge is on A/C of the Shipping Lines owning the boxes.
- Chittagong Port has a shortage of equipment to continuously serve the clients for taking delivery of the containers/cargo. Hence cargo is stranded awaiting loading and despatch.
- Though the depots located in Chittagong are charging the same tariff for 40 ft. and 40 HC, the CPA is charging 1.5 times higher. The same is the case with the Railways carrying containers to Dhaka: it charges higher rail freight for HC.
- Chittagong Port is served by feeder vessels operated from Singapore, Colombo, and Port Kelang. This increases the ocean freight as it is not a hub port. The Pilot time is about 1 hr. to the Port covering about 9 nautical miles from the outer anchorage.
- There is official restriction by the Chittagong Port on weights of the 20 ft. and 40 ft. containers. As per CPA, the Gross Weight of 20 ft. containers shall be less than 24,000 kg., and, the 40 ft. Containers shall not exceed 30,480 kg. This official restriction imposed by CPA should be withdrawn and international practices imposed (i.e. load should be as per the weights allowed in the boxes.)
- The currently used road within the Chittagong Port area is public; this causes traffic jams and undue delay in delivery. If the CPA can develop a separate 'Buffer Parking Area' inside the Port gate where trucks can come inside and park instead of waiting and jamming the gates and the roads, it would not only decongest the gates but also give relief to the traffic jams on the VIP road. 'This Buffer Parking Area' is a common user facility inside the open gates where trucks can line up and be inspected as per the gate entry requirement and then finally enter the controlled port premises.
- There is no EDI connectivity between different relevant agencies as the Port, Customs, and Depots etc. making it paper based for processing.
- The Port, Customs and the Depots use their own software hence there is no compatibility in their operation.
- Due to an inadequate number of scanners, delivery is delayed as the trucks have to wait their turn to get scanned prior to exit from the gates.
- The same gate is used for both entry and exit causing congestion. If separate gates were earmarked, it would solve the gate jams to a certain extent.

- The Port does not have adequate export slots. So the vessels ready for loading containers have to call the Depots to send the containers directly to the Vessel which takes 2-4 hours and sometime due to traffic, the container is stranded and when it arrives, the vessel is gone. The containers then have to return to the depot.
- So basically, the CPA has space constraints, equipment shortages, and requires better management for optimal use of its facilities adhering to the needs of the market (market driven approach).

Railways

- Since the railway system consists of three gauges – broad, metre and dual lines which involve transhipment at the break of gauge points, transhipment causes delay and increase the chance of pilferage.
- The number of available wagons for operating between Dhaka and Chittagong (on metre gauge track) for carrying containers is limited. This is the reason behind 10 - 15 day back log at the Chittagong Port. Though rail freight may be cheaper, this backlog is forcing the importers to shift their cargo from rail to road.
- The limited number of wagons (32) per train/ per rake (64 TEUs) is not sufficient to cater to the growing rail transport business between Dhaka and Chittagong Port. In neighbouring India and even in Nepal, all the container special trains (rakes) carry 45 wagons/ 90 TEUs, and even double deck container service has started in certain routes in India.
- Transit time: Though ideally it should take about 8 hours from Chittagong to Dhaka, it takes about 15 hours due to constant breakdown and sharing of tracks with the passenger trains.
- Though railways transportation is cheaper, there is not much development in expanding the network. Laying of new tracks is almost stagnant with focus on the existing tracks.

2.9.4 Customs Clearance System

The Customs were using the "ASYCUDA ++" software now but had plans of upgrading to the "ASYCUDA World" – probably in September 2013. A pilot project is already underway. They were using the "red" and "yellow" button system for cargo clearance now, but with the introduction of "ASYCUDA World" They will also use the "Green" button system for Customs examination of cargo.

Under the "red" button, 100% of the cargo is to be examined, under the "yellow" button, 20% of the cargo is to be examined and under the "green" button, no examination is required. Under the present system, Customs does not have access to other Customs Office declaration verification systems elsewhere in Bangladesh, but with "ASYCUDA World", they will have this access – clearing the way for simplification of cargo clearance and also on-line filing of documents. In addition, with the implementation of "ASYCUDA World", electronic filing of documents will takes place whereas now, both manual and electronic filing of documents is taking place.

2.9.5 Multimodal Transport

Article 1.1 of the United Nations Multimodal Convention (not yet ratified) defines multimodal transport as follows: 'International multimodal transport' means the carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country at which the goods are taken in charge by the multimodal transport operator to a place designated for delivery situated in a different country".

2.9.5.1 Advantages of Multimodal Transport Operation

Multimodal transport is the carriage of goods by at least 2 modes of transport under a single contract operated by one carrier. It involves the usage of more than one means of transport as a combination of ship, truck, railways, or airplane in succession. When a multimodal transport operator (MTO) signs a contract, he assumes the responsibility for the execution of the assigned transportation using several individual operators, but these subcontractors would not affect his obligation to the consignor for the performance and liability arising under the contract.

Any consignment coming from overseas and destined inland will be travelling on multi modes of transport utilizing sea, rail, air or road. The only difference with appointing an MTO is that he assumes the responsibility and is liable for the complete chain of transportation.

Advantage of Multimodal Transport

Minimises time loss at trans-shipment points
Multimodal transport, which is planned and coordinated as a single operation, minimises the loss of time and the risk of loss, pilferage and damage to cargo at trans-shipment points. The multimodal transport operator maintains his own communication links and coordinates interchange and onward carriage smoothly at trans-shipment points.

Provides faster transit of goods
The faster transit of goods made possible under multimodal transport reduces the disadvantages of distance from markets and the tying-up of capital. In an era of Globalization the distance between origin or source materials and consumer is increasing thanks to the development of multimodal transport.

Reduces burden of documentation and formalities
The burden of issuing multiple documentation and other formalities connected with each segmentof the transport chain is reduced to a minimum.

Saves cost
The savings in costs resulting from these advantages are usually reflected in the through freight rates charged by the multimodal transport operator and also in the cost of cargo insurance. As savings are passed onto the consumer, demand increases.

Establishes only one agency to deal with
The consignor has to deal with only the multimodal transport operator in all matters relating to the transportation of his goods, including the settlement of claims for loss of goods, or damage to them, or delays in delivery at destination.

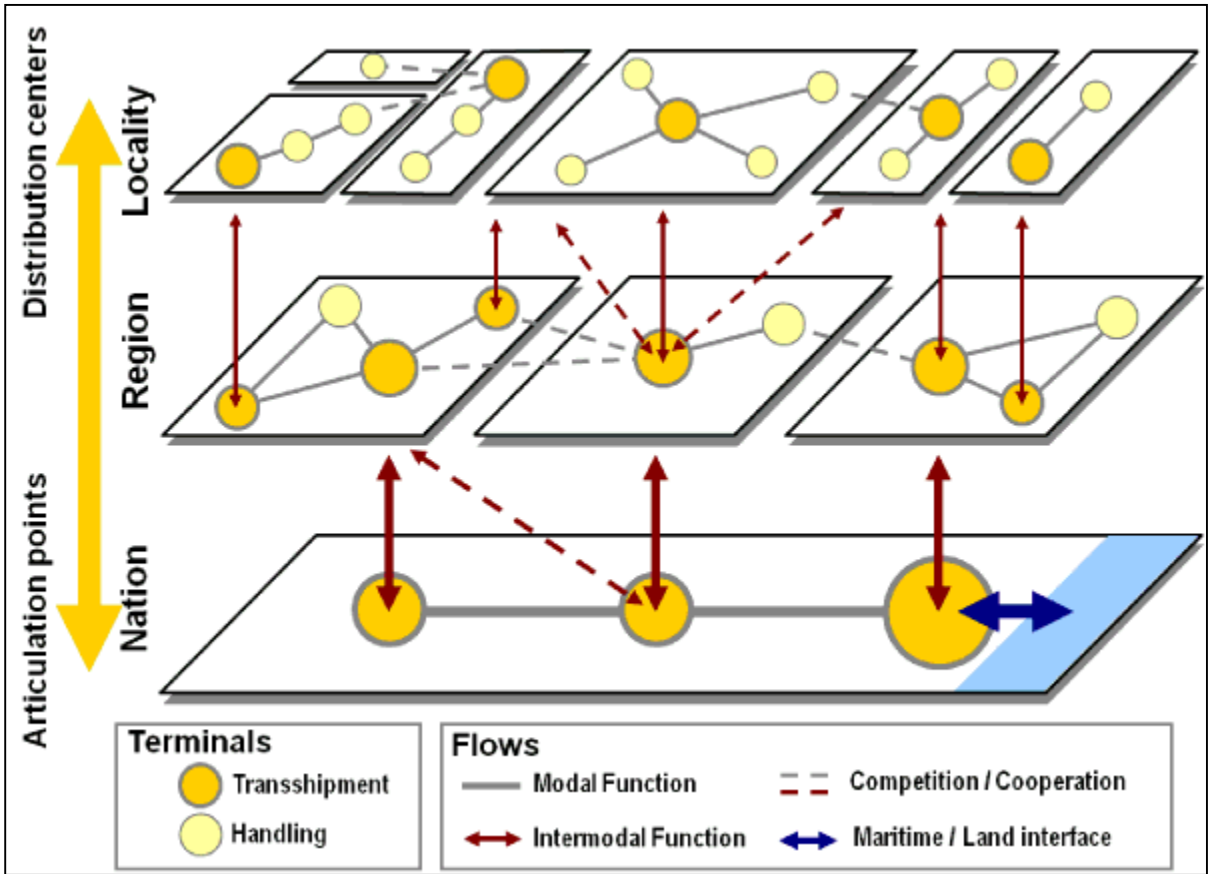
Reduces cost of exports
The inherent advantages of multimodal transport system will help to reduce the cost of exports and improve their competitive position in the international market.

Source: http://www.unescap.org/ttdw/CapBuild/Module%20-Multimodal%20Transport%20 Operations.pdf

Multimodal transportation is the result of containerization where one single unit (container) was to be carried from the place of origin to the place of delivery without breaking bulk. This resulted in the development of containerization throughout the world and the development of modern container terminals and the equipment associated with carrying, loading and offloading the container. However

it is to be noted that other cargo can also be carried and delivered on the concept of multimodal transport –i.e. without changing its original form, but with the change of mode of transportation.

Figure 2.9.5.1-1: Function of Multimodal Transportation



Source: http://people.hofstra.edu/geotrans/eng/ch3en/conc3en/multimodal.html

2.9.5.2 The Case of Bangladesh

The MTD (Multimodal Transport Document) is not used as there is no legislation in place for authorizing MTOs (Multimodal Transport Operators). Neighbouring countries like Nepal and India have the Multimodal Transport Act in place. There are about 840 Freight Forwarding Companies in Bangladesh, out of which about 40 are Multi Nationals.

In the context of Bangladesh, multimodal transport is very relevant as the government of Bangladesh is trying to increase its Ex-Im, regional, bilateral and domestic trade. Bangladesh has a vast river network, but its potential is yet to be harnessed. River transportation is the most economical means of transport compared to road, rail and air. It can play a significant role in transportation of goods including the positive impact it has on the environment and cost of transportation.

As smooth connectivity through the gateway ports and to the rest of the world is the key for setting up economic zones in inland locations, any such large investments should first consider the cargo evacuation system and methods using multimodal transport operations.

Multimodal Systems and Options of Cargo evacuation to/ from the Anwara EZ

a. Land – Sea (using road and ocean going ship)

✓ Road transport will be used for accessing Chittagong Port and from there onwards, ocean going ships shall be used for handling export traffic. The reverse order of modes applies for import cargo.

➔ This system of cargo evacuation can be currently used.

b. Sea – Sea (using feeder ship and ocean ships)

✓ The EZ industries' requirement of using the sea route for import of cargo could be explained as below.

➔ A 250MW coal-fired power plant is proposed in the EZ along with a captive jetty. It is envisaged that this jetty shall specifically be used for handling of imported coal required for the power plant.

➔ The industries inside the EZ (shipbuilding component) including the Shipbuilding, electric furnace, and cement manufacturing may use the Port of Chittagong for all their import shipments. In addition, the proposed 2 Shipbuilding yards in the water front have the option of having their own private wharfs from where they shall access their imported raw materials. Similarly, the electric furnace, proposed in between the 2 shipbuilding yards, also has the option of having its own private wharf for all their imports. The picture below provides a glimpse of the proposed yard.

Figure 2.9.5.2-1: A Typical Shipyard

c. Land – Air (using road and airport)

Air shipments to/from this EZ can be received/ delivered to Chittagong Airport which is located at about 46 Km from the site. As mentioned above, the access road needs improvement and modifications to cater to the heavy traffic of trucks and trailers when the EZ is operational.

2.9.6 Analysis of Freight Benchmark, Trading Across Border and Trade Connectivity

Analysis of road freight, ocean freight, air freight, trade connectivity and Bangladesh's position on the Doing Business index was undertaken and is given below. The GoB needs to take some strong measures to improve its positioning in the global index. There is room for intra-regional trade that Bangladesh should explore. It's FDI in stock GDP is below regional average in 2012.

A. Road Freight

It is expected that all goods heading/arriving from domestic destinations to/from the EZ shall be using covered vans[220] and trucks; whereas trucks and trailers shall be used for carrying containers to the EZ from the Chittagong Port.

On the basis of taking a 20ft. container (with a 20 ton load) and a 40ft. container (with a 30 ton load) from Chittagong to Anwara and comparing it with a similar load from Chittagong to Dhaka, we arrive at the per ton per Km freight cost as per the figures mentioned below. Though the cost is slightly higher on that basis (of per ton per Km), it is reasonable at this stage as there is no big volume traffic movement and there is no competitive force acting to fulfil the demand supply. Calculations of similar destinations are also provided as references.

Table 2.9.6-1: Benchmark – Road Freight

Sector	Distance	20ft. (20ton) Freight	40ft. (30 ton) Freight	Per ton cost (20ft.)	Per ton/Km cost (20ft.)	Per ton cost (40ft.)	Per ton/ Km cost (40ft.)
Chittagong - Anwara	28 Km	BDT 12,000	BDT 15,000	US$7.5	US$ 0.267	US$ 9.375	US$0.33
Chittagong - Mirershorai	39 Km	BDT 15,000	BDT 18,000	US$9.37	US$ 0.240	US$ 7.5	US$0.19
Chittagong - Dhaka	319 Km	BDT 30,000	BDT 35,000	USD18.75	US$ 0.058	US$ 14.58	US$0.045
Chittagong - Sherpur	435 Km	BDT 50,000	BDT 60,000	US$31.25	US$ 0.071	US$ 27	US$0.062
Kathmandu - Kolkata	1200 (by road)	US$ 2300	US$3300	US$115	US$ 0.095	US$ 132	US$0.11
Kathmandu – Kolkata	900 (by road - rail	US$ 1800	IS$2800	US$90	0.1	US$ 112	US$0.124

**Above information is based on an interview with 'Homebound Logistics' and a local transporter from Chittagong and info from Nepal from Inter State Multimodal Transport Pvt. Ltd- Kathmandu, Nepal*

B. Ocean Freight to/from Chittagong Port to Major Destinations

An analysis is made for comparing the freight of a of 20ft. and 40ft. container originating/destined from/to Chittagong port and other major destinations worldwide Ocean Freight rates for the major ports from/to the Chittagong Port are given below. From the freights provided, it is seen that import and export to Hong Kong & Dubai are most economical. For import & export cargo in general, Australia, followed by New Zealand, Rotterdam, New York, & Los Angeles are in economical order with Canada having the costliest ocean freight. It is to be noted here that most of the sectors have a large difference in the import and export freight. Ocean freight rate is volatile and is governed by the demand and supply theory as well as the availability of containers. The freight rates can go up substantially during peak season.

[220] In the context of Bangladesh, small pick-up delivery vans up to 3 tons are normally referred as "covered vans" followed by mini trucks (upto8 tons), trucks (upto20 tons includi) and trailers (above 20 tons).

Table 2.9.6-2: Comparison – Ocean Freight Rates

EXPORT / IMPORT	20ft. (in US$)	40ft. (in US$)	20ft. (in USD)	40ft. (in USD)
Ocean Freight to International Destinations (from Chittagong Port)	**EXPORT**		**IMPORT**	
Major European Ports (Rotterdam)	1,300	2,600	1,500	3,000
USA - East Coast (New York)	3,000	4,000	3,000	4,000
USA - West Coast (Los Angeles)	3,000	4,000	3,000	4,000
Canada (Toronto/ Montreal)	3,500	4,500	3,500	4,500
Australia (Melbourne)	1,200	2,400	1,100	2,200
New Zealand	1,200	2,400	1,500	3,000
Hong Kong	1,000	2,000	1,200	2,400
UAE (Dubai)	1,100	2,200	1,200	2,400

Source: National Agencies, Dhaka, Bangladesh

C. Air Freight to/from the Shahjalal (R.) International Airport, Dhaka:

Air freight rates to/from Dhaka to several destinations are given below**.** Similarly to ocean freight, air freight shipments to/from Dubai, Hong Kong, and Shanghai are comparatively cheaper in comparison to Melbourne, London, Rotterdam, and Montreal. The cheaper freight to Dubai, Hong Kong, and Shanghai is due to the fact that there are many scheduled flights to those nearer destinations (with belly-hold capacity in the passenger crafts) as well as the availability of freighter services to those destinations. Shipments to other destinations as London, Montreal, New York, and Los Angeles etc. have to use transit route with lesser frequency resulting in costlier freights - the greater the distance and transit, the costlier the freight.

Table 2.9.6-3: Comparison – Air Freight Rates

Air Freight (Export /Import from Dhaka Airport)	Up to 1 Kg (US$)	Up to 10 Kg(US$)	Up to 50 Kg(US$)
Dubai	50/100	4.50/3.5	3.70/3.2
London	50/100	7.50/3.5	3.70/3.2
Rotterdam	50/100	7.87/3.5	3.70/3.2
Montreal	75/100	9.50/5.5	7.10/5.1
Melbourne	50/100	6.50/3.5	3.70/3.2
Hong Kong	50/100	4.50/3.5	3.70/3.2
Shanghai	50/100	4.50/3.5	3.70/3.2
New York	75/100	9.50/5.5	7.20/5.1
Los Angeles	75/100	9.50/5.5	7.20/5.1

Source: National Agencies, Dhaka, Bangladesh

D. Ocean Freight – Comparative Analysis

The table below provides the benchmark on how two major cities from OECD countries (Yokohama and Los Angeles) fare from a developed country's perspective. The table provides the status of Bangladesh's ocean freight standing in terms of import and export to/from Japan (Yokohama Port) and to US – West Coast (Los Angeles). It can be noted from the table that other ports/cities like Seoul, Kuala Lumpur, Beijing, and other Chinese cities are paying less then or about USD700 per 40ft. box for their export shipment, Batam with about 800 whereas Bangladesh is paying US$900 followed by Bangkok, Phnom Penh, Batam, and Yangon. The most expensive ocean freight seems to be from Danang and Hanoi which is above US$2,000.

Except for Dalian, other Chinese cities are enjoying cheap ocean freight within/about 900 for their import shipment from Yokohama. Dalian is followed by KL, Singapore, Cambodia, and Bangladesh. Indian and Vietnamese import freights are near/above US$2,000.

In the case of export to Los Angeles, again, Bangladesh's position is in the lower section with Seoul, Beijing's fare within US$2,000 followed by other Chinese cities, Jakarta, and Singapore. Bangladesh is almost at par with Bangkok but costlier than Mumbai, Chennai, Ho Chi Minh City, and Guangzhou.

Table 2.9.6-4: Comparison - Ocean Freight of 40ft. Container to/from Yokohama (Japan) & to Los Angeles (USA)

Country	City	Export to Yokohama	Import from Yokohama	Export to Los Angeles
1.Bangladesh	Dhaka	900	2,000	3,675
2. Cambodia	Phnom Penh	1,500	1,400	4,000
3. India	a. Mumbai	500	2,450	3,000
	b. Chennai	979	2,803	2,817
	c. New Delhi	1,566	2,878	3,968
4. Indonesia	a. Jakarta	800	1,200	2,600
	b. Batam	1,850	1,800	4,000
5. Myanmar	a. Yangon	1,600	2,400	6,500
6. Vietnam	a. Da Nang	2,500	3,000	5,000
	b. Ho Chi Minh	500	650	2,600
	c. Hanoi	2,000	2,500	4,500
7. Thailand	a. Bangkok	1,162	1,322	3,863
8. Malaysia	Kuala Lumpur	643	1,008	2,878
9. Singapore	Singapore	900	1,100	3,000
10. China	a. Hong Kong	700	100	2,900
	b. Dalian	50	2,400	227
	c. Shenzhen	400	995	2,700
	d. Guangzhou	650	895	3,000
	e. Shanghai	564	775	2,938
	f. Beijing	1,005	671	1,945
11.South Korea	Seoul	480	200	1,823

Source: (http://www.jetro.go.jp/en/reports/survey/pdf/2013_05_01_biz.pdf): The 23rd Survey of Investment Survey Related Costs in Asia and Oceania (FY 2012 Survey) May, 2013 –Overseas Research Department, Japan External Trade Organisation (JETRO)

2.9.7 Bangladesh's Position in *Doing Business 2013*

In the country table provided in *Doing Business 2013*, Bangladesh ranks 119 out of 185 countries under the Trading Across Border heading. The table below provides a glimpse of Bangladesh's standing compared to its neighbours and also to the developed countries in the world. Documents required for export are fewer in Bangladesh than in India, but the time it takes to export and import is more than any other country in the list given below. Ideally, Bangladesh's import and export container costs should be below the US$1,000 threshold, but it is not. This may be because of it not being a hub port and relying on feeder services serving the hub port which adds cost. With the development of the proposed Sonadia Deep Sea Port, as a hub port, the scenario may change.

Table 2.9.7-5: Comparison - Doing Business (Trading Across Border)

Country	Trading Across Border (rank)	Documents to export (number)	Time to export (days)	Cost to export (US$ per container)	Documents to import (number)	Time to import (days)	Cost to import (US$ per container
Bangladesh	119	6	25	1,025	8	34	1,430
India	127	9	16	1,120	11	20	1,200
Sri Lanka	56	6	20	720	6	19	775
Cambodia	118	9	22	755	10	26	900
Thailand	20	5	14	585	5	13	750
Indonesia	37	4	17	644	7	23	660
China	68	8	21	580	5	24	615
Japan	19	3	10	880	5	11	970
USA	56	6	20	720	6	19	775

Source: Doing Business 2013

2.9.8 Bangladesh's Position in Trade Connectivity: UN Report221

In a UN-ESCAP report published some time ago, Bangladesh took 137th position out of 179 in the ESCAP International Supply Chain Connectivity (ISCC) Index. Bangladesh's progress in enhancing supply chain connectivity from 2006 to 2012 has been similar to other countries in South and South West Asian region. The latest data from the ESCAP database suggest that Bangladesh has made limited progress in reducing trade costs with its South and South-West Asian neighbours, with relatively more progress with East and North East Asia.

With the exclusion of tariff cost, trade between Bangladesh and the USA is only slightly higher than those between Bangladesh and some other South Asian countries, suggesting room for intra-regional trade facilitation.

As per ESCAP, the country's export growth was slightly above average for the Asia-Pacific region, while imports fell by over 5% compared to 2011. This improved the trade balance deficit of 11% of GDP in 2011 to 8% in 2012.

Though foreign investment increased from US$700 million in 2009 to under US1 billion in 2012, the country could do a lot more to attract investment as the share of inward FDI stock in GDP was far below the regional average in 2012.

2.9.9 Recommended Infrastructure for Transport Accessibility

Road

A new access road of 7 Km connecting the EZ site with the national highway is proposed. Cost and access road specifications are covered separately in Chapter 3.

Jetty

A captive jetty for handling coal for the power plant is proposed. Detail of its design can be found in the next Chapter.

[221] *Financial Express, 24th Nov 2013*

CHAPTER 3

MASTER PLANNING AND INFRASTRUCTURE

(COMPONENT 2)

3.1 Site Assessment

3.1.1 Site Visit Report

As a startup activity for the Feasibility Study, the team of consultants (expatriates and local personnel) visited the Anwara EZ site from July 7 until July 10, 2013. The purpose of the visit was to observe and explore existing site conditions, investigate off/on site infrastructure and available facilities, land acquisition and resettlement issues, environmental and social aspects, etc. Details of that visit are provided in Chapter-3, Inception Report. The power point presentation given to the World Bank on the Field Visit is shown in an Annex of that inception report.

Subsequently, while preparing the Master Plan, the Consultant Team (Local Personnel) visited the site again from July 23 to July 25, 2013. During this period, the Team also visited various offices. These include the DC office, the pazila Parishad office, the RHD Office, the BWDB Office, the BPDB Office, the Gas office, etc. in Chittagong Division and Anwara Upazila. Relevant documents were collected, for example location maps of the sites, information regarding assessment of cost of compensation and relocation of affected persons and the list of the affected properties, etc. and other information related to the project. The team discussed the previous activities related to the project (EZ sites) with engineers and others conversant with the features of the sites.

3.1.1.1 Location and Physical Aspects of the Site

The site is located in Anwara Upazila (Chittagong District, Ward No. 8 & 9 of Roypur Union, Mouza-Gahira); about 20 Km southwest from Upazila Headquarter, 30 Km south from Chittagong District Headquarter and about 39 Km off from Chittagong Seaport. Chittagong-Anwara-Chandnaish Highway is about 16 Km towards north-east from the site.

The project site is located on 611.47 acres (247.56 Ha) of land, of which 321.2 acres (130.04 Ha) is private land and 290.27 acres (117.52 Ha) is public land. The site is vulnerable to cyclonic and tidal surges. The pennisular site is surrounded by the Bay of Bengal/BWDB embankment on its western side and the Sangu River (Refer to Figure 3.1.1.1-1: Location Map of Anwara EZ site) on its eastern side. The land uses of the project area comprise agriculture and scattered rural settlement.

During the site visit, the Consultants Team visited and investigated two existing access roads from the site to the Highway.

Map 3.1.1.1-1: Location Map of Anwara EZ

3.1.1.2 Access Road for Anwara EZ Site

Of the two access roads, investigated by the consultants, one (Access road 1) is from Chaturi Bazar, the intersection at Chittagong-Anwara-Chandanaish Highway through KAFCO, Parky Beach Bazar then through BWDB embankment (Dike) along the bank of the Bay of Bengal up to the site's starting point and onward and the second access road (Access road 2) is from Chaturi Bazar point through CUFL Centre/Bandar Centre, Barshat Union, Dovashi Bazar up to the BWDB embankment just near the starting point of the project. The distance from Chaturi Bazar through access road-1 to the end of the western part of the site is about 16 Km. The second access road (access road 2) is 20.47 Km.

The access road from Chaturi Bazar to CUFL centre is about 4 km and was constructed under Chittagong Urea Fertilizer Ltd (CUFL). The rest of the road about 6 Km up to the BWDB embankment was constructed under LGED.

Near Parky Beach Bazar there is a 'khal' (canal) flowing across a short (zigzag) road with a small bridge over it. Here, the road/bridge almost perpendicularly connects the LGED road and BWDB embankment portions of the access road, which will have to be taken into consideration. The distance from Parky Beach Bazar up to the end of this part of the EZ site through the BWDB embankment is about 8 Km. While visiting the BWDB embankment, the Team observed - next to the Parky Beach Bazar the BWDB embankment up to a distance of about 3.5 Km towards the proposed site seems to be quite stable with very mild side slope. Small clusters of tree plantations exist on the side slope and along the embankment, but with the increase of distance towards the site this tree plantation becomes less and no plantation was observed along the embankment near the project site. Erosion was observed to have taken place from wave action intermittently basting the embankment. Protective measures were seen to have been taken for side slope protection of the embankment. Concrete blocks were seen to have been used in protective work, placed horizontally on the slope and additional blocks placed vertically at intervals for the dispersion of waves from the Bay of Bengal. This effort to protect the embankment displayed average quality workmanship. It was observed that these blocks were not placed properly causing erosion and settlement of the embankment slope. The Consultants' Team discussed the embankment with the local people (member of the locality), the year of its construction, its behaviour relative to wave action, maximum level of waves as they saw it. The Consultants observed some places on the embankment as slightly wet which happens from water thrown from the slope of the embankment due to wave action of the Bay. The team visited almost up to the end of the embankment on the western side (mouth of Sangu River) [Refer to Figure 3.1.1-1: Location and Layout of Access roads].

The following table shows the possibilities and constraints of the existing access road from Chaturi Bazar to the project site through Parky Beach Bazar then through the BWDB embankment.

Table 3.1.1.2-1: Possibilities and Constraints of the Existing Access Road From Chaturi Bazar to the EZ Site Through Parky Beach Bazar (Access Road 1)

Possibilities	Constraints
01. Most of the road up to the embankment is double lane and the part of the BWDB embankment found in good condition is 100 feet wide. Widening the road in the future is possible up to the required width of 4-lanes. Widening of the embankment will be possible up to 300 feet. 02. Minimum resettlement required along the road portion and almost no resettlement needed for the BWDB embankment part. 03. The embankment would be used in the road network.	01. The access road needs realignment near Parky Beach Bazar. Within a very short distance from Parky Beach Bazar to the BWDB embankment, the road takes several turns. A khal flows across this zigzag road and a small bridge extends over it. 02. Before designing the embankment cum road for heavy/long vehicles and as well as the design of protective work of the embankment a comprehensive Hydro-Morphological Study needs to be carried out. 03. Protection of the embankment as well as the site from tidal and cyclonic surges will be difficult and involves high cost.

The second access road (Access road 2), is about 4km from Chaturi Bazar to CUFL Centre/Bandar Centre (CUFL Road) and from the Bandar Centre it runs about 10 Km south-west through a dense locality (Barshat Union, Dovashi Bazar etc.) up to the BWDB embankment near the starting point of the EZ site. Many newly built 'pucca' structures were seen along both sides of the road during the visit (Refer to Figure 3.1.1-1 for location and layout of Access road 2).

Considering the above, the existing access road (Access road 1) from Chaturi Bazar (Intersection at Chittagong-Anwara-Chandanaish Highway) to the project site through Parky Beach Bazar then through the BWDB embankment might be considered for the project. The access road (Access road 2) up to the BWDB embankment near the EZ site through Bandar Centre, Barshat Union, and Dovashi Bazar may not be considered for the project. Widening and straightening of this road to make it fit for the purpose of the EZ will be simply not possible.

3.1.1.3 Possible Social Implications

About 53% of the total site land is to be acquired to establish the EZ which amounts to 321.2 acres (130.04 hectares). There was a preconceived idea that the people might not like the idea of their households being acquired by the government. But that concern was proven to be wrong during the site visits.

During the field visits various consultation meetings were held with Upazila level government officials and union parishad officials. Consultations were conducted with local people including home owners, private land owners, fishermen, shopkeepers and restaurant owners, and workers, women, school going children, and local traders. The poorest local people living inside and in adjacent areas, said that the EZ will bring more economic benefits to the population of the EZ and adjacent areas as there are not many income generating activities currently in this place. The agricultural production of the land is very low and fishery is also not possible due to the saline water intrusion. So they're willing to give up their land towards the establishment of the proposed EZ.

The site visits didn't have the scope to cover all the people who will have to be relocated due to the construction of the EZ and so it cannot be said conclusively that problems will not arise during acquisition. So the proper mechanism for land acquisition should be taken and arrangements should be made so that the real affected people receive the appropriate compensation. A proper grievance redress mechanism will be outlined in Chapter 4 so that people can seek remedy and achieve settlement. A resettlement area is required in the Master Plan for the people having households on the site and would need to be resettled. This will solve some of the land acquisition issues at the site.

Some relevant photographs of field visit on Anwara EZ site are presented below.

View of Chaturi Bazar-CUFL Road, starting of access road from Chittagong– Anwara- Chandaraish Highway (Chaturi Bazar Intersection Point) leading to Anwara Project site (through KAFCO, Parky Beach Bazar then through BWDB Embankment (Dike) along the Bay of Bengal up to the project starting point of Gahira.

View of entry to Korean EPZ (KEPZ) from CUFL road (about 2.5 Km from Chaturi Bazar intersection).

View of khal flowing across short (Zigzag) road near Parky Beach Bazar as seen from the bridge over the river (road/bridge connecting almost perpendicularly the LGED road portion and BWDB Embankment portion of the access road 1).

View of BWDB Embankment towards project site near Parky Beach Bazar. Paved road top apparently in good condition. Concrete blocks are ready to be used for side slope protection of Embankment.

Another view of Embankment towards project site with Paved road on top.

View of BWDB Embankment with earthen road top. Stable side slope with tree plantation is seen in the view.

View of Embankment in very poor condition with water body at project site to the left.

View of Anwara EZ site as seen from BWDB Embankment shows landscape and settlement characteristic of the site.

View of EZ site along the BWDB Embankment.

Photograph shows dike with displaced concrete blocks and washed road on top.

View of side slope protection work of Embankment with displaced concrete blocks along the toe line.

View of Embankment side slope failure.

View of char near Sangu River as seen from the Embankment.

View of 2nd access road as seen on the way to Anwara EZ site through Bandar Centre, Dovashi Bazar, Bakhtiarpara, Barshat Bazar etc. and BWDB Embankment. Photograph taken from CUFL Road near Bandar Centre, about 4km west from the Chittagong-Anwara-Chandanaish Highway (Chaturi Bazar intersection).

Another view of 2nd access road as seen from the BWDB Embankment near the EZ site. The road runs towards north-east (about 8km) till it meets the Chaturi Bazar-CUFL road at Bandar Centre.

View of access road 2 at Dovashi Bazar showing dense structures on both sides of the narrow road.

View of access road 2 as seen on the way to the EZ site at Bakhtiarpara

3.1.2 Description of Sub-soil Condition of the Site

The soil bore is collected from a secondary source and it is of a site about 25-30 km from the project site. It can be a general idea about the region and considered in the design process. All super structures are estimated assuming the standard pile foundation based on this general information.

The top soil at the EZ site is mainly very soft silt with clay or clay-ridden silt. According to the subsoil investigation record of this area (Chittagong District) the soil profile at shallow/beyond shallow depth is mainly dominated by non-cohesive soil with normally low SPT values at the upper level. However, for better understanding, a field soil bore log data of a bridge site (bore hole location on the land) in Patiya, Chittagong District is shown in the following figure.

Figure 3.1.2-1: Soil Bore Log Data Sheet

FIELD BORELOG

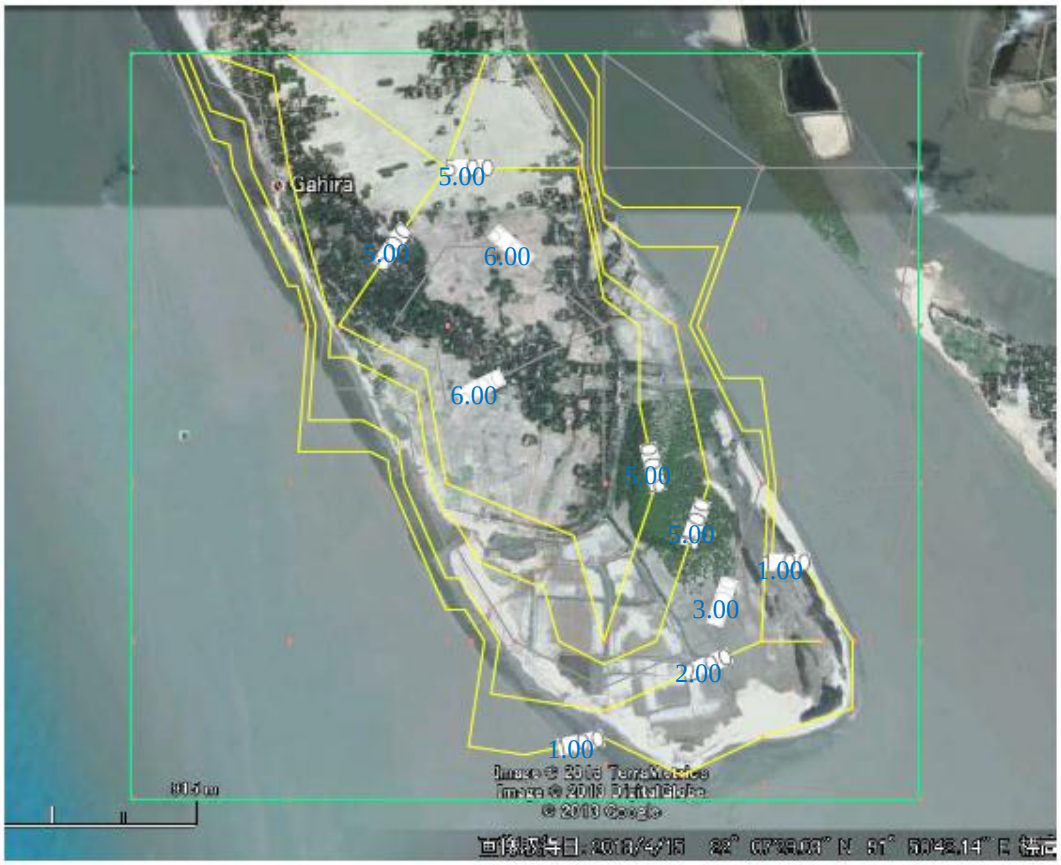
CLIENT : LGED, PATIYA, CHITTAGONG
PROJECT : BRIDGE
LOCATION : Ch-4+00km, Upazila-Patiya, District- Chittagong.
BORE CHART OF BORING NO : 01
METHOD OF BORING : WASH
DIAMETER : 4"
INCLINATION : VERTICAL
DATE STARTED : 17/07/2011
DATE COMPLETED : 17/07/2011
R.L 2·58 m, GR. W. TABLE 2'-4" BELOW ON 18/07/2011

DEPTH IN METER	R.L. IN METER	Description of Strata Encountered	No. of Blows/Ft (SPT)	DEPTH IN FT.	SOIL SAMPLE TYPE
1.52		Grey, very soft silt and clay, trace fine sand.	2	5	☐
3.04			2	10	☐
4.56			2	15	☐
6.08			2	20	☐
7.80			2	25	☐
9.12		Grey, very soft to soft to medium to soft silt, some clay, little fine sand.	2	30	☐
10.64			3	35	☐
12.16			4	40	☐
13.68			5	45	☐
15.20			6	50	☐
16.72			4	55	☐
18.24		Grey, loose to medium fine sand, some silt.	8	60	☐
19.96			10	65	☐
21.28			10	70	☐
22.80		Grey, medium fine sand, some silt.	12	75	☐
24.32			12	80	☐
25.84			14	85	☐
27.36		Grey, medium fine sand, little silt.	18	90	☐
28.88			20	95	☐
30.40			21	100	☐
31.92				105	☐

3.1.3 Topographical Condition

The topographical condition is investigated to determine the finishing level and the necessary height needed for the dike. Details are shown in the Engineering Design section.

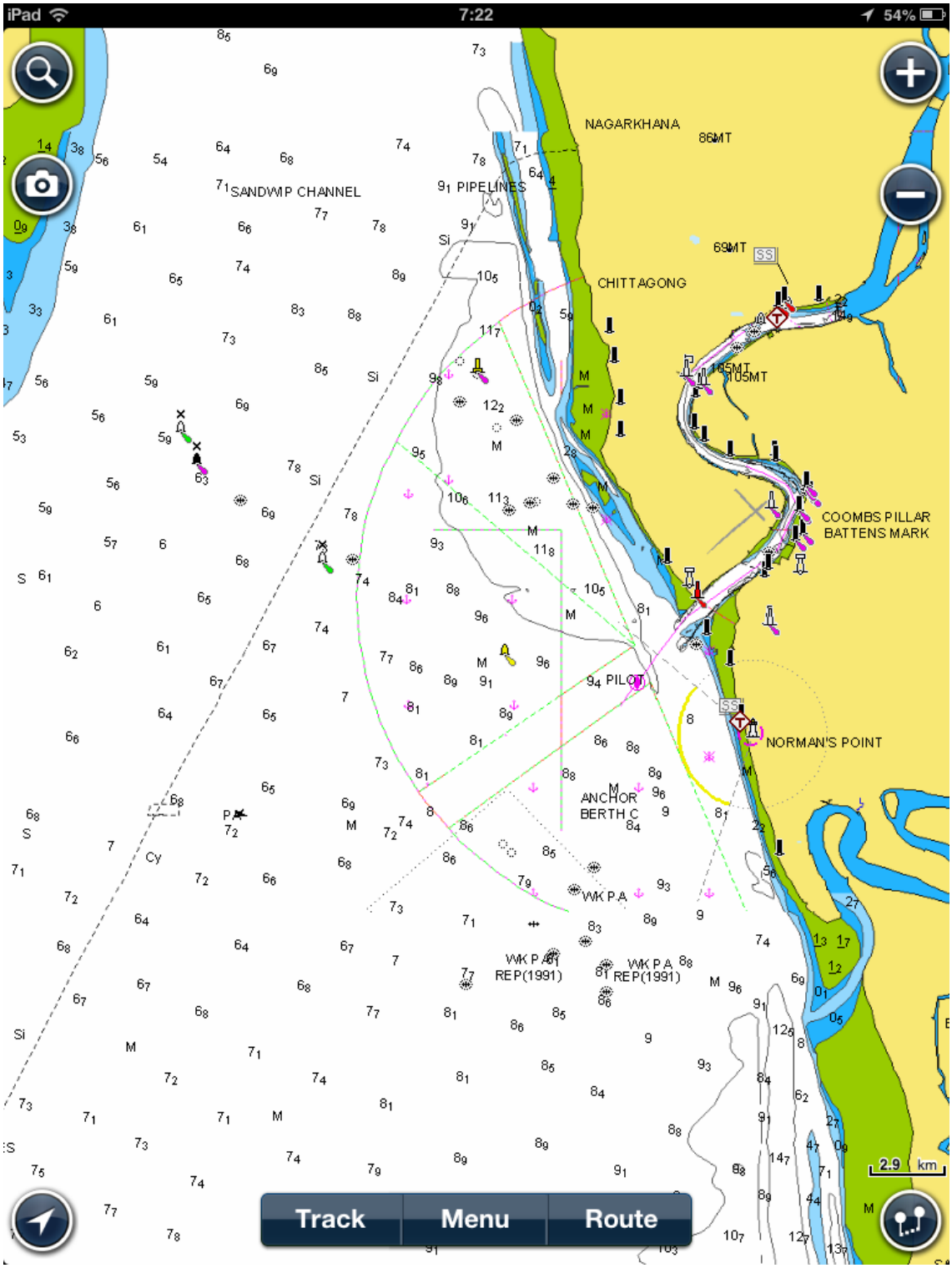
Figure 3.1.3-1 Contour Lines on the Existing Land



The contour lines are created through Google Earth information. The ground elevation of the private land is about El+4.00 ～ El+6.00. On the other hand the ground elevation of public land which outside the surrounding dike is about El+1.00 ～ El+2.00.

Regarding the oceanography conditions, there are huge sand bed areas expanding to the south. River depth is about from 2.7m to 0.6m. The depth of the Bengal seashore line is between 2.2m and 1.3m where sheet piling works are possible.

Figure 3.1.3-2: Oceanography Map near Anwara Region



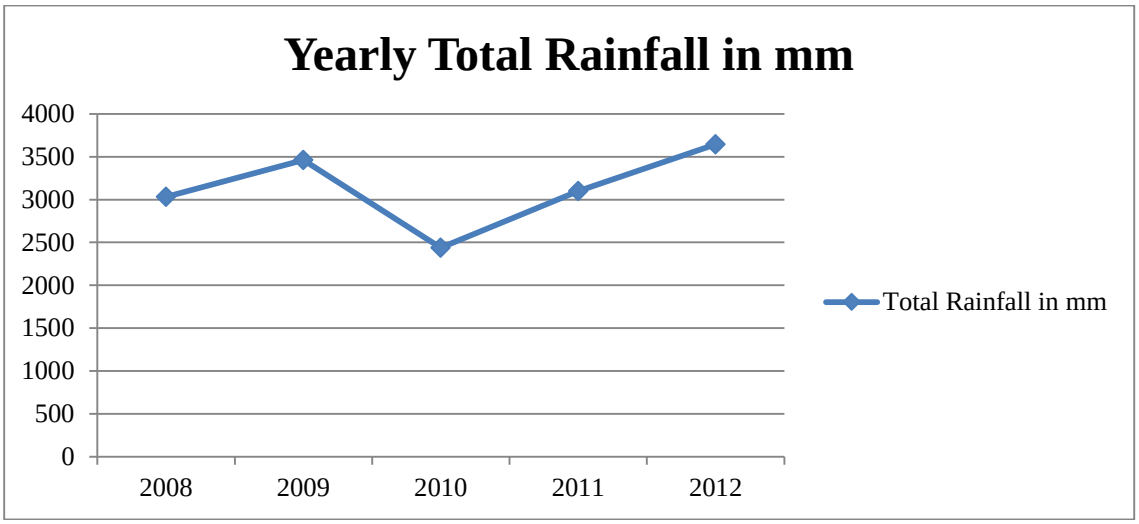
3.1.4 Rain Data

The rain data is investigated to determine the dimension of u-channel drain and the retention pond systems. Details are shown in Annex 3.

The following data is used for the analysis:

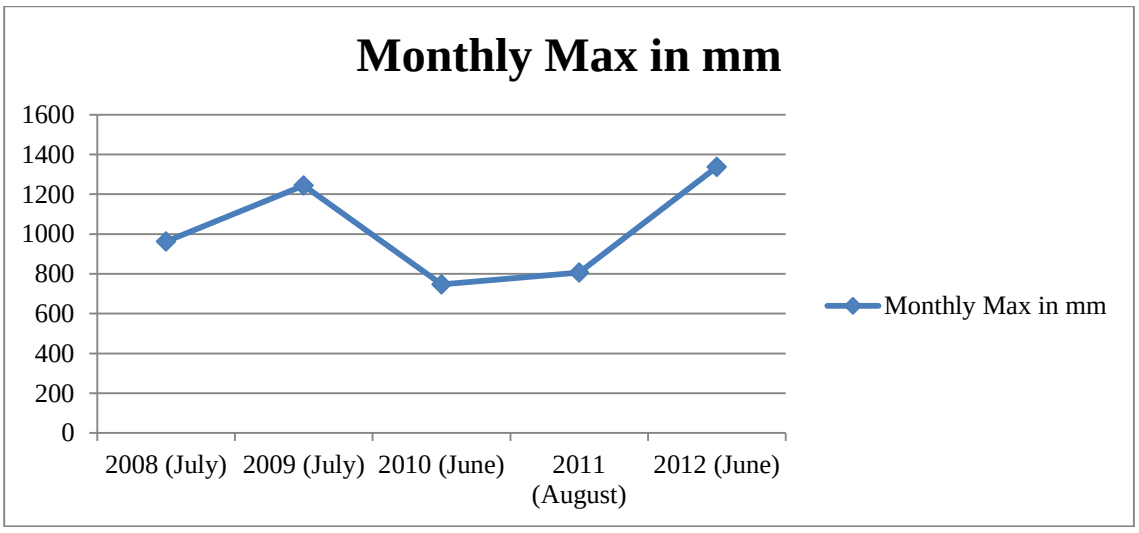
- Rainfall in millimetres.txt, Bangladesh Meteorological Department, Climate Division, Agargaon, Dhaka-1207, Data (Chittagong Division)

Figure 3.1.4-1: Yearly Total Rainfall in mm



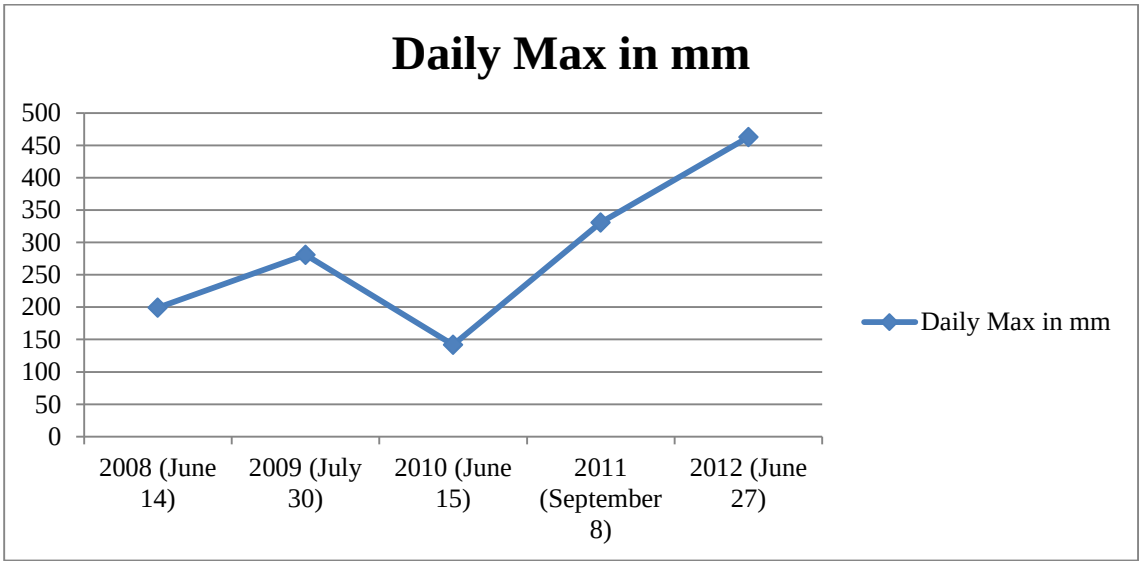
The data shows that the average yearly rainfall (in mm) of the past 5 years has been between 3,100～3,200 mm.

Figure 3.1.4-2: Monthly Max Rainfall in mm



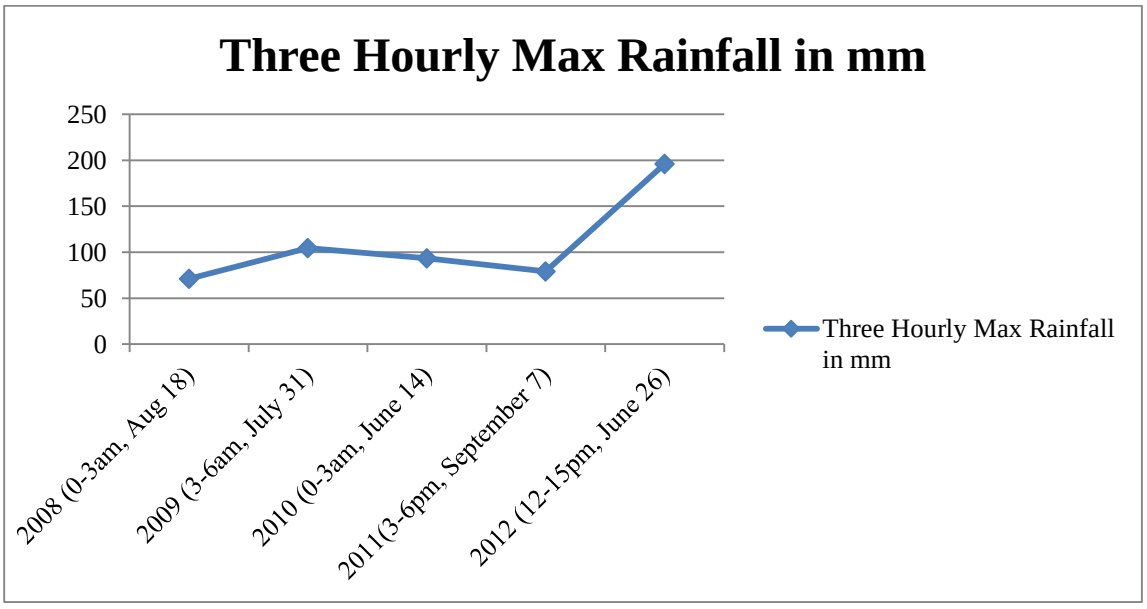
The monthly maximum data shows that June, July, and August are the highest rainy months in Bangladesh. In 2012, 1,337 mm fell in June.

Figure 3.1.4-3: Daily Max Rainfall in mm



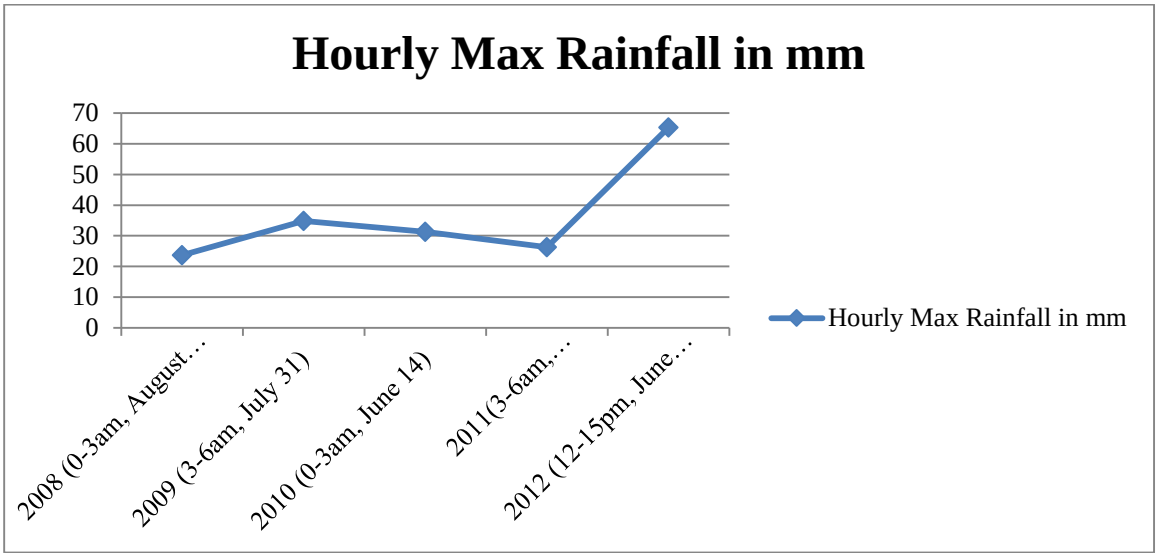
The data shows that relatively high figure (463 mm/day) was recorded on 27 of June 2012. This figure will be used for the drainage design in order to find the optimal dimension of the retention pond.

Figure 3.1.4-4: Three Hourly Max Rainfall in mm



The average rain fall in three hours was about 70～80mm until 2011. The relatively high figure (196mm) was recorded in 2012.

Figure 3.1.4-5: Hourly Max Rainfall in mm



The hourly max rainfall data shows that about 30mm/hour was the average intensity until 2011. The figure of 2012 shows relatively high intensity (65.3mm/hour). This figure will be used for drainage design specifically for the dimension of a U-shape channel.

3.1.5 River Condition

Bangladesh has about 24,000 Km of rivers, streams and canals that together cover about 7% of the country's surface. Most parts of the country are linked by a complex network of waterways which reach their maximum size in the monsoon period. Out of 24,000 Km of rivers, streams and canals only about 5,970 Km are navigable by mechanized vessels during the monsoon period and this shrinks to about 3,870 Km during the dry season.

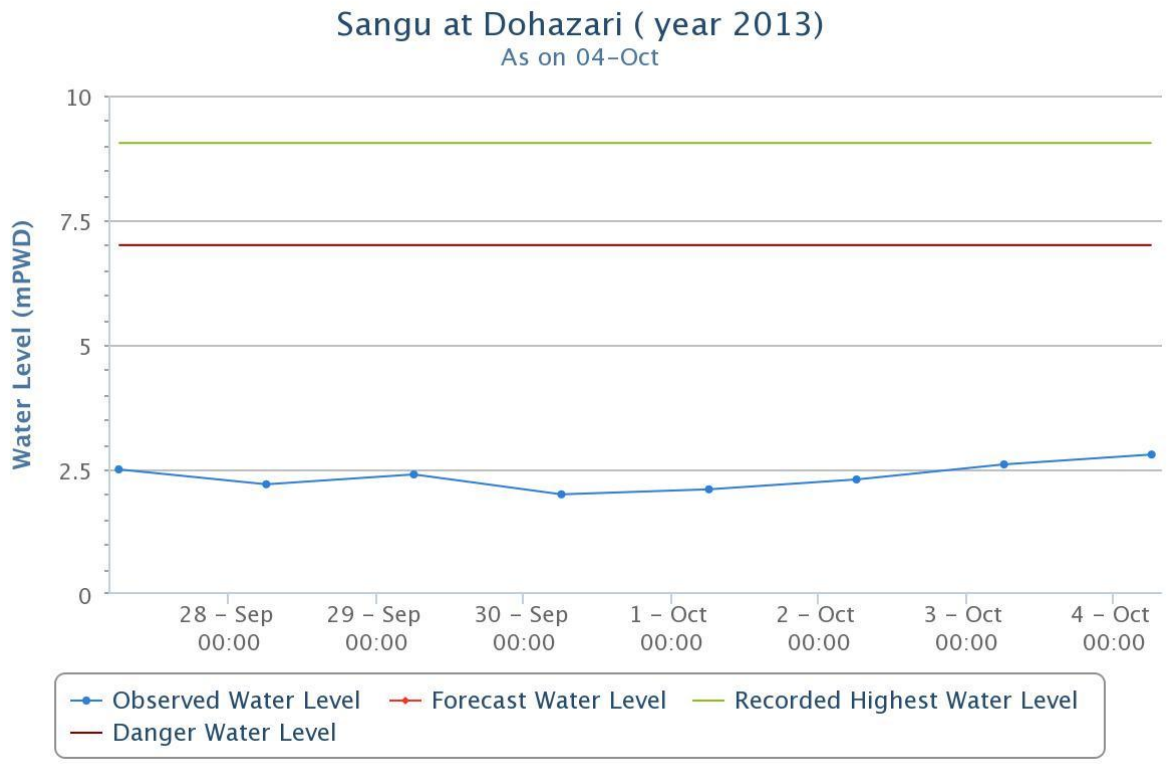
The Sangu River has its source at 21°13´N and 92°37´E in the North Arakan Hills, which form the boundary between Arakan and the Chittagong Hill Tracts. It follows a northerly circuitous course in the Hill Tracts up to Bandarban District. It enters Chittagong district from the east and flows west across the district and finally falls into the Bay of Bengal at the end of a course of 270 Km (173 Km within Bangladesh territory) at 22°6´N and 91°51´E about 16.09 Km south of the mouth of the Karnaphuli.

The principal tributary of the Sangu is the Dolukhal, which drains the Satkania plain. The Chand Khali flowing through the Patiya plains also joins it on its right-bank. Further down, it is joined by the Kumira Khali and ultimately falls into the Kutubdia Channel. The Sangu is, therefore, a very important river in so far as it drains off the waters of three important Upazilas - Patiya, Satkania, Anwara and Banshkhali. It also has a connection with the Karnaphuli through the Chand Khali. The Sangu is a shallow river but it becomes dangerous during the rains with rapid currents. It is navigable up to 48.27 Km from the estuary.

3.1.5.1 Past Maximum Water Surface Level

According to the web data from the Flood Forecasting & Warning Centre, Bangladesh Water Development Board (BWDB), the past maximum water surface level is +9.05m in Dohazari. This point is 50 Km upstream of the EZ site. In Bandarban (85 Km upstream of EZ) the river had a past highest water level of +20.70 m. These figures are critical for designing the flood protection system.

Figure 3.1.5.1-1: Present River Surface Level at Dohazari



Historical hydrograph of Sangu River at Dohazari is given below.

Figure 3.1.5.1-2: Past Maximum River Surface Level at Bandarban

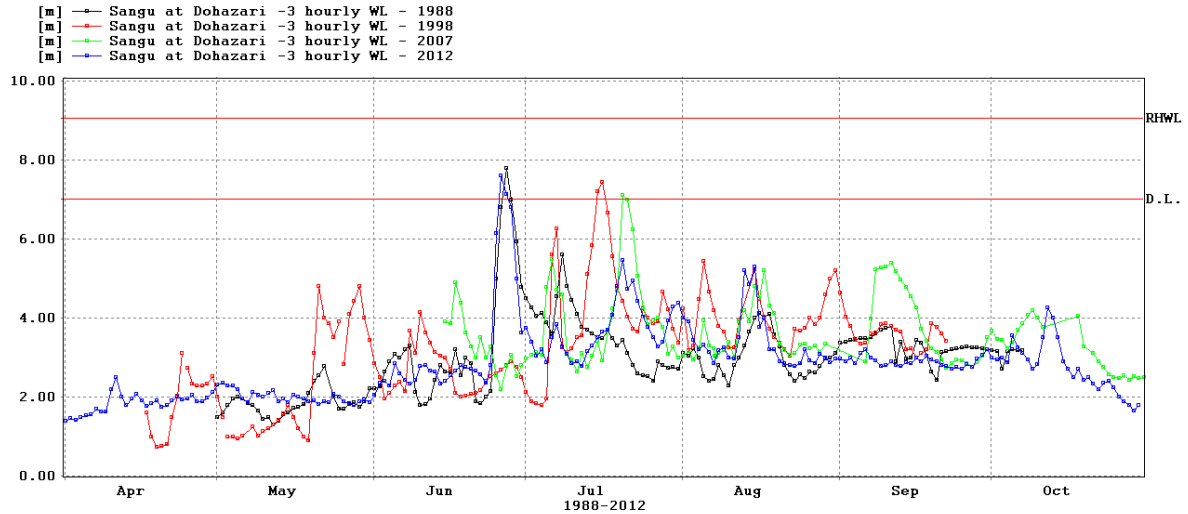
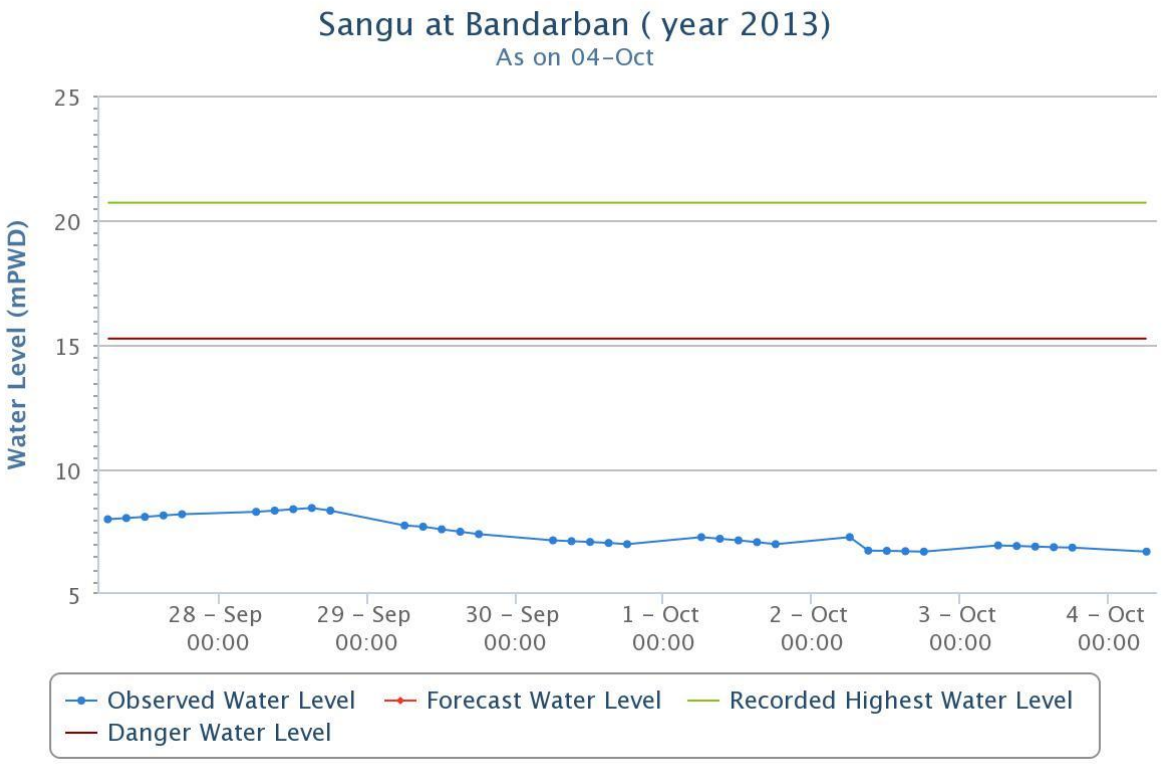
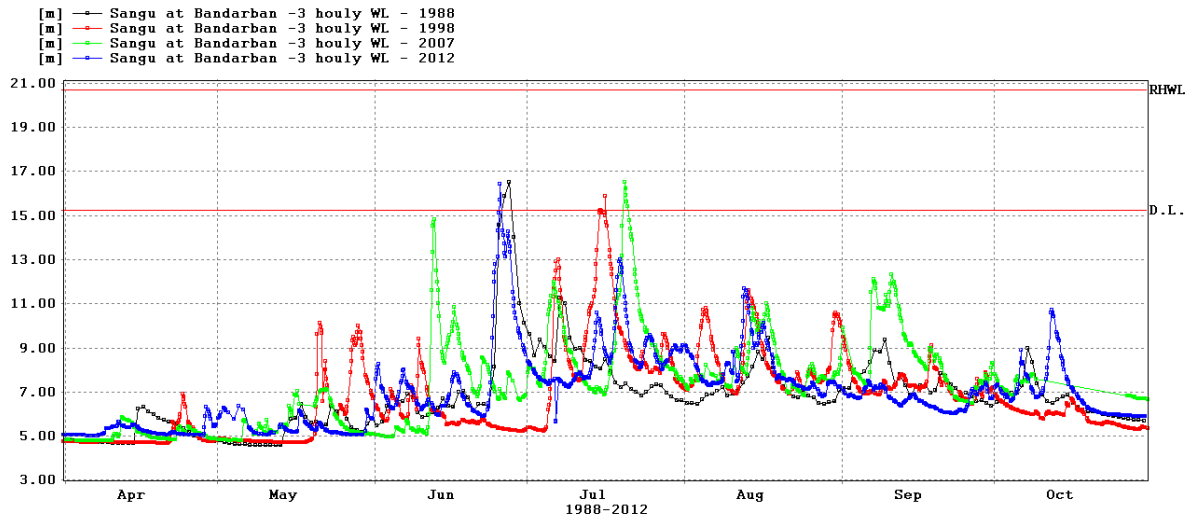


Figure 3.1.5.1-3: Present River Surface Level at Bandarban



Historical hydrograph of Sangu at Bandarban follows below.

Figure 3.1.5.1-4: Past Maximum River Surface Level at Bandarban



3.1.5.2 Water Quality

The water quality data is presented below.

Table 3.1.5.2-1: Water Quality of Sangu River[222]

Parameter	Unit	Value
pH		7.66
EC	u/Scm	270.9
TDS	mgL	135.32
DO	mgL	5.83
Transparency	cm	35
Acidity	mgL	3.09
T.Alkalinity	mgL	146.52
T.Hardness	mgL	160
Chloride	mgL	14.35
BOD	mgL	2.24
Nitrate	mgL	0.01
Nitrite	mgL	0.25
Sulphate	mgL	4.66
Fe	mgL	0.6
Mn	mgL	0.37
%NaCl		0.49

3.1.6 Condition of the Sea

As a maritime country, Bangladesh has about 9,000 square nautical miles of territorial waters and 20,000 sq. nautical miles of economic resources zone in the sea. The bottom topography of the coastal waters in Bangladesh is very shallow having several detached shoals with shifting sand banks. As such, navigation by the ocean-going ships in these waters is hazardous and demands regular hydrographic surveys and studies of the area. Regular publications of up-to-date nautical charts and tide tables for the waterways and port are, therefore, required for the safety of navigation. In general, the topography of the country is extremely flat except marginal hills along the North-East and South-East region. The average land elevation is about 7.62 meters (25 ft.) above mean sea level whereas for coastal and offshore islands it is about 1.5 meters (approx.) above mean sea level and major portions of the waterways are under tidal influence. The land elevation in the EZ site in Anwara is very low. Average height is found to be 3.5 metre (11.5 ft.).

3.1.6.1 General

Japan International Cooperation Agency (JICA) collected gauge data from the Karnaphuli River's mouth and determined MSL value as 3.486 m. JICA determined the above MSL value using observation period from 1600 hours 28th January, 1993 to 2300 hrs. 30th November, 1994. Contents of Data as mentioned in their report (Tidal observation reference data 1, no determination of the Mean Sea Level, March 1995) are shown below in tabular form:

[222]Source: Ahmed et. el. "Physicochemical Assessment of Surface and Groundwater Quality of the Greater Chittagong Region of Bangladesh" Pak. J. Anal. Environ. Chem. Vol. 11, No. 2 (2010) 1 – 11

Table 3.1.6.1-1: Mean Sea Level Measured by JICA

Year	Total Heights	Numbers of Values	Mean
1993	20813.33	5832	3.569
1994	26944.64	7866	3.425
Total	**47757.97**	**13698**	**3.497(Average)**

JICA's computed MSL value in the mouth of Karnaphuli River differs about 1 (one) metre from the BIWTA's computed MSL value at Sadarghat, Chittagong.

3.1.6.2 Past History

The maximum height experienced by the coastal belt in the Chittagong area was during the 1991 cyclone. It was among the deadliest tropical cyclones on record. Wind velocity was around 250 Km/h (155 mph) which caused the highest storm surge in the area with 6 metre (20 ft.) height. The death toll was 138000 with approximately 400,000 in Anwara and Banshkhali area. The storm caused an estimated US$1.5 billion in damage. The high velocity wind and the storm surge devastated the coastline. The extensive damage caused the price of building materials to increase greatly.

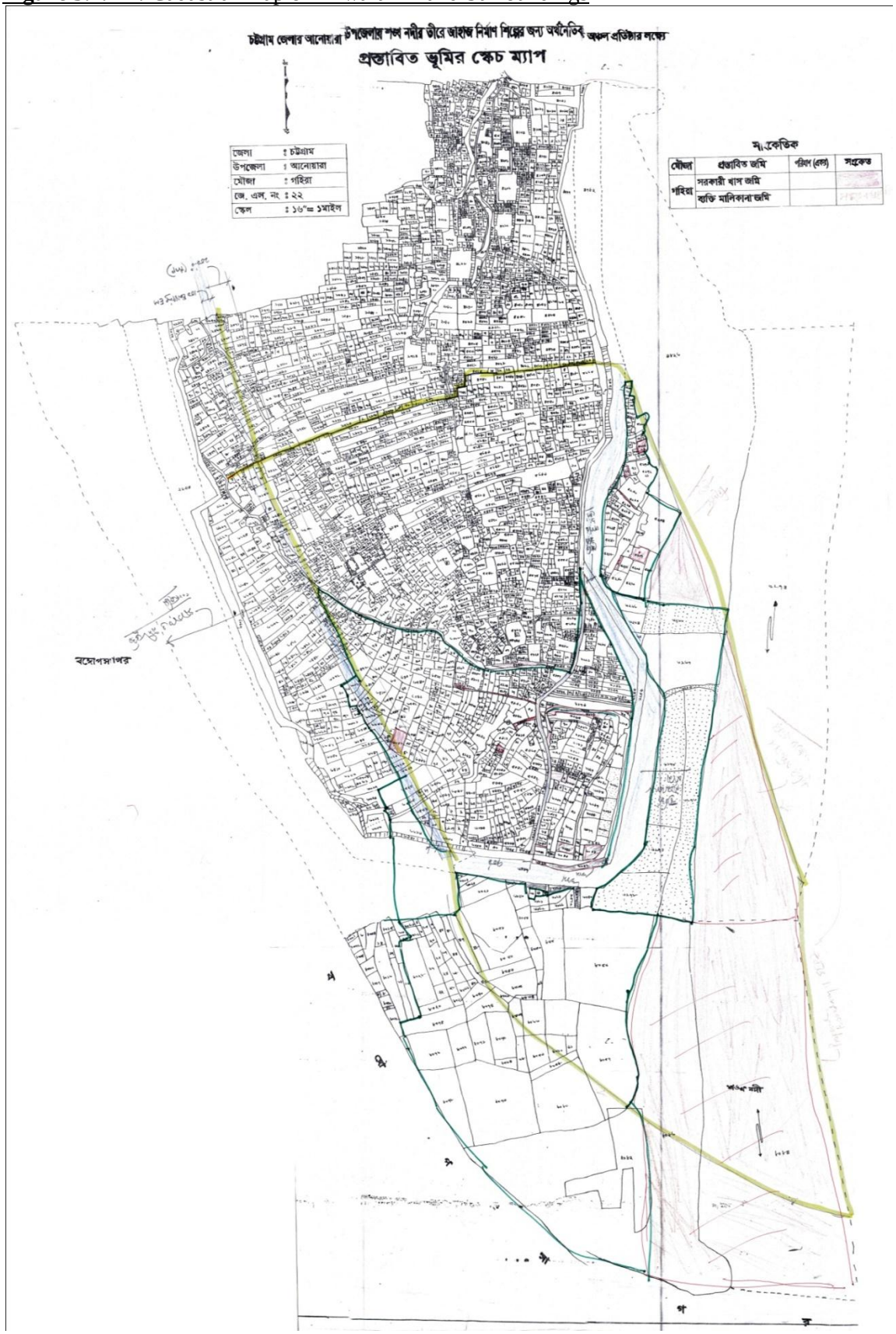
3.1.6.3 Projection of Highest Wave Height in the near Future and Recommended Finishing Level of Dredging

Going through the collected data on tide levels of different years in the coastal areas of Bangladesh it was found that the tidal height is about 3.5 metres on average. Normally, the tidal height varies from 3-4.5 metre. The highest surge is found during the 1991 cyclone which is about 6 metres in height. So the formation level for the EZ site at Anwara will be 5 metres and the height of the super dike should be 7 metres predicting the highest projected tidal surge of 6.5 metres.

3.1.7 Cadastral Map

The cadastral map of Gahira Mouza (Cadastral Unit); in which the EZ site is located is shown below.

Figure 3.1.7-1: Cadastral Map of Anwara EZ and Surroundings



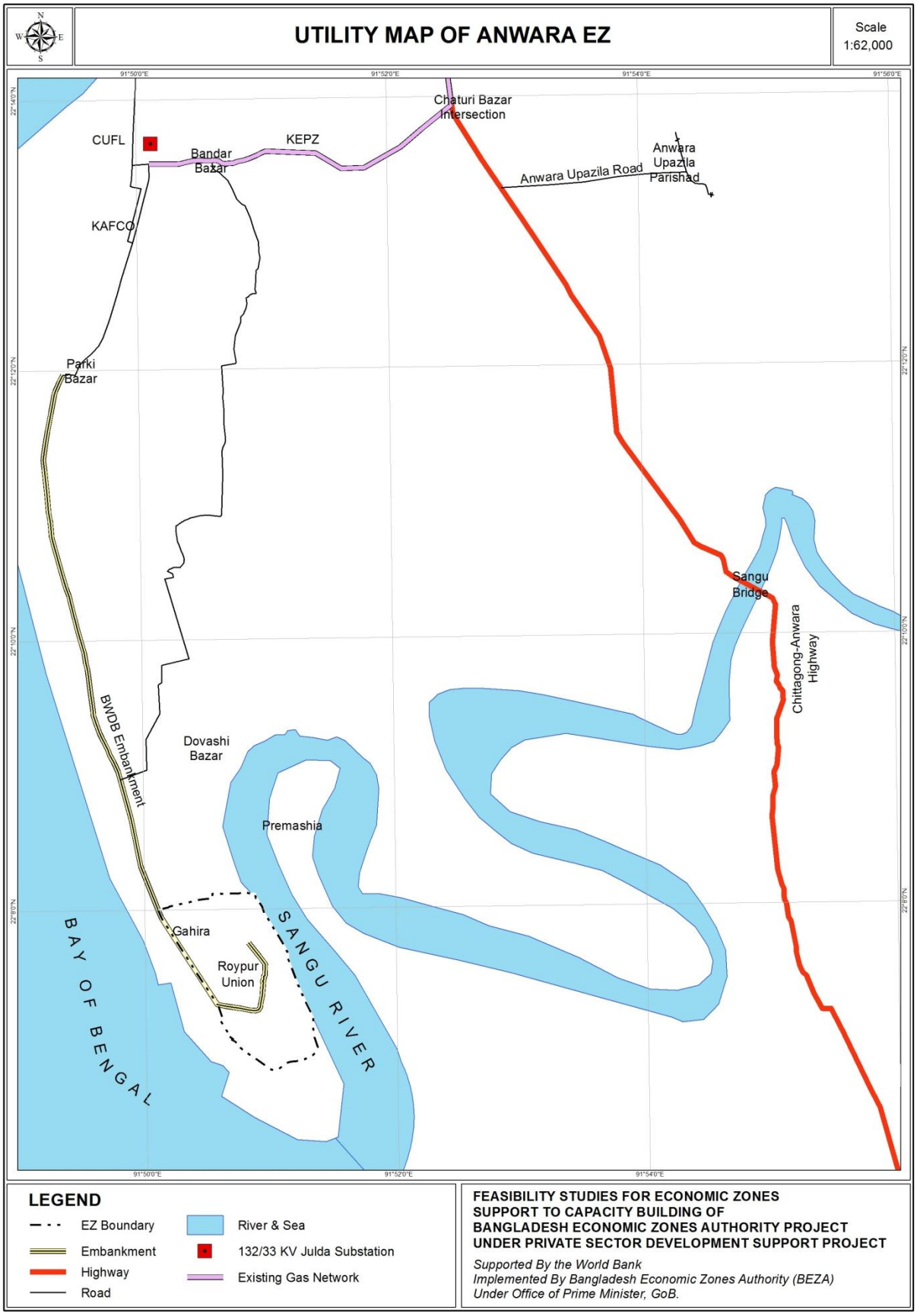
3.1.8 Utility Map

At present the EZ site at Anwara Upazila has no water supply or gas connection. People use deep tube wells to extract water from underground. Wood is the main source of cooking fuel for the homes. The communication network is also not in a very good condition. There is a 132/33KV SS in nearby Julda area (10 Km from site). The EZ can hook up with this SS to be connected with the national grid. There is also a proposal of 1300 MW PP in that area which will be established very soon. These possibilities are explained in detail in section 3.3 of this chapter.

As the water in Sangu River flowing near the site is saline, water should be collected from further upstream, to get sweet water. Details of the proposed off-site water connection are explained in section 3.3.

Gas connection is also available in CUFL and KAFCO, but the availability of gas in Chittagong region is very low. The following figure shows the utility map of Anwara EZ and its surrounding area.

Figure 3.1.8-1: Utility Map of Anwara EZ



3.1.9 SWOT Analysis of Anwara EZ

The proposed Anwara EZ as an EZ site and as an industrial and commercial entity has got both strengths and weaknesses, as well opportunities and threats. But, compared to weaknesses and threats, its strengths and opportunities are great and as such, this EZ has been proposed for implementation. Following are the lists of strengths, weaknesses, opportunities and threats:

Table 3.1.9-1: SWOT Table

Strengths	Weaknesses	Opportunities	Threats
• Site is located on the mouth of the Sangu River and has access to water transportation. • Being a waterfront EZ, it'll be easier to connect it with the port. • Transportation of cargo to Chittagong Port is only 12 Km from the EZ through the sea. • Land is flat and suitable for dredging for filling up the site and creating depth of the river. • Reclamation is possible. • The land is mostly vacant and not much agricultural activity is present. • Site is especially suitable for heavy and large industry like shipbuilding and shipbuilding component etc.	• About 913 households needs to be evicted from the site. • Total 321.2 acre (130.04 hectare) land is to be acquired. • Land filling using dredging from sea may delay the project due to the compaction issue. • No potable water supply, sanitation facility at site. • Saline water on adjacent Sangu River and so surface water availability is also limited. • About 2,500 trees of different types will required to be cut down during site clearing. • The site is exposed to natural calamities as the dike protecting the site is mostly broken.	• 1,320MW coal power plant is planned to be constructed within 10 Km at Julda. • Existing 132/33KV grid substation available within 10 Km from the site in Julda. • An opportunity for suitable place for shipbuilding industries. • The place shall attract both local and foreign investors on completion of all required infrastructure facilities. • Setting up of the infrastructure will create a township and cause the diminishing local economy to flourish. • Engagement of large unemployed/underemployed youth in the locality. • Uplifting of skills and technology. • Enhancement of income and standard of living of the local people. • Creation of super dike shall also protect the people of that locality from cyclone and tidal surge.	• The site is 23 Km from the national highway (Chittagong-Cox's Bazar Highway). • No possibility of obtaining gas connection as the national production is very low. • Nearest ODF (Optical Distribution Frame) is in Chittagong and 36 Km from the site for obtaining telecom facilities. • Most of the offsite infrastructure to be built for the project including a super dike which is very costly. • Surface water on adjacent Sangu River is saline. Need to collect sweet water from 26 Km upstream of the river. • No access road from 3 Km of the site. • Existing road on BWDB (Bangladesh Water Development Board) embankment is broken on most of the places. • Super Dike is to be constructed to protect the site which will be highly costly.

Strengths	Weaknesses	Opportunities	Threats
			• Suitable soil for construction is not available at or near site. This is a fact that will increase the construction time. • No urban living and recreational facilities. • The site is prone to natural calamities like cyclone and tidal surge.

In fine, it may be concluded that, to ensure at least optimum (if not maximum) utilization of the strengths and opportunities of the proposed EZ, the weaknesses of the same need to be overcome and the threats need to be eliminated or at least controlled (brought in to effective control of the EZ management) and it is possible only when the concerned management takes in to active consideration the above characteristic features and address them properly and adequately in a way it deserves.

3.2 Best Practice Master Plan

This chapter describes the primary planning and engineering considerations required to achieve the best practise master planning for Anwara Economic Zone.

3.2.1 General Land Use Concept

3.2.1.1 Present Site Condition

The project site is on the mouth of the Sangu River facing the Bay of Bengal and exhibits great potential for a new base servicing maritime industries. The west side of the planned area is protected by the existing dike from the sea. The existing dike divides the planned area into northern and southern sections. The northern section belongs to private owners and the southern section is designated for public use. The site is strategically located closer to the key transportation nodes of Chittagong for export and import. It is within 28Km from Chittagong town and 13Km from Anwara town headquarters. The site is advantageous in that it lies a shorter distance away from national trade nodes, but it is lacking in the necessary inner infrastructure and a proper access road. The site is also vulnerable to cyclones and tidal surges. The existing dike has been eroded by regular sea waves and the dike has been cut into several portions. Regarding water, since the site is located on the sea front, salinity has been the bottle neck in industrial operations. Due to these natural constraints, the site has had little opportunity to achieve any industrial functions.

3.2.1.2 Application of Super Dike and Reclamation

1) Super Dike and Land Reclamation

The Anwara site has been suffering from powerful sea waves. With this natural condition and without any mitigation, it might be difficult to develop an economic zone because of lack of interest from suitable tenants.

The super Dike is a suitable structure to mitigate the currently progressing damage to the existing dike. The structural feature of the dike is as follow:

- Long piles are driven at the sea side front edge of the dike with a concrete mass foundation. These special treatments strengthen the resistance against the strong ebb tide during the monsoon.
- Both surfaces of the sea side and inner land side are covered by concrete block surfaces. The

majority of the dike failure comes from damage to the inner side slope which is normally formed of soil. If the high tide goes beyond the top of the dike, the massive gravitated sea water attacks the inner side slope. Once the inner side slope is damaged, the whole structure of the dike will be eroded and demolished.

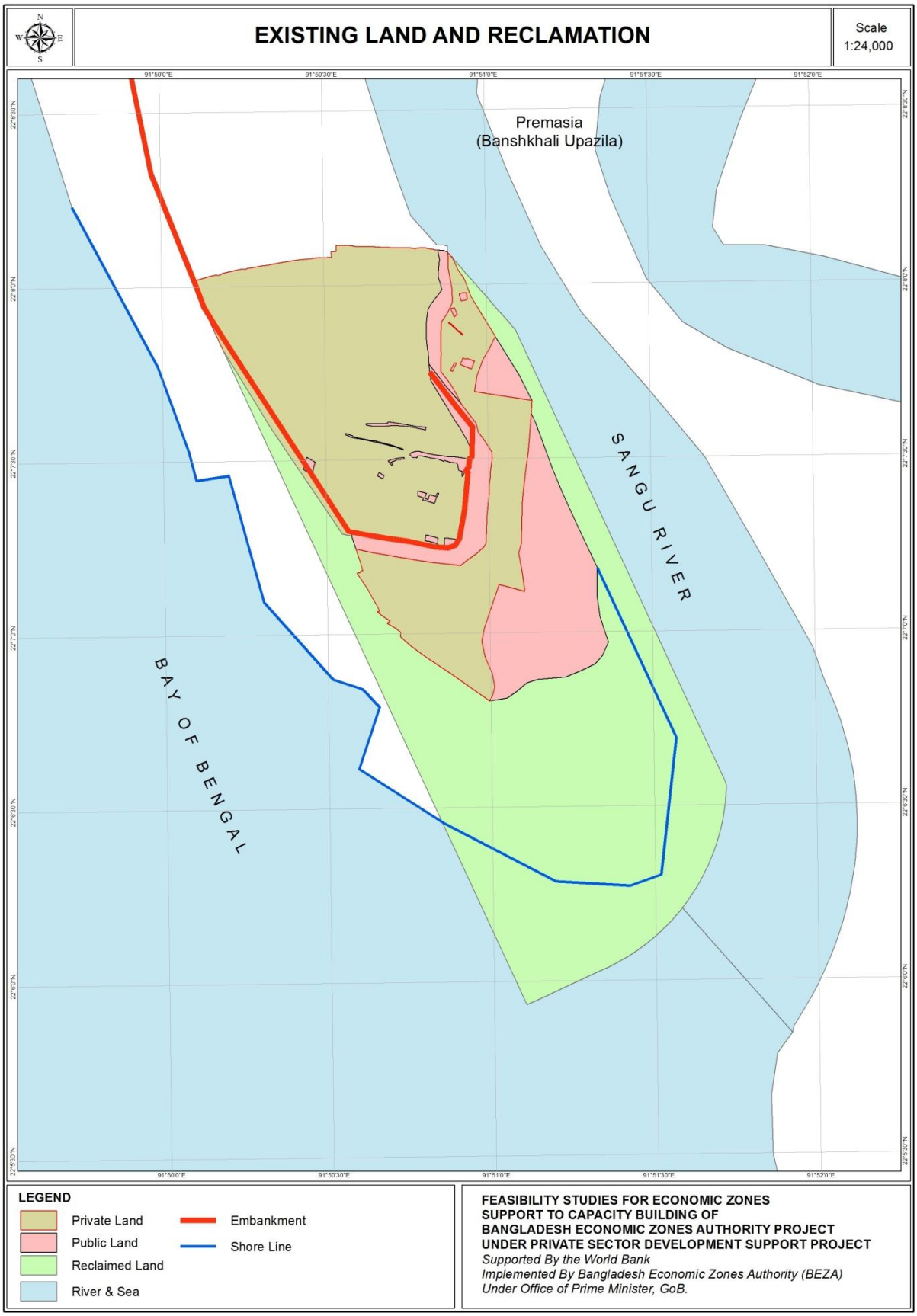
The combination of the super dike on the sea front and the reclamation behind the super dike will create a large and safe place for the economic zone.

The total development area is 1,389.50 acres (562.31 ha). The land is composed from private land (321.2 acres; 130.04 Ha), public land (290.27 acres; 117.52 Ha) and additional reclaimed land (778.03 acres: 314.99 ha).

With land reclamation of about 778 acres (315 ha) the southern part of Anwara EZ will be located near the mouth of Sangu River facing the Bay of Bengal. Significant flow occurs in Sangu River during monsoon with semi diurnal tidal oscillations. The major tributary of Sangu is Dolu Khal which drains the Satkania plain. Other tributaries are Chandikhal, Kumira Khal etc. which drain off the water of Patiya, Satkania, Anwara and Banshkhali Upazila. On the other hand the river near the EZ site including this point (mount of Sangu River) is shallow in the lean/dry season. Regarding oceanographic condition here, a huge sand bed area is seen expanding to the south. Depth of water in the river falls to about 6m from the lowest bed of the river. So, for the EZ site sheet piling is adopted to reclaim soil along to the western bank of the river. A small channel of 6m deep is proposed to be constructed by the EZ side which will ease the river flow at this point. However, with implementation of the EZ the western bank of the river will be raised significantly (+5m from sea level) while the eastern bank of the river will remain lower. It will be very important to study the changes in flow pattern in Sangu River near the EZ site and at the mouth of the river. So along with carrying out a detailed topographic/level survey of Sangu River and surroundings; a hydro-morphological study of Sangu River and project area with all tributaries connected to the river can be considered. Forecast of potential morphological changes in the Sangu River near the EZ with and without the project should be done.

The following figure shows the presently given land area and the reclamation. The planned area is designed so as to maximize the reclamation land and maintain the present shape of the river mouth in the original position. The river front alignment of sheet piling is designed on the present river boundary line. Using these designs, the river flow pattern will stay the same as at present. Future monitoring is necessary for the river maintenance.

Figure 3.2.1.2-1: Existing Land and Reclamation



2) Basic Design Concept of Anwara Economic Zone

Super Dike

According to the past history (site assessment section 3.1.6.2), the recorded maximum sea wave height level is El+6m. Maintaining 1m for the safety, the top elevation of the dike is designed to be El+7m.

Land Reclamation

According to the past history (site assessment section 3.1.5.1), the past maximum river height is El+3.5m and the finishing level of the reclaimed land is designed to be El+5m, maintaining 1.5m for the safety.

Structural Design

The previous Figure 3.1.2-1 (Soil Bore Log Data Sheet) is used for the basic foundation design. The top soil at the EZ site is mainly very soft silt with clay or clayey silt and this very soft condition continues until the depth of 7 or 8 meters. As for structural design, the RC bored pile of 8m length will be used for protection of blocks placed along the toe line of the side slope of the embankment on the sea side. For protection against displacement these piles will be connected by tie beams longitudinally with each other and transversely with more RC bored tie piles placed 3m apart and at 2m centre tocentre. Protection of these piles from scouring concrete blocks of size 12x12x12 inch will be placed along the toe line to the extent of 2m depth from existing ground level.

The details of the super dike system are shown in the following figures.

Figure 3.2.1.2-2: Proposed Cross Section of the Embankment

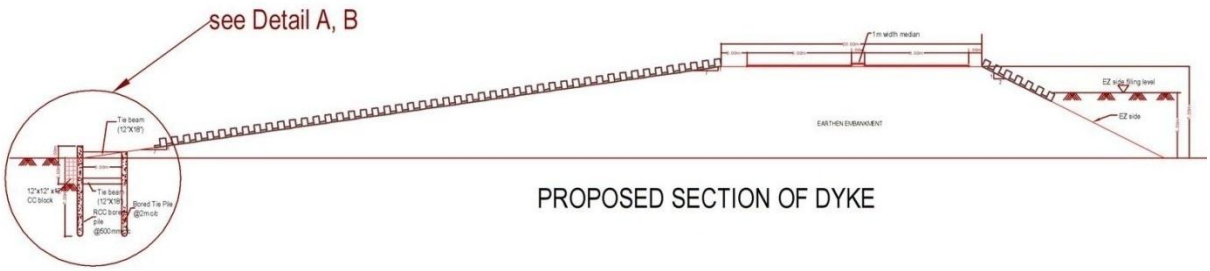


Figure 3.2.1.2-3: Detail of Dike at Sea Side with Tie Beam (Detail A)

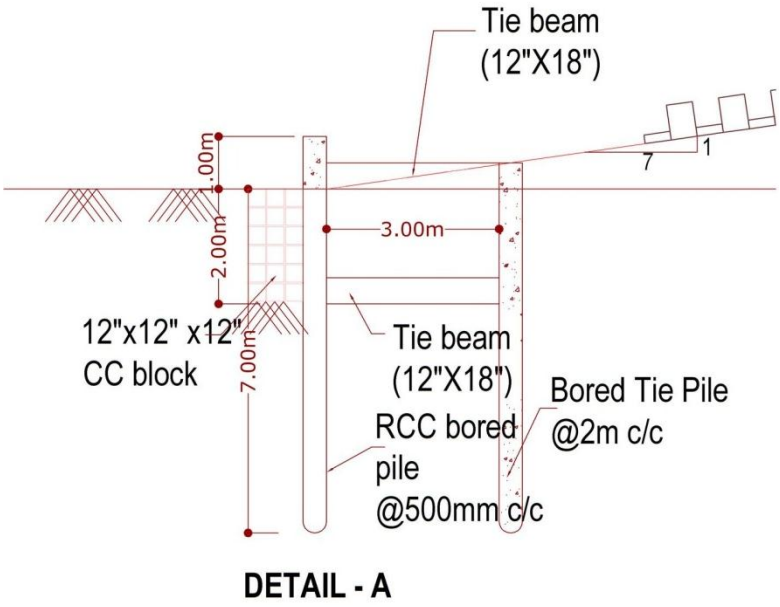


Figure 3.2.1.2-4: Detail of Dike at Sea Side without Tie Beam (Detail B)

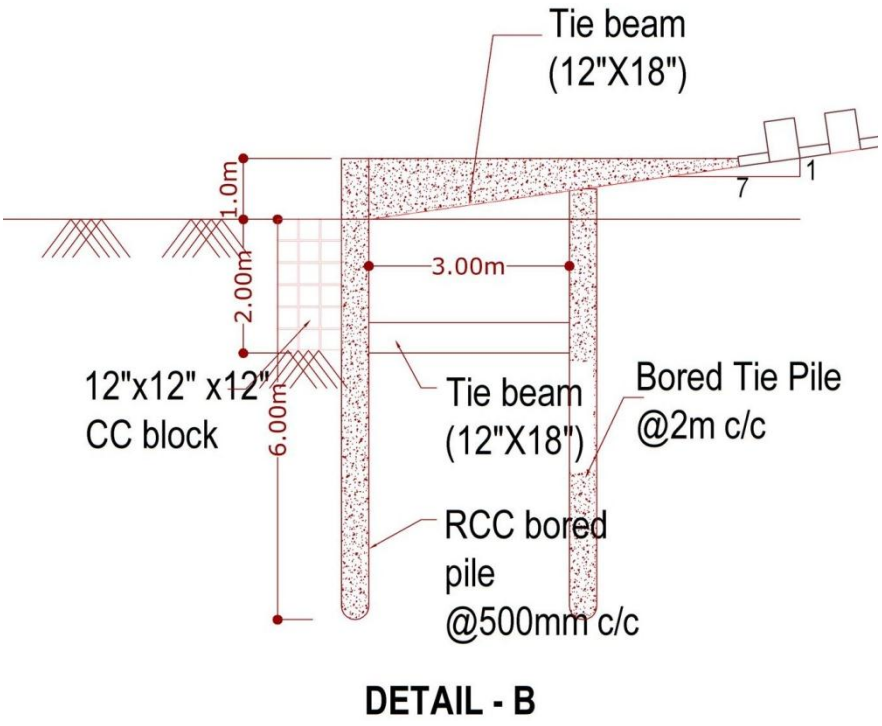


Figure 3.2.1.2-5: Detail of Dike at EZ Side

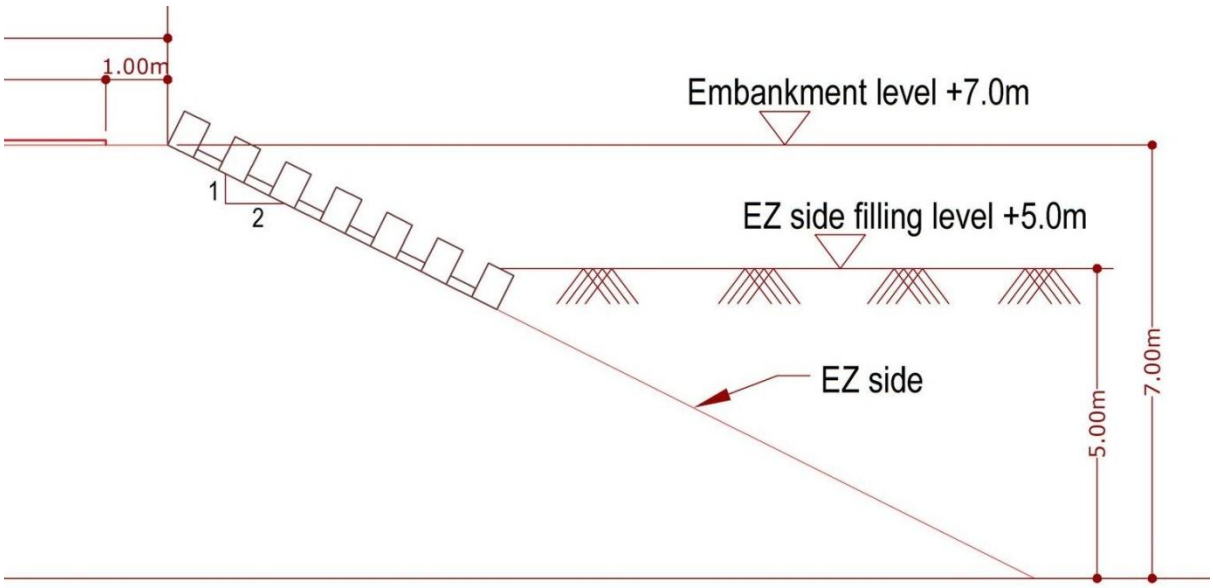


Figure 3.2.1.2-6: Road on Top of Dike

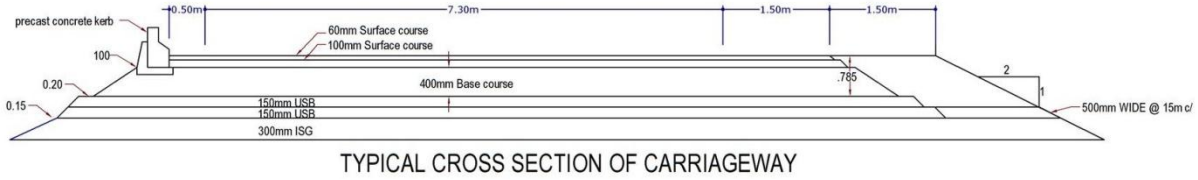
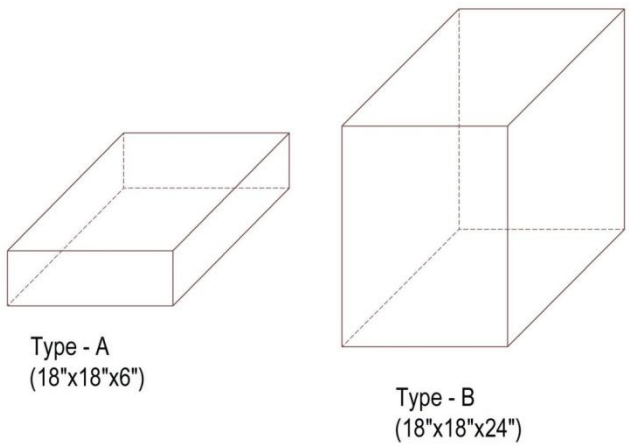


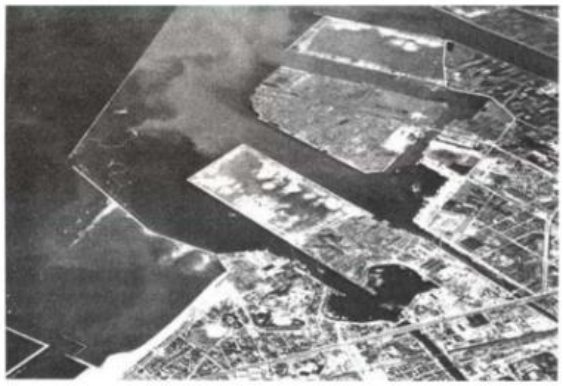
Figure 3.2.1.2-7: Three Dimensional View of RCC Block (Heavy and Light)



3) Economic Zones on Reclaimed Land in Other Countries

There are similar conditions in South East Asia.

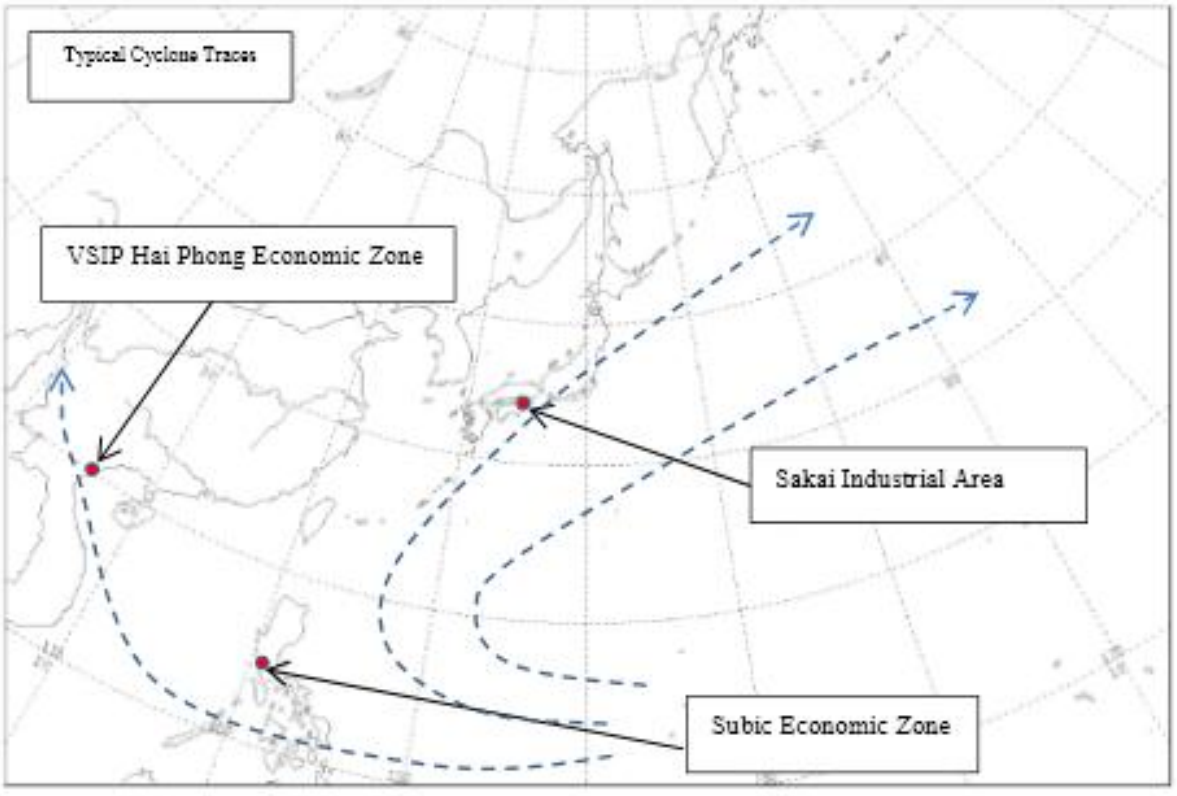
Table 3.2.1.2-1: Sea Front Economic Zones in South East Asia

Location	Country	Land	Note
Sakai Industrial Area	Japan	Reclaimed Land	• This area was heavily damaged by a typhoon in 1934. • New industrial area was developed by the reclamation in 1957. Since then the industrial operation has been continuing without serious interruptions.
			
Subic Bay Metropolitan Authority (Economic Zone)	Philippine	Reclaimed Land	• The zone was established in 1992. • Since then industrial operation has been continuing without serious damage. • The typhoon Haiyan attacked The Philippines in 2013 and caused heavy damage in several regions, but serious damage was not reported in this zone.
			
VSIP HaiPhong SEZ	Vietnam	River Front Area Close to the Sea	• The zone development launched in 2010. • Operation started in 2012. • Strong Typhoon Haiyan attacked in 2013, but serious damage was not reported.

Location	Country	Land	Note
			Year: 2008 Area: 1,600 ha Located in the Dinh Vu - Cat Hai Economic Zone 120 km from Hanoi Capital Adjacent to new City Centre of Hai Phong Special tax incentives Exemption of non-agricultural land tax Land tenure: 50 years Zoom In

The following figure shows the typical cyclone traces in South East Asia. Most typhoons originate in the east side of the Philippines and head to the west or the north. These three economic zones are on the typhoon route.

Figure 3.2.1.2-8: Typical Cyclone Traces in South East Asia



It is a fact that the strong typhoon Haiyan attacked The Philippines in 2013, causing serious damage. The route of the typhoon is close to the line which is from the east side of The Philippines to the west. Heavy and serious damage was not reported from the Subic economic zone and VSIP HaiPhong economic zone. With proper design of land reclamation, these economic zones have durability against natural disasters.

With proper engineering design of land reclamation and the super dike, the Anwara economic zone will be a safe industrial base.

3.2.1.3 The Main Objectives of the Plan

The main objective of the plan is to create a safe new ship-related industry base in Anwara, inclusive of the supporting industries such as ship-parts manufacturing. This can be attained by the application of the super dike and land reclamation described previously. Regarding the lack of water, an appropriate off-site water connection will make the suitable water supply to the site possible.

Chittagong division has already been forming a base for ship related industries and, shipping firms are aggressively seeking new places in which to expand their business activities. The Anwara Peninsula has already attracted the enthusiastic interest of ship related investors. However, it is a fact that the natural vulnerability of the area is an obstacle to investors' expansion activities. The relentless sea waves have been destroying the existing embankment and pushing back the coast line.

Given this situation, considering that the safety level of the existing dike could be improved and expanded along the Anwara Peninsula, the peninsula itself would become a natural block against tidal surges and would create a safe area for a shipbuilding base along the river front behind the dike.

A meeting was held recently with the Association of Export-Oriented Shipbuilding Industries of Bangladesh (AESIB) during which following potential issues were addressed:

Ship related industry had a plan to construct a 700 acre shipyard and a supporting ship components manufacturing zone. A particular company currently builds 10 ships (10,000 tons deadweight each) per year and plans to expand their output to the wider scope of ship-repair and shipbuilding with some manufacturing.

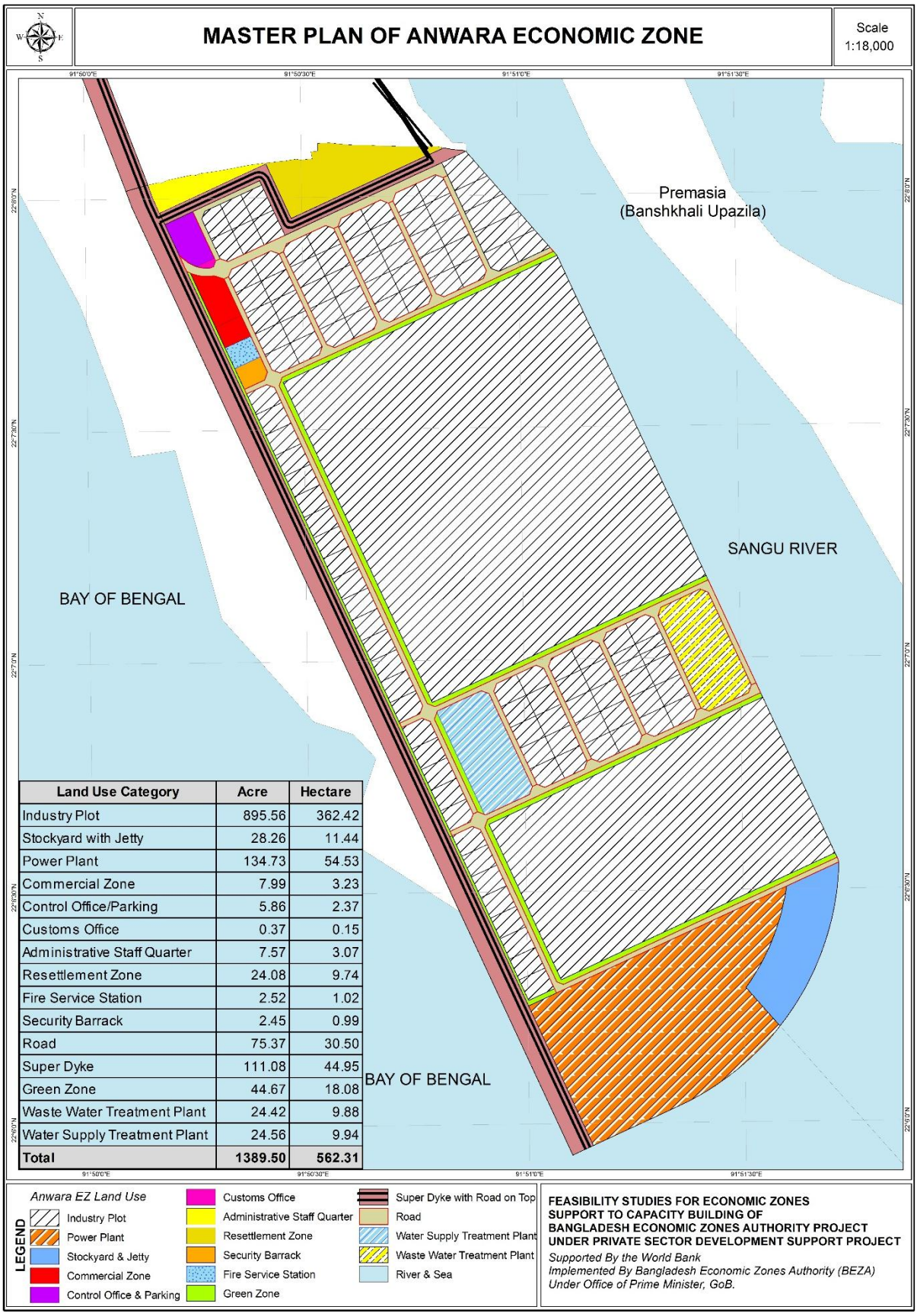
These shipyards and components' manufacturing facilities alone require more land than the planned Anwara Economic Zone of 611 acres (248 ha). Therefore, we consider the Anwara EZ will be planned as a shipyard and components manufacturing EZ with a 6 metre deep channel and 250MW clean power plants in order to supply sufficient power.

The Anwara Economic Zone needs to have a safe super dike and modern infrastructure such as a reliable power supply, water supply treatment system, waste water treatment system, communication system and an efficient drainage system equipped to international standards. This economic zone aims to become an independent and self-sufficient industrial zone. A unique eco-design is prepared for the energy conservation systems of water recycling and maintaining sufficient green areas. "A Safe and

Clean Shipbuilding Zone" is the development concept recommended for recognition as a future industrial development model for Bangladesh.

The Master Plan drawing is shown the next page.

Figure 3.2.1.3-1: Master Plan (Anwara Economic Zone)



Land Use Category	Acre	Hectare
Industry Plot	895.56	362.42
Stockyard with Jetty	28.26	11.44
Power Plant	134.73	54.53
Commercial Zone	7.99	3.23
Control Office/Parking	5.86	2.37
Customs Office	0.37	0.15
Administrative Staff Quarter	7.57	3.07
Resettlement Zone	24.08	9.74
Fire Service Station	2.52	1.02
Security Barrack	2.45	0.99
Road	75.37	30.50
Super Dyke	111.08	44.95
Green Zone	44.67	18.08
Waste Water Treatment Plant	24.42	9.88
Water Supply Treatment Plant	24.56	9.94
Total	**1389.50**	**562.31**

3.2.2 Basic Land Use

The main objective of the economic zone is to create a safe and secure first industrial zone in a site which is vulnerable to cyclone and tidal surges. Building a Super Dike and an access road are essential. The industrial lot layout is designed to provide a wide space for potential ship related firms. Surrounding the shipbuilding yard, factory lots are allocated for the supporting industries. A coal fired power plant and coal stock yard/jetty are planned. The total development area is 1,389.50 acres (562.31 ha).

The following table shows the Area of Requirement of the Master Plan.

Table 3.2.2-1: Area of Requirement of Master Plan (Anwara Economic Zone)

Lease Status	Land Use Category	Acres	Hectares
Leasable	Industry Plot	895.56	362.42
	Stockyard with Jetty	28.26	11.44
	Power Plant	134.73	54.53
	Commercial Zone	7.99	3.23
Not-leasable	Control Office/Parking	5.86	2.37
	Customs Office	0.37	0.15
	Administrative Staff Quarter	7.57	3.07
	Resettlement Zone	24.08	9.74
	Fire Service Station	2.52	1.02
	Security Barrack	2.45	0.99
	Road	75.37	30.50
	Super Dike	111.08	44.95
	Green Zone	44.67	18.08
	Waste Water Treatment Plant	24.42	9.88
	Water Supply Treatment Plant	24.56	9.94
Total		**1,389.50**	**562.31**

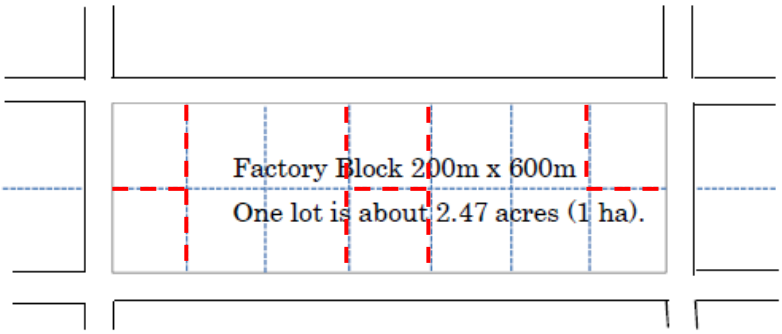
3.2.3 Standard Plot Size

The road network is planned in order to divide the factory lot block by approximately 200m x 600m, on average, for optimizing the traffic flow inside the economic zone.

The standard factory lot is designed to have an average area of 2.47 acres (1 ha). The standard dimension of the standard lot is 90m x 111m. The factory lot dimension excluding the front setback (main road: 20m, minor road: 15m) becomes approximately square which forms a desired factory wall lines.

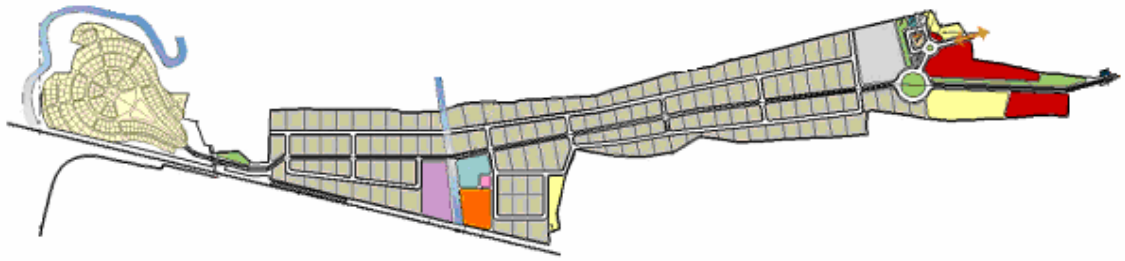
In addition, the plot layout is designed to be adjustable for increasing or decreasing, as desired. Tenants will be able to purchase any large lot by adding a standard lot or, any small sized piece by dividing the standard lot into smaller pieces of 2,000 m^2.

Figure 3.2.3-1: Standard Factory Block and Road Network



This approach has been applied to the Phnom Penh Special Economic Zone in Cambodia which was built recently and enjoys good reputation from foreign direct investors. This allows flexible plot layout and has been accepting frequently changing real demand of tenants when the land leasing contract was signed. The following figure shows the master plan layout of Phnom Penh Special Economic Zone in Cambodia. The total development area is about 360ha. The average standard plot size is 1 ha as explained before.

Figure 3.2.3-2: Example of Plot Layout

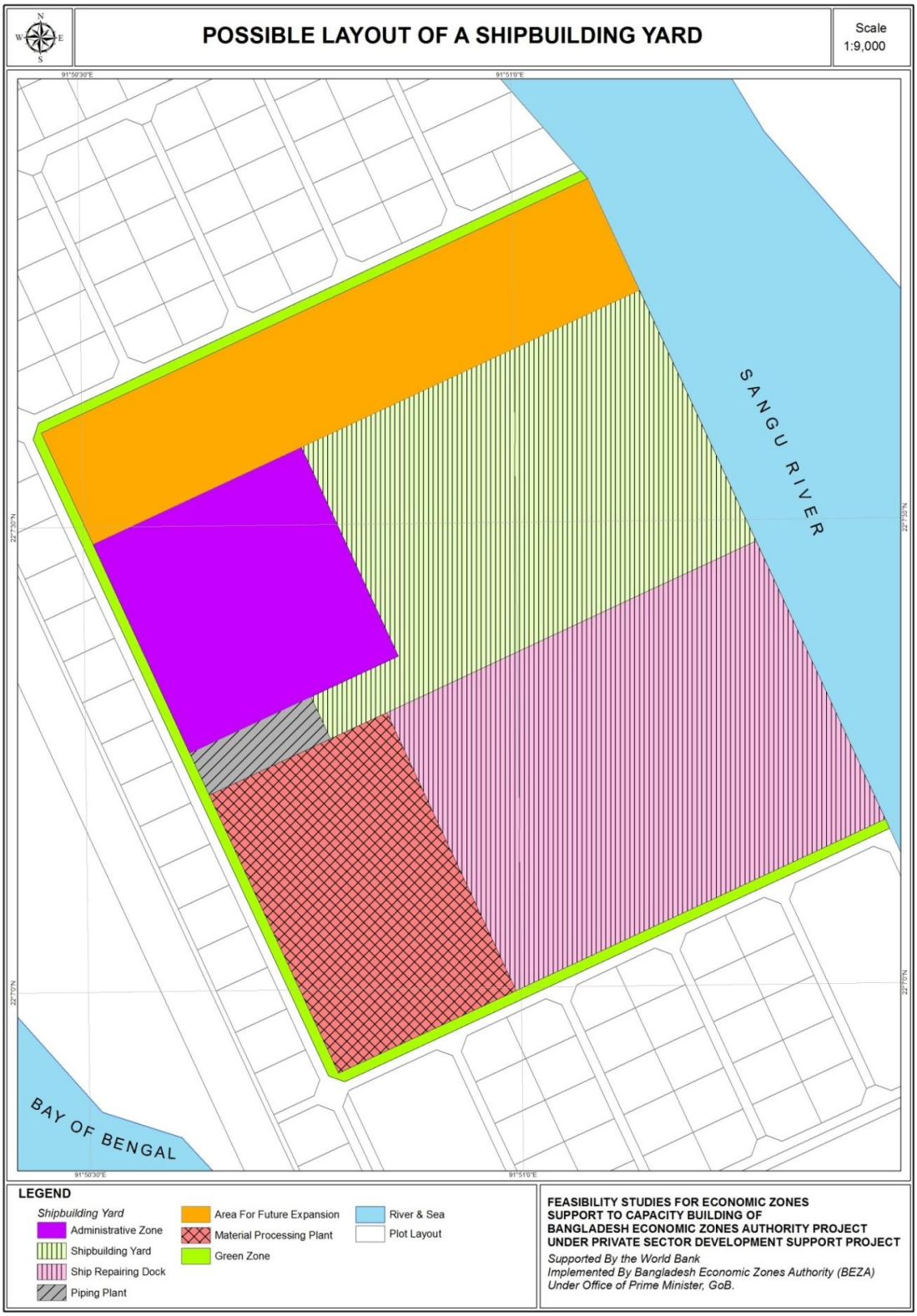


This layout has accepted variety of tenant's need such as 1ha, 3ha, 5ha, 10ha, or even 2000m^2. Therefore, the same layout can be applied to the EZs in Bangladesh.

3.2.4 Layout of Shipbuilding Yard

A possible layout of shipbuilding yard is presented below.

Figure 3.2.4-1: Probable Layout of Shipbuilding Yard



The layout of the southern shipbuilding yard might be on a similar pattern with a smaller scale. All these facilities, inclusive of necessary utilities, will be designed and installed by shipbuilding investors. With suitable connections, electricity and water and all other utilities, will be supplied by the economic zone developer.

3.2.5 Main Functions inside Anwara Economic Zone

A brief explanation is given to the major functions inside the Anwara Economic Zone.

1) Main Functions

Focal Point Main Gate

An attractive monumental main gate should be built. It should be an eye catching structure with a unique design and be visible from the access road.

One-Stop Service Centre

The facility will provide advocacy information to economic zone tenants for their continuous operation as well as providing the clear and transparent supportable guidance. This facility could be located inside the administration building. It has been traditional that investors have been required to submit documents and proposals to several ministries when applying to build their factory or when seeking approval to export/import goods, and they often complained of rampant corruption, or the requirement of paying 'under-the-table-money,' to ministry officials or government clerks, as well as endure long delays in processing necessary paperwork. The One-Stop Service Centre will simplify paperwork and cut out traditional redundancy. Ministries' offices are collected in one building and highly motivated officials will support application procedures for potential investors in the zone.

Administration Building

A sales office and administration building will be located adjacent to the focal point. The facilities should have administrative functions as well as promotional and sales functions. The audio visual briefing room should be available for interested investors to gain more knowledge about the facilities and the attractiveness of the economic zone.

Customs Office

A customs office is to be built adjacent to the focal point for controlling the flows of goods into and out of the economic zone. The custom officers normally check for appropriate documentation and verify that a good or a resource is entitled to enter the economic zone. Any goods or resources not yet cleared through the custom are held near the custom office until processed.

Green Landscape

All along the main road, the industrial zone will be landscaped by beautiful, low trees. In addition, the 20 metre wide green space would be provided, as a buffer specifically between the shipbuilding yard and other industries, with tall trees. Normally, ship related industry yards have a polluted and dirty image. But here, the green space provided in the Anwara economic zone will increase the clean image of the zone and give a pleasant environment to the industrial community.

Factory Lots

Large lots are designated for occupation by potential shipbuilding industries. Ship-building tenants will be able to use utilities prepared by the economic zone developer and tenants will have the freedom to design their own internal facilities. In the meantime, for supporting industries, the normal rectangular shape of plot is designed with approx. 1 ha (2.47 acres) area inclusive of the building setbacks from the front road. Forming a factory block surrounded by the internal road will give tenants a variety of land purchasing options. Tenants are able to purchase any continuous plots or able to reduce the lot size accordingly.

Power Plant with Coal Stock Yard / Jetty

The coal-fired 250MW power plant with coal stock yard/jetty is planned. The 6 metre deep channel is planned so as to import coal from Cox's Bazar where construction of a coal centre is expected to start in 2020. Until the completion of the coal centre, the coal will be imported from another place. (Details are described in Annex 4 (Section 3.10).

Housing Zone

A total of 7.57 acres (3.07 ha) of space is allocated to house the zone's administrative staff. It will provide residences for the administrative Officials working there. Details of buildings are explained in the Annex-4. Workers will be able to find necessary facilities in Chittagong and Anwara.

Resettlement Zone

The households currently present in the zone will be resettled in the resettlement zone. A total of 24.08 acres (9.74 hectares) is proposed for this purpose.

Commercial Zone

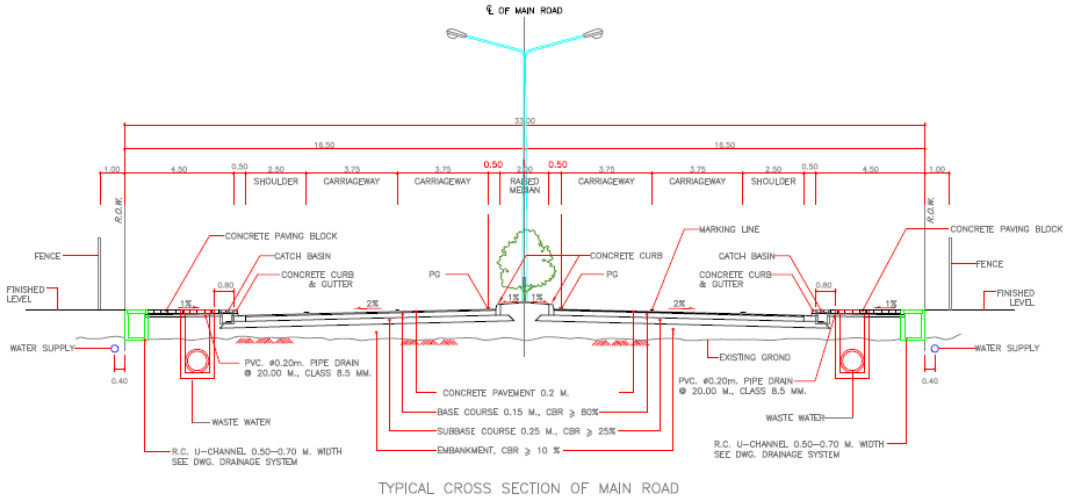
The commercial zone will be established in the economic zone by private investors. As the local market is quite far from the EZ, the residents here will need commercial facilities within walking distance. This zone will include a food market and other shops. It will have a total area of 7.99 acres (3.23 hectares). The shops in this zone will be mini food stalls selling vegetables, fruit, meat, and other food. It will also include the investor's club with a restaurant.

2) On-Site Infrastructure

Road

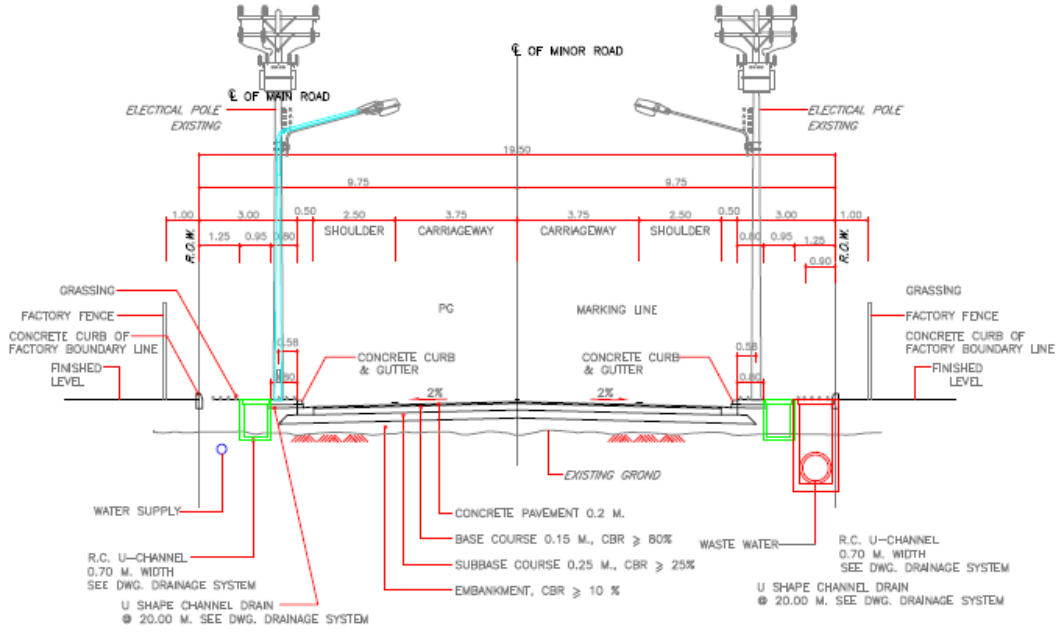
There will be two types of concrete surface roads in the economic zone. One is a main road with a 33 metre right of way and the other is minor road (a secondary road) with a 19.5 metre right of way. The total length of the main road is planned to be 1,559 m with the secondary road to be 15,298 m. The road network is designed to provide smooth traffic flow inside the zone. As asphalt surfaced minor road is planned on the super dike along the economic zone. All utility lines such as electrical distribution, communication lines, water supply pipes, waste water pipes, and drains are built along the roads.

Figure 3.2.5-1: Typical Cross Section of Main Road



TYPICAL CROSS SECTION OF MAIN ROAD

Figure 3.2.5-2: Typical Cross Section of Minor Road



Super Dike

The super dike is the key infrastructure of the Anwara economic zone. The most important concern is the design of a protection system against the natural hazard of high waves. The dike will be built along the Bengal Sea side to block the unexpected high waves during a cyclone. Design is explained in Section 3.2.1.2.

Retention Pond

A retention pond is to be built at the centre of the economic zone to catch the suitable water for recycling, especially for water supply during the rainy season.

Water Supply Plant

Water from the Sangu River will be used as the water supply source for the Project. The place of water intake is to be at some point up-stream of the river that is free from the salinity problem.

Waste Water Treatment Plant

A central waste water treatment plant will be provided. A waste water system will comprise a gravity sewer pipe, a sewer manhole, a lift station and pressure sewer pipe to collect waste water generated within the Project that will be treated by a central wastewater treatment plant. Pre-treatment for toxic waste will have to be provided in a factory prior to discharging to the sewer system outside the factory area. The final treated water will be used for recycling purposes and for maintaining the green zone.

3) Off-Site Infrastructure

Off-site infrastructure is explained in section 3.3.

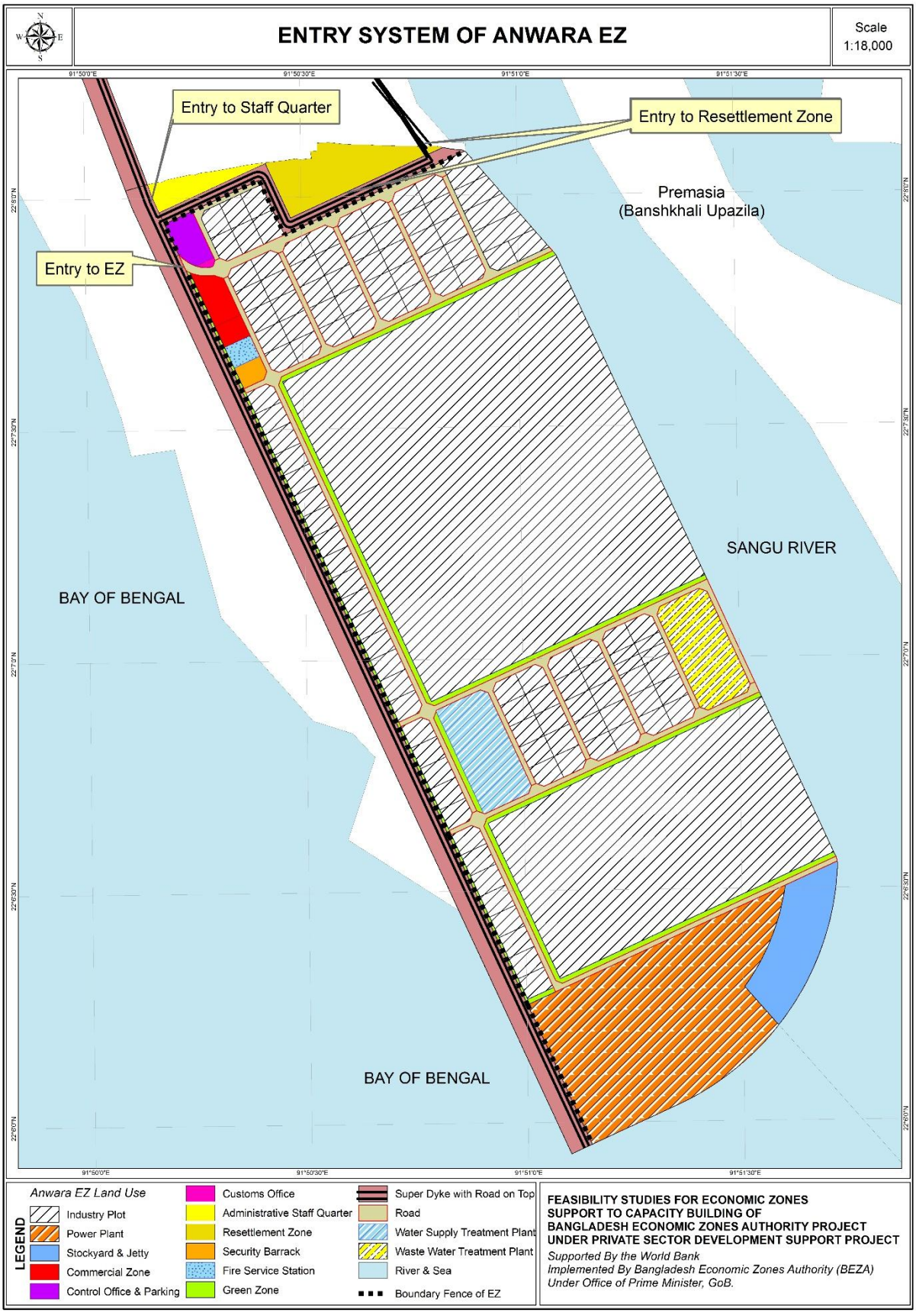
The dimensions and cost estimates of all on and off site infrastructure are shown in Annex-4 (Section 3).

3.2.6 Gate System

Since the administration quarter area and the resettlement area are located at the northern side of the zone, the entry to these areas are carefully designed. The key issues are as follows:

- The custom office is built alongside the administration building next to the entry to the economic zone.
- The housing site has direct entrance from the road on the super dike.
- We found that the local road connecting to the resettlement zone is in poor condition so that the road on the embankment should be used for the resettled people.
- The fence line (dash line in the drawing) protects the direct entrance from the housing site and the resettlement zone to the EZ.

Figure 3.2.6-1: Entry System of Anwara EZ



3.2.7 Investment Structure

Proposed investment structure for Anwara EZ is given below. Details are described in Chapter 5.

Table 3.2.7-1: Proposed Investment Structure on the Planned Land Use

Sale-status	Main Land Use	Investor
Saleable Lease	Industry Plot	PI
	Commercial Zone	PI
	Power Plant, Coal Stock Yard with Jetty	IPP
Not-Saleable Lease	Control Office/Parking	EZD
	Fire Service Station	EZD
	Security Barrack	EZD
	Administrative Staff Quarter	EZD
	Super Dike (On Site)	EZD
	Inner Road	EZD
	Waste Water Treatment Plant	EZD
	Water Supply Treatment Plant	EZD
	Green Zone	EZD
Offsite Infrastructure	Super Dike	GOB/BWDB
	Electric Connection	PDB/EZD
	Water Connection	PHE/EZD
	Access Road	BWDW/RHD/EZD
	Communication	BTCL/ISP/EZD

Note

EZD	*Economic Zone Developer*
PI	*Private Investor*
GOB	*Government of Bangladesh*
BR	*Bangladesh Railway*
PDB	*Power Development Board*
BTCL	*Bangladesh Telecom Communication Ltd*
RHD	*Road Highway Department*
PHED	*Public Health Engineering Department*
IPP	*Independent Power Producer*
BWDB	*Bangladesh Water Development Board*
ISP	*Internet Service Provider*

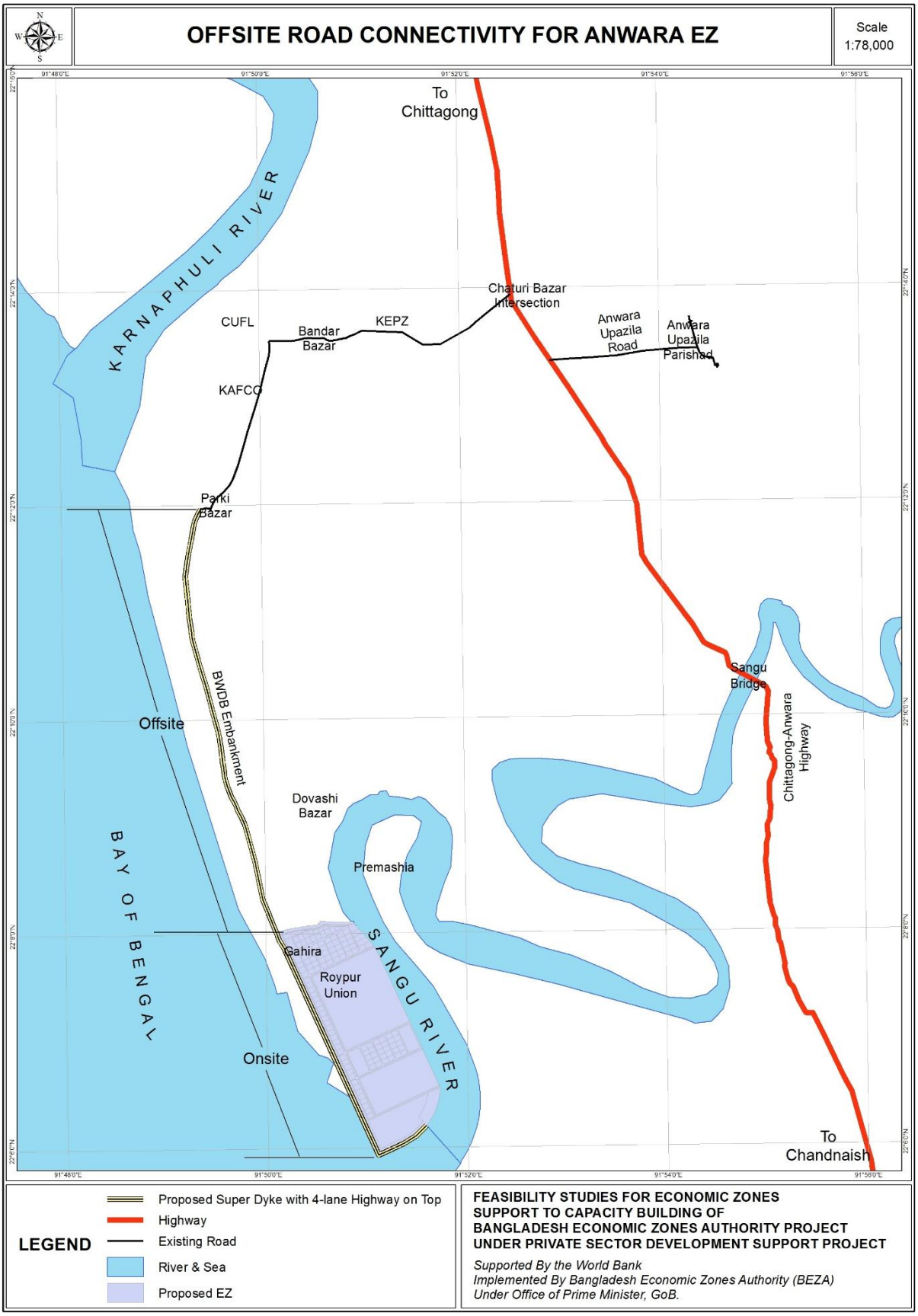
This table shows the investors that will be responsible for the lands. EZD will be responsible for the whole zone but it'll not be the investor for the industrial plots. Funding options for the GoB are discussed herein Chapter 5. Without proper and adequate funding these kinds of project will never succeed. This type of remote location, with vulnerability to cyclone/tidal surges, will require infrastructure that carries a higher cost. Without proper and adequate infrastructure the tenants will not be convinced as to the safety of their investment. The higher cost infrastructure will ensure higher safety and thus quick and large investments.

3.3 Off-site Infrastructure Requirement

3.3.1 Road Connectivity

It is already explained in the site visit report that only one access road will connect the Anwara EZ with the outer world. It will go along the BWDB dike on the seafront up to Parky Beach Bazar and then continue to Chaturi Bazar Intersection via CUFL and Bandar Centre. The existing dike will be upgraded to super dike; the cross section of which is provided in section 3.2.1.2. On top of this dike a 4-lane highway is proposed to be constructed. The following figure shows the proposed offsite road connectivity for the EZ. The road connection is required for 7km between the EZ site and the existing road.

Figure 3.3.1-1: Proposed Offsite Road Connectivity for Anwara EZ



3.3.2 River Intake for Water Supply

There is no good source of surface water in the project zone. As it is situated in the coastal belt, the surface water sources are saline. The ground water source is available at 900 to 1,200 ft. Depth. The industrial zone requires a huge quantity of water which cannot be extracted through deep tube wells. Useful water is available upstream nearby the Sangu River. Project planners recommend extracting water from upstream of the Sangu through a river intake and supply it to the project area by pipeline. The length of the pipeline will be 26 Km and 1,000 mm diameter. The raw water will be collected from the river by a river intake. For the river intake at least 4 sets of 500 m3/h centrifugal pumps will be required. Arrangements for a constant power supply are to be ensured. A stand-by generator for emergency supply is to be installed at the intake location. The following figure shows the offsite river intake line for Anwara EZ.

Figure 3.3.2-1: River intake system for Anwara EZ


RIVER INTAKE SYSTEM FOR ANWARA EZ
Scale 1:62,000
CUFL
Bandar Bazar
Entry to KEPZ
KEPZ
KAFCO
Anwara Upazila Road
Anwara Upazila Parishad
Premasia (Banshkhali Upazila)
Parki Bazar
Sangu Bridge
Chittagong-Anwara Highway
SANGU RIVER
BWDB Embankment
Dovashi Bazar
Premashia
Pagli Pukur Par
Gahira
Roypur Union
BAY OF BENGAL
LEGEND
Embankment
Highway
Road
River Intake Point
River Intake Line
Anowara EZ Site
Water Supply Treatment Plant
River & Sea
FEASIBILITY STUDIES FOR ECONOMIC ZONES
SUPPORT TO CAPACITY BUILDING OF
BANGLADESH ECONOMIC ZONES AUTHORITY PROJECT
UNDER PRIVATE SECTOR DEVELOPMENT SUPPORT PROJECT
Supported By the World Bank
Implemented By Bangladesh Economic Zones Authority (BEZA)
Under Office of Prime Minister, GoB.

3.3.3 Electrical Connection (Offsite)

Anwara EZ needs a direct grid connection.

Present option:

i) Near the area of the Anwara EZ at "Julda", the Power grid company of Bangladesh (PGCB) has one 132/33KV grid substation with capacity of 48/64MVA and a present local load of 15MW. Recently one 100MW quick rental H.F.O power station has been connected to Julda 132/33KV Grid substation by ACRON Engineering Services Ltd. (Bangla CAT sister concern). It is only 10 Km from Anwara EZ area. By construction of a 132KV line and a 132/33KV sub-station on site, the Anwara EZ can be connected to grid power.

ii) In another nearby area at 'Sanirpur', a 132/33KV PGCB grid substation of capacity 2x 48/64 MVA was built for the Korean EPZ.

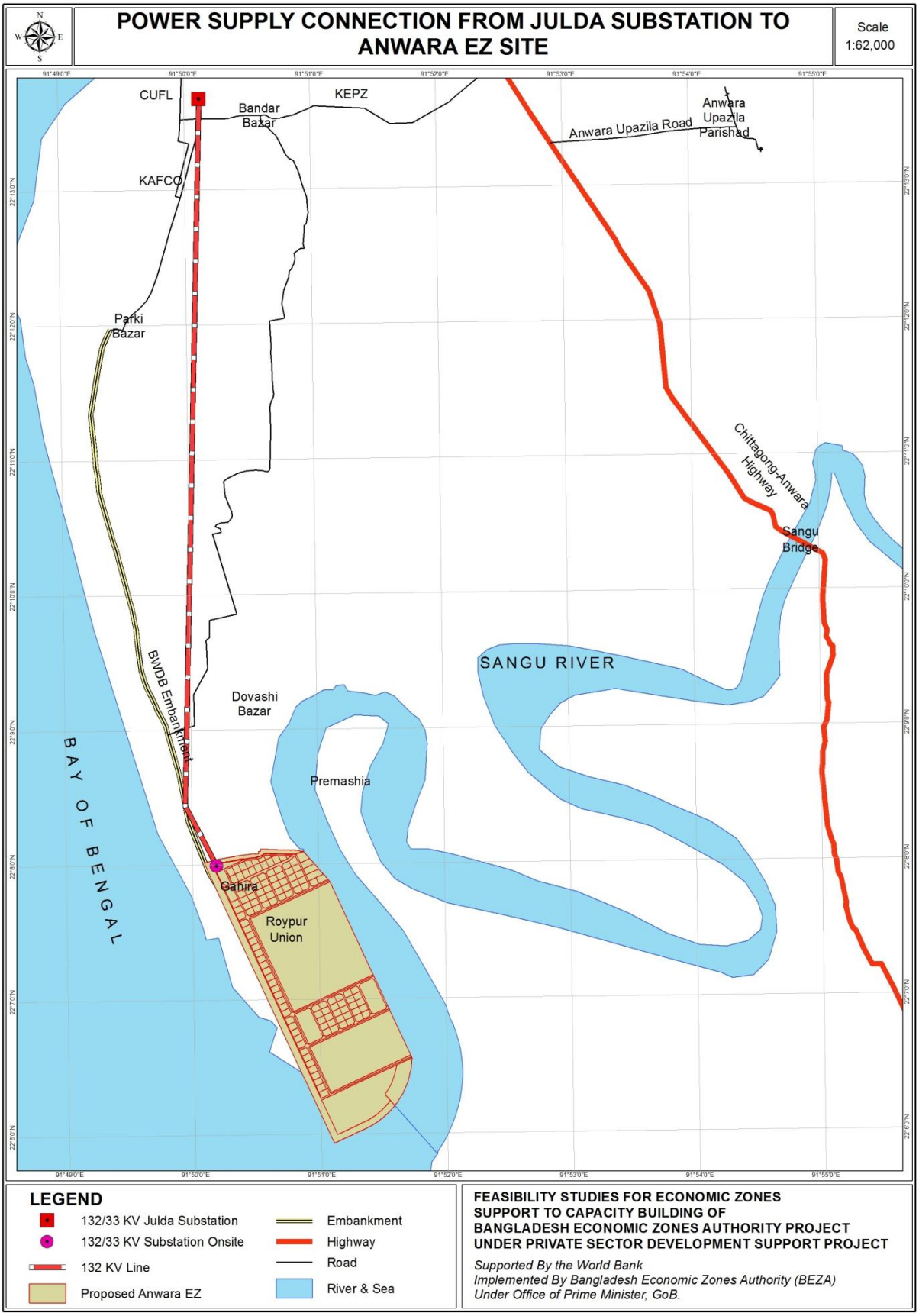
Future options:

Bangladesh Power development Board BPDB has already acquired and occupied an area of 600 acres of land at Anwara and another 1,583 acres is in the process being acquired. In the area, a 2x1320MW coal-fired power plant will be constructed in phases. The process may be carried out by IPP, consortium, as a joint venture but it is not yet finalized. The details are given below:

- Construction cost maybe BDT 120,000,000/MW.
- Requires 6 (six) years for construction. Completion of construction is expected by 2020.
- Coal supplied from Indonesia, Australia, South Africa, Mozambique.
- Anwara EZ site is about 10 Km from the proposed power station site.
- BDT 8/kwh may be the tariff.
- Anwara site can expect sufficient power from the proposed coal based BPDB power station to be connected to the national power grid.

The total demand of Anwara EZ is estimated to be 105.68 MW. This demand will be supplied by the proposed 250MW onsite coal power plant. The 72.42MW of power demand in 2020 could be supplied from national grid.

Figure 3.3.3-1: Power supply connection from Julda grid substation to Anwara EZ

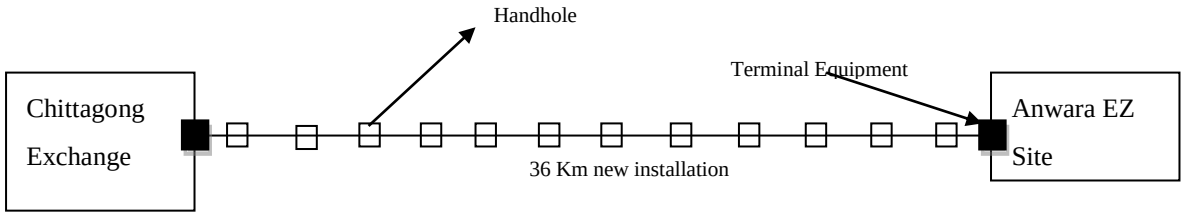


3.3.4 Telecommunications Connection (Off-site)

If a BTCL Fixed Phone network is to be installed in Anwara, the FOC connection will be established by laying the FOC between Anwara EZ site and the Chittagong main Exchange. A BTCL exchange will be installed at the EZ site and the local network is to be expanded. The cost is calculated on the basis of using the most modern soft switching (SS) technology. The FOC line can be hung above the power transmission line, if it is cheaper than laying the FOC underground.

According to the number of plots in the Master Plan, the number of industries in the EZ may be 103. Taking into account other connections such as, connections for the BEZA (Bangladesh Economic Zone Authority) administrative office, customs office, power plant office, shipbuilding offices and some residential connections, the total number of distribution points is considered to be 150 and the exchange capacity is considered to have a line limit of 512. This exchange will have telecom connection and internet facility. The number of industries may vary slightly. Some industries may need more than one plot. On the other hand, more than one small industry may share one plot.

Figure 3.3.4-1: Connection Diagram (off-site)



3.4 Existing Condition of Utility

3.4.1 National Conditions

The following sections describe the present condition of utility services such as electricity, gas, and telecommunications in Bangladesh.

3.4.1.1 Electrical Power

At present only 60% of the people have access to electricity (including from renewable power sources). Per capita generation is 321KWh (including captive), which is one of the lowest in the region. Every year the demand is increasing at a rate of 10%. Present generation capacity is 10,213MW. Out of this total capacity 800-1,000MW could not be generated due to shortage of gas. As a result, about 800-1,000MW load shedding was experienced during peak hours last summer.

Table 3.4.1.1-1: Present Power Condition in Bangladesh at a Glance

Type	Capacity
Installed capacity (Derated)	10,213 MW
Demand (Summer)	7,600 MW
Generation Capacity (Summer)	6,000-6,800 MW
Maximum Generation (August 4, 2012)	6,350 MW

About 13,000MW of new generation addition has been planned from 2013 to 2017. A number of HFO (Heavy Furnace Oil) based peaking plants, in the public and private sector, has been undertaken as a short term plan. Large coal and gas based combined cycle power plants have been considered for base load plants in the future.

Table 3.4.1.1-2: Planned power Generation Project up to 2017

Sector	Year-wise Generation (MW)					
	2013	2014	2015	2016	2017	Total
Public	662	960	1,813	1,260	1,950	6,645
Private	895	1,028	888	1,654	1,300	5,765
Import	500					500
Total	**2,057**	**1,988**	**2,701**	**2,914**	**3,250**	**12,910**

Generation Plan from 2017 to 2021 is 11,655 MW. So the total power generation in the year 2021 will be 24,565 MW.

Long Term Generation Plan (2010-2030):

The Government has prepared a Power Sector Master Plan, 2010 (PSMP 2010). According to the PSMP 2010, the maximum demand in 2015, 2021 and 2030 will be 10,000, 19,000 and 34,000MW respectively. To meet the demand with reliability, installed capacity needs to be increased to 24,000MW and 39,000 MW by the year 2021 and 2030 respectively. Generation capacity from different primary fuels in the year 2030 would be:

Table 3.4.1.1-3: Planned Generation Capacity from Different Primary Fuels in 2030

Fuel	Generation Capacity
Domestic and imported coal based ST (Station Turbine)	19,650 MW
Nuclear Power	4,000 MW
Gas and LNG	8,850 MW
Regional Grid	3,500 MW
Liquid Fuel, Hydro and Renewable	2,700 MW
Total	**38,700 MW**

3.4.1.2 Communications Network

In Bangladesh there are two Types of National Network; Radio Link Network and OFC Link Network BTCL has both the types. The network diagrams are shown in figure 3.4.1.2-1 and 3.4.1.2-2.

Figure 3.4.1.2-1: BTCL Microwave Links

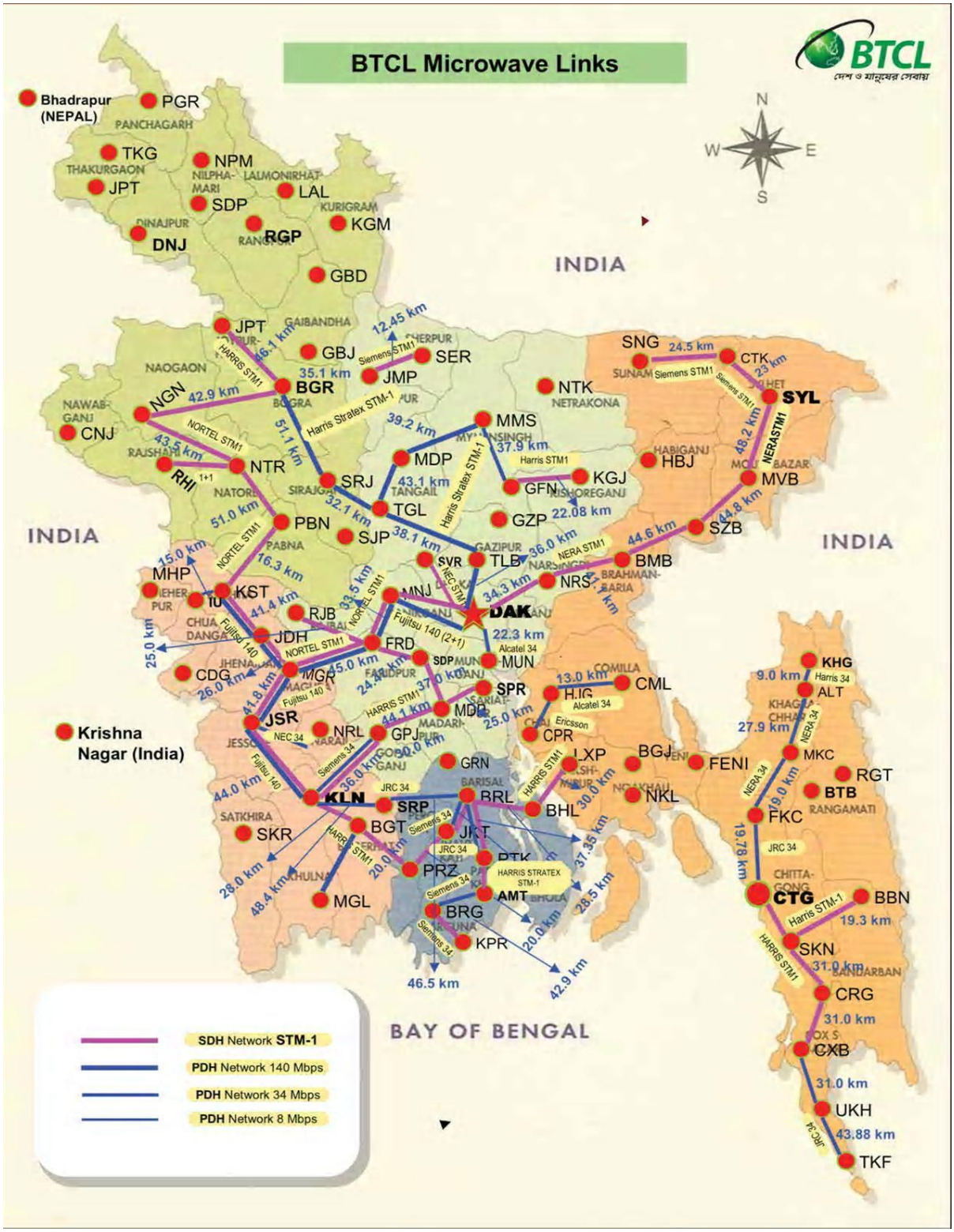
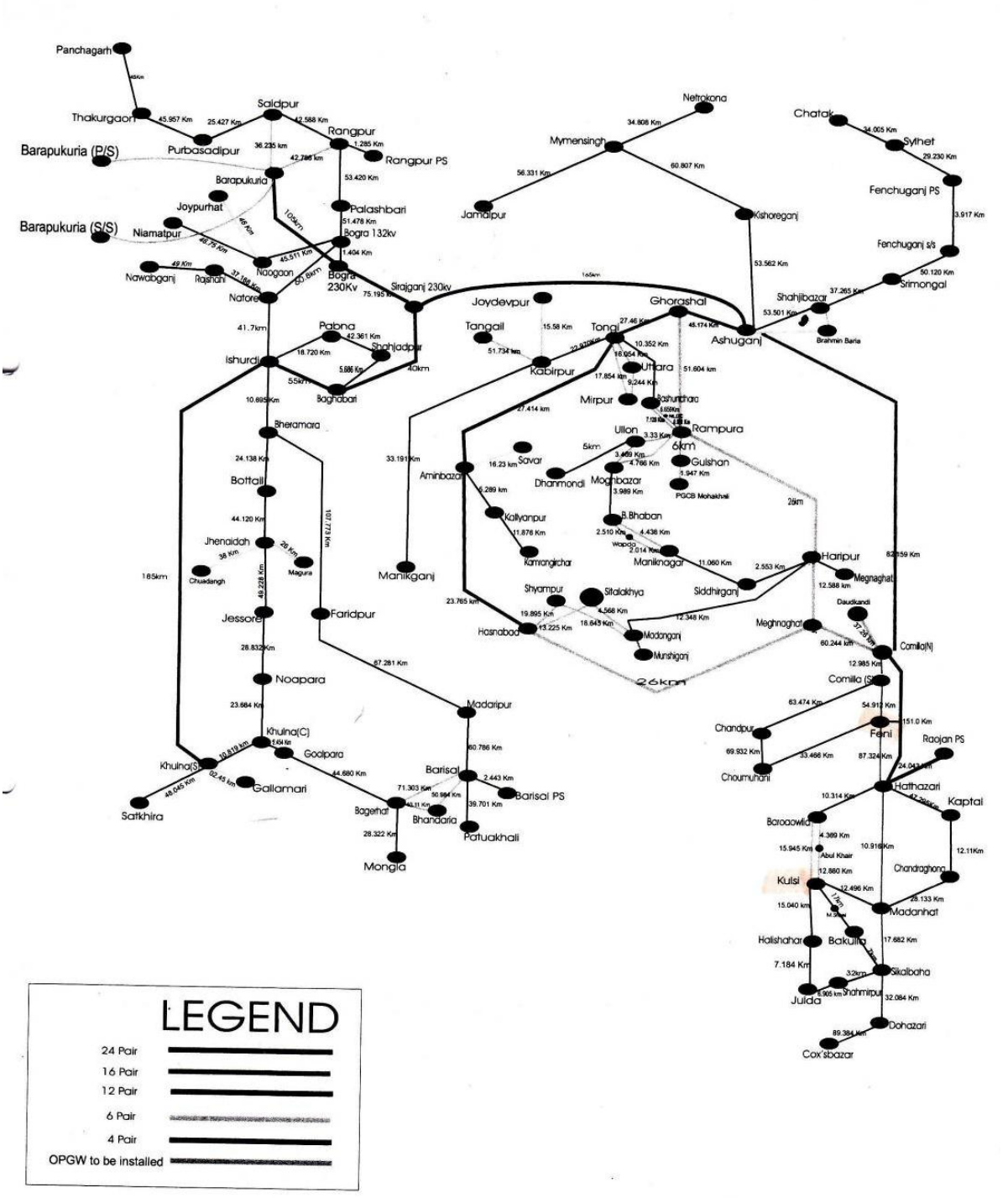


Figure 3.4.1.2-2: BTCL Optical Fibre Links (OFC)

The Power Grid Company Bangladesh also has an OFC overhead Network through Bangladesh along the HT power transmission Towers, shown below in Figure 3.4.1.2-3.

Figure 3.4.1.2-3: Optical Fibre Backbone of PGCB



From various discussions with service providers in the telecommunications sector in Bangladesh, the communications network has been evaluated. The following is a brief of these visits.

Visit to Bangladesh Telecommunication Regulatory Commission (BTRC), Dhaka

It is reported that BTRC has given license/permission for telecom operation of PSTN to a good number of Operators. Most of them could not become successful in fixed/land phone network service. Among the private operators, Ranks Tel started with a land/fixed phone service. But recently their service also became non-standard. Most of the Mobile Operators are successfully promoting their businesses.

Visit to Bangla Phone (BP)

Another operator, Bangla Phone (BP) is providing service, with a completely different concept. They are working only in the Sylhet Region and also in some rural areas. BP claims that their leased Optical Fibre network, leased from PGCB, is spread throughout Bangladesh. They have only one switching center in Dhaka. Wherever service is requested, they drop an FOC line, from the nearest junction to create a Termination Point (TP) and connect the required service from the TP. They can provide telephone service, internet service and point to point data communication service throughout Bangladesh and Internationally. They have worldwide International connections through POPs of BTCL.

Visit to Power Grid Company Bangladesh (PGCB)

It was found that the Power Grid Company of Bangladesh (PGCB) is a primary owner of FOC throughout Bangladesh. PGCB has High Tension power lines with HT power transmission towers throughout Bangladesh. Also, they have constructed FOC an overhead network for their own communications and are also leasing their FOC to other Telecom Operators.

Information of other FOC networks

The primary owners of FOC networks in Bangladesh are BTCL, PGCB, Grameen Phone (GP) and some others. The FOC network of GP was initially purchased from Bangladesh Railways. At a later stage, they laid and expanded their network.

Visit to Dhaka EPZ

This EPZ has a total of 356 acres of land in two phases with a total number of 451 plots (each plot 2,000 sq. m). Some of the bigger factories occupy more than one plot. The total number of factories is 102 facilities. The EPZ Zone has a BTCL Telephone Exchange of 3,000 lines. Primarily, the Exchange was installed by BTCL by contributory work, i.e. Dhaka EPZ has established a BTCL fixed Phone network through contributory work. At a later stage, the exchange was expanded by BTCL to connect with outside subscribers. The EPZ factories are connected with only about 600 telephones. Other telephone connections are with the other BTCL subscribers.

Though there is internet service provision with the BTCL exchange, the EPZ factory owners prefer to use private internet services. It is found in Dhaka EPZ, that, internet facilities are provided by several private Internet Service Providers (ISPs). About 4 to 5 ISPs have set up their network in Dhaka EPZ. The EPZ authority mentioned only one name 'AMRA.' The EPZ Authority did not have to pay for the internet service. The ISPs connected their facilities to the factories and offices of the Zone by overhead FOC network along the electric poles, for which they are paying a yearly rent to the EPZ Authority. They have no underground FOC network. Factory owners have their internet connection from more than one ISP, so that, in case one ISP is interrupted, service can continue.

3.4.2 Local Conditions

3.4.2.1 Electrical System

Anwara is within the Chittagong zone of the Bangladesh Power Development Board. A picture of BPDB's Daily Generation Schedule of Chittagong zone is depicted here (as of October 5, 2013).

- Installed Capacity = 1,207MW
- Derated Capacity= 1,117MW
- Fuel Used = Hydro, Gas, H.F.O
- Day peak generation = 386MW
- Evening peak generation=581MW
- Due to gas/water limitation generation short =510MW
- Machine shutdown = 0MW
- Evening demand = 634MW
- Evening supply= 601MW
- Evening load shedding = 33MW

At present the Anwara EZ site has no power grid line of 230KV & 130KV available. The Anwara EZ site is within the jurisdiction of the Rural Electrification Board (REB) of Patya/Anwara where the REB 33KV, 11KV and LT lines are available. Some solar systems have also been installed.

Figure 3.4.2.1-1: 230 and 132 KV Grid Network of Chittagong Region

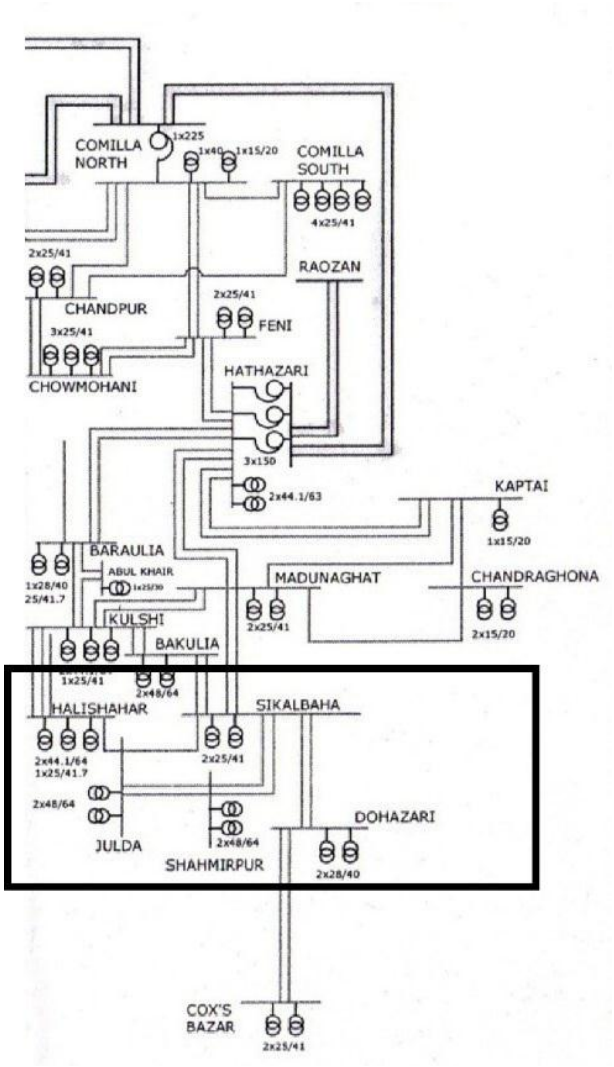
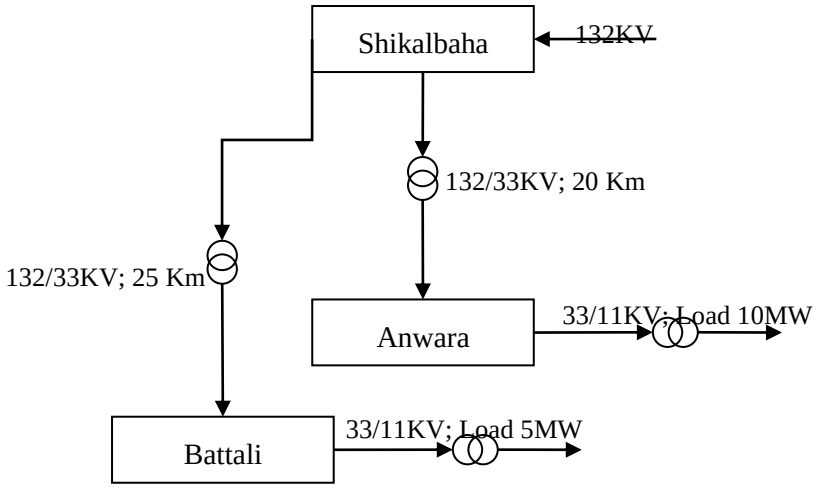


Figure 3.4.2.1-2: Present power supply situation at Anwara



3.4.2.2 Water Supply

The Anwara EZ site is about 18 Km from the Upazila HQ. It is situated on the seashore of the Bay of Bengal. Sufficient surface water is available in the project area. The Sangu River is flowing adjacent to the eastern side of the project area. The project area is about 2-3 Km wide and about 10 to 12 Km long. Most of the surface water is saline. There are a few ponds in which fresh water is available but that is not sufficient. People generally depend on deep tube wells at a depth 900 to 1,200 ft. There are some canals also, but their water is also saline. As the project will consume a huge quantity of water, it will have to depend on surface water source. Though the lower part of the Sangu River is saline, upper parts contain fresh water. So the water of the Sangu River should be continually tested to judge the quality. If the water of the Sangu River is not suitable and sufficient, another option is the Karnaphuli River which is about 60 Km from the site and so the initial cost would be very high.

3.4.2.3 Telecommunications

The Anwara EZ (Economic Zone) has mobile connectivity from almost all mobile companies. There is no fixed network. It is recommended to install BTCL (Bangladesh Telecom Company Limited) network, as fixed Phone Network of BTCL is the only reliable network. The Anwara EZ site is 36km from the Telephone Exchange of Chittagong City Headquarters which is an ICX (Inter Connection Exchange) of BTCL and from where national and International connectivity will be available. This is probably the nearest ODF (Optical Distribution Frame) of BTCL for the EZ site at Anwara. If there is availability of any other ODF in this rout, the FOC (Fibre Optic Cable) laying cost may be reduced. In that case operation cost will increase. In Anwara Upazila Exchange, there is an FOC connection. The Anwara Upazila Exchange is interconnected over a radio (Microwave) link of Tele-talk mobile company.

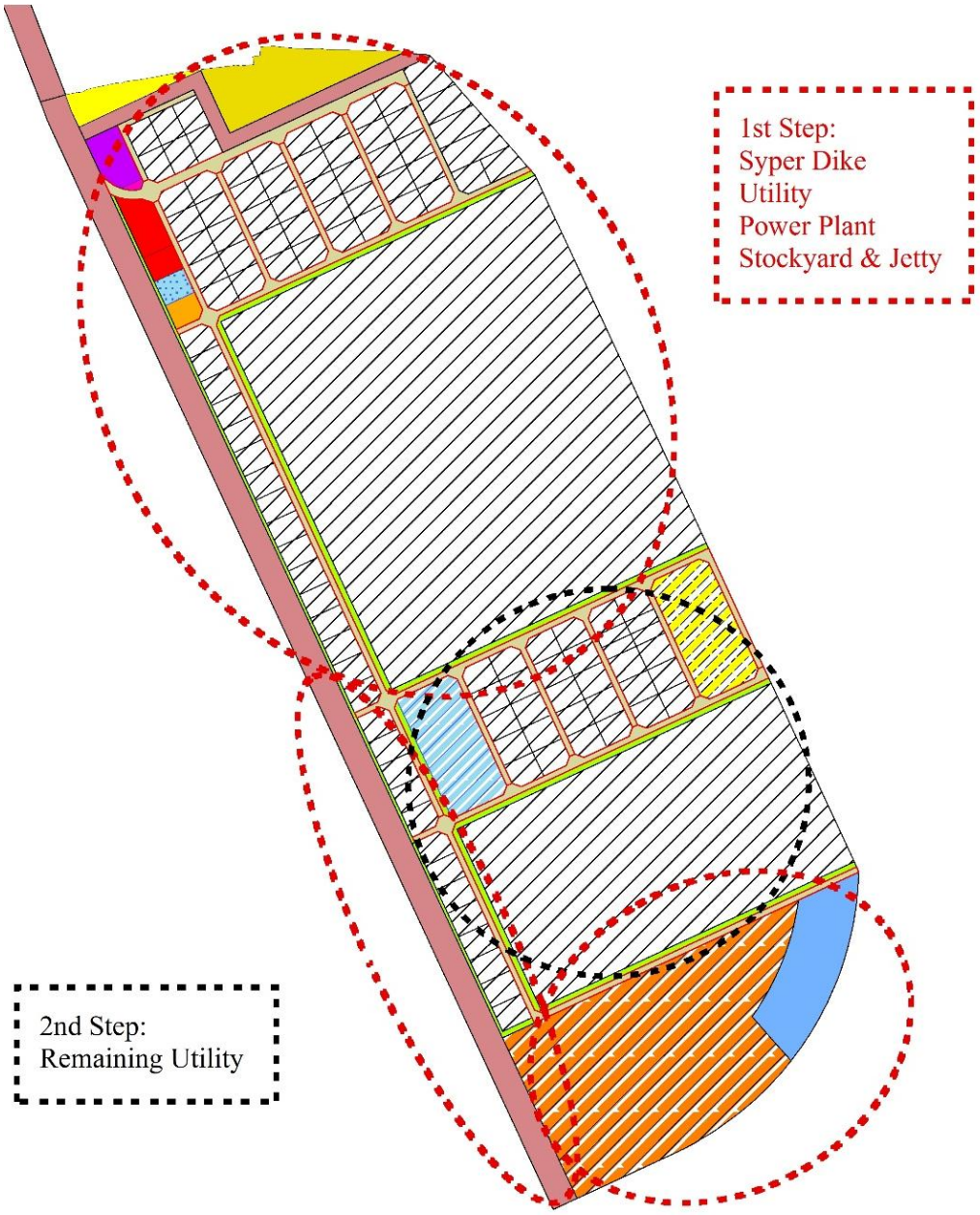
3.5 Total Construction Cost and Schedule

3.5.1 Development Process

The development of Anwara EZ is proposed to be accomplished in a single phase. The location of the coal power plant with jetty is planned at the river mouth to facilitate smooth coal import from the coal centre in Cox's Bazar. The construction of the coal centre will start in 2020. The coal will be imported from another source until the completion of the coal centre. In order to supply power to EZ tenants as soon as possible, the construction of the power plant should start soon after the dredging is carried out. At the same time, the super dike all along the economic zone needs to be completed in order to protect the whole economic zone area from the high wave. Since all works are related each other, the construction of the Anwar economic zone needs to be done in a single phase. Since the existing ground elevation of the northern side requires less dredging work (less than 2m), it is possible for the northern side to be equipped with all utilities and for tenants to occupy this area while the southern side is under construction.

As the first construction step, the dike and dredging will be carried out for whole areas. Then utility works will be done in the northern part. As the second step, the remaining utility works in the southern area will be done. The utility line works should be done from the deepest position to the shallower position. The order of waste water pipe, water supply pipe, gas pipe, drainage u-channel is the recommended standard. Upon completion of the utility line works, the road work will start.

Figure 3.5.1-1: Development Process for Anwara EZ



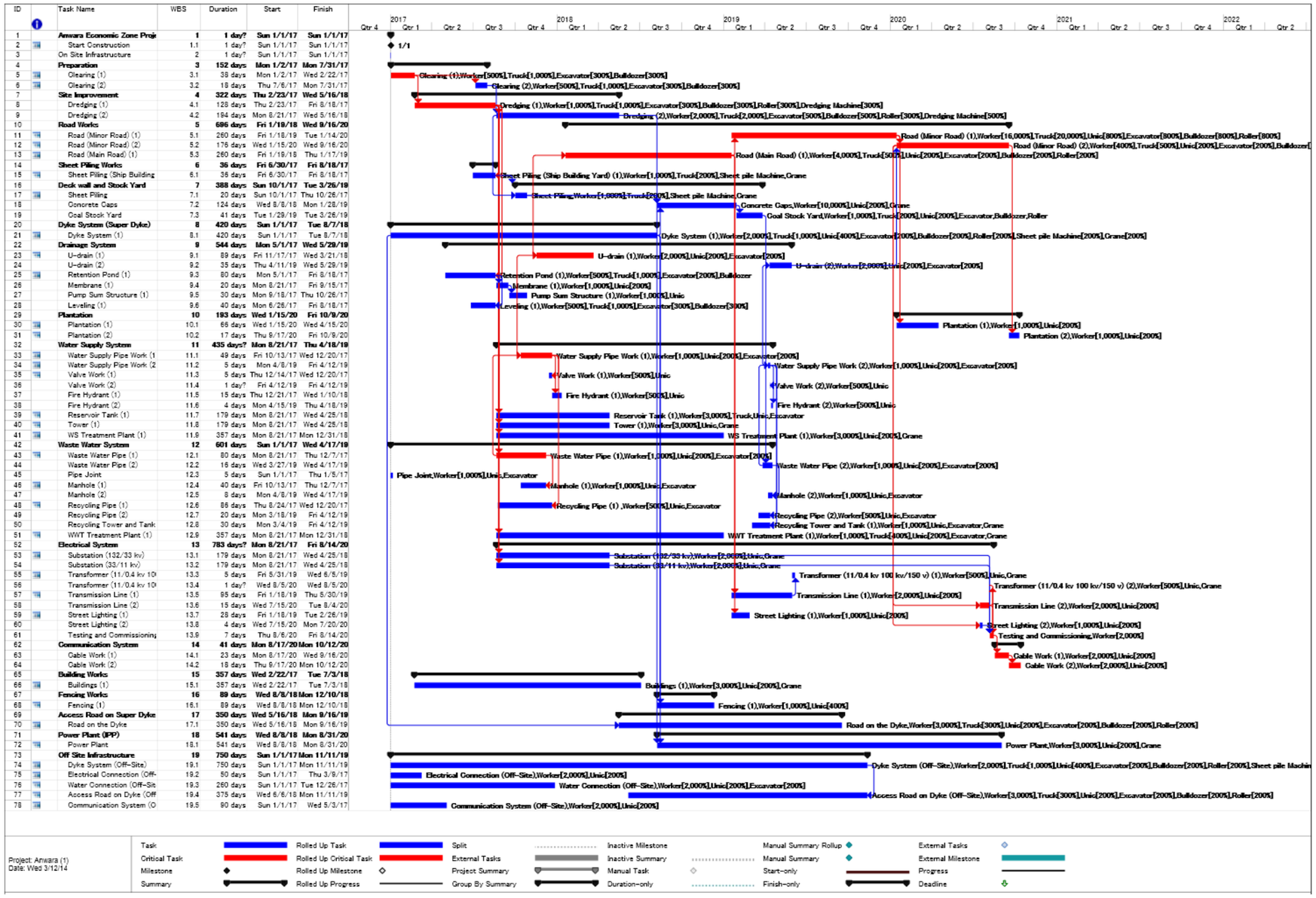
The following Gantt chart is strategically planned to minimize the construction cost with a shorter time frame. The dike and sheet piles will close the entire EZ and the dredging will be carried out. The utility work in the northern area is scheduled as the first step while the southern area needs natural settlement time. The utility work in the southern area is supposed to be done by the workable resources continuing from the northern area. Thus the construction resources are levelled and the total construction schedule and cost are minimized by this CM (Construction Management) approach.

The feasibility study is carried out in 2014. The land acquisition and detail design works are anticipated to take about two years due to the resettlement issues described in the social analysis (Chapter 4). The tender and detailed design will be done in the following year, 2016. The construction of the whole area will start in 2017 and will be finished by the end of 2020. The construction is expected to be carried out in a single phase.

3.5.2 Construction Schedule

The total construction schedule is shown.

Figure 3.5.2 -1: Construction Schedule for Anwara EZ



Footnotes:

(1) Scope of Works in Northern Area

(2) Scope of Works in Southern Area

3.5.3 Construction Cost

The year-wise total cash flow of Anwara EZ is given below.

Table 3.5.3-1: Cash Flow (Anwara EZ)

Item/Year	2017	2018	2019	2020	Total (BDT)	Total (US$)
On Site Infrastructure						
Preparation						
Clearing (1)	38,357,960				38,357,960	479,475
Clearing (2)	17,897,058				17,897,058	223,713
Site Improvement						
Dredging (1)	1,547,726,080				1,547,726,080	19,346,576
Dredging (2)	1,161,376,800	1,185,572,150			2,346,948,950	29,336,862
Road Works						
Road (Minor Road) (1)			927,970,250	37,118,810	965,089,060	12,063,613
Road (Minor Road) (2)				163,097,264	163,097,264	2,038,716
Road (Main Road) (1)		114,448,932	6,023,628		120,472,560	1,505,907
Sheet Piling Works						
Sheet Piling (Ship Building Yard) (1)	223,690,572				223,690,572	2,796,132
Deck wall and Stock Yard						
Sheet Piling	160,845,000				160,845,000	2,010,563
Concrete Caps		4,469,504	859,520		5,329,024	66,613
Coal Stock Yard			1,247,923,068		1,247,923,068	15,599,038
Dike System (Super Dike)						
Dike System (1)	1,697,730,750	1,013,474,250			2,711,205,000	33,890,063
Drainage System						
U-drain (1)	47,404,022	88,691,396			136,095,418	1,701,193
U-drain (2)			51,981,300		51,981,300	649,766
Retention Pond (1)	21,760,000				21,760,000	272,000
Membrane (1)	12,250,000				12,250,000	153,125
Pump Sum Structure (1)	5,022,870				5,022,870	62,786
Leveling (1)	21,760,000				21,760,000	272,000
Plantation						
Plantation (1)				6,682,830	6,682,830	83,535
Plantation (2)				631,125	631,125	7,889
Water Supply System						
Water Supply Pipe Work (1)	12,276,705				12,276,705	153,459
Water Supply Pipe Work (2)			2,175,200		2,175,200	27,190
Valve Work (1)	1,303,000				1,303,000	16,288
Valve Work (2)			198,000		198,000	2,475
Fire Hydrant (1)	11,818,331	13,506,664			25,324,995	316,562
Fire Hydrant (2)			8,455,000		8,455,000	105,688
Reservoir Tank (1)	53,631,264	46,368,697			99,999,961	1,250,000
Tower (1)	15,016,800	12,983,275			28,000,075	350,001

Item/Year	2017	2018	2019	2020	Total (BDT)	Total (US$)
WS Treatment Plant (1)	215,126,016	584,873,856			799,999,872	9,999,998
Waste Water System						
Waste Water Pipe (1)	84,240,640				84,240,640	1,053,008
Waste Water Pipe (2)			16,400,000		16,400,000	205,000
Pipe Joint	400,000				400,000	5,000
Manhole (1)	72,032,280				72,032,280	900,404
Manhole (2)			14,500,000		14,500,000	181,250
Recycling Pipe (1)	21,037,406				21,037,406	262,968
Recycling Pipe (2)			4,800,900		4,800,900	60,011
Recycling Tower and Tank (1)			3,999,990		3,999,990	50,000
WWT Treatment Plant (1)	172,100,832	467,899,137			639,999,969	8,000,000
Electrical System						
Substation (132/33 kv)	214,525,152	185,474,871			400,000,023	5,000,000
Substation (33/11 kv)	16,089,408	13,910,634			30,000,042	375,001
Transformer (11/0.4 kv 100 kv/150 v) (1)			5,000,000		5,000,000	62,500
Transformer (11/0.4 kv 100 kv/150 v) (2)				1,000,000	1,000,000	12,500
Transmission Line (1)			24,177,880		24,177,880	302,224
Transmission Line (2)				4,913,355	4,913,355	61,417
Street Lighting (1)			1,405,012		1,405,012	17,563
Street Lighting (2)				210,000	210,000	2,625
Testing and Commissioning				500,003	500,003	6,250
Communication System						
Cable Work (1)				19,749,594	19,749,594	246,870
Cable Work (2)				13,166,388	13,166,388	164,580
Building Works						
Buildings (1)	277,880,400	163,023,168			440,903,568	5,511,295
Fencing Works						
Fencing (1)		39,155,372			39,155,372	489,442
Access Road on Super Dike						
Road on the Dike		62,412,332	70,784,718		133,197,050	1,664,963
Power Plant (IPP)						
Power Plant		3,844,732,008	9,722,735,751	6,432,532,398	20,000,000,157	250,000,002
Off Site Infrastructure						
Dike System (Off-Site)	1,283,974,942	1,274,210,874	1,103,339,684		3,661,525,500	45,769,069
Electrical Connection (Off-Site)	150,000,000				150,000,000	1,875,000
Water Connection	1,285,260,080				1,285,260,080	16,065,751

Item/Year	2017	2018	2019	2020	Total (BDT)	Total (US$)
(Off-Site)						
Access Road on Dike (Off-Site)		94,406,400	143,193,600		237,600,000	2,970,000
Communication System (Off-Site)	36,870,030				36,870,030	460,875
Total (BDT)	**8,879,404,398**	**9,209,613,520**	**13,355,923,501**	**6,679,601,767**	**38,124,543,186**	
Total (US$)	**110,992,555**	**115,120,169**	**166,949,044**	**83,495,022**		**476,556,790**

Table 3.5.3-2: On and Offsite Cost

Scope	2017	2018	2019	2020	Total (BDT)	Total (US$)
On-site Infrastructure	6,123,299,346	3,996,264,238	2,386,654,466	247,069,369	12,753,287,419	159,416,093
Off-site Infrastructure	2,756,105,052	1,368,617,274	1,246,533,284	0	5,371,255,610	67,140,695
Power Plant (IPP)	0	3,844,732,008	9,722,735,751	6,432,532,398	20,000,000,157	250,000,002
Total (BDT)	**8,879,404,398**	**9,209,613,520**	**13,355,923,501**	**6,679,601,767**	**38,124,543,186**	
Total (US$)	**110,992,555**	**115,120,169**	**166,949,044**	**83,495,022**		**476,556,790**

3.5.4 Comparative Scenario of Construction Schedule, Land Sale, Industry Operation and Utility Demand

The following tables and figures explain the relationships between construction schedule, land sale, industry operation, and utility demand

3.5.4.1 Notes from the Gantt Chart

2017 Construction begins with dredging, sheet piling, and super dike.

2018 The northern and southern areas are closed by sheet piles and the super dike. Dredging in the northern and southern areas is finished.
All underground utilities are completed in northern area. Water supply treatment plant and Waste water treatment plant are completed.
About half of roads in northern area are completed. The northern area becomes leasable late 2018.

2019 All utilities and roads are completed in northern area. All underground utilities in southern area are completed early 2019.
The southern area becomes leasable late 2019.

2020 All utilities and infrastructure are completed in the southern area.

Considering these notes, the development schedule of leasable land is shown.

Table 3.5.4.1-1 Developed Area for Land Lease

Land	Land Use	Area	Developed Area for Land Lease (Hector)					Total Area	
		Year	2017	2018	2019	2020	2021	Hector	Acres
Developed Land	Shipbuilding Yard		0	167.95	81.58	0	0	249.53	616.34
	Other Industry		0	104.84	8.05	0	0	112.89	278.84
	Commercial Zone		0	3.23	0	0	0	3.23	7.98
	Power Plant		0	54.53	0	0	0	54.53	134.69
	Coal Stock Yard, Jetty		0	11.44	0	0	0	11.44	28.26
Total Area (Hector)			0	341.99	89.63	0	0	431.62	
Total Area (Acres)			0	844.7153	221.3861	0	0		1,066.10

3.5.4.2 Notes from the Marketing Reserach

According to the market reserch (Table 2.4.2.4-1 Projected Demand and Timeframe of Investment), the demand of industrial land is very high and the following asumptions are set up.

Asumptions

2018 Industries (Shipbuilding, Shipbuilding Components, Steel Mills/Steel Products, Automobile Parts, Leather goods, Pharmaceuticals) acqire the industry plots in the northern area.
IPP investors (Power Plant, Coal Stock Yard, and Jetty) acquire the land in 2018 when the areas are closed by the super dike, sheet piles, and the dredging are completed.

2019 Industries (Shipbuilding, Shipbuilding Components) acquire the industry plots in the southern area.

3.5.4.3 Projection of Land Sales

Following previous assumptions, the land sales are projected.

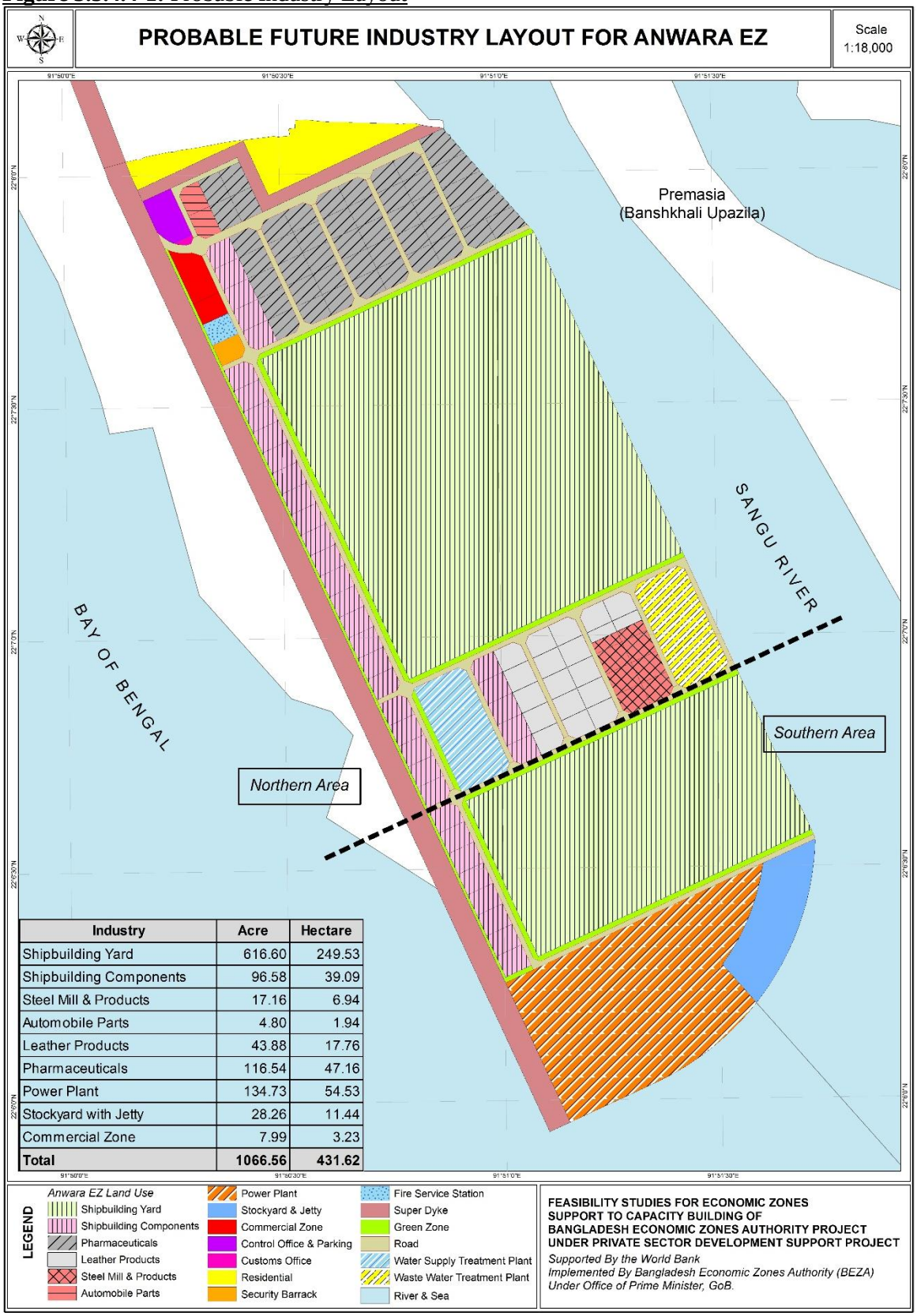
Table 3.5.4.3-1 Demanded Area by Marketing (Projection of Land Sales)

Land	Land Use		Area	Demanded Land Area (Hector)					Total Area	
			Year	2017	2018	2019	2020	2021	Hector	Acres
Demanded Land	Shipbuilding Yard			0	167.95	81.58	0	0	249.53	616.34
	Other Industry	Shipbuilding Components		0	31.04	8.05	0	0	39.09	96.55
		Steel Mills/Steel Products		0	6.94	0	0	0	6.94	17.14
		Automobile Parts		0	1.94	0	0	0	1.94	4.79
		Leather Goods		0	17.76	0	0	0	17.76	43.87
		Pharmaceuticals		0	47.16	0	0	0	47.16	116.49
	Commercial, Residential Zone			0	3.23	0	0	0	3.23	7.98
	Power Plant			0	54.53	0	0	0	54.53	134.69
	Coal Stock Yard, Jetty			0	11.44	0	0	0	11.44	28.26
Total Area (Hector)				0	341.99	89.63	0	0	431.62	
Total Area (Acres)				0	844.7153	221.3861	0	0		1,066.10

3.5.4.4 Probable Industry Layout

The demand for land is reflected in the following probable industry layout. The layout is designed with the consideration of the marketing demand and developed land available in the timeframe. A special attention is paid for the location choice of clean industries.

Figure 3.5.4.4-1: Probable Industry Layout



Industry	Acre	Hectare
Shipbuilding Yard	616.60	249.53
Shipbuilding Components	96.58	39.09
Steel Mill & Products	17.16	6.94
Automobile Parts	4.80	1.94
Leather Products	43.88	17.76
Pharmaceuticals	116.54	47.16
Power Plant	134.73	54.53
Stockyard with Jetty	28.26	11.44
Commercial Zone	7.99	3.23
Total	**1066.56**	**431.62**

3.5.4.5 Land under Operation

The following assumptions are set up to project the land area under operation.

Assumptions

Northern Area:

2019 All utilities and roads are completed. The occupancy permit is issued. Tenants commence factory construction.
2020 Tenants start operation which covers the 50% of their leased land.
2021 Tenants expand their operation which covers the remaining 25% of their leased land.
2022 Tenants expand their operation which covers the remaining 25% of their leased land.

Southern Area:

2020 All utilities and roads are completed. The occupancy permit is issued. Tenants commence factory construction.
2021 Tenants start operation which covers the 50% of their leased land.
2022 Tenants expand their operation which covers the remaining 25% of their leased land.
2023 Tenants expand their operation which covers the remaining 25% of their leased land.

The projection of land area under operation is shown.

Table 3.5.4.5-1 Land under Operation

Land	Land		Area	Operating Land Area (Hector)							Total Area	
			Year	2017	2018	2019	2020	2021	2022	2023	Hector	Acres
Demanded Land	Shipbuilding Yard			0	0	0	83.975	82.78	62.38	20.40	249.53	616.34
	Other Industry	Shipbuilding Components		0	0	0	15.52	11.79	9.77	2.01	39.09	96.55
		Steel Mills/Steel Products		0	0	0	3.47	1.74	1.74	0	6.94	17.14
		Automobile Parts		0	0	0	0.97	0.49	0.49	0	1.94	4.79
		Leather Goods		0	0	0	8.88	4.44	4.44	0	17.76	43.87
		Pharmaceuticals		0	0	0	23.58	11.79	11.79	0	47.16	116.49
	Commercial, Residential Zone			0	0	0	1.615	0.81	0.81	0	3.23	7.98
	Power Plant			0	0	0	54.53	0	0	0	54.53	134.69
	Coal Stock Yard, Jetty			0	0	0	11.44	0	0	0	11.44	28.26
Total Area (Hector)				0	0	0	203.98	113.82	91.41	22.41	431.62	
Cumulative Land Area under Operation (Hector)				0	0	0	203.98	317.8	409.21	431.62		
Total Area (Acres)				0	0	0	503.83	281.14	225.79	55.35		1,066.10

3.5.4.6 Utility Demand

The marketing demand survey provides information about the utility use of the industries. The following table is prepared based on the utility demand estimated by the respondents in industry demand surveys.

Table 3.5.4.6-1 Unit Rate of Utility Demand (Per Hectare) for Anwara EZ

Industry Type	Power (MW)	Water (m^3)
Shipbuilding Yard	0.33	18
Shipbuilding Components	0.1	5
Steel Mill (Electric Furnace)	0.91	40
Automobile Parts	0.42	18
Leather Goods	0.07	77
Pharmaceuticals	0.21	650
Stockyard & Jetty	0.03	2
Commercial & Others	0.25	20

Based on this the estimated demand for power and water for Anwara EZ is shown below.

Table 3.5.4.6-2 Utility Demand by Industries (Power)

Land	Land		Unit Rate	Demanded Power (MW)							Total
			MW/ha	2017	2018	2019	2020	2021	2022	2023	MW
Demanded Land	Shipbuilding Yard		0.33	0	0	0	27.71	27.317	20.59	6.73	82.34
	Other Industry	Shipbuilding Components	0.10	0	0	0	1.55	1.179	0.98	0.20	3.91
		Steel Mills/Steel Products	0.91	0	0	0	3.16	1.579	1.58	0	6.32
		Automobile Parts	0.42	0	0	0	0.41	0.204	0.20	0	0.81
		Leather Goods	0.07	0	0	0	0.62	0.311	0.31	0	1.24
		Pharmaceuticals	0.21	0	0	0	4.95	2.476	2.48	0	9.90
	Commercial, Residential Zone		0.25	0	0	0	0.40	0.202	0.20	0	0.81
	Coal Stock Yard, Jetty		0.03	0	0	0	0.34	0	0	0	0.34
Total Area (MW)				0	0	0	39.15	33.27	26.33	6.93	105.68
Cumulative Total (MW)				0	0	0	39.15	72.42	98.75	105.68	

Assumptions

Utility demand is proportional to the land area under industrial operation.

Table 3.5.4.6-3 Utility Demand by Industries (Water)

Land	Land		Unit Rate	Demanded Water (m3/day)							Total
			m3/day/ha	2017	2018	2019	2020	2021	2022	2023	m3/day
Demanded Land	Shipbuilding Yard		18	0	0	0	1,511.55	1,490.00	1,122.89	367.11	4,491.54
	Other Industry	Shipbuilding Components	5.00	0	0	0	77.60	58.93	48.86	10.06	195.45
		Steel Mills/Steel Products	40	0	0	0	138.80	69.40	69.40	0	277.60
		Automobile Parts	18	0	0	0	17.46	8.73	8.73	0	34.92
		Leather Goods	77	0	0	0	683.76	341.88	341.88	0	1,367.52
		Pharmaceuticals	650	0	0	0	15,327.00	7,663.50	7,663.50	0	30,654.00
	Commercial, Residential Zone		20	0	0	0	32.30	16.15	16.15	0	64.60
	Coal Stock Yard, Jetty		2	0	0	0	22.88	0	0	0	22.88
Total Area (m3/day)				0	0	0	17,811.35	9,648.58	9,271.41	377.17	37,108.51
Cumulative Total (m3/day)				0	0	0	17811.35	27,459.93	36,731.34	37,108.51	

Assumptions

Utility demand is proportional to the land area under industrial operation.

Table 3.5.4.6-4 Operating Land and Utility Demand

Operating Land and Utility Demand	Year		2015	2016	2017	2018	2019	2020	2021	2022	2023
Items	Project Stage		LA & DD		Construction in Single Phase				Operation		
Cumulative Land under Operation (Hector)	Unit	Hector	0	0	0	0	0	203.98	317.8	409.21	431.62
Cumulative Power Demand (KW)		KW	0	0	0	0	0	39,149	72,415	98,750	105,682
Cumulative Water Demand (m3/day)		m3/day	0	0	0	0	0	17,811	27,460	36,731	37,109

Notes

LA & DD: Land acquisition and detail design

Figure 3.5.4.6-1 Cumulative Land under Operation

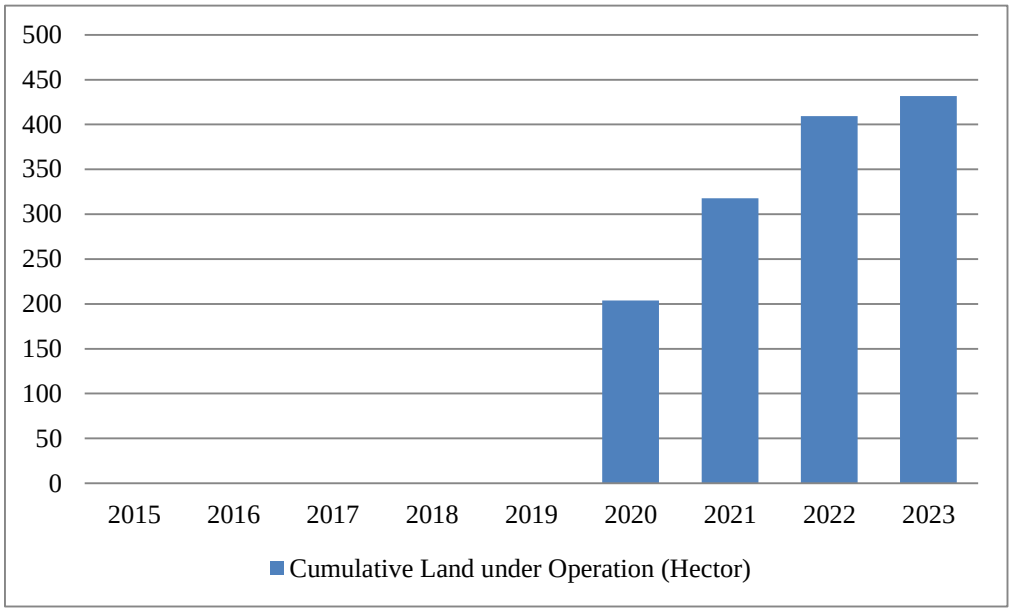
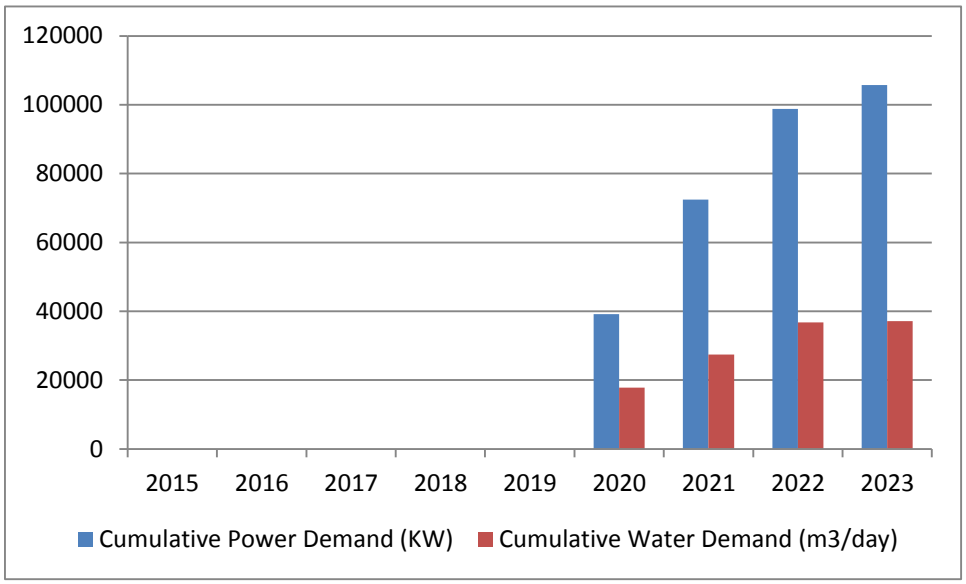


Figure 3.5.4.6-2 Cumulative Utility Demand



Tenants are able to start their operation upon completion of the whole construction of the economic zone by the application of CM (Construction Management). This kind of efficient approach is necessary for private sector's development projects.

3.5.4.7 Comparison of Utility Demand with Other EZs

The utility data is compared with the utility data of two proposed EZs (Sherpur and Mirershorai) and Dhaka and Chittagong EPZ.

Table 3.5.4.7-1: Comparison of Daily Utility Demand (Per Hectare) Among Industrial Zones in Bangladesh

Utility	Dhaka EPZ	Chittagong EPZ	Sherpur EZ	Anwara EZ	Mirershorai EZ
Water (m3/day/ha)	516.72	1,677.00	663.04	85.98	161.20
Power (MW/ha)	0.51	0.48	0.37	0.24	0.34
Gas (m3/day/ha)	3,720.00	5,349.00	7,363.06	NA	NA

NA: Not Applicable

The utility data of Dhaka and Chittagong EPZ is for the month May and June, 2013. From this table it can be seen that the utility estimated for Anwara EZ is less than Dhaka and Chittagong EPZ. The difference occurs due to the different mix of industries in different EZs and EPZs.

3.6 Building Guidelines

Key items of building guidelines are described, necessary to make the economic zone a high quality environment.

3.6.1 Architectural Plans

1. The tenants of plot/plots desiring to construct their buildings in the economic zone shall submit the architectural plans/area layouts for their proposed building and other ancillary structures.
2. Enlarged plans of the plot/plots shall be submitted giving the dimensions of the plot and indicating the location of the building/buildings, parking areas, lawns, walkways, loading/unloading area, vehicular and pedestrian approaches from the road, septic tank, guard house, pump-house, electric sub-station, boiler house, generator house, and surface drains, etc.
3. Special attention shall be paid to site plans and section drawings of the ground level. Directions and connection of the drainage system shall be clarified to connect the economic zone utilities.
4. Number of stories of buildings can be unlimited.

3.6.2 Compulsory Open Space Requirement

3.6.2.1 Ground Coverage and Setback

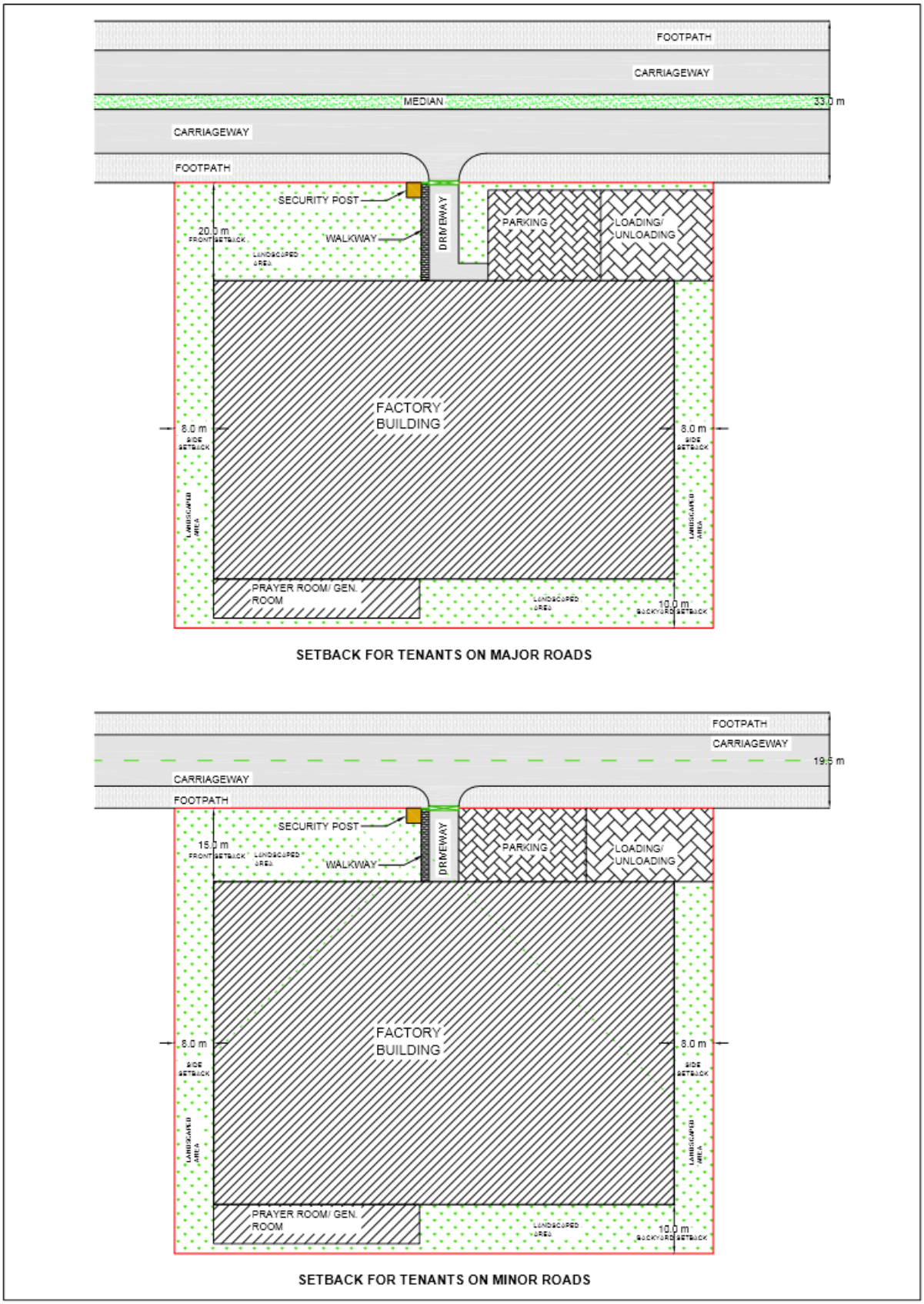
The setback areas are determined as in the flowing patterns shown in Figure 3.6.2.1-1.

- Minimum Setback from Plot boundary are as follows:
  - Frontage: 65.57 feet (20m) for the main road (width = 33m), 49.2 feet (15m) for the minor road (width =19.5m)
  - Side Yard: 26.2 feet (8 m) (on both side)
  - Back Yard: 32.8 feet (10 m)

The Study Team suggests the following are regulations on ground coverage.

- Nothing can be constructed on the setback area on the side of the building for the firefighting. It should be properly landscaped with small sized trees.
- 30% of the setback area on the back yard can be used for services (generator room, prayer room, etc.)
- 65% of the frontage can be used for parking, loading/unloading, security booth, walkway and driveway etc.
- 35% of the setback at the frontage should be landscaped with trees and properly grassed.

Figure 3.6.2.1-1: Setback for Tenant's Building on Major and Minor Road



3.6.2.2 Parking

- Parking for industries and other facilities is to be developed within the plot. No on-street parking will be allowed within the EZ.
- 30% of the setback area on the front can be used as open parking.
- 30% of the setback area on the front can be used for loading and unloading.
- All plots will have a minimum parking space of 1 standard sized automobile (2.5mx4.6m) per 200 m^2 of floor space.
- An extra 5% of ground coverage is permissible for construction of automated multi-level/multi-level parking with ramp parking structures for additional needs.
- In case of basement parking, it cannot exceed the setback line and maximum 20% of the ground coverage. It should be kept as a service area (prayer room, generator room etc.).
- Space Standard for parking:

Table 3.6.2.2-1: Equivalent Car Space (ECS) for Different Types of Parking

Parking Type	Area in m^2 Per ECS
Open shed	23
Basement	32
Multi-level with ramp	30
Automated multi-level	16

- For bicycle parking, 1 space per 500 m^2 floor space is to be provided.
- The dimension of the parking area and turning radius will be fixed following the table below:

Table 3.6.2.2-2: Important Dimensions for Different Types of Vehicles

Type of vehicle	Parking width (m)	Parking length (m)	Internal turning radius (m)	External turning radius (m)
Car	2.5	4.6	-	-
Truck	3.6	10.0	8.7	12.8
Trailer	3.6	18.0	6.9	13.8

3.6.2.3 Landscape

- All plant materials shall be watered with an automatic irrigation system.
- Sprinkler layout should be designed in a way that it minimizes the amount of spray that falls on sidewalks, neighboring properties and buildings (no overspray onto hardscape or on landscaped areas).
- All grass areas should be mulched to a depth of 2 inches.
- The plant design shall address sight distance (no landscape improvements shall be placed so as to obstruct the vision of drivers and/or pedestrians).

3.6.3 Compulsory Exterior Requirements

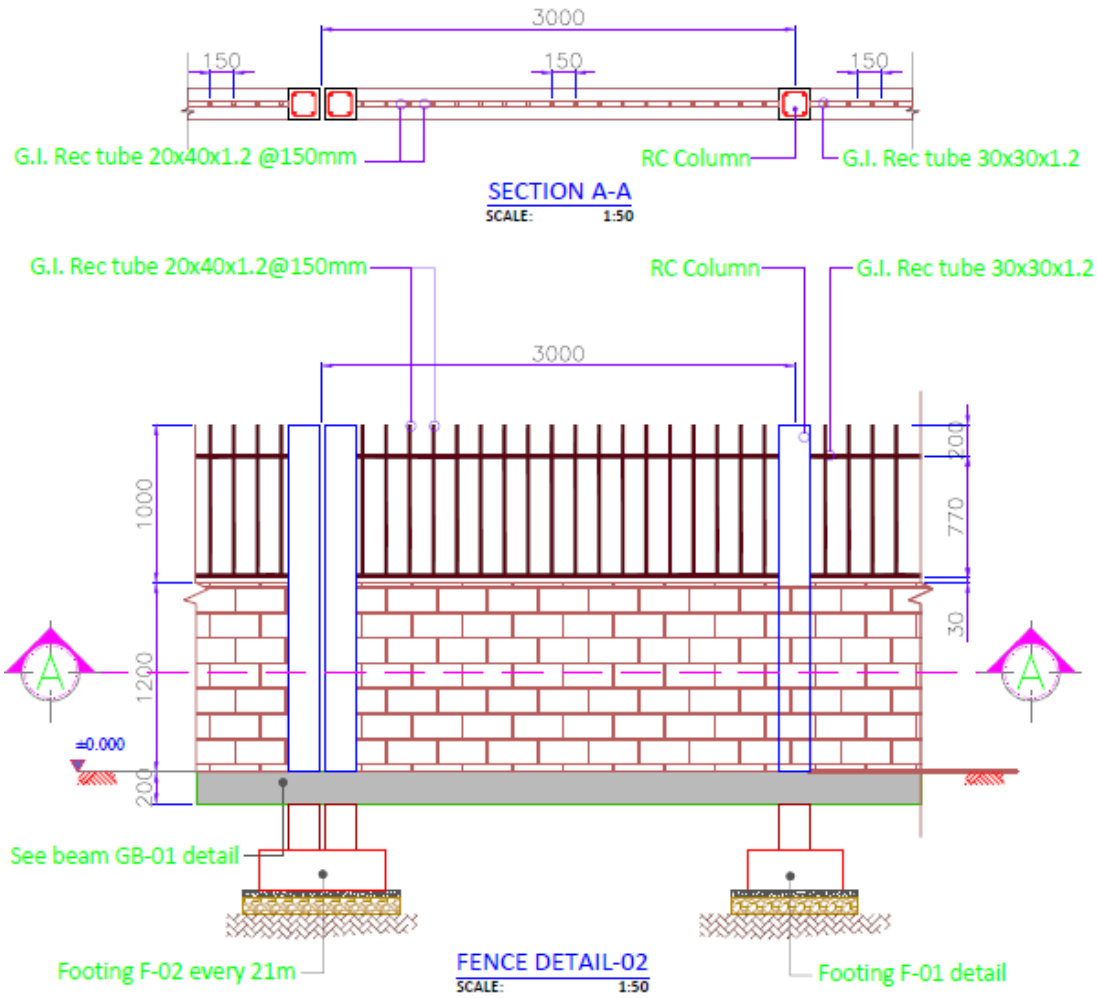
3.6.3.1 Entrance/Exit of the Plot

1. The gate of entrance/exit shall be located along the main or minor (secondary) road.
2. One main entrance/Exit gate has to be built for each plot. The main entrance gate has to face the road.
3. For safe and smooth and efficient traffic flows, the main entrance gate must be located at least 20 meters from major intersections.

3.6.3.2 Fence

4. The maximum height of fences, if any, shall be 7.2 feet (2.2 m) from the ground level. For the front side, the upper half portion should be open type and the lower half portion should be closed type. The standard sample is shown.

Figure 3.6.3.2-1: Standard Front Fence



5. The Fences facing the front road shall be open-type fences made of iron bars or galvanized chain-link fencing material framed with galvanized pipes and other similar types of fences. Details of color and material should be discussed with the economic zone administrators.
6. No concealing fences shall be erected facing the roads in order to maintain transparency. On the other hand, the structure of the side and back fence should be closed type for security purpose.
7. The fence between two adjoining plots could be built rightly on the plot division line with agreement of both tenants of plot and the cost of the fencing could be shared by the two tenants.
8. The setback of 3.281 feet (1m) is required between the u-channel and the fence. This is for the necessary maintenance of the fence foundation in the future. The setback should be grassed for landscaping purposes.

3.6.3.3 Signage

The purpose of the Special Signage Regulations is to allow the Economic Zone Area to have sufficient signage for business purposes, while avoiding clutter and maintaining the character of the surrounding region.

1) Entrance to Office and Industrial Zone

One (1) entrance monument sign that is up to ten (10) feet in height (measured from the grade of the street centerline) and one hundred (100) square feet at each entrance to the zone from a public street are permitted. Such monument signs shall only announce the name of the economic zone.

2) Industrial Lots within Economic Zone

One (1) monument sign shall be permitted at a maximum of eight (8) feet tall and forty-eight (48) square feet in area. The amount of permitted building-mounted signage shall be determined by the area of the building covering area or tenant space.

Over 40,000 square feet: Individual building users or tenant spaces shall be permitted one building-mounted sign on each facade that faces a public street or main development driveway. However, no more than two such signs shall be permitted. The permitted size of the building-mounted signs shall be two square feet for each lineal foot of building or tenant space width on which the sign is mounted but shall not exceed two hundred and fifty (250) square feet.

40,000 square feet in area or smaller: Individual building users or tenants spaces shall be permitted one building-mounted sign for each facade that faces a public street or main development driveway. However, no more than two such signs shall be permitted. The permitted size of the building-mounted signs shall be two square feet per each lineal foot of building or tenant space width on which the sign is mounted but shall not exceed one hundred fifty (150) square feet in area.

Monument Signs

The base and sides of the sign shall be constructed with a masonry product (excluding smooth or textured concrete block).

The top of the sign shall have an architectural feature representing the concept of the economic zone. Single panel plexi-faced cabinets shall not be permitted.

Building-mounted Signs

Board signs, graphics painted directly on the building, manually changeable copy, electronically changeable copy, plexi-faced panels, internally illuminated awnings, firmly structured awnings with an “inflated” or plastic appearance and similar signs shall not be permitted unless specifically approved through a Design Review Meeting with the economic zone administrators.

3) Commercial Zone

3-1) COMMERCIAL/RETAIL/SHOPPING CENTRES

A group of retail and/or service establishments is to be planned, developed and managed as a single site with common off street parking provided on the property.

One (1) architectural freestanding sign is permitted at the main development entrance where it meets a public street. The architectural free standing sign shall include only the name of the center and the major anchor tenant unless the conditions below are met. The maximum size of such a sign shall be two hundred (200) square feet in area. The maximum height of such a sign shall be proportional to the road frontage along which the sign is to be located - up to two hundred (200) feet of frontage allows a fifteen (15) foot tall sign and more than two hundred (200) feet of frontage allows a twenty (20) foot

tall sign. Multi-tenant signs may be permitted with one tenant panel per 100,000 square feet of gross floor area in the retail center with a maximum of four such panels per retail center. These multi-tenant panels shall be accessory to the main development identification portion of the sign.

3-2) INDIVIDUAL TENANT SPACES WITHIN COMMERCIAL/RETAIL/SHOPPING CENTRES

Anchor tenants over 40,000 square feet in area shall be permitted one building-mounted sign on each facade that faces a public street or main development driveway. However, no more than two such signs shall be permitted. The permitted size of the building-mounted signs shall be two square feet for each lineal foot of tenant space width on which the sign is mounted but shall not exceed two hundred and fifty (250) square feet.

Individual tenants spaces that are 40,000 square feet in area or smaller are permitted one building-mounted sign. The permitted size of the building-mounted sign shall be two square feet per each lineal foot of tenant space width on which the sign is mounted but shall not exceed one hundred (100) square feet in area. Incoming tenant spaces can break their permitted square footage up and display it on the front and side facades if the side facade is visible from a public street or main development driveway. In such a case, the permitted signage can be broken into one sign area on the front facade and one sign area on the side facade.

3-3) FREESTANDING COMMERCIAL LOTS AND OUTLETS WITHIN COMMERCIAL/ RETAIL/SHOPPING CENTERS

One building-mounted sign shall be permitted on each facade that faces a public street or main development driveway. However, no more than two such signs shall be permitted. The permitted size of the building-mounted signs shall be two square feet per each linear foot of building or tenant space width on which the sign is mounted but shall not exceed two hundred (200) square feet in area. One monument sign shall also be permitted at maximum of eight (8) feet tall and twenty-four (24) square feet in area.

4) Administration of the Signage

As stated previously, all proposals that meet the Special Sign Regulations can proceed directly to the Sign Permit Review Process of the Economic Zoning Regulations. Proposals that do not meet the Special Sign Regulations shall be reviewed and suitable modificati0ons will be advised by the Economic Zone Administrators.

3.6.4 Utility Connections

3.6.4.1 Electricity

The prospective tenants shall apply to the economic zone administrators using a prescribed form at least 30 days before the actual designated service connection. The following documents shall be submitted in triplicate with the application.

- A site map drawn to a suitable scale, showing the location of the tenant's sub-station within his premises and the location of the economic zone's 11KV line and incoming cable to be consumer's sub-station.
- Copies of the manufactures' test certificate and manual of the transformer as per BSS or IEC standard.
- Copy of the oil test report of the transformer (the oil test report is to be prepared after the transformer is brought to the site). Such tests may be conducted by the Bangladesh Power

Development Board or any expert recognized by the Chief Electrical Inspector of the economic zone.

3.6.4.2 Waste Water

1. Waste water drainage and rain water drainage system shall be designed separately.

2. The pre-treatment for toxic and chemical constituent elimination from each factory is required prior to discharging to the wastewater system.

3. The connection of water and electricity shall be carried out with the consultation of the economic zone administration.

3.6.4.3 Water Supply

1. The application in the prescribed form shall have to be submitted at least 30 days before the date of the actual requirement of water.

2. Tenants have to construct their own over-head reservoir, pump and float valve, etc. at their own cost before applying for construction.

3. The water meter has to be approved by the economic zone administration and has to be arranged by the tenants at their own cost. The water meter shall be kept sealed and it shall always be available to the representative of the economic zone for checking and billing purpose. Without any meter, water connection can be given with the condition that the tenants agree to pay by flat rate for their consumption.

4. In case any unauthorised water connection is detected, the economic zone administrator may cut off the said connection without any notice. Reconnection of the fraudulent consumer shall be allowed after payment of an outstanding bill for unauthorized water consumption, reconnection fee and other charges as determined by the economic zone administration.

3.6.4.4 Shipbuilding Yard

Tenants have the responsibility to make necessary adjustment to the existing river front structures by their own cost when they build a dock or a deck.

3.6.5 Approval of the Contractor

Foreign investors interested to construct factory buildings in the zone usually do not know the rates of construction materials in Bangladesh, as a result investors may be misguided or cheated by the local contractors or a person who is not concerned about the construction work and therefore adverse reactions arise among the investors.

To help investors in constructing their own factory building with reasonable rates, investors are advised to take approval for appointment of contractors in specified forms prepared by the economic zone administrators before starting the work. It may be mentioned here that no work shall start before the approval of plans of the factory building and also approval of the contractor.

CHAPTER 4

ENVIRONMENTAL & SOCIAL REVIEW

4.1 Environmental Review

4.1.1 Background

In Bangladesh, the proposed Economic Zone Projects will provide for a new approach in association with the existing BEPZ functional establishments, both in management and in investment. The proposed Economic Zone (EZ) should function as a test field for reforms and an open economy that would provide experience that can be replicated and promoted nationwide. The Economic Zone Act was passed in the Parliament in August 2010, providing the overall framework for establishing EZs throughout Bangladesh. Subsequently the government of Bangladesh has preliminarily selected three locations for setting up an economic zone. One at Sherpur in Sylhet division and the other two are at Mirershorai and Anwara in Chittagong Divisions, the Bangladesh Government has also decided to make a feasibility study of the proposed three sites.

The objective of the study is to provide clear-cut data, information, and analysis about the feasibility status of the proposed three Economic Zones at the three preliminarily selected locations in the country, including Transport Assessment, Industry/Market Assessment, Demand Forecast, Master Planning, Infrastructure Requirements, Environmental and Social Review, and Institutional Framework.

This Initial Environmental Examination (IEE) has been prepared as part of the GoB assistance in undertaking the project appraisal of the Anwara EZ Development Project for Bangladesh Economic Zone Authority (BEZA). The project proponent is the BEZA under the Prime Minister's Secretariat. The objective of the TA is to help the Government prepare a detailed EZ Project suitable for World Bank financing.

As such, this IEE was prepared based on field reconnaissance, coordination with BEZA, BEPZA, Department of Environment (DOE), the Water Resources Planning Organization, and stakeholder consultations. This report covers the description of existing environmental conditions, assessment of qualitative environmental impacts of the land filling activities and associated economic zone project components, recommended mitigation measures and environmental monitoring. The environmental impact was considered for activities during pre-construction, construction, and operations phases of the Project. Further, this IEE is an updated self-standing companion document of the Feasibility Study of the Project.

4.1.2 Environmental Clearance Requirements

In accordance with the Environmental Management Framework (EMF) of the PSDSP project, safeguard policies of The World Bank and Environmental Assessment Requirements of Infrastructure Projects, an Initial Environmental Examination (IEE) and Summary Initial Environmental Examination (SIEE) will be presented to the Department of Environment (DoE) of the Government of Bangladesh for site clearance and to the World Bank. An Environmental Assessment (EA) of the project, will, however, be carried out by the Developer in line with the EMF of PSDSP and the Environmental Regulations of GoB.

4.1.2.1 Government of Bangladesh Environmental Laws, Regulations and Guidelines

The Economic Zone with associated industrial development is subject to the environmental requirements of the GoB. Section 7 of the Environmental Conservation Rules of 1997 mandates that, an Environmental Clearance Certificate (ECC) shall be obtained for specific types of projects. The document to be submitted to the concerned Divisional Officer of the DoE for Orange B Category and Red Category are the following:

(i) Accomplished Form-3: Application for an Environmental Clearance Certificate
(ii) Report on the feasibility of the project;
(iii) For Orange B Category: a). an IEE Report of the project b). layout Plan and design of the EZ Project;
For Red Category: a). an IEE relating to the project and also the terms of reference for the

Environmental Impact Assessment (EIA) of the unit or the project b). It's Process Flow Diagram; c). EIA report prepared on the basis of a terms of reference previously approved by the Department of Environment, along with the Layout Plan (showing the location of Effluent Treatment Plant), Process Flow Diagram, design and time schedule of the Effluent Treatment Plant of the unit or project, (these are applicable only for a proposed project)

(iv) Report on the Environmental Management Plan (EMP) for the project and also the Process Flow Diagram, Layout Plan (showing location of Effluent Treatment Plant), design of the Effluent Treatment Plant and information about the effectiveness of the ETP of the unit or project, (these are applicable only for an existing project);

(v) No objection certificate from the local authority;

(vi) Emergency plan relating adverse environmental impact and plan for mitigation of the effects of pollution; and

(vii) Outline of the relocation, rehabilitation plan (where applicable).

The National laws, regulations, ordinances and policies reviewed during the development of this IEE. The list and description of current legal and regulatory framework related to EZ Project development are presented in Table 4.1.2.1-1 below.

Table 4.1.2.1-1: Relevant Laws and Regulations on Economic Zone Projects

Reference	Description
Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009	
	The Government of Bangladesh prepared the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2008 and revised it in 2009. This is a comprehensive strategy to address climate change challenges in Bangladesh. It is built around the following six themes.
Coastal Zone Policy, 2005	
	Coastal zone policy initiated as a harmonized policy that transcends beyond sectoral perspectives. The policy provides general guidance so that the coastal people can pursue their livelihoods under secured conditions in a sustainable manner without impairing the integrity of the natural environment. The policy framework underscores sustainable management of natural resources like inland fisheries & shrimp, marine fisheries, marine fisheries, mangrove and other forests, land, livestock, salt, minerals, sources of renewable energy like tide, wind and solar energy.
National Agricultural Policy, 1999	
	The overall objective of the National Agriculture Policy is to make the nation self-sufficient in food through increasing production of all crops, including cereals, and ensuring a dependable food security system for all.
Standing Orders on Disaster, 2010	
	The 'Standing Orders on Disaster, 2010' is a substantial improvement over the previous edition (English 1999) New features introduced in this edition include, among others, the following: i) an outline of disaster management regulative framework, ii) an introduction of core groups for emergency response at various levels, iii) multi-agency disaster incident management system, iv) risk reduction roles and responsibilities for all committees and agencies, v) new outlines for local level plans, vi) revised storm warning signals, vii) a report on cyclone shelter design.
Environment Policy of 1992	
Section 3.3: Health and Sanitation Section 3.5: Water Development, Flood Control and Irrigation	Requires prevention of harmful impacts in all areas and development activities in the country Requires environmentally sound utilization of all water resources Requires prevention of adverse environmental impact of water resource development projects and irrigation networks Requires sustainable, long term, environmentally sound and scientific exploitation and management of the underground and surface water resources

Reference	Description
	Requires conduct of Environmental Impact Assessment before undertaking projects for water resources development and management
National Environmental Management Action Plan of 1995	
Unsustainable land use	Development of sustainable land use management
Pollution and degradation of open waters	Inclusion of water treatment plants should be made obligatory by all new projects; Dumping of sewage and other human wastes as well as other raw organic wastes into the open waters should be discontinued
Environment Conservation Act of 1995 (Amendment 2000 & 2002)	
Section 12: Environmental Clearance Certificates (ECC)	Requires all industrial units or projects to obtain an ECC from the DoE prior to implementation
Environment Conservation Rules of 1997	
Section 7: Procedures for issuing ECC	Describes procedures and documentation requirements for obtaining ECC for different project category
Schedule 1	Classification of industrial units or projects based on location and impact on the environment
Schedule 3	Standards for ambient water quality and drinking water quality
Schedule 10	Standards for effluent from industrial units and projects
National Policy for Safe Water Supply and Sanitation of 1998	
	Provide safe water in urban, slum, squatter settlements. Setting tariffs, reducing non-revenue water.
East Bengal Embankment and Drainage Act, 1952	
	Concerning construction, maintenance, management, removal and control of embankment and water courses for the better drainage of lands and for their protection from floods, erosion, or other impacts by water
The Protection and Conservation of Fish Act, 1950	
	Concerning the protection and conservation of fish in Bangladesh
Water Supply and Sewerage Authority Ordinance, 1963	
	Concerning construction, improvement, expansion, operation, and maintenance of water and sewerage work and other facilities relating to environmental sanitation and for construction authority
Groundwater Management Ordinance, 1977	
	Regarding management of groundwater resources for drinking and agricultural purposes

Source: Modified, Environmental Policies, Rules & Regulations, DoE, 1992-1997

4.1.2.2 Other Acts and Regulations of Bangladesh

Titles of the relevant literature, Acts, and regulations were also reviewed and applied, where applicable, during the course of this process are listed below:

- Bangladesh Wildlife (Preservation) Order 1973 (Amended in 1994);
- The Environmental Court Act 2000 (Amendment 2002);
- The Forest Act, 1927 and the Forest (Amendment) Act 2000;
- Bangladesh Electricity Act 1910 and Regulations;
- Fifth Five Years Plan;
- National Energy Policy, 1995;
- River Dredging Conditions of BIWTA; and

4.1.2.3 International Conventions, Treaties, and Protocols

- The Convention on Biological Diversity,1992;
- The Convention on the Conservation of Migratory Species of Wild Animals, 1979

4.1.3 World Bank Environmental Requirements

The EMF for PSDSP will facilitate compliance with the World Bank's environmental safeguard policies and also with the policies, acts, and rules of the Government of Bangladesh. Ensuring the long-term sustainability of benefits from "EZ Subprojects" by adjusting interventions with the natural resource on which they are dependent. The main objectives of the EMF is " to outline a framework for environmental screening procedures and methodologies for the "EZ Subprojects" and guidelines for preparation of environmental management (mitigation, monitoring, and compensation) and reporting on the concept, design, construction, and operational stages of the project.

The Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable. The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01 - Environmental Assessment. This policy is considered to be the umbrella policy for the Bank's environmental "safeguard policies" which among others includes - Natural Habitats (OP 4.04), Pest Management (OP 4.09), Physical Cultural Resources (OP 4.11), Forests (OP 4.36), and Safety of Dams (OP 4.37). The Operational Policies (OPs) are the statement of policy objectives and operational principles including the roles and obligations of the Borrower and the Bank, whereas Bank Procedures (BP) are the mandatory procedures to be followed by the Borrower and the Bank.

4.1.3.1 OP/BP 4.01: Environmental Assessment

The Bank requires environmental assessment (EA) of projects proposed for Bank support to ensure that they are environmentally sound and sustainable, and thus to improve decision making. EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The borrower is responsible for carrying out the EA and the Bank advises the borrower on the Bank's EA requirements.

The Bank classifies the proposed project into three major categories, depending on the type, location, sensitivity, scale of the project, and the nature and magnitude of its potential environmental impacts. Projects with multiple components or with multiple subprojects (other than projects using FIs) are categorized according to the component with the most serious potentially adverse effects. Dual categories may not be used. However, the depth and breadth of EA and choice of EA instrument(s) for each component or each subproject is decided on the basis of its respective potential impacts and risks.

Category A: The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.

Category B: The proposed project's potentially adverse environmental impacts on human population or environmentally important areas - including wetlands, forests, grasslands, or other natural habitats- are less adverse than those of Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases, mitigation measures can be designed more readily than Category A projects.

Category C: The proposed project is likely to have minimal or no adverse environmental impacts.

4.1.3.2 OP/BP 4.04: Natural Habitats

The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank therefore supports the protection, maintenance and rehabilitation of natural habitats and their functions in its economic and sector work, project financing and policy dialogue. The Bank supports and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank promotes and supports natural habitat conservation and improved land use by financing projects designed to integrate into national and regional development the conservation of natural habitats and the maintenance of ecological functions. Furthermore, the Bank promotes the rehabilitation of degraded natural habitats. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

4.1.3.3 OP/BP 4.36: Forests

Forest is defined as an as an area of land of not less than 1.0 hectare with tree crown cover (or equivalent stocking level) of more than 10% that have trees with the potential to reach a minimum height of 2 meters at maturity *in situ*. A forest may consist of either closed forest formations, where trees of various sizes and undergrowth cover a high proportion of the ground, or open forest. However, the Bank's forests policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development. Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank also assists borrowers with the establishment and sustainable management of environmentally appropriate, socially beneficial and economically viable forest plantations to help meet growing demands for forest goods and services.

4.1.3.4 OP/BP 4.11: Physical Cultural Resources

Physical cultural resources are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Their cultural interest may be at the local, provincial, or national level, or within the international community. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development and as integral parts of a people's cultural identity and practices. The Bank assists countries in avoiding or mitigating adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigation measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements. The borrower addresses impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process. The following projects are classified during the environmental screening process as Category A or B and are subject to the provisions of this policy: (a) any project involving significant excavations, demolition, movement of earth, flooding, or other environmental changes; and (b) any project located in, or in the vicinity of, a physical cultural resources site recognized by the borrower. Projects specifically designed to support the management or conservation of physical cultural resources are individually reviewed and are normally classified as Category A or B. When the project is likely to have adverse impacts on physical cultural resources, the borrower identifies appropriate measures for avoiding or mitigating these impacts as part of the EA process. These measures may range from full site protection to selective mitigation, including salvage and documentation, in cases where a portion or all of the physical cultural resources may be lost.

The above WB safeguard documents were reviewed in preparing this IEE for the proposed Anwara Economic Zone Project.

4.1.4 Description of the Project

4.1.4.1 Overview

The initiative of the Bangladesh Government for establishing economic zones in all potential areas, including backward and underdeveloped regions, and development, operation, management, and control thereof, including the matters ancillary thereto, focuses upon encouraging rapid economic development through expansion and diversification of industry, employment, production, and export. Likewise, the Bangladesh Export Processing Zones Authority (BEPZA) is expected to stimulate rapid economic growth of the country, particularly through industrialization. The government has adopted an 'Open Door Policy' to attract local and foreign investment to Bangladesh. The BEPZA is the official organ of the government to promote, attract, and facilitate foreign investment in the Export Processing Zones. Similarly, the primary objectives of an EZ are to provide special areas where potential investors would find a congenial investment climate, free from cumbersome procedures. Industrial agglomeration suggested in the EZ includes a coal power plant, jetty and stockyard, electric furnace, cement manufacturing, steel mill, etc.

4.1.4.2 Project Location

Anwara EZ is located in Gahira Mouza of Anwara Upazila of Chittagong District. It is at the mouth of the Sangu River. The following figure shows the location of Anwara EZ in Bangladesh.

Figure 4.1.3.2-1: Location of Anwara EZ

4.1.5 Objectives of the Project

The project's objectives are as follows: (a) to establish central treatment plant and treated wastewater reuse facilities in the Economic Zone, and (b) to strengthen regulation, enforcement, and environmental monitoring of the EZs to promote pollution control, to improve public wellbeing in the neighbouring areas, and to promote investments and capability in the planning of BEZA.

4.1.6 Description of the Project

The Anwara EZ site is located on the mouth of the Sangu River facing the Bay of Bengal on the west. The closest national highway (Chittagong – Cox's Bazar Highway) is located at a distance of 23 km from the site (closest point), the district headquarters at 30 km and Chittagong town at about 28 km. Anwara Upazila is located at about 20 km from the site. Currently the access road is about 12 -15 feet wide with many zigzags connecting the site and 4-wheel drive vehicle recommended for access. There is no movement of heavy vehicles to the site. When the new access is constructed, it shall connect to the National Highway.

The summary of the project components are given below. Detail can be found in Chapter 3 and Annex-3.

1) Main Functions

- Focal Point Main Gate
- One-Stop Service Centre
- Administration Building
- Customs area
- Green Landscape: Along the main road and some green zones in the EZ
- Factory Lots: 1 hectare size plots with and two large shipbuilding yards (total 250 hectares)
- 250MW Power Plant with Coal Stock Yard/Jetty - Imported coal will be used.
- Housing Zone: Total area 7.57 acres (3.07 hectares)
- Commercial Zone: 7.99 acres (3.23 hectares)

2) On-Site Infrastructure

- Road: Major road width 33 m, length 1,559 m, and minor road width 19.5 m; length 15,298 m. Utility lines will run along the road.
- Super Dike: 7 meter high dike with bank protection by concrete blocks and piling.
- Retention Pond: For rainwater harvesting.
- Water Supply Plant: Capacity 40,000 m^3/day. Source: sweet water from 26 Km upstream of Sangu River. Supply water standards will be strictly maintained.
- Waste Water Treatment Plant: Capacity 32,000 m^3/day. Waste water standard will be strictly maintained.
- Others: Telecommunications, electrical connection, etc.

3) Off-Site Infrastructure

- Road Connectivity: About 7 Km offsite road on top of super dike. The dike will protect the whole Anwara Upazila from cyclones and tidal surges.
- River intake for water supply: Water on Sangu River near site is saline. Sweet water from this river will be collected from 26 Km upstream.
- Electrical Connection: 132KV electrical connection from Julda substation at 10 Km from the site.

- Telecommunications: 36 Km new offsite FOC connection along the highway from Chittagong BTCL Headquarter.

4) Utility Requirement

- Power: 105.68 MW/day
- Water: 37,108.51 m^3/day

The following figure shows the aerial view of the proposed site, and Figure 4.1.6-2 shows the master plan of the Anwara Economic Zone.

Figure 4.1.6-1: Anwara Site, Google earth map

Figure 4.1.6-2: Anwara Site: Existing Condition

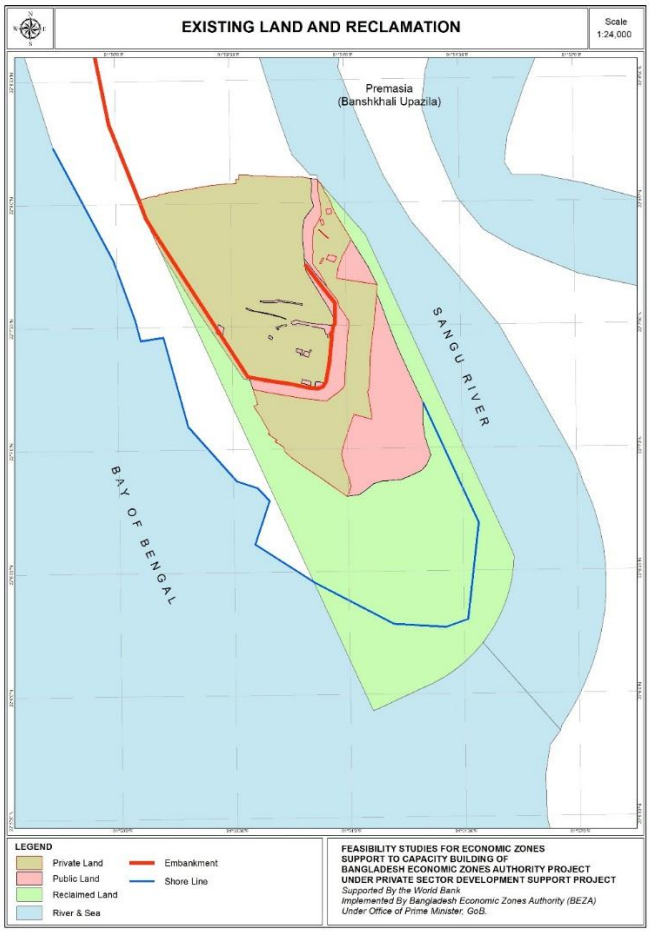
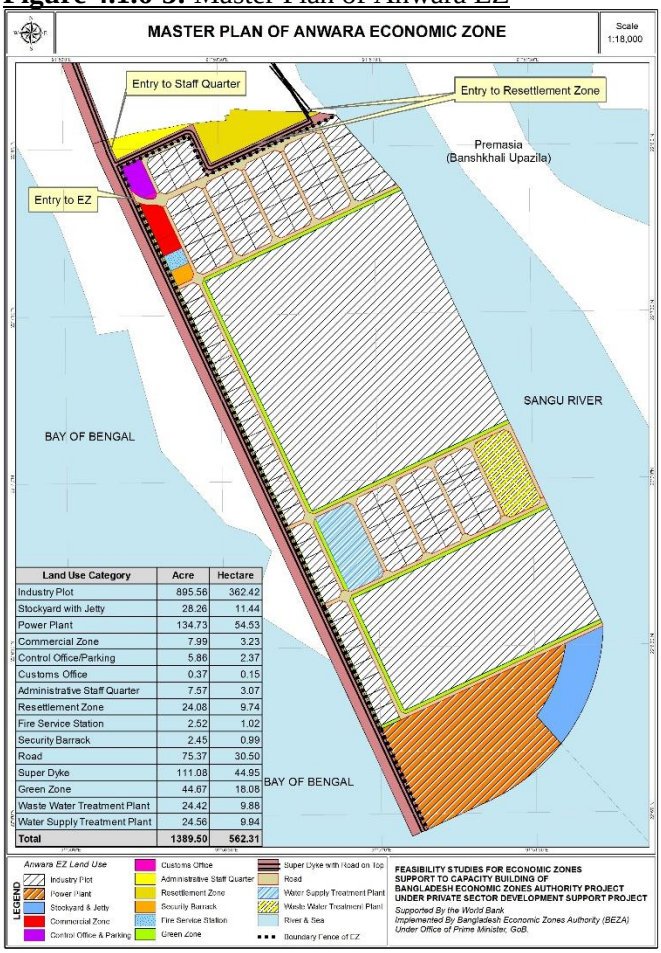


Figure 4.1.6-3: Master Plan of Anwara EZ



4.1.7 Methodology

This IEE report prepared during the period has considered review of data from the following disciplines:

- Engineering design
- Surface and groundwater
- Aquatic and terrestrial ecology
- Public participation

Additionally, this IEE is based on field reconnaissance, coordination with BEZA, BEPZA and stakeholder consultations. Thus, the following activities were undertaken during the preparation of this report:

1. Review of initial and secondary data for the environmental component of the project;
2. Meeting with concerned agencies;
3. Reconnaissance field visit;
4. Public consultation within the project area;
5. Analysis and presentation;
6. Preparation of the review Report; and
7. Feedback and Quality check.

4.1.7.1 Stakeholders' Engagement

Participation of local people and other stakeholders has now been recognized as a key element to ensure sustainable results of both environment and development projects. Participation enables different socioeconomic interest groups in an area to develop their capabilities and to play a dynamic role in developing initiatives. It also strengthens the commitment of a wide cross-section of stakeholders, such as the Association of Export-Oriented Shipbuilding Industries of Bangladesh, government employees, professional groups, and voluntary groups including NGOs and community-based organizations, by giving them an opportunity to share responsibility in key decisions. Finally, it enables project planners to make use of local knowledge of the environment, of specific land and water regimes and land and water use by different socio-economic groups.

Initial public consultations were conducted during the field visit in Anwara. Peoples concerns basically focused on the construction impacts, land acquisition, and resettlement issues which will be addressed during detailed EIA if the client approves for the study. However, consultation outcomes are expressed in the following table with signature in Annex-5.

Table 4.1.7.1-1: Public Opinion

Issues	Participants' Opinion, Comments and Suggestions	Response to Questions and Concerns	Action Points during Detailed Design of EZ
General perception about the project and the awareness about the proposed project.	Most of the participants are in favour of the project	N/A	The project site is not required to be relocated at this stage
Support of local people for the proposed project?	Almost everybody said that they will support the project and advised the Consultant to take precautions in the environmental mitigation to avoid wetlands, flora, and religiously sensitive locations.	Explained possible mitigation measures	N/A

Public consultation at Anwara EZ site

World Bank and Department of Environments' Environmental Considerations for Category A and Category B projects require the conduct of public consultation during the project preparation stage. Initial public consultations were conducted involving stakeholders according to WB Environmental

Guidelines. The consultation also involved with participants representing local people, farmers, and rickshaw-van pullers.

4.1.7.2 Secondary Baseline Data Collection

Literature Review

During this stage, further review was conducted of the physical, ecological and legal issues relevant to the Project. The review of secondary sources and field reconnaissance was used to prepare a qualitative assessment of the physical environment, biodiversity and conservation significance of the Project site. This preliminary literature review assists in identifying the baseline situation, which ultimately forms the basis for the impact assessment component of the Rapid Environmental Assessment (REA). The following activities have been undertaken:

- Data were collected from secondary sources comprising ecological information, including habitats, ecosystems, flora, fauna, vertebrates, fish, and invertebrates for the prospective site's terrestrial and fresh water environments (Ref: Interim environmental report);
- An appraisal was made of all legislation having direct and indirect relevance to the environmental conditions and biodiversity within the study areas;
- Information was collected on current local conservation management practices; and,
- An information gap analysis and identification of the areas where further field work is required to be undertaken was completed.

4.1.8 Description of the Environment

4.1.8.1 Overview

The project area is located in Gahira Mouza of Anwara Upazila under Chittagong District. The ecosystem of Anwara proposed EZ site is principally driven by seasonal hydraulics. Currently, the candidate site is low lying fallow land. During the rainy season, most of the area is inundated with water, as such, flooding and river bank erosion are the main natural hazards of the region. Cyclonic surges in the southern coastal area are also natural risks with wind effects of cyclones also affecting areas further inland. The region is also at medium risk from seismic events as it lies at the junction of three tectonic plates (Annex 5).

4.1.8.2 Topography and Soils

The north-west of the Chittagong Hills is a broad plain, cut by rivers draining into the Bay of Bengal that rise to a final chain of low coastal hills, mostly below 200 metres, that attain a maximum elevation of 350 meters. West of these hills is a narrow, wet coastal plain located between the cities of Chittagong to the north and Cox's Bazar to the south. The alluvial soils in the Anwara region's coastal plain are generally fertile and are enriched with heavy silt deposits carried downstream during the rainy season.

Further, the project area is a flat and almost level alluvial plain formed by the Sangu alluvial deposits. The land slopes from the north-west to south-east. Approximate elevation of the site and its area of influence vary from 10 to 50 metres (m) above sea level. The significant geological feature of the project area is the alluvium deposit. The depth of such deposits may vary up to several thousand meters and are of Pleistocene (50,000 years) to Recent (few hundred years) origin.

The soil composition consists of sandy, silt loam/fine sand and calcareous/fine textured respectively. The soils are calcareous alluvial loam fine to medium textured homogenized and well drained. These are highly fertile and productive. Moisture content in the soils is very high. The soils fall in an erinaceous zone. In view of the said criteria the project area soils are suitable for the construction of

the Economic Zone. However, their engineering properties can further be improved by application of the required treatments and practices.

Currently there are about 700 rivers in Bangladesh that can be divided into five major water networks – the Jamuna-Brahmaputra, the Padma-Ganges, the Suma-Meghna, the Padma-Meghna, the Sangu and Karnaphuli. The rivers are the main water source in the country and are used for drinking, fishing, transport, and cultivation. There is also a hydroelectric power plant on the Karnaphuli Dam so the water is used to generate a portion of the country's electricity. While the annual flooding of these rivers does hinder development to some extent, it also brings with it rich silt and clay deposits that replenish the soil and help to keep it fertile.

In general, the topography varies in altitude from the Lalmai Hills (30msl) and the base of the Tripura Hills (7–8 MSL) to the bank of the Meghna (1–2 MSL). The floodplain varies between 1–5 MSL. Tidal effects along the coast are generally up to 2 m above mean sea level, on the floodplain are generally masked by depth of river flooding.

4.1.8.3 Climate

Rainfall

In the Chittagong area, the regional average of 2,735 mm of rainfall per year, or 227.9 mm per month has been recorded by the Meteorological Department. In an average year, there are 135 days with more than 0.1 mm of rainfall, or 11.3 days with a quantity of rain, per month. The driest weather is in January experiencing an average of 6 mm of rainfall per day. The wettest weather is in July when an average of 598 mm of rain falls from the sky daily.

Temperature

The annual mean temperature in Chittagong, is fairly hot at 25.1 degrees Celsius. Mean monthly temperatures have a variation of 9°C which is a very low range. The range/variation of daily average temperatures is 8.8°C. The hottest month, May, has a mean temperature of 28°C. In the coolest month, January, the mean temperature cools down to a balmy 19°C.

Wind

The wind speeds in the region average around 3.2 Km/hour with a maximum of 67 Km/hour and a minimum of 1.3 Km/hour.

Sunshine

On average, the region experiences 6.5 hours of sunshine each day. The longest stretch of continuous sunshine hours occurs in the days from November to February - the coolest and lowest in humidity. The least amount of sunshine occurs in the months between June and September, when the cloud cover is high.

Relative Humidity

The average relative humidity in the region is 78%.

Evapo-transpiration

Evapo-transpiration reaches its maximum level in April when temperature, sunshine, and wind are all at, or close to, their maximum levels for the year. Potential evapo-transpiration data for 4 stations of the Region are presented in the following table.

Table 4.1.6.2-1: Monthly Potential Evapo-transpiration (mm)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Chandpur	68	82	129	146	139	107	109	112	103	101	77	62	1,235
Comilla	71	89	138	152	144	120	118	122	111	103	81	64	1,314
Feni	72	89	130	143	145	115	113	117	110	106	81	68	1,288
Maijdee Court	67	83	125	145	141	106	106	115	104	101	78	66	1,238

Source: NWRD, WARPO (2000) from BWDB data

4.1.8.4 Water Resources

The project area is characterized by canals and distributaries. Irrigation is mostly done from canal water and also by adding tube well water. Water is available for construction activities. Water is generally of a saline nature. The depth of the water table varies from a few metres to 20 metres. The ground water is not fit for drinking. There are visible signs of water logging pockets in the project area. Soil salinity is observed in many patches.

The Sangu River is located adjacent to the EZ project site, has its source at 21°13´N and 92°37´E in the North Arakan Hills, which form the boundary between Arakan and the Chittagong Hill Tracts. It follows a northerly circuitous course in the Hill Tracts up to Bandarban.

It enters the district from the east and flows west across the district and finally falls into the Bay of Bengal at the end of a course of 270 Km (173 Km within Bangladesh territory) at 22°6´N and 91°51´E about 16.09 Km south of the mouth of the Karnaphuli River.

4.1.8.5 Water Quality

The project is surrounded by the river on one side and the Bay on the other, and, is thoroughly impacted by the resulting riparian environment in which is exists. There are small and medium ponds, which are used for multiple purposes. Some ponds are located inside the EZ site adjacent to human settlements. Ground and river water are saline. People usually use boiled pond water and harvested water for drinking purposes. There is scarcity of drinking water in the dry season consequently people suffer from lack of potable water as pond water level declines.

4.1.8.6 Flooding and Drainage

The selected area falls under the plain land type. According to the information collected through focus group discussions (FGD), the area is not affected in normal floods. But heavy rainfall and sometimes high tides can cause water stagnation in the area for some time. Drainage is good, as water drains out quickly through the Sangu River and Gahira coast line and there is no water logging problem.

In many places along the coast of this region brackish/saline water of marine origin renders the groundwater unsuitable for irrigation and potable water supply. In addition, extensive areas are found in the central and western parts of the region where the groundwater salinity exceeds 1,000 μ s/cm and 2,000–8,000 μ s/cm locally[223]. Groundwater, with EC values exceeding 2,000 μ s/cm, is unsuitable for the irrigation of rice.

Several different types of industries are situated in the region; the most notable is KAFCO (Karnaphuli Fertilizer Company). Most of the industries are agriculture-related, i.e. engineering, chemical, and textile. Not much is known about water pollution because of the limited sampling in the region. However, some trees located inside the EZ will require cutting.

[223] Chapter Vol-3 of Vol-4; FAP-5, WARPO, 1992-1994

4.1.8.7 Archaeology and Cultural Site

Archaeological heritage and relics sites are Mohsin Awlia's Dargah; Monu Miah's Cannon (now preserved in National Museum). Religious institutions include Mosque 342, Tomb 20, Temple 23 and Pagoda 7, some are inside the EZ, no permission is required for if these are close to EZ. There are no archaeological sites adjacent to the EZ project area.

4.1.9 Screening Environmental Impacts & Mitigation Measures

4.1.9.1 Soils and Geology

During the construction period, the main impacts on the land will be from the excavation of soil from different locations to raise the EZ Project site and associated land and access road development. Possible impacts include the loss of top soil, damage to local existing roads during transportation of construction material and equipment, erosion of stockpiles during rain and re-suspension of dust during the dry weather. The construction process will potentially remove vegetation and disturb the upper soil layer making it more susceptible to erosion and increased runoff. However, the areas that will be subject to disturbance will be very small and so the potential impacts associated with the development of the EZ land are not considered significant, provided basic environmental management measures are implemented.

During the operational period, it is possible that contamination of soil could occur from spillage of hazardous materials and wastes from the different industrial operations in the EZ premises. However the impact of such an event would be much localized. In order to mitigate against such an event, the following measures will be implemented - all hazardous wastes and hazardous materials, like lubricating oil, solvents and fuels, shall be stored within concrete or brick buildings properly designed for such storage facilities and oil spill clean-up materials (sorbent pads, loose sorbent material, etc.) will be made available. It will be ensured that the industrial operators are trained in repair and maintenance of machines and equipment and also on how to clean up the spill and dispose of contaminated materials using treatment technologies.

Likewise, the potential impacts associated with geology may include the loss of and damage to geological, paleontological, and physiographic features of the geological environment. Seismicity related potential impacts would include any change to the frequency or severity of earthquakes or impacts to earthquake preparedness and response capabilities.

Considering the Project features, there are no specific potential impacts related to geology and seismicity that have been identified as having the potential to result from the site establishment stage of the Project and subsequent EZ Industrial set up.

4.1.9.2 Air Quality

During construction, air quality is likely to be degraded by initial earth work for excavation of soils and subsequent dumping to raise the EZ site, exhaust emissions from the operation of construction machinery; fugitive emissions from aggregate and dust generated from earth works, approach roads, exposed soils and material stock piles. Air quality is expected to be less impacted by any activity during operations by the industrial operators subject to compliance of EMP and DoE Environmental Regulations.

In order to mitigate these, the following shall be implemented: (i) Construction equipment will be maintained to a good standard and idling of engines discouraged; (ii) Machinery causing excessive pollution (e.g., visible smoke) will be banned from construction sites, and, (iii) Spraying of water on

the soil excavation and dumping site and access roads if dust is being generated, and, (iv) the covering of loads with tarpaulins.

4.1.9.3 Noise and Vibration

The noise and vibration sources will exist for the EZ Site construction phase only as operation of heavy machinery (bulldozer, excavator, dump truck, loader, roller, asphalt paver, water tanker, concrete mixer, car/ passenger vehicle movement, etc.) generates high noise levels. To prevent noise and vibration, work will be restricted to between 6 am and 9pm.Additional management and mitigation measures should be considered as: (a) Noise generated during the construction should aim to comply with the noise standards of the Government of Bangladesh; (b) Establish a code of conduct for field personnel to reduce the potential for impacts to nearby communities, such as avoidable noise generation; and, (c) Undertake noise monitoring at the nearest sensitive receivers if complaints about noise are received, etc.

4.1.9.4 Surface Water and Hydrology

Water is an essential resource which sustains all life on earth. Surface water is made up of standing water such as ponds, lakes and dams, and watercourses such as streams, rivers and wetlands. Hydrology is the study of precipitation, evapo-transpiration, and the interaction between surface water, soil water, and groundwater.

Potential impacts to surface water and hydrological systems due to EZ developments are usually centred on changes to the water quality and water quantity of the Sangu River and associated networks in the project area of influence. Potential water quality impacts may result from changes to the physical and chemical composition, while potential water quantity impacts may result from changes to the storage and flow of water. This section identifies the potential impacts from the Project on surface water and hydrology.

There is some possibility that the following impacts related to surface water could result from the site establishment stage of the Project:

- The de-watering of waterlogged dredged materials may contribute to increased turbidity in the Sangu River (If dredged material is used for EZ land development);
- Dredging operations may disturb sediments and contribute to the volume of turbidity in the Sangu River;
- There is the potential that vehicle movement and land development could lead to erosion and sedimentation;
- Accidental spillage, mismanagement or leaks of hazardous materials (such as fuels, oils and solvents) may pollute surface waters;
- Waste generated by the accommodation of personnel living and working on EZ site could pollute surface waters if improperly managed;
- Dredged areas may present changes in bathymetry promoting changes to the velocities of flows and erosion / accretion cycles (If dredged material is used for EZ land development);
- Drainage preferred flow paths may be modified by the construction of the raised EZ site;
- Construction of the raised EZ pad may impact flooding and ponding conditions in the local area.

Management and mitigation measures include the following:

- Major earthworks should be planned within the dry season to reduce the potential for runoff and sedimentation of adjacent waterways,

- A progressive sediment and erosion control plan should be developed prior to construction (or prior to disturbance of soils) and subsequently implemented and maintained throughout construction,
- Storage stockpiles and dewatering stockpiles should only be placed in designated areas,
- Regularly check and maintain erosion and sediment controls and during the Project construction phase.

4.1.9.5 Flora

Flora relates to all aquatic and terrestrial based plants. Plants are vital for ecosystem function and are used as resources for human food, shelter, clothing and other products. Developments often have the potential to impact flora. These potential impacts may be felt at several different levels including individuals, communities, populations, species, ecosystems, or habitats.

Potential impacts to flora could include a reduction in diversity, change in species composition and the destruction of individuals, species or communities or, changes to species population distributions or health. This section identifies the potential impacts to flora that may occur as a result of the Project.

The majority of impacts to local flora species and communities will occur within the site establishment phase of the project. In summary, potential impacts could include:

- Dredging could impact aquatic plants due to increased turbidity and sediments in the Sangu River water (If dredged material is used for EZ land development);
- Agricultural plants are likely to be removed as a result of the formation of the EZ raised pad, stockpile areas, roads and tracks; and,
- Existing roadside vegetation may be lost if new or existing roads need to be constructed and widened or improved.

Agricultural land

As agricultural lands cover a large percentage of the EZ study area, the majority of potential impacts on flora are likely to occur in this ecosystem. The most important impact will be the land use change of grazing or agricultural land to a raised pad area. Agricultural areas provide little habitat for local flora species and thus, this change will not constitute a significant loss to potential habitat for plant species.

Village Forest and Plantation

Removal of native and significant vegetation within and around the EZ raised pad site, connecting roads and other possible service points has the potential to be the most significant impact on terrestrial flora. The significance of the potential impact depends largely on the species composition to be removed.

Management and mitigation measures include:

- Stabilization, e.g. re-vegetation/compaction of disturbed areas, should be undertaken as soon as possible following works.
- Stabilization, e.g. any re-vegetation of disturbed areas, should be staged where possible.

4.1.9.6 Fauna

At the time of construction, potential impacts are destruction of habitat from the trimming or cutting of the trees in the vicinity, disturbance of individual animals, localized decline in the quality of habitat (removal of original plants) and poaching of edible animals and birds by construction workers using equipment and machines. During the operational years the most common impact is the reduction of faunal habitats with infrastructure development and associated industrial activities.

Management measures include, development of alternative wildlife habitat sites by plantation of native flora leading to support for a wide range of species including birds.

4.1.9.7 Other Impacts and Mitigation

Other Impacts and Mitigation measures are presented in **Annex 5** as anticipated environmental impacts, corresponding mitigation measures related to the pre-construction (pertaining to project location and design), construction and operation of the Anwara EZ project as well as the responsible entity for implementation.

Potential environmental impacts have been assessed according to magnitude (I-insignificant, M-moderate or S-significant) and impact duration (T-temporary or P-permanent) and are presented in a manner that shows magnitude and duration of a particular impact, e.g., I/T means the impact is insignificant and is temporary in nature.

4.1.10 Institutional Requirement for Environmental Management

4.1.10.1 Institutional Framework

The Environmental Management Plan (EMP) was prepared to provide an outline of measures likely to be needed to mitigate the potential adverse environmental and social impacts due to proposed EZ development project. A detailed EMP covering all significant environmental and socio-economic issues would be developed as part of a full scale Environmental Impact Assessment (EIA). This EMP will form the primary mechanism for management, accountability, and reporting on the project's social and environmental performance.

This report has been based upon the project description as provided by BEZA at the time of initial project commencement. In the event that any details of the project's implementation are changed it will be necessary to appropriately update this plan.

Project Management Office (PMO): The Project's management will comprise an executive committee, an inter-agency working group, a Project Management Organization in the BEZA (BEZA-Project Director) and PIU in Anwara or Chittagong.

The Executing Agency (EA), PMO, in association with Prime Minister's Office will be responsible for the overall technical supervision and execution of the project; the staffing of PMO will include expertise in project management, civil engineering, institution and finance, environment, socioeconomic, land acquisition and resettlement aspects. The mitigation measures that are incorporated into the design will be verified by the PMO before providing technical approvals. The mitigation measures that form part of the Contract Documents will also be verified by Project Consultant (JDI-Maxwell, Sheltech) before getting the contract signed between the PMO and the contractor.

The mitigation measures identified in the IEE will be incorporated into the project cycle. Environmental controls pertaining to design and location will be incorporated into the detailed design by the project construction supervision consultant (CSC). Mitigation measures during construction stage shall form part of the Contract Documents and will be implemented by the contractor.

Project Implementation Unit (BEZA-PIU): In Anwara or Chittagong, a PIU will be established as soon as the Executing Agency (EA) enters into a project agreement with the funding agency (GoB, WB). The PIU will be headed by a Chief Engineer and will comprise the following sections: (i) Construction Section, (ii) Environment and Social Development Section, (iii) Operations and Maintenance Section and (iv) the Project Accounts Section. The PIU will be located within the Chittagong District office and with the assistance of CSC, will be responsible for construction supervision, local level procurement activities, contracting local contractors and implement the engineering and environmental control.

The responsibilities of the PIU with support from project supervision consultants, shall include (i) construction supervision and management; (ii) assessment of works carried out by the contractor; and (iii) preparation of quarterly reports on the implementation of environmental mitigation measures and monitoring plan at the construction stage.

The contractor will provide BEZA (PIU) with monthly reports on the implementation of mitigation measures. The reports prepared by the contractor along with quarterly monitoring reports to be prepared by the Project Consultant will be consolidated and submitted to PIU for review.

During the operation stage of the Project, the responsibility of monitoring environmental performance of Project components should be delegated to either the external monitoring consultant, or BEZA in association with O&M Contractor and Consultants will undertake routine and random monitoring of specific environmental plans addressed in this IEE.

4.1.11 Environmental Management and Monitoring Plan

4.1.11.1Environmental Management

The Executing Agency of the Project is BEZA-PMO and the Prime Minister's Office and thus has overall responsibility for ensuring that all standards and procedures are followed during construction activities. BEZA also has responsibility for ensuring that all monitoring requirements, including progress reporting are fulfilled. The Construction Contractor under Special Conditions of Contract of GoB will be responsible for construction of EZ site and associated civil works. On completion of construction, the O&M Contractor will be responsible jointly with the BEZA for maintenance of the EZ establishment and all project management aspects, including oversight of environmental pollution, mitigation and monitoring (subject to approval of additional O&M Contract).

4.1.11.2Environmental Monitoring Program

Environmental monitoring is a very important aspect of environmental management during construction and operation stages of the project to safeguard the protection of the environment. An environmental monitoring program for the construction and operation stage of the Project will be undertaken to monitor environmental impacts of the Project, to determine conditions requiring remedial measures and to assess compliance with national and WB environmental safeguard policies. The contractor will be responsible for implementing the monitoring program and preparation of monthly progress reports regarding implementation. The Project Consultant will undertake the environmental monitoring program during the construction stage and will also monitor compliance of the contractor with the implementation of required mitigation measures and contract provisions pertaining to environmental aspects.

The following activities will also be carried out and cross-checked in association with the implementation of the monitoring program:

- Pre-construction: updating of EMP during detailed design phase and inclusion of environmental clauses in bid and contract documents;
- Construction: environmental performance of contractors with regard to control measures pertaining to erosion, material storage, location of work site, noise, waste disposal, traffic management, workers' safety, etc.
- Operation: O&M practices and environmental effects including soil erosion, soil contamination, surface water, and groundwater quality.

(Further detailed in the following table and also in Annex 5)

Table 4.1.9.2-1: Environmental Monitoring Program

Impact	Location	Means of Monitoring	Frequency of Monitoring
Construction Phase			
Pollution of water courses and flow obstruction due to improper stockpiling of excavation spoils and construction materials	Throughout project raised area (and its influence area)	Site inspection	Regular Monitoring
Flooding or accumulation of construction run-off due to inadequate drainage and improper stockpiling of excavation spoils and construction materials	Throughout project area	Site inspection	Quarterly
Excessive dust emission	Throughout project area	Site inspection, interviews/ consultation with adjacent households/occupants of nearby schools and other structures	Regular site specific instrumental monitoring
Excessive noise emission	Throughout project area	Site inspection, Interviews/ consultation with adjacent households/occupants of nearby schools and other structures	Quarterly
Health and safety hazards (workers and community) associated with construction activities	Throughout project area	Site inspection, interviews with workers and communities	Quarterly
Pollution due to improper disposal of wastes and excavation spoils	Treated water	Measurement of pH, iron, manganese etc.	Quarterly
Operational Phase			
Health hazards due to distribution of unsafe water	Treated water	Measurement of pH, iron, manganese etc.	Quarterly
Pollution due to improper disposal of sludge from industrial establishments	Disposal site, Receiving body of water for supernatant water drained from the sludge tank	Site inspection; Interviews with pump operator, staff and communities; Measurement of total suspended solids	Quarterly
Odour emission and fly/vermin proliferation	Compost/sludge pit	Site inspection	Weekly
Pollution due to sewage overflows from filled-up septic tanks/pit latrines and bypassing of soak pits	Sanitation facilities (e.g., public and community latrines) throughout the EZ area	Site inspection	Monthly

Source: Environmental Analysis, October, 2013

The Construction Supervision Consultant (CSC) in cooperation with the PIU during project implementation will be required to develop an environmental auditing protocol for the construction period, formulate a detailed monitoring and management plan, supervise the environmental monitoring regularly and submit quarterly reports based on the monitoring data and laboratory analysis. The PIU shall submit the following environmental reporting documentation to the GoB and the funding agency (World Bank):

a) Baseline Monitoring Report
b) Bi-annual Environmental Monitoring Reports
c) Project Completion Environmental Monitoring Report: Three years after completion

4.1.12 Conclusions

Findings of the IEE reveal that no major negative environmental impacts are likely to occur due to construction and operation of the Economic Zone Project. The potential negative environmental impacts associated with the construction activities are relatively minor in comparison to the significant environmental and economic benefits resulting from project operation. The implementation of the EMP which details with mitigation measures, implementation responsibilities, and monitoring plan as defined in the IEE will result to minimal adverse impacts.

During construction, the contractor will implement the mitigation measures identified in the IEE while project consultants will conduct regular monitoring to ensure contractor's compliance with applicable provisions of the EMP. The project consultant will also assist the PIU in preparing contractual documents so that bidding documents, bills of quantity and other contractual obligations of the contractor clearly identify environmental responsibilities and describe penalties for non-compliance.

In conclusion, the Project will have overall beneficial impacts and will have minor negative impacts, which will be carefully monitored and adequately mitigated. As such, the completion of this IEE fully meets the Government of Bangladesh and Word Bank standards at this stage.

However, it is recommended to undertake a detailed EIA study considering alternative EZ site options, undertake seasonal data collection by a multidisciplinary team (wildlife expert, limnologists, fisheries biologist, terrestrial and aquatic ecologist, etc.) to precisely record the baseline situation, and refine designs and specifications necessary for the parameters.

The tentative ToR for the international environmental specialist and the ToR for the local environment specialist to be employed by the Project Consultant are as follows:

Environmental Training Specialist – International

The proposed ToR for the training consultant is as follows:

(i) review prevailing DoE and WB regulations and guidelines governing the assessment and management and mitigation of environmental impacts of EZ project;
(ii) identify the procedures and tasks required to be performed by BEZA to meet the requirements of these regulations and guidelines;
(iii) review the skills of relevant BEZA officials and personnel and assess the need for training to establish the capability to meet requirements for preparing environmental assessments, environmental monitoring and implementation of mitigation measures of EZ and associated infrastructure development projects;
(iv) prepare a short-term staff training plan and associated materials to meet immediate needs;
(v) undertake training workshops that will include the following topics:

- Environmental assessment requirements of GoB EZ Projects;
- WB requirements and procedures on project cycle, project categorization, IEE/EIA process, preparation of summary IEEs/EIAs, including formats and reporting requirements;
- Assessment of environmental impacts;
- Identification of mitigation measures;
- EMP formulation, implementation and monitoring;
- Review of IEE/EIA/ reports to comply with WB requirements;
- Incorporation of mitigating measures in the project design and contracts.

(vi) evaluate the effectiveness of the training, measuring improvements in attitudes and skills achieved.

Environment Specialist – Local

Below is the proposed ToR for the environment specialist to be employed by the BEZA during the construction stage:

(i) develop an environmental auditing protocol for the construction period;
(ii) conduct quarterly monitoring (through site inspection, review of the contractor's monthly reports, review of related documents and interviews/consultations with village people and community, PIU staff, on-site workers/employees, etc.) of the contractor's performance regarding implementation of mitigation measures;
(iii) based on the monitored findings, recommend additional mitigation measures, as necessary;
(iv) in close coordination with the PIU, prepare and submit monthly and quarterly monitoring reports;
(v) assist the international environment specialist and in the needs assessment, preparation of training materials, as well as coordination and conduct of training.

Thus, the EIA is intended to include a wide range of Important Environmental Components' (IECs') as:

(i) Identification of Impacts (IECs'), Quantification of Impacts and Valuation of Impacts to ensure appropriate monitoring for Project sustainability.
(ii) Increase and ensure the physical safety of proposed Anwara EZ Site combined with social security of the inhabitants of the study area;
(iii) Enhance and strengthen operational knowledge of hydraulic and morphological processes in the Sangu River, Karnaphuli River, lower Meghna estuary and Bay of Bengal;
(iv) Find suitable land reclamation and bank protection methods;
(v) Further explore on assessment of the physical behavior of the Sangu River and dynamic morphological processes along the estuary;
(vi) Generate reliable data and further analyze to serve as a supplement to results and data from other sources, such as the Institute of Water Modelling, BWDB, BIWTA, and Department of Meteorology, as well as analysis of time series satellite imagery, and historical data, notably from the Land Reclamation Project and the Cyclone Shelter Preparatory Study.
(vii) Other existing and proposed projects and studies in the area of influence of the Anwara EZ, such as Coal based Power Plant. Annex - 5 highlights the impact of such establishment

Likewise, detailed monitoring including management training procedures and costs will be presented in the EIA.

4.2 Social, Gender and Resettlement Review

4.2.1 Introduction

Social and gender aspects and resettlement issues are crucial in the planning and implementation of any development project. On the one hand, EZs require land acquisition which will cause loss of property, homes, and livelihood sources and on the other hand they will provide significant opportunities for economic activities, commerce and trade. These are likely to have an impact on landownership, poverty issues, food security, economic status, social status and gender relations. The social and gender aspects and the resettlement issues presented here, cover the impact of the proposed EZ on the EZ itself and on adjacent areas. These are based on the current socio-economic scenario of the locality and take into account whether the proposed project is going to affect lives, livelihoods, structures, institutions, historic sites, ethnic and religious minority people and resettlement matters of the displaced population for the proposed EZ.

4.2.2 Methodology

- Review of relevant documents and data including World Bank policies related to social, gender and resettlement aspects and the Bangladesh Government Acts.
- Meeting with concerned agencies.
- Reconnaissance field visit.
- Public consultation within the project area and adjacent areas.
- Preparation of the review report including secondary and primary data and incorporation of feedback.

4.2.2.1 Secondary Data Collection and Literature Review

The literature review is carried out to identify the current socio-economic scenario of the EZ and adjacent areas and the Project Affected People (PAP). This will provide the basis in formulation of the RAP (Resettlement Action Plan). However during the feasibility stage, a further review will be conducted on social, economic and legal issues relevant to the project.

The following activities have been undertaken:

- Data were collected from secondary sources comprising demographic composition, occupational status and sources of livelihood, educational status, household structures, and access to basic physical facilities.
- An assessment of all legislation including World Bank Policies and those of the Bangladesh Governmentwas done.
- A list of social, cultural, religious and academic institutions and sites was done.
- An information gap analysis and identification of the areas where further field work was done.

4.2.2.2 World Bank Policies and Acts and Regulations of the Bangladesh Government

The World Bank's environmental and social safeguard policies: The World Bank's environmental and social safeguard policies were analysed. These are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for World Bank and borrower staff in the identification, preparation and implementation of programs and projects. Safeguard policies have often provided a platform for the participation of stakeholders in project

design and have been an important instrument for building ownership among local populations. The following policies and legislation were reviewed:

- World Bank OP 4.12 Requirements for Involuntary resettlement
- World Bank Gender Policy: OP 4.20 - Gender and Development (Revised March 2012)
- Specific Funding Requirement of the World Bank Policy OP 4.10.
- World Bank policy on Physical and Cultural resources: OP4.11
- Bangladesh Government Acquisition and Requisition of Immovable Property Ordinance, 1982

4.2.2.3 Public Consultation in Project Area and Adjacent Areas

A participatory approach is an essential part of projects dealing with development in order to ensure sustainability. Participation of local people and other stakeholders enables different socio-economic interest groups in enhancing their capabilities to play an effective role in development initiatives. It also ensures commitment and a sense of ownership of various stakeholders beyond local people and direct project beneficiaries. Government agencies, people's representatives, professional groups and voluntary groups including NGOs and community-based organizations, could be actively engaged to share responsibility in key decisions. It also enriches project planners with local/indigenous knowledge.

Field visit to the Anwara EZ:

Meetings were held with the ADC at the Chittagong District and Anwara UNO and other government officials, Upazila chairman of Anwara in Anwara UNO office.

Consultations were conducted with local people including home owners, private land owners, fishermen, shopkeepers and restaurant owners and workers, women, elementary school children and local small-scale traders.

Table 4.2.2.3-1: Consultations at site

Date	Stakeholders	Location	No of persons
24th July 2013	Interviews with the DC and ADC and other government officials	Chittagong District	
24th July 2013 and	Youth, students, fishermen, van pullers, shop owners	Anwara, Gahira	26 fishermen, 3 van pullers, 9 shop owners, 18 youth
24th July 2013	Affected households.	Anwara, EZ and adjacent area	17 home owners' place, 18 children in the adjacent area, 2 women
11-14 February, 2014	Youth, students, fishermen, van pullers, shop owners, Affected households.	Anwara, EZ and adjacent area	Several spot discussions with many locals and to be affected people in their home and shops
11-14 February, 2014	Survey on population composition, HH, & shops structures, institutions, ponds, trees	Anwara, EZ area	Whole area covered- Gahira ward 8 and 9.

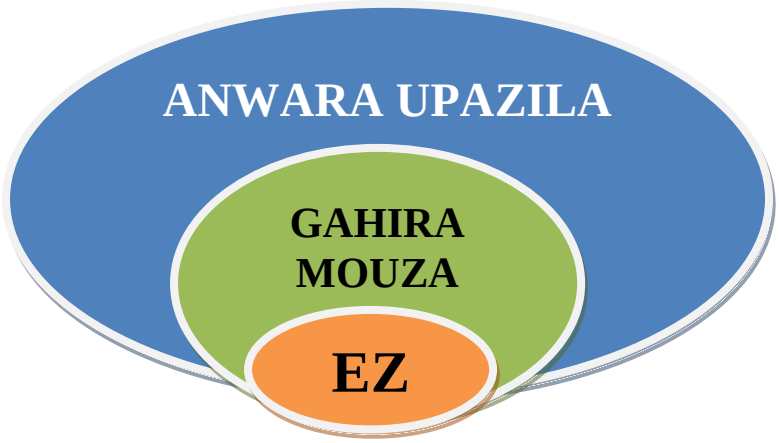
4.2.3 Information on Anwara and the EZ area

The following section provides the current socio-demographic and economic conditions of the people of the EZ area of Gahira Mouza of Roypur Union of Anwara Upazila.

The EZ is only a small part of the Gahira Mouza and population density in this part is much less compared to the Mouza's overall population. The EZ covers government land and part of the adjacent area By the Sea. From the consultation with local people during the field visits, and the field survey, it

is found that 913 households (HH) will be affected and that the number of people living in the proposed EZ area is 5,350. The survey covered both Wards 8 and 9 but some portion of these wards may not fall under the EZ as they live on the societal fringe too, thus the number of real affected households and people may be less. During the site visit, it appeared that they are among the most poverty stricken families, mostly fishermen or old aged people once were involved in fishing in sea and living in 'kutcha' houses.

Figure 4.2.3-1: Conceptual Diagram Showing EZ Location in Anwara Upazila



The socio-demographic data in this section presents details of the EZ area to provide an idea of the locality and the people who will be affected by the proposed EZ.

Table 4.2.3-1: Land distribution of Anwara EZ

1.	Existing land	611.47 Acre (247.56 ha)
2.	Private land	321.21 Acre (130.04 ha)
3.	Public land	290.27 Acre (117.52 ha)
4.	Reclaimed land	778.03 Acre (314.99 ha)
	Total project area	1,389.50 Acre (562.3ha)
	Land for resettlement in EZ / Resettlement Zone	24.08 Acre (9.74 ha)

Table 4.2.3-2: Total number of households, population, and structure of residences

Name of area	**Total HH**	**Total population**	**Pucca/Semi pucca**	**Tin shed**	**Earth-made**	**Hut**	**Ponds**	**Temporary**
Ghatkul ward 9	267	1,530	13	138	29	81	130	06
South Gahira	438	2,585	50	343	12	33	132	
Dakshin para	208	1,235	26	56	45	76	120	-
Total	**913**	**5,350**	**89**	**537**	**86**	**190**	**377**	**06**

Table 4.2.3-3: Total Number of Shops with types in EZ areas

Type of Shop	Ward No. 8	Ward No. 9
Grocery	19	20
Tea Stall	5	8
Vegetable	2	1
Pharmacy	2	3
Beatle leaf	5	1
Stationery	3	
Barber Shop	2	1
Fuel	1	
Machinery		1
Hardware		1
Poultry		1
Traditional Oil Mill		1
Rice mill		1
Total	**39**	**39**

9 shops in the south and one wood-made rice mill
30 in the south-west, a market named 'Baroawliar Bazar'

Table 4.2.3-4: Total Number of Institutions in EZ areas

	Educational Institutions		Religious Institutions	Social Institutions	Graveyard
Institution type	**Primary school**	**Madrasa**	**Mosques**		
No	1	1	4	1	3

a. Type of ownership of Land

(i) Home:
(ii) Agricultural land: List provided in 4.2.13.
(iii) Water bodies, Baluchar (sandy islands) - the major part of the water body belongs to the government and only a very small area of such land is in private ownership. (List provided in 4.2.13)
(iv) All lands are compensated at double the current market price. Compensation for homes will be twice the current market price. Actual current market price of trees will be provided also. For livelihood loss, payment for sources of income and relocation costs will be provided.

b. Tribal Population within/around the Site

The project does not have any indigenous/tribal land acquisition, and, there is no tribal population living in the project area. No information was found about any tribal population living inside Anwara Upazila. Thus, it is not going to have any adverse impact on such a population.

4.2.4 Population of Chittagong District and Division

Population in Chittagong District: 7,616,352 (male - 3,838,854, female - 3,777,498)
Population living in rural areas: 4,463,723

Population in Chittagong Division: 28,423,019
(Male: 1, 39, And 33,314, female: 14,489,705)
Population living in rural areas: 21,517,539

Due to the location of the Anwara EZ, the population of Chittagong district will benefit from the high number of industrial jobs created there.

4.2.5 Socio-economic background of Gahira's population

Population distribution:

For a better understanding of the Mouza and locality the following section provides information on Gahira Mouza. In Gahira Mouza of Roypur Union, the total number of households is 1,920 with a total population of 10,906.There is no floating population in the Mouza. The population density (per sq.km) in the Union is 1,524.The following population composition and information on the households are based on the Mouza population.

Table 4.2.5-1: Percentage of population in age groups

Population: Age group	0-4	5-9	10-14	15-19	20-24	25-29	30-49	50-59	60-64	60+	Total population
In percentage	14	17.8	14.4	9.1	7.3	7.7	20.8	4.4	1.8	2.8	10,906

Source: BBS, Population and Housing Census 2011, Community Report, Chittagong Zila

Poverty information

There is no data directly indicating poverty in the latest Census. But the data on occupation, education and household types are presented to give an idea of the socio-economic condition of the locality. From these variables, the area seems impoverished and very few well-off families live in the proposed area. But in the Upazila there are several structures and buildings and institutions which are presented in the report.

The number of people not attending school

There are 4,466 school-age young people not attending school - 2,132 males and 2,334 females. Out of approximately, 7,000 population, that figure represents more than 50 % of the population aged 7 and above, which presents a depressing picture. The better employment of parents is expected to contribute to higher school attendance of children, particularly girls, at schools and overall higher education levels for all.

Employment status:

Table 4.2.5-2: Employment Status of Gahira Mouza

Population not Attending School			Employment Status							
			Employed		Looking for Work		Household Work		Unemployed	
Total	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
4,466	2,132	2,334	1,651	89	93	44	33	1,839	355	362

Source: BBS, Population and Housing Census 2011, Community Report, Chittagong Zila

There is a huge gap in male-female employment. Only 89 females are employed in contrast to 1,651 males. In the job seeking category, 93 are males, and 44 are females. Most of the women are involved in household work - 33 males and 1,839 females are involved in this activity. Unfortunately, 355 males and 362 females are unemployed.

Women's empowerment:

Since women are mostly in the household work category. Thus, employment opportunities for women, as created by the proposed EZ directly or indirectly in Anwara, are expected to provide them with a better socio-economic status, i.e. empowerment.

Occupation:

Table 4.2.5-3: Field of Activity by the People Living in the EZ

Field of activity					
Agriculture		Industry		Service	
Male	Female	Male	Female	Male	Female
1474	37	40	23	137	29

Source: BBS, Population and Housing Census 2011, Community Report, Chittagong Zila

Among the employed population – 1,474 males and 37 females work in agriculture; 40 males and 23 females work in industry; and 137 males and 29 females work in the service sector. The employment status clearly shows that the majority are dependent on agriculture related activities. Fewer than 100 people are involved in industry - an insignificant percentage of the population.

During consultation with local people, it appears that as a whole, in terms of occupation, this is a predominantly fisheries-based area.

Household structure:
Most of the houses are kutcha (76.4%) followed by Jhupri/ straw-shed (16.3%). Only 3.2% are pucca and 4.1% semi-pucca structures.

Sanitation facilities:
Sanitary water sealed toilets: 5.2%; Sanitary non water sealed toilets: 41.6%; non-sanitary toilets: 47%, no toilets: 6.1%.

The household pattern, sanitation facilities, and behaviour show a grim picture of poverty in the proposed EZ area. The majority of the population (around 83%) live in kutcha and temporary straw-shed houses. The number of people using sanitary toilets is only 5.2% of the resident population. Due to the sea-side location, salinity of the water available is also a problem for pure drinking water.

Total Number of Structures:

The socio-cultural institutions of Anwara, Gahira Mouza are presented below. Though the proposed EZ area is part of the Gahira Mouza, not all of these institutions fall under the EZ proposed area, thus the number of affected institutions is less than these. Therefore, an inventory and population census is done in the area which is presented in earlier section.

a. Homes: The number of total households in Gahira Mouza is 1,920, the total population is 10,906. Gahira is a huge Mouza. During consultation, we were informed that the proposed EZ area will be in the seaside area where the population concentration is very low and around 913 households will fall under the EZ area. People living in these households will be affected and will need resettlement and compensation. The houses are scattered and mostly kutcha structures.
b. Business centres, bazaar, shops etc. - There are also a few shops and restaurants which are mostly small and kutcha and tin-sheds. There are a few trees around the homes and the roadside but they are mostly small and newly planted. In the resettlement compensation package, all of these will be included. Details of these are provided in the budget analysis section of this report.
c. Primary Schools: 2
d. Mosques: 8
e. Dakhil madrashas-1
f. Forkania madrashas-6
g. Nurani madrasas-2
h. Cyclone shelters: 2
i. Community centres: 2

j. Health centres: None in project area
k. Graveyards: 11
l. NGOs: GONO UNNOYON PROCHESTA has micro-credit and awareness raising programs.

Although in the consultations during field visits, local people, mentioned no higher academic or social institutions within the EZ area, the UNO of Anwara provided the list of institutions in Gahira. If any academic or religious institutions fall under the EZ area, proper compensation and replacement cost will be provided after consultation of local authorities and local residents.

Price for various categories of Land

Categories of Land	Price per acre in BDT*	Price per 1 acre in BDT**
Home/Bari	32,50,000 BDT	32,545 BDT
Vita	26,99,700 BDT	30,75000
Nal/Agri Land	21,64,700 BDT	2231900
Pond	2680,00 BDT	9,82500
Baluchar/Sandy Island	26,99,200 BDT	27,25900
Khila/ High Fallen Land/Tila	30,87,000 BDT	31,20300
Shiksti- Land Lost For River Erosion	30,87,000 BDT	
Ghat		2,35000

*Source: *Data collected from the UNO of Anwara*
*** Data collected from the Land Acquisition officer, Chittagong*
**risen land considered as government land*

4.2.6 Overall Social Impact

Regarding social indicators, the following are likely to have an impact on the social lives of the local population due to EZ:

Table 4.2.8-1: Overall Social Impacts with Strategies for Mitigation

Issues	Impact	Strategies for Risk mitigation
Poverty Alleviation and Diversification in livelihood	Through industrialization and related trades, diversification of livelihood will occur for all strata of people. Diverse livelihood option for the locals and better wages for the employees of the industrial zone will reduce poverty for many poor households and will contribute to reducing the poverty level in the locality.	Skill training programs by relevant government agencies and NGOs will be needed for efficient utilization of this huge manpower.
	This EZ will have shipbuilding, ship repair, shipbuilding components, steel and other industries and will create approximately 174,680 workers (397 workers per hectare).	
Food security	With increased income the families will be able to ensure food security for themselves. As current earnings are not enough for the small farmers and fishermen to ensure food security for their families or a reasonable livelihood, they prefer a better livelihood and secure alternative earning options.	Better livelihood options and food security should be ensured for the 913 households that will be displaced and the most impoverished fishermen's families.
		Preferences of the males and females of displaced households in job opportunities created by the EZ.
Awareness and accessibility regarding health:	Better access to health facilities and better communication and access to health services is expected. Housing patterns and WATSAN behaviour which is very poor at the current stage are expected to be much better due to affordability	Issues of health hazards caused by the EZ industries to be identified. If there are any, steps need to be taken to prevent and minimize such hazards.

Issues	Impact	Strategies for Risk mitigation
	of better housing, sanitary toilets, and attitudinal change due to people's increased earning power and industrial zone led urban atmosphere.	
Education for children including Girls' Education	Due to the establishment of the EZ and better economic changes in the locality, the child education rate is likely to increase leading to a reduction in children's informal or agriculture based labour.	During construction and until the EZ becomes operational, children's safety needs to be ensured.
		Local community needs to be sensitized and NGOs can be engaged with them.
Access to civic amenities and communication	Civic life for the overall communities will be better due to the modern facilities and better communication. Industrialization will ensure better livelihood and increase ability to access better civic facilities. However, due to the EZ construction overall traffic may be congested over the years.	913 households will be displaced, compensation package should be ensured to be sufficient for a better livelihood and standard of living.
Social mobility	With improved employment opportunities and increased and secured income, impoverished people will be able to move up the social ladder.	Special compensation package or priorities in job opportunities for the most impoverished are needed so that they don't become more vulnerable due to higher income level of others.
Women's empowerment	Women mostly occupy the household work category of the labour force. Thus, employment opportunities for women created by the proposed EZ directly or indirectly are expected to provide them with better socio-economic status. Through employment, women will be empowered economically by being self-reliant and may become more socially aware. This could lead to their having more decision making power in their respective families and communities.	Measures should be taken to ensure women of the households who are losing livelihood opportunities do not face vulnerable situations of losing livelihood options of their household head or themselves.
	This will also encourage the parents to send their children to schools and withdraw them from wage earning activities. At the same time girl's education due to parents' better economic condition and awareness will prevent early and child marriage as girls' education will automatically retain them in school increasing social awareness and reducing pressure marrying them off at an early age.	While dealing with land transfer and compensation, the gender issue should be taken care of sensibly as women in Bangladesh do not usually possess land in their names but in the male household members' names. If cash compensation is given, it could be also in joint account transfer, so women are not deprived of any benefit and also do not bear the loss alone. With female headed households, a special package can be provided.
		Preferences of males and females in job opportunities created by the EZ.

At the macro-level, employment opportunities, social and economic commitment of development efforts, and the public-private partnership will be the outcomes of the project.

More detailed consultation at the EZ site and adjacent areas may be needed to assess detailed socio-cultural effects.

4.2.7 Resettlement Issues and Plan

The policy objective conforms to that of the government, to reduce poverty and meet the Millennium Development Goals (MDGs). The basic policy is to avoid land acquisition as much as possible. The guiding principles are:

- to minimize and mitigate adverse impacts;
- to ensure compensation payment according to the World Bank OP 4.12 and GoB rules and regulations;
- to establish a grievance redress mechanism with representatives from stakeholders to suggest institutional and monitoring arrangements for compensation payment.

4.2.7.1 People Likely to be Affected

The households to be relocated will have to be provided with financial compensation. However, for Anwara financial compensation might not be needed as a resettlement zone would be proposed.

All lands are compensated in amounts double the current market price. Compensation for homes will also be double that of the current market price. Actual current market price of trees will be provided. For any calculable loss of livelihood, payment for sources of income and relocation costs will be provided. The private land owners will be compensated according to standard provisions.

The proposed industries here are shipbuilding and related industries, requiring huge number of workers at different levels. This EZ will have shipbuilding, ship repair, shipbuilding components, steel and cement factories and will create 174,680 workers (397 workers per hectare). As the EZ will provide job opportunities with standard wages, the overall population, including the poor population, will benefit from that immensely. The project can make provision the affected fishermen, small shopkeepers, labourers to be given priority in employment and recruitment in the EZ, so that a better livelihood is ensured for them. The most impoverished section of the population, women and other vulnerable people, could be given priority and a special package of compensation to restore or initiate ways to produce a sustainable livelihood in case they are not capable of taking jobs.

The fishermen in the EZ area and nearby locality will benefit from greater job opportunities. At the moment, they can only catch fish from the sea for 4 months of the year, and it is not a plentiful catch. They often have to risk their lives. Many of them have lost relatives and their investments. Thus, economic activities in the locality will bring more opportunities and diverse and secure livelihood options for them.

During the consultation with the local poorest people including fishermen, shopkeepers, unemployed youth, and students living inside and adjacent areas, all opined that the EZ will bring more economic benefits to the population of the EZ and adjacent areas as there are no industries established or income generating activities currently undertaken. The poorest strata of the population of the locality, fishermen and unemployed women, will benefit from the EZ.

However, while the construction activities go on, including the establishment of the EZ, widening roads and seaside dam improvement with dikes, outside workers are likely to be present in the locality for at least the first few years of the project. Thus, necessary measures needed to be taken to prevent any harassment or violence against women and public health related problems including HIV-AIDS.

Detailed survey and consultation on socio-economic conditions and land ownership and asset ownership patterns of PAPs at the EZ site needed for efficient and effective resettlement actions. Further consultation in EZ adjacent areas may be needed before and during implementation of resettlement and establishment of EZ for ensuring best possible socio-economic effects of the EZ.

4.2.7.2 Estimated Employment Creation

The estimated employment magnitude is expected to become 47,539 workers when the Anwara EZ is fully occupied. Once those 47,539 jobs are created in the Anwara area, an additional 23,770 indirect jobs (normally about 50% of direct employment) are likely to be created in the Anwara area mainly various services such as transport, retail, health, food and housing services. The total employment of direct and indirect jobs in the area may reach 71,309 workers.

Table 4.2.7.2-1: Employment Estimate for Anwara Economic Zone

Industry & Com	Land Area (Ha)	Employment /Ha	Jobs
Shipbuilding	249.53	80	19,962
Shipbuilding Components	39.09	200	7,818
Steel Products	6.94	100	694
Automobile Parts	1.94	350	679
Leather Goods	17.76	400	7,104
Pharmaceuticals	47.16	200	9,432
Commercial Zone	3.23	200	646
Power Plant	54.53	20	1,090
Coal Stock Yard	11.44	10	114
Total	**431.42**	**110 (Average)**	**47,539**

Source: WB Study Team
** is estimated from the Bangladesh Industry Examples*

4.2.7.3 Resettlement Plan

As there are various types of households, a detailed survey will be needed to assess the socioeconomic condition, land and asset ownership patterns before the compensation is provided. Proper consultation would be needed before displacing people from their households. Moreover, consultations with the local elite, UP chairman and members, teachers, religious leaders, local administration, including UNO, need to be carried out along with consultations with the representatives of the PAPs. It is necessary for the individuals losing their homes to have representation in the grievance redress mechanism committees to ensure proper compensation is provided. This might also motivate PAPs to move out of their current homes on time.

Affected households will be resettled in or adjacent to the EZ area in Anwara. The shop-keepers, farmers, fishermen, and people from other affected occupational groups will receive compensation for loss of livelihood options and income, with twice the current market value. Private tree owners will also be compensated.

4.2.7.4 Compensation and Entitlements

The affected persons will be compensated for their affected structures, trees, cropping field, ponds and businesses. Compensation is based on entitlements including: (i) replacement value for structures, trees, etc. and (ii) other resettlement assistance as required such as transfer grants, re-installation grant (except replacement value) and compensation for loss of business/wages due to dislocation. Vulnerable households will be eligible for further cash assistance for relocation and resettlement to improve their living conditions. The entitlements as per loss category are presented in the table below.

Table 4.2.7.4-1: Resettlement Matrix and Compensation Package

Sl. No.	Type of loss	Type of compensation suggested
1	Home	Resettlement in EZ area (land for land)
		Cash compensation: twice the current market price and relocation costs for those who opt for cash instead of land
		Preference in the jobs created by the EZ

		Skill training for new livelihood options
2	Private land ownership	Cash compensation x 1.5 times of current price
		Actual of loss of crops where applicable
		Preference in the jobs created by the EZ
		Legal owner(s), including mortgagees, as determined by DC during Compensation under law (CUL) payment, or by court in cases of legal disputes.
		Co-sharers/ to be determined by title deeds/records by DCs.
		Transition allowance (TA) for income loss from productive lands.
3	Shop owners	Actual cost of the shops & materials
		Relocation costs
		Compensation for two months earnings.
		Preference in the jobs created by the EZ
4	Ponds	Market price
5	Trees	Market price
		In case of fruit tress one season of earnings from fruit sale
5	Livelihood loss	Preference in the jobs created by the EZ
		Compensation of 2 months of earnings and relocation costs
6	Vulnerable groups	A special compensation for the most vulnerable people such as female headed families, people with disability, orphans.
7	Training needs assessment	Government's youth department, Women's affairs department, NGOs can do needs assessment on training and provide technical training related to employment at EZ industries.
8	Temporary/short term hassle for construction period	Compensation to the affected people
		Employ their household members in construction works or other relevant works.
9	Social, educational and Economic organizations	The project is avoiding any destruction of such institutions and minimizing such loss, thus approach roads were carefully designed to avoid loss.
10	Public property	In case any such public property is affected during the construction or operational phase, these services and facilities will be compensated and rehabilitated/relocated properly before implementing work.
11	Historical, cultural or religious sites	None fall in the project area. In case any such sites are affected, relocation cost should be paid.
12	Closing/obstructing to accessibility to natural resources	Anwara EZ is adjacent to the sea. But the EZ is not closing or obstructing access for communication or livelihood to the natural resources as a whole. The dike for protection of the EZ will be constructed with a road on top of it. So accessibility to surroundings will be very good. The dike will also protect the locality of the fishermen from cyclones. There is no possibility of destroying the access of fishermen to the sea. But, a sea channel is proposed to bring coal to the power plant inside the EZ. It will be a shipping lane. So the mouth of river Sangu may have limited access for fishing activities.

Though BEZA is responsible for overall execution and coordination, ensuring GOB's support and timely financial disbursements of the EZ but land acquisition and resettlement has to be done by the Ministry of Land through the respective DC office. Thus, complexity of bureaucratic procedure and coordination may happen.

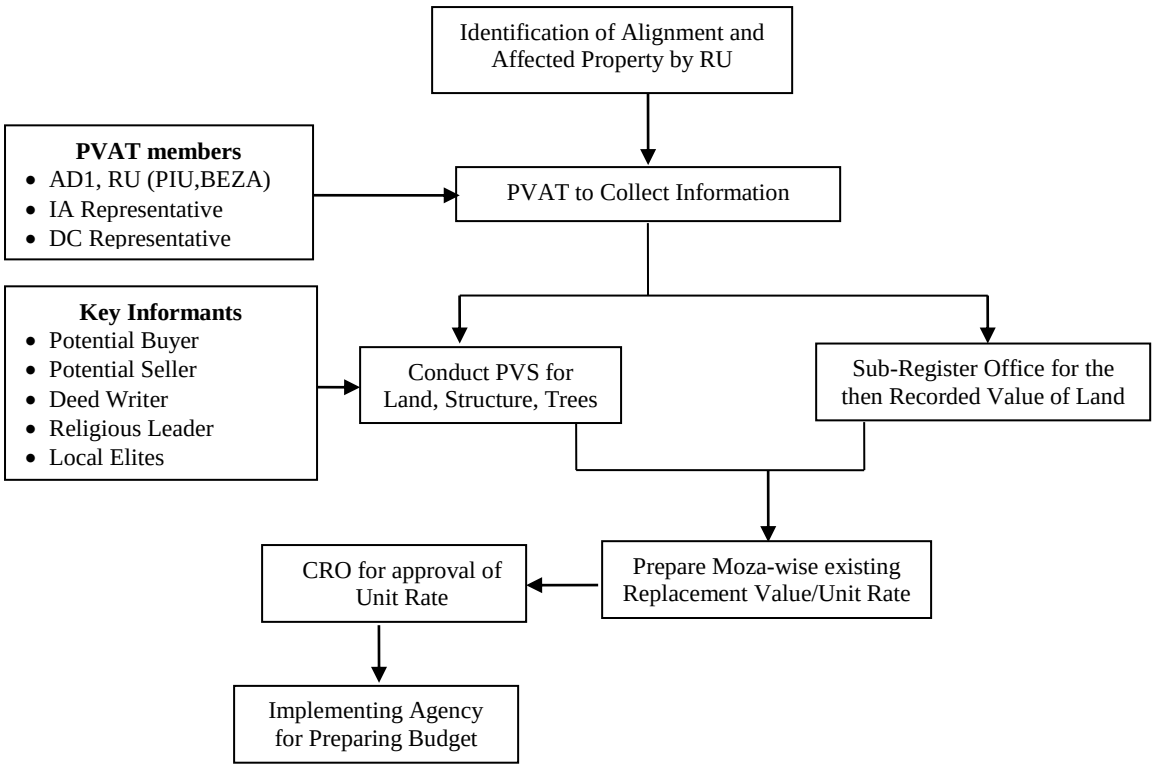
Land replacement costs, dislocation allowance, transfer grants, reconstruction grants, onetime special assistance, income and livelihood restoration grants will be included in the compensation package so that the economic condition of PAPs will be improved.

The Project construction activities will require many unskilled labourers and skilled staff for earthwork in the EZ development, approach roads, offices, and management work. Provision should be made in the contract with the contractors for employment of qualified PAPs and their dependents in the recruitment of local labour, including affected women. Employment in the project construction will act as an added source of income and livelihood restoration of the PAPs.

Table 4.2.7.4-2: Institutional Responsibilities in the Resettlement Process

Related Activities and Responsibilities	Responsibility
A. Preparation of Updated RAP	
Preparation of land acquisition plans	RU/Eng Firm
LA process and land acquisition	DC/RU
Recruitment of ERS and NRS	RU/WB
Recruitment of Implementing Agency	PIU
Design and reproduction of RAP Information Brochures	RU/NRS
Disclosure and public consultations	RU/IA
Selection of members for resettlement advisory bodies	RU/IA
Design and carry out census for joint inventory of losses	RU/IA
Market survey on prices of lands, structure, crops and trees.	IA/PVAT
Establishment of unit prices	PVAT/RU
Processing the Census and socioeconomic data of APs	IA/NRS
Assessing AHs to be relocated and any vulnerable APs	IA/RU
Determination of entitlements and consultations with individual APs	RU/IA
Consultation of Draft RAP to EA, APs and stakeholders	ERS/RU
Incorporate suggestions and finalizing the RAP	ERS
Review and concurrence of RAP	SS(National)/WB
B. RAP Implementation	
Mobilization of GRC	RU/IA
Establishment of internal monitoring and hiring of EMA	MOHW/DCs/PIU
Budget approval for compensation and resettlement	PIU
Release of funds for compensation	BEZA/RU
Filing and resolution of complaints APs,	RU/GRCs/IA
Assess needs, identify sites, and develop relocation sites	RU/IA/APs
Consultation with APs on schedule of clearing the lands	RU/IA
Clearing of lands	APs
Confirmation of "No Objection" for the award of civil works contract	WB
Relocation and livelihood restoration assistance	IA/RU/LIRP
C. Monitoring and Evaluation	
Internal monitoring	RU/ERS/NRS/IA
Independent external monitoring and evaluation	EMA/WB

Figure 4.2.7.4-1: Procedure of Determining Valuation of Property



4.2.7.5 Grievance Redress

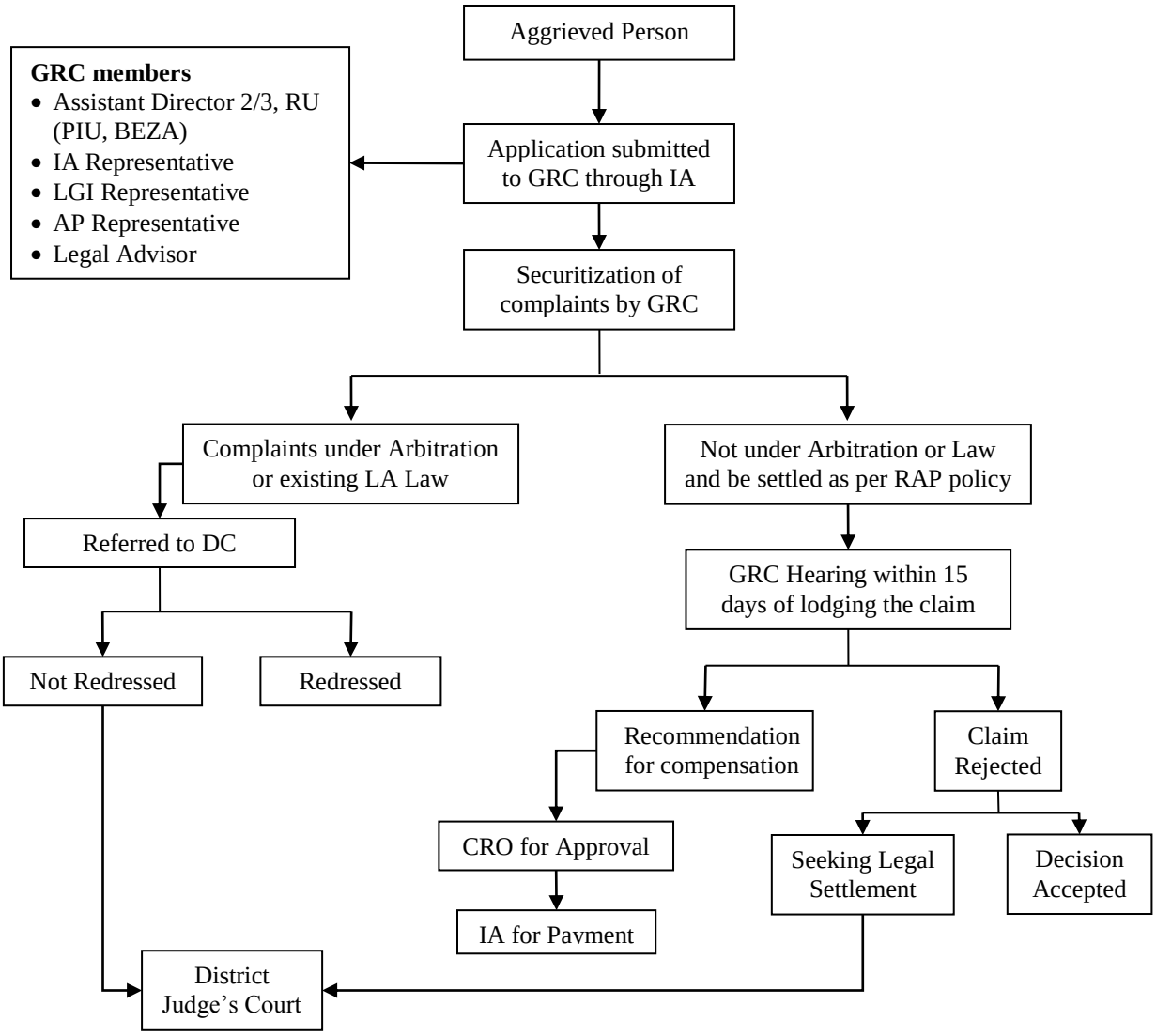
A grievance redress mechanism should be developed prior to the compensation provided and during the resettlement period.

The land acquisition and resettlement will be done during mid-2014 to early 2016. A local body incorporating the Local Governance (LG) representatives and the government administration at the local level, with a cell at the central level, could be established to take care of this process.

The aggrieved person will apply to the GRC (Grievance Redress Committee). The grievance redressing mechanism is shown in the following figure. GRC will review the application and if the application is under arbitration then it will be referred to the DC. If the application is not under arbitration then the grievance will be settled by an RAP policy. If the application is rejected then the person can apply to the district judge for legal settlement.

It should be remembered that grievance redress is a very time consuming matter and should be given priority so that the minimum possible time is required for it.

Table 4.2.7.5-1: Grievance Redress Mechanism



4.2.7.6 Disclosure of Information

According to WB OP 4.12, people's participation in the project planning and implementation phase is essential. People have the right to information what is going to happen in their surroundings. They must be informed about the positive and negative impacts of the proposed project and their opinion, suggestions and feedback must be incorporated in the project design. People living in the EZ area, where embankment improvement with dikes and super dikes will be undertaken, must be informed so that they can take protective measures for their safety, or can get compensation for the loss of their structures. Consultation was done with various stakeholders in the EZ area and adjacent areas for initial assessment of the positive and negative effect of the EZ.

4.2.7.7 Compensation Needed for the Project

A budget on compensation for asset loss (homes, land, livelihood sources, shops and trees, ponds, sites of special importance) costs is assembled for settlement purposes.

Table 4.2.7.7-1: Budget for Resettlement and relocation cost and Compensation

Type of HH	#HH	average area/unit	Price per katha/unit	Budgeted Compensation	Premium Rate	Compensation with premium
Ghatkul						
Pucca/Semi Pucca	13	1	90,000	1,170,000	200%	2,340,000
Tin Shed	138	1	70,000	9,660,000	200%	19,320,000
Earthmade	29	1	40,000	1,160,000	200%	2,320,000
Hut	81	1	40,000	3,240,000	200%	6,480,000
Temporary	6	1	30,000	180,000	200%	360,000
Sub-total	**267**			**15,410000**		**30,820,000**
Ponds	**130**	1	60,000	7,800,000	100%	7,800,000
Trees	**3,902**	1	1,000	3,902,000	100%	3,902,000
				11,702,000		**11,702,000**
Dakshin para						
Pucca/Semi Pucca	26	1	90,000	2,340,000	200%	4,680,000
Tin Shed	56	1	70,000	3,920,000	200%	7,840,000
Earthmade	45	1	40,000	1,800,000	200%	3,600,000
Hut	76	1	40,000	3,040,000	200%	6,080,000
Temporary	0	1	30,000	0	200%	0
Sub-total	**203**			**11,100,000**		**22,200,000**
Ponds	**120**	**1**	**60,000**	**7,200,000**	**100%**	**7,200,000**
Trees	**2,605**	**1**	**1,000**	**2,605,000**	**100%**	**2,605,000**
Sub-total				**9,805,000**		**9,805,000**
Institutions						
Graveyard (Large)	1	1	1,000,000	1,000,000	200%	2,000,000
Graveyard (Small)	2	1	225,000	450,000	200%	900,000
Social and Religious institutions	2	1	2,000,000	4,000,000	300%	12,000,000
Sub-total	**5**			**5,450,000**		**14,900,000**
Shops						
Grocery	34	1	80,000	2,720,000	150%	4,080,000
Tea Stall	19	1	80,000	100,000	150%	150,000
Hardware	1	1	100,000	100,000	150%	150,000
medicine	5	1	80,000	400,000	150%	600,000
Vegetables	3	1	60,000	180,000	150%	270,000
Saloon	3	1	100,000	300,000	150%	450,000
Machinery	1	1	120,000	120,000	150%	180,000
traditional Oil making shop	1	1	120,000	120,000	150%	180,000
Poultry	1	1	100,000	100,000	150%	150,000
Rice Mill	1	1	200,000	200,000	150%	300,000
betel leaf	6	1	80,000	480,000	150%	720,000
stationary	3	1	100,000	300,000	150%	450,000
Sub-total	**78**			**5,120,000**		**7,680,000**
South Gahira						

Type of HH	#HH	average area/unit	Price per katha/unit	Budgeted Compensation	Premium Rate	Compensation with premium
Pucca/Semi Pucca	50	1	90,000	4,500,000	200%	9,000,000
Tin Shed	343	1	70,000	24,010,000	200%	48,020,000
Earthmade	12	1	40,000	480,000	200%	960,000
Hut	33	1	40,000	1,320,000	200%	2,640,000
Temporary	0	1	30,000	0	200%	0
Sub-total	**438**			**30,310,000**		**60,620,000**
Ponds	132	1	60,000	7,920,000	100%	7,920,000
Trees	6000	1	1,000	6,000,000	100%	6,000,000
				13,920,000		**13,920,000**
Grand Total				**102,817,000**		**171,647,000**
M&E (Adm. Expense 2%)						**3,432,940**
Cost for Implementation and Monitoring & Valuation				**Lump sum**		**25,000,000**
Grand Total				**BDT**		**200,079,940**
				$ million		**2.501**

Gahira EZ area has a few social and religious institutions which will be affected by the establishment of EZ. There is a multi-storeyed building built by Saudi donation situated on a parcel of donated land which is a common property land. There is a mosque, a school/madrasa, and cyclone shelter in this building. The compensation package is proposed to cover replacing cost of these intuitions. There is a community health clinic in the EZ area in a common property land, compensation cost is counted for that. Compensation can be given to the community to establish a multi-purpose multi-storeyed building as they are now for accommodating these institutions together for easy accessibility. There are also 2 small mosques in the locality but separate compensation is not counted for that as the proposed compensation will cover a mosque for the resettled people as a community resource. There is a large family owned graveyard and 2 small graveyards which will be compensated including land value. The relevant institutions and the concerned authorities of the proposed grievance redress mechanism, which will include community representatives, will take care of the proper implementation of the compensation process. Moreover, if any disputes arise, the community along with the committees and supporting NGO will resolve the disputes.

Table 4.2.7.7-2: Budget for Land Acquisition

Item	Amount	Unit
Total Costs of Land Acquisition of Private Lands	10.196	US $ million
Total Costs of Land Acquisition of Private Lands with Premium	15.294	US $ million
Total Cost of Govt. Khas Land	8.996	US $ million

Note: Detailed can be found in the Annex-4

4.2.8 Institutional Arrangements and Problems Related to it

There may be problems regarding institutional arrangements among several government departments involved in the EZ implementation. Lack of manpower, lack of training, lack of coordination, administrative problem for transfers, trust building and rapport with local people are the major problems which may be faced during implementation of the project.

During consultation with the relevant stakeholder government agencies, it appeared that while the PPP agency had a considerable amount of money to undertake new ventures, due to lack of

experience, in practise, the money could not be spent. Also the regulatory frameworks and coordination are mentioned as major obstacles.

Government Ministries and agencies likely to be the stakeholders are, among others : the Prime Minister's Office, the Ministry of Finance (Finance Division and Economic Relations Division), the Ministry of Land, the Customs Authority, the Board of Investments (BOI), Bangladesh Economic Zone Authority (BEZA), Bangladesh Export Processing Zone Authority (BEPZA), the Ministry of Industries, the Ministry of Commerce, the Ministry of Power, Energy and Mineral Resources, the Ministry of Communications, the Ministry of Water Resources, the Ministry of Railways, the Ministry of Law, and the Ministry of Environment and Forest. More consultations are needed in this regard.

A cell could be established under the PM's office but working independently headed by a "Steering Committee" or "Project Advisory Committee" to identify the problems prior to implementation and act proactively, determining strategic direction for the zone and pulling all government agencies in to support the project.

Land will be acquired by the Ministry of Land where other activities will be done by other ministries and agencies, so good coordination is needed and will be a major challenge.

Figure 4.2.8-1: Institutional arrangements in Central level

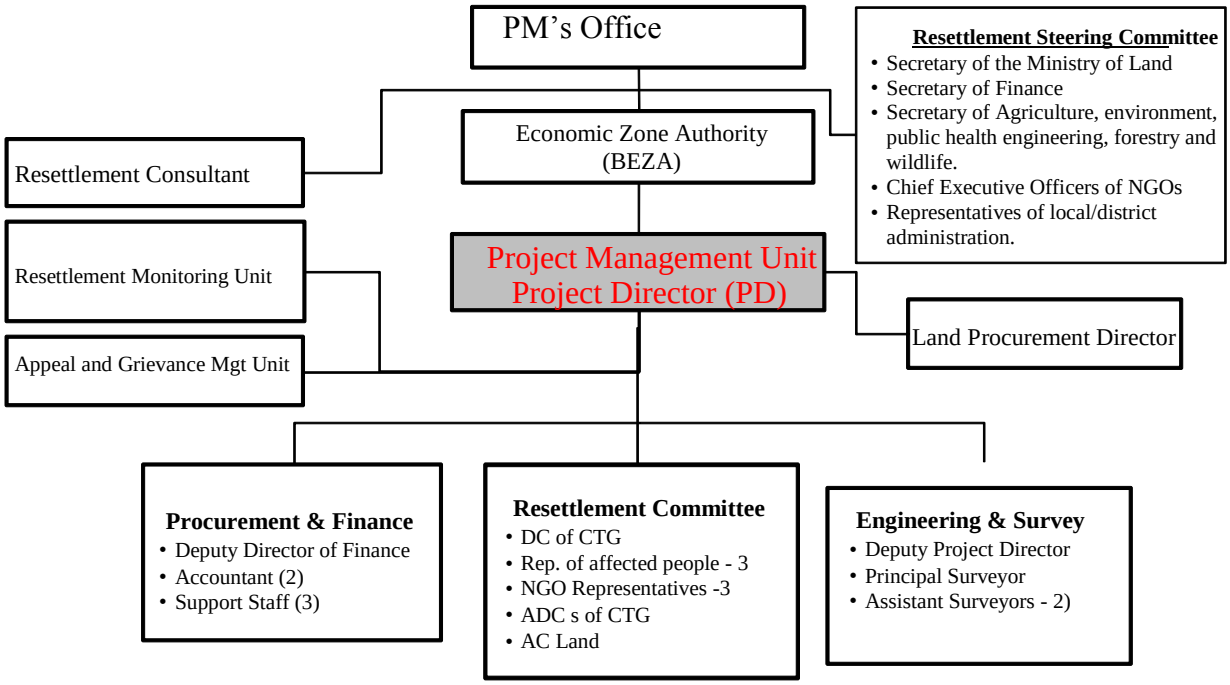


Figure 4.2.8-2: Details Resettlement unit for BEZA up to EZ level

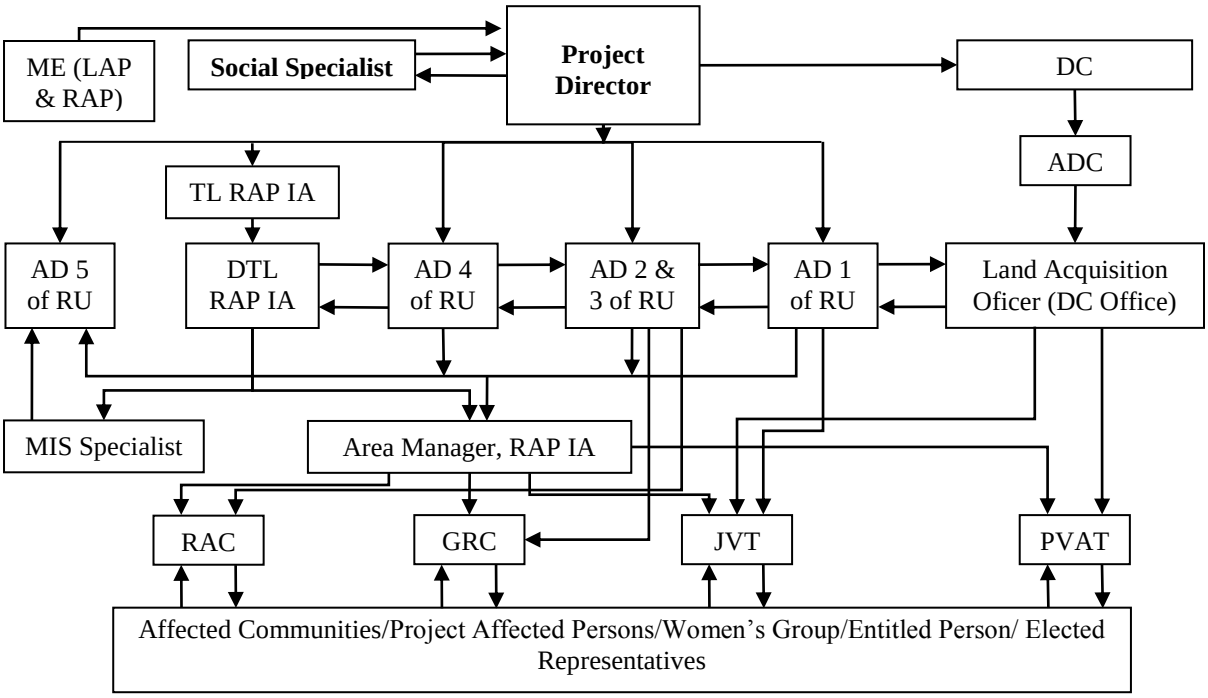
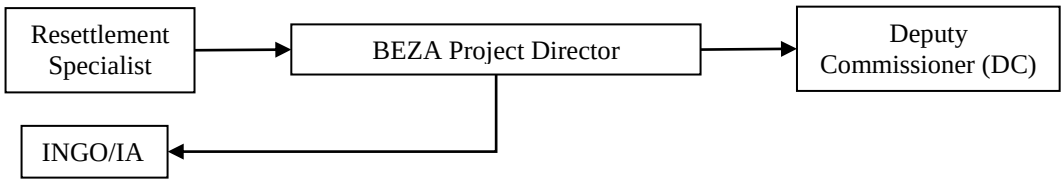


Figure 4.2.8-3: Resettlement Unit (RU) for BEZA



An INGO needs to be involved in the process of resettlement for transparency and effect land acquisition and resettlement and grievance redress process for timely completion of this phase to move on to construction of EZ and allocation of industrial plots.

In Section 5, on Institution and PPP, details of the institutions, agencies' roles, and responsibilities are presented.

4.2.9 Consultation with Locals

A participatory approach is an essential part of projects dealing with development in order to ensure sustainability in a spirit of inclusion. Participation of local people and other stakeholders enables different socio-economic interest groups in enhancing their capabilities to play an effective role in development initiatives. It also ensures commitment and a sense of ownership of various stakeholders beyond the locals and direct project beneficiaries. Government agencies, people's representatives, professional groups and voluntary groups including NGOs and community-based organizations, could be actively engaged to share responsibility in key decisions. It also enriches project planners with local/indigenous knowledge.

As part of the public consultation of social, gender, and resettlement issues, we carried out a series of consultations with people from a range of categories within the proposed EZ and the nearby areas including proposed approach roads. These meetings were held on 24th July 2013. Meetings were held

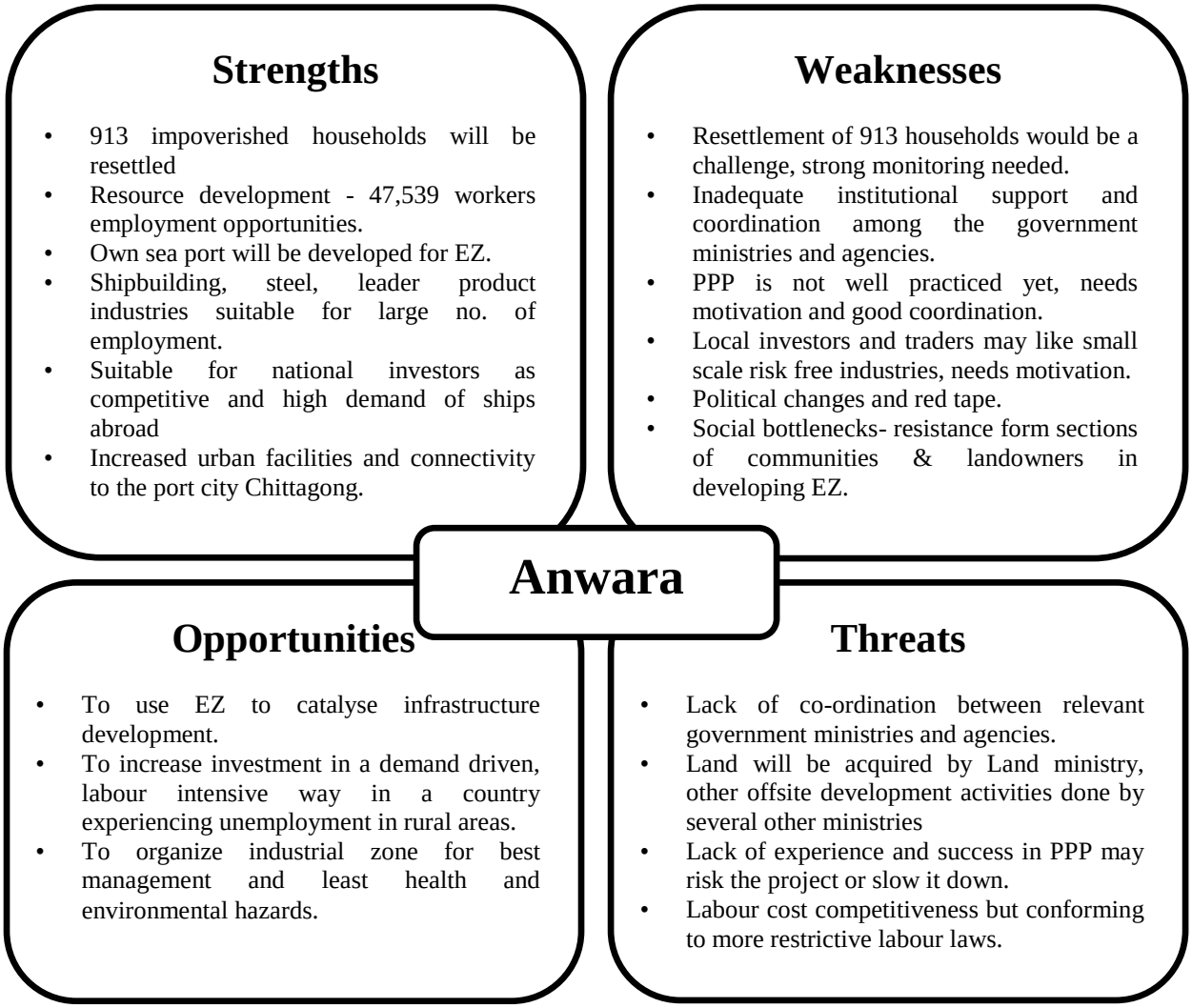
with relevant government officials. Consolations took the forms of individual interviews, focus group discussions – mostly informal, in Gahira area.

Consultations were done with the locals including fishermen, shopkeepers and restaurant owners, labourers, youth and children. In the consultation, various stakeholders mentioned the positive impact of the EZ on the lives and livelihoods of the people of that area or adjacent areas. They consider that in the current scenario of the unemployment and low return from agriculture and fishing, low food security is a problem. They perceive that industrialization in the EZ will enhance job opportunities and income and will have positive impacts on poor people by various occupational and income generating opportunities even in addition to the EZ employment. The probable offshoots of the EZ would be tourism, small trading, suppliers of raw materials to the related small factories, better transportation and transportation related businesses, women's entrepreneurship and children's education.

Issues covered in Consultation:

During consultations, issues covered are current socio-economic conditions of the population living inside the EZ area and the locality, women's employment, children's education and health facilities; how EZ will affect the lives and livelihoods of the people living inside and adjacent areas, what are the expected prospects for socio-economic development in the area due to the EZ, and, if there are any probable negative problems related to the establishment of the EZ, what should be the resettlement compensation and grievance redress.

4.2.10 SWOT Analysis for Anwara



4.2.11 World Bank Policy on Involuntary Resettlement, Gender and Indigenous/Tribal Populations

4.2.11.1 World Bank OP 4.12: Requirements for Involuntary Resettlement

The primary objective of the World Bank policy on 'Involuntary Resettlement' is to explore all alternatives to avoid, or at least minimize, involuntary resettlement. Where resettlement is unavoidable, the resettlement activities should be conceived and executed as sustainable development programs, providing sufficient resources to enable affected persons to share in project benefits and assisted in their efforts to improve their livelihood and standard of living, or at least to restore them to pre-project level. The policy also requires that affected people are meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs. The policy applies to the taking of land and other assets when involuntary resettlement results in the loss of shelter, the loss of all or part of productive assets, or access to them and the loss of income sources or means of livelihood, with or without physical displacement.

Measures required ensuring that resettlement has a positive outcome include:

- Providing Project-affected persons with options;
- Permitting their participation in planning and selecting these options;
- Prompt compensation at full replacement cost for losses;
- Choosing relocation sites that provide, at a minimum, the same benefits as the sites they replace;
- Providing allowances and other assistance to make a smooth transition after displacement;
- Identifying vulnerable groups and providing and special assistance to these groups; and,
- Implementing an institutional structure that supports the process to a successful end.

World Bank policy on Involuntary Resettlement requires payment of compensation and other assistance to project affected people before they are displaced from their existing locations. Further, the policy requires income rehabilitation assistance to those affected severely due to the loss of their productive assets or loss of incomes and livelihood.

Absence of legal title does not exclude individuals from the eligibility to receive compensation and/or other assistance. The displaced or affected population eligible for compensation for losses includes - those who have formal legal rights to land or other assets and those who initially do not have formal legal rights to land or other assets but have a claim to legal rights based upon the laws of the country. The policy also requires that those without legal title should be given assistance to meet the objectives of the policy. The genesis of these rights may come from continued possession of public land where the government has not sought their eviction. World Bank policy also recognizes that stakeholders who illegally occupy project-affected areas after established cut-off-date for any components are not eligible for compensation and other assistance provided that adequate measures are taken for information dissemination to people.

The gaps in the existing legal framework of Bangladesh and the objectives and requirements of the World Bank and other multilateral agencies are well recognized. Therefore, institutional or project specific policies are prepared to address these gaps and to meet the requirements of multilateral agencies in projects funded by them.

The following basic categories of issues/impacts are foreseen under this entitlement framework:

a. Loss of land;
b. Loss of structure;
c. Loss of source of livelihood;
d. Loss of access to common resources and facilities;
e. Loss of standing crops, trees and perennial trees; and
f. Loss of public infrastructure.

Data on the various land patterns, structures and institutions are provided in the report showing the overall condition and probable impact of the proposed EZ. In the financial and economic plans, financial compensation is counted for all the affected households whoever is living inside the proposed EZ area. From the secondary data it seems there are mostly kuccha and khupri houses in the area of the EZ site, so the financial compensation along with job opportunities will benefit them compared to the amount of land they will lose from their possessions and their current loss of livelihood. Though there are structures and institutions and buildings in adjacent areas, if extension or new constructions for transportation are needed, more consultation will be needed with relevant stakeholders.

4.2.11.2World Bank Gender Policy OP 4.20: Gender and Development (Revised March 2012)

The objective of the World Bank Gender and Development policy is to assist member countries to reduce poverty and enhance economic growth, human well-being, and development effectiveness by addressing the gender disparities and inequalities that are barriers to development and by assisting member countries in formulating and implementing their gender and development goals.

No gender disparity will result from implementation of the proposed EZ. Rather, it will contribute to gender parity and women's empowerment by their involvement in the income generation activities and employment in the industries, compared to the current situation where women are mostly unemployed or underemployed. However, a special package should be provided for the female headed households.

While providing compensation money for those households, a joint bank account should be opened and money should be transferred by banks for the purchase of property. If possible, property should be bought in the name of husbands and wives jointly. While moving to a new place, many women might face the situation where social networks with family and friends along with informal economic transactions might be lost. Therefore, for the displaced population, special care needs to be taken to ensure that women are not left vulnerable and without assets. In the case of women having some kind of income generating activities, livelihood restoration support must be provided.

Regarding poverty alleviation, as previously stated the project will contribute tremendously by creating jobs particularly for women and the impoverished population. By reducing poverty and contributing to the solvency of families within the area, it is also expected that education and health will improve. This project conforms to various MDGs and has no conflict with the World Bank's aim of poverty alleviation and development. But the project needs to ensure that the affected people are given priority in employment and that the most vulnerable people including widows, the old age population, orphans and people with disabilities get priority in assistance packages.

4.2.11.3Specific Funding Requirement of the World Bank Policy OP 4.10

Policy document OP4.10 of the World Bank contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that any development activity and accompanying processes fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. Hence, it is a requirement that all projects which are proposed for financing by the World Bank are assessed to see whether the policy needs to be triggered keeping in mind the geographic location, nature, and scope of activities.

The policy requires client governments to seek broad community support of Indigenous Peoples through a process of free, prior, and informed consultation before deciding on development projects affecting Indigenous Peoples. The policy requires that Indigenous Peoples benefit from the commercial development of natural resources. The Project must include measures to (a) avoid potentially adverse effects on the Indigenous Peoples' communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. World Bank-financed projects are also to be designed and structured in a manner to ensure that Indigenous Peoples receive social and economic benefits which are culturally appropriate and gender and inter-generationally inclusive.

4.2.11.4World Bank OP/BP 4.11: Physical and Cultural Resources

The objective of OP/BP 4.11 on Physical Cultural Resources is to avoid, or mitigate, adverse impacts on cultural resources from development projects that the World Bank finances. Cultural resources are important as sources of valuable historical and scientific information, as assets for economic and

social development and as integral parts of a people's cultural identity and practices. The loss of such resources is irreversible, but fortunately, it is often avoidable.

Taking OP 4.11 into consideration the project planning team endeavoured to avoid any such resources being affected by the project and proposed alternatives to avoid destruction of cultural resources and to minimise the displacement of physical resources.

4.2.12 Legal Context of Land Acquisition in Bangladesh

Currently the only legal framework that governs land acquisition in Bangladesh is the **Acquisition and Requisition of Immovable Property Ordinance, 1982.** However, its provisions are not adequate to address adverse impacts associated with land acquisition and involuntary displacement and do not fully satisfy the requirements of the Bank's Operational Policy (OP 4.12) on Involuntary Resettlement or that of the international practices.

The project proposal follows the World Bank policy OP 4.12 Requirements for Involuntary Resettlement where there is a gap between the government's and World Bank's policy regarding the resettlement issues.

Due to the low lying land, the EZ area is at risk of flooding, during cyclones, for example the site was affected by the particularly strong cyclone of 1991. Therefore, people living in the site area are willing to relocate to a safer site with compensation. Although the site is currently waste land prone to flooding in the time of cyclones, the construction of a super dike is planned (7 metres in height, which is 1 metre higher than the historical record flooding.) surrounding the Anwara EZ site. This, plus land-reclamation of 5 metres, will turn the waste land into a safe and valuable water front industrial zone. Many ports and industrial zones in Asia, including Japan, Korea, China, Philippines and Vietnam were low waste land, but were turned into valuable industrial zones/ports. The Anwara EZ can convert the current waste land into a valuable water front industrial zone using the above technical solution. Bangladesh has no water front industrial zone sites. At present the shipbuilding industries have been searching for suitable water front industrial zones for a long time found the Anwara site to be suitable. They are, therefore willing to invest in future expansion if the public side is willing to support partially the construction of a super dike and related channel; this would give the site access to the deep sea (6 m depth initially and may increase to 10 m in the future). The off-site cost is a bit high ($53 million) but if the public side is willing to provide a VGF of 15-20%, the private developer may construct the entire super dike (12km length) plus channel and land reclamation. These would make the EZ safe and valuable and also ensure the safety of the entire community of Anwara (population of 259,022 in 49,966 HH living in the Upazila, including the 48,807 HH living in rural areas).

4.2.13 Detailed Information of the land for the proposed EZ

Data on this section was collected from the AC Land from the Chittagong DC office records. There may be a small gap in these details and the land use pattern in the EZ. This is provided to help in identifying the land details during the land acquisition and compensation for resettlement.

Table 4.2.13-1: Detailed Information of Anwara EZ Land

Class of land		Size of land		Comments
According to record	**According to inquiry**	**Total**	**Proposed**	
River	Sandy island (Baluchar)	148.86	60	**88.86 acre**
Khila	Sandy island	81.28	45	**36.28**
River	Sandy island	107.98	107.98	**38.28 acre private ownership**
Shikasti	Sandy island	105.45	10	**95.45 acre**

Class of land		Size of land		Comments
According to record	**According to inquiry**	**Total**	**Proposed**	
				Shikasti
Nal	Nal	0.12	0.12	
Nal	Nal	0.73	0.73	
Road/path	Road	0.19	0.73	
Road	Road	0.3	0.3	
Nal	Nal	0.1	0.1	
Nal	Nal	0.04	0.04	
Nal	Nal	2.32	2.32	
Nal	Nal	0.25	0.25	
Nal	Nal	0.11	0.11	
Khai	Khai	0.15	0.15	
Nal	Nal	0.03	0.03	
Nal	Nal	0.11	0.11	
Khila	Khila	0.27	0.27	
Nal	Nal	0.64	0.64	
Nal	Nal	0.56	0.56	
Nal	Nal	0.23	0.23	
Nal	Nal	0.08	0.08	
Nal	Nal	0.5	0.5	
Sandy island	Sandy island	0.69	0.69	
Nal	Nal	0.14	0.14	
Nal	Nal	0.6	0.6	
Nal	Nal	0.1	0.1	
Nal	Nal	0.09	0.09	
Nal	Nal	0.42	0.42	
Khal	Khal	0.25	0.25	
Khila	Khila	0.16	0.16	
Road	Road	0.02	0.02	
Nal	Nal	0.07	0.07	
Nal	Nal	0.07	0.07	
Shikasti	Sandy island	113.24	7	
Nal	Nal	0.07	0.07	
Nal	Nal	0.16	0.16	
Home	home	0.28	0.28	
Home	home	0.15	0.15	
Road	Road	0.07	0.07	
Nal	Nal	0.13	0.13	
Nal	Nal	0.1	0.1	
Nal	Nal	0.52	0.52	
Khila	Khila	0.12	0.12	
Govt. Khas land		**567.75**	**240.92**	

Class of land		Size of land		Comments
According to record	**According to inquiry**	**Total**	**Proposed**	
Khila		16.89	16.89	
Khila		3.22	3.22	
Noyonjali	dam	5.62	5.62	
Dam	dam	5.62	5.62	
Dam	dam	1.74	1.00	
Shikasti	Sandy island/Baluchar	31.60	5.00	
BWDB total land		**88.78**	**49.35**	
Private land ownership : total land		**321.20**	**321.20**	
	TOTAL	**977.73**	**611.47**	

Photos of Meetings and public consultations are given below.






CHAPTER 5

INSTITUTIONAL FRAMEWORK & PPP

(COMPONENT 3)

5.1 Background

The Government of Bangladesh passed the Bangladesh Economic Zones Act in 2010 and established the Bangladesh Economic Zone Authority (BEZA). The Economic Zones (EZ) Act allows various institutional frameworks with a special focus on Public Private Partnership (PPP) arrangements involving the private sector, to implement EZs. For a successful PPP EZ, technical assistance funds, Viability Gap Financing (VGF) and infrastructure investment funds are allotted. A number of PPP EZ projects are in the pipeline including the Anwara site, in Chittagong Division.

5.2 Findings of Field Visits & Consultations

PPP Experts of the Team met the following organisations:

1. Infrastructure Development Company Limited (IDCOL).
2. Bangladesh Infrastructure Finance Fund Limited (BIFFL).
3. Summit Assets Limited.
4. Korean EPZ
5. Shamsul Alamin Real Estate Limited.
6. Building for Future Ltd.
7. Summit Power Limited
8. Ananda Group

During discussions with IDCOL, it was found that this financial institute has a track record in financing some components of running EPZs including the Chittagong Export Processing Zone (CEPZ) in Chittagong and a power plant in Dhaka EPZ. It has no plans to fund green field EZs i.e. land & onsite development of future EZs, for example the Korean EZP and Savar Leather Industrial Park, as they feel that these projects are uncertain. On the other hand, the Bangladesh Infrastructure Finance Fund Limited (BIFFL) has scope to finance some components of running EPZs and future EZs. At the same time, it has plans to finance green field EZs provided the projects are good and balance sheets of sponsors are quite sound.

The country's only private EZ development company, Summit Assets Limited stressed the importance of quick approval of EZ projects by the government and access to low cost long term loans to carry the PPP economic zone forward. Summit informed the team that Design-Build-Finance-Own-Operate-Transfer (DBFOOT) is the World Bank suggested concession PPP model for Kaliakoir Hi-Tech Park. The private Korean EPZ, now under construction, has recognised the importance of a multimodal transport system including jetty facilities on its adjoining river front.

Real estate companies indicated that they are interested in building and operating PPP EZs if they are provided with conditions similar to those enjoyed by Indian real estate companies i.e. Particularly quick approval of projects and availability of low cost long term funding. If real estate companies will not take up the full project, single components (housing & commercial zone in economic zones) will be taken up on the basis of PPP models. They suggest that the One Stop Service (OSS) centre at BEZA will coordinate with relevant government agencies in simplifying paperwork for fast track approval of economic zones under PPP models. That will create an enabling environment for effective private sector participation in the country's EZ program.

Private investors in power sector, Summit Power Limited, placed emphasis on the importance of low cost foreign currency loans for the country's EZ program. Summit Power has collected loans from the International Finance Corporation (IFC), the Asian Development Bank and foreign commercial banks at a lower rate of interest compared to local financial markets. Its financial controller feels that the private sector of the EZ program will try to arrange funds from those financial institutions. EZ private investors need the World Bank's PRG facility in order to collect loans easily from international

financial markets. The Chairman of the Ananda Group emphasised that the right type infrastructure facilities must be available for the Anwara EZ to attract private shipbuilding and investors in related industries.

5.3 Institutional Frameworks and PPP Schemes

Economic zones have been implemented across the world using a variety of institutional structures, ranging from fully public (government operator, government developer, government regulator) to 'fully' private (private operator, private developer, public regulator). In many cases, the public sector, in partnership with private investors, formed pseudo-corporate institutional structures to develop and operate economic zones. Under this arrangement, the public sector provides some level of support including initial land acquisition and provision of off-site infrastructure, while the private sector arranges funding, develops onsite infrastructure, sells industrial plots and takes up Operation and Management (O&M). PPP economic institutional structures and PPP schemes must be tailored to accommodate the existing conditions and customized to achieve project development objectives. The following institutional frameworks and PPP options for implementation of the selected economic zones are evaluated to facilitate a comparative analysis.

5.3.1 Option A: Government-Led Model

Under Option A, Bezos would be responsible for land acquisition, arranging funds, development of onsite infrastructure, regulation and operation & management of EZs. BEZA would promote EZs and lease ready plots to industrial units.

5.3.2 Option B: Operating and Managing Outsourcing Model

BEZA would request the concerned government organization to acquire land on its behalf and fill the land. BEZA would develop on-site infrastructure such as roads, electricity connections, sewerage network, etc. In parallel, they would invite tenders from potential private investors to operate and maintain the selected 3 EZs. The private operator would obtain a flexible long term lease over the land for the concession period through a concession agreement. It would pay a royalty to the government and sub- lease plots to industrial units.

5.3.3 Option C: Concession PPP Model

BEZA would request a concerned government organization to acquire land on its behalf. BEZA would grant control over the land (acquired by a government organisation) to a private economic zone developer under a long term lease agreement through competitive public bidding. After completion of the land bidding, the private developer would form an SPV, responsible for preparing detailed concepts, plans, layouts and detailed design, arranging financing, land preparation & onsite development, and preparing plots for sub-lease to industrial units for 99 years. BEZA would provide operation and management services.

5.3.4 Option D: Private Ownership PPP Model

Under Option D, BEZA would be responsible for regulation of the zone and land acquisition. The SPV would pay the land price upfront. In parallel, the SPV would be responsible for preparing detailed concepts and plan layouts, arrange financing, prepare detailed design, carry out land filling, develop onsite infrastructure, prepare plots for outright sale to different categories of entrepreneurs,

and manage O & M of the zone area. As per the Bangladesh Economic Zones Act, 2010, the SPV will impose minimum standards for the zones, criteria for plot design, and development control guidelines for on-site infrastructure and common facilities etc.

5.3.5 PPP Options in Summary

Table 5.3.5-1: Summary of the PPP Options

Options	Land Acquisition	Off-site	Financing	Land filling and On-site	O & M	Regulation
Option A: Government-Led Model	BEZA	BEZA	BEZA	BEZA	BEZA	BEZA
Option B: Operating and Managing Outsourcing Model	BEZA	BEZA	BEZA	BEZA	Private operator	BEZA
Option C: Concession PPP Model	BEZA	BEZA	i)BEZA –Initial land acquisition and SPV procures land and funding up front development	Private operator	Private operator	BEZA
Option D: Private Ownership PPP Model	BEZA	BEZA	Private operator	Private operator	Private operator	BEZA

5.4 Components of the EZ as PPP Entities

From field trips to the three sites and best practise master plans of the sites, it is well understood that implementation of EZs on the sites will require substantial investment. It is envisaged that there will be two categories of projects such as core infrastructure of the zone (land and onsite infrastructure) and individual components (commercial zone, inland cargo depot, IPPs, water treatment plant, and CETP, etc.).

Some of the major services could be split off as separate component PPPs in the case of the Anwara EZ. PPPs would be governed by their respective concession agreements. The private zone developer will be free to outsource the above components to other private organizations as PPP entities. The basic revenue and cost model envisaged for implementation through a component PPP is presented in the following table.

Table 5.4-1: Components of Anwara EZ

Sale-status	Main Land Use	Land Use Sub-category	Investor	PPP Scheme
Leasable	Industry Plot	Shipbuilding Yard	PI	BOT
	Commercial Zone	Investor's Club	PI	
		Market	PI	BOT
	Power Plant, Coal Stock Yard with Jetty		IPP	BOO
Not-leasable	Control Office/Parking		EZD	
	Fire Service Station		EZD	
	Security Barrack		EZD	
	Administrative Staff Quarter		EZD	

Sale-status	Main Land Use	Land Use Sub-category	Investor	PPP Scheme
	Super Dike (On Site)		GOB/BWDB	
	Inner Road	Main Road	EZD	
		Minor Road	EZD	
	Waste Water Treatment Plant		EZD	DBFOOT
	Water Supply Treatment Plant		EZD	DBFOOT
	Green Zone		EZD	
Off Site Infrastructure	Super Dike		GOB/BWDB	
	Electric Connection		PDB/EZD	
	Water Connection		PHE/EZD	
	Access Road		BWDW/RHD/EZD	
	Communication		BTCL/ISP/EZD	

Non-core infrastructure such as the Commercial Zone, Coal Based IPP with captive Jetty, Water Treatment Plant and CETP can be done on the PPP model based on the following criteria:

1. Projects being within the range of minimum economic size as an independent investment.
2. Establish revenue model that is typically viable.

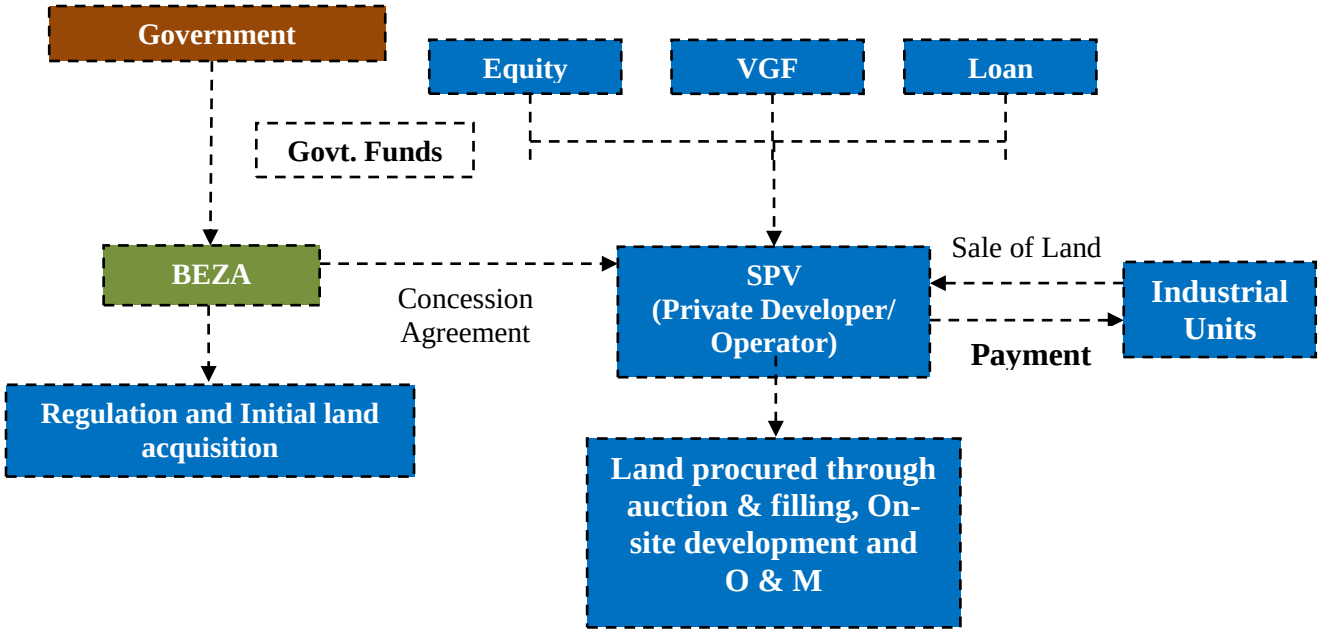
The Private zone developer cum operator will take up core infrastructure of the zone (land & onsite development, preparing plots and O &M) along with individual components of the project, or separate SPVs can be proposed for individual components, being PPP entities.

5.5 Business Model of Anwara EZ

The Concession PPP Model (BOT) - **Option C** - is proposed as the preferred modus operandi of the private developer cum operator in implementing Anwara Economic Zone. The Anwara site can be developed as specialised Shipbuilding & Component Economic Zone (S&C EZ). The business model of Anwara EZ is to procure land under a 99-year lease through competitive public bidding at auction, develop plots and sell these plots to shipbuilding and component industry entrepreneurs and provide good quality infrastructure and facilities such as a quality power supply, commercial facilities, constant power supply, jetty facility, water supply, and CETP under a PPP structure. Super dike and off-site infrastructure includes access road, jetty facility, telecom network, and power transmission line outside the economic zone's premises, to be borne by BEZA. The social infrastructure is also very important and ensures proper living conditions for the people inside the zone and could include administrative buildings, low cost housing for workers, a clinic, a mosque, and public restroom facilities. These should be the part of BEZA's initiatives.

It is noted that only BOT PPPs projects are qualified to receive viability gap financing according to the Guideline for Viability Gap Financing (VGF) for Public-Private Partnership Projects, 2012. The PPP structured Anwara Economic Zone will be enabled to receive VGF in the form of a capital grant during construction or annuity for O&M over the concession period. After completion of the concession period on a 99-year lease, the private operator will hand over the operation and management of the zone to BEZA. The overall structure is presented in the figure below.

Figure 5.5-1: Business Model for Anwara EZ



The advantages of this model are as follows:

1. Private sector efficiency in operating and maintaining the EZ is achieved.
2. If Option C-Concession PPP Model (BOT) is chosen, the Government needs substantially less investment in the EZs compared to other options - Government-Led Model and Operating and Managing Outsourcing Model. In table 3.5.3-1 of Chapter 3 the cost summary of different investors is given. From that table it is can be seen that 25% cost will be borne by the EZD, 11.4% by the Government, and 64% by IPP.
3. The Government has strong control through the concession agreement of regulation of the selected EZ.
4. Viability gap funding may be provided to the SPV to increase viability of the project and attract investors.

The disadvantages of this model are as follows:

1. No clear source of government funding for the initial land acquisition cost of Anwara Economic Zone.
2. Private operator interest in operating and managing the EZs is uncertain at this point and has to be tested in the market following the completion of the feasibility study.

5.6 Delineation of Responsibilities under Option C-Concession PPP Model

The responsibilities of BEZA and the private developer/operator under the concession PPP model are given in the table below.

Table 5.6-1: Responsibilities of BEZA and EZ Developer/Operator

BEZA	Private Developer/ Operator
1. Initial Land acquisition. 2. Conduct competitive land auction bidding for private investors. 3. Guideline for developing the zone. 4. Defining terms and conditions defining the interrelationships within the PPP, between private and the public sector. 5. BEZA and BOI will jointly formulate and implement marketing of EZ through information gathering, stakeholder consultation, intra-govt. communication and clear up-to-date information provision on rules and regulations. 6. Development of off-site infrastructure, which includes gas pipeline and power transmission line.	1. Prepare master plan of the zone. 2. Receive land on lease basis through competitive bidding. 3. Develop onsite infrastructure and sub-leasing industrial plots. 4. Environmental and social impact mitigation. 5. Side by side, zone developer with BEZA and BOI will market the zone to the potential entrepreneurs for setting units in the zones. 6. Reporting to BEZA. 7. Payment of license fees to the Government.

5.7 Need for Change in Present Land Lease Regulations

The current BEZA Land regulation is 30 years lease (extendable twice up to 90 years). However, it is strongly recommended to consummate a 99 year lease, with clauses rendering the instrument both renewable and transferable, as the most similar development situations in Asian countries. If the land lease is only 30 years and not transferable in accord with the usual BEPZA land regulation, then the PPP scheme is not likely to attract many developers/investors, and the BEZA EZ Program may have to use the Case 1 which would be for BEZA to develop and operate the EZ under the current BEPZA program.

Table 5.7-1: Land Regulations for Asian Countries and Bangladesh

Country	Bangladesh	Thailand	Philippines	Malaysia	Cambodia
Land Ownership	NO	Yes For Industrial Park	Yes For Industrial Park	Yes	No
Land Lease Extension Transferable	30 years Yes No	Any period Yes Yes	Any period Yes Yes	Any Period Yes Yes	50-99 Ys Yes Yes
Recommended	50-99 Ys Plus Transferable & Extendable				

Source: WB Study Team

With the present land regulations which are not extendable and transferable, BEZA EZ project is not likely to be promoted as a PPP scheme as originally considered. It is strongly recommended that the land lease regulations to be changed immediately before starting the BEZA EZ program.

5.8 Institutional Framework: Implementing Anwara Economic Zone

Fundamental to the institutional framework is the question of the implementation route. It has been proposed in the study that the Anwara site be developed and operated as a shipbuilding and component zone under PPP arrangement - a four-tier system, as the institutional framework for the implementation of Anwara Economic Zone:

- An Apex body, headed by a Principal Secretary to the Prime Minister's Office with concerned heads of line agencies (BEZA, PPP office, Department of labour, customs, power, roads &

highway, national highways, Department of Environment) as Members for overall guidance, planning and approval.

- In this project, BEZA, headed by a full time project director, is to be responsible for initial land acquisition and transfer of land to private investors through competitive bidding for site development. The Project Director will ensure infrastructure development of the zone within a specified period through monitoring the activities of its own and of economic zone development.

- Various government agencies will be involved in the process of implementation of Anwara EZ. Each and every agency will want to regulate Anwara EZ. Due to involvement of various government agencies, problems can occur during pre-operational and operational periods of the Anwara EZ. In order to identify and solve problems immediately, a Steering Committee (SC) will be formed for this zone to coordinate and conclude all technical, legal aspects, or issues. It has a further duty of receiving any complaints and finding solutions to such complaints filed by the Zone Developer as well as by Zone Investors. Anwara EZ Steering Committee will meet once per month. The composition of the Anwara EZ SC is as follows:

  - A member nominated by the Prime Minister.
  - Chairman of BEZA.
  - Heads of Relevant Government Agencies.
  - Project Director of Anwara Economic Zone.
  - Deputy Commissioner of the District Relevant to Anwara Economic zone.
  - Chairman of the established SPV Company for Anwara Economic zone.

- The SPV Company of Anwara EZ is the "One-Stop Service" organization in charge of the development and management of operations of the zone. The SPV Company will arrange equity and debt fund from local & foreign markets. Various formations of SPV have been explored for development and O&M activities of Anwara Economic Zone. These are :

  - Private Shareholding Company governed by a board of directors and owned through a joint venture partnership between the Government and private investor.
  - 100% single private owned SPV.
  - 100% single foreign investor owned SPV.
  - Private consortium owned SPV.
  - Local and foreign investors' consortium will jointly form SPV.
  - Multiple SPVs will be formed to develop and manage Zone development & operation and non-core individual components (Zone development & operation, commercial Zone, coal based IPP, stockyard and jetty, water treatment plant and CETP).

5.9 One Stop Service (OSS) for Anwara Economic Zone

The OSS of the EZ will have an impact in reducing the cost of doing business and increasing the flow of investments through improved service delivery. BEZA may, if the Government directs, set up, maintain and manage centres of the Customs Department and Office of the Chief Controller of Imports and Exports (CCI&E) at the zone area to facilitate export, import and supply to the local market. Apart from customs facilities, investors will receive all types of services required for investment. In the meantime, the Export Processing Zones of Bangladesh are running this type of OSS from where the investors can receive all types of services required for investment.

Tentative OSS System for BEZA is shown below:

Table 5.9-1: Delineation of Responsibilities in OSS

Item	BEZA	Other Agency
Investment License	Yes	
Construction & Operation Permit	Yes	
Import & Export License	Yes	Customs Office
Tax Registration	Yes	NBR
Working Permit	Yes	Ministry of Home
Multi Visa Issues	Yes	Immigration
Incentive Arrangement	Yes	
Environmental Issues &Permit	Yes	Ministry of Environment

The above OSS operation is based on the BEPZA practise now which is considered as a fairly good system and BEZA should able to improve upon the existing OSS system of BEPZA.

Further improvements are suggested below:

1) One customs official should be posted full time under BEZA to facilitate activities of Bond permission and renewal of Bond licenses every year.
2) One representative should be posted to each EZ from different (respective) Gas Company to take proper care about connections and other matters related to Gas wherever the facility is available.
3) One representative from ministry of home may be posted to BEZA H/Q for security clearance of BEZA investors.

Comprehensive and high-standard infrastructure:

- Reliable power and gas supply
- Independent water supply system
- Common Effluent Treatment Plant
- Reliable and modern telecommunications system
- Multi-mode transport system

"On-site, one-stop" services in partnership with relevant government agencies:

- Bangladesh Economic Zones Authority.
- The Customs Department
- Office of Chief Controller of Imports and Exports (CCI&E)
- The Ministry of Commerce
- The Ministry of Labour and Vocational Training

Other on-site services provided by Anwara Economic Zone:

- Investment registration
- Import / Export permits
- Customs clearance
- Business: Bank, Courier, Post office, C&F Agent, Shipping Agent and commercial complex etc.
- Workers' recruitment support
- Labour management assistance in cooperation with the Ministry of Labour
- 24 hours security and fire station.
- Garbage collection and disposal
- Canteen and Medical Centre for workers.
- Legal, Administrative and accounting consultation

5.10 Financing Plan of Anwara Economic Zone

The Concession PPP Model (BOT) is proposed as the preferred modus operandi of the private developer/operator in implementing the Anwara Economic Zone. The SPV Company of the Anwara Economic Zone will mobilise internal & external equity and debt funds to procure land on a long term lease at competitive auction, develop onsite infrastructure, and prepare industrial plots.

Option C (Concession PPP Model) should consider sources of finance for developing Anwara Economic Zone from the perspective of two parties i.e. government/BEZA and private developer cum operator.

5.10.1 Government/BEZA Financing

The potential sources of finance for government/ BEZA for developing off-site infrastructure and the super dike of the zone are assumed to be as follows:

- Government‘s own funding

To gain the confidence of private investors regarding the government’s eagerness and strong position in the PPP initiative, US$35 million is kept aside for the Public-Private Partnership (PPP) programme in the fiscal year 2013-14 national budget. Part of the PPP fund will be used to finance off-site development and initial land acquisition. Later, the cost will be realised from private investors through competitive bidding. BEZA will use the expertise of the Public Private Partnership Office, Bangladesh under PMO to enter into a PPP agreement with the private zone developer.

- Funding provided by different donor agencies (like IDA, ADB, JBIC, JICA etc.);

The terms and conditions of financing provided by different donor/lending agencies are discussed below:

- **International Development Association (IDA)**

IDA credits are given only to governments with a maturity of 40 years including a 10-year grace period. IDA credits have no interest, but carry with an annual service charge of 0.75% on the disbursed and outstanding credit. The commitment charge on IDA credit and grant is set annually within a range of 0–0.5% and is determined by the Executive Board before the start of a financial year. IDA is financed by a partnership of donors who come together every three years to agree on the resources required to fund IDA‘s lending program and to determine the policy objectives that guide IDA‘s activities. As a result, the IDA‘s resources, unlike the resources of a regular lending institution, must be regularly replenished through contributions if the agency is to continue in business.

- **Asian Development Bank (ADB)**

ADB provides two types of loans - Asian Development Fund (ADF) and Ordinary Capital Resources (OCR). ADF is a concessional loan while OCR attracts near market rates for the borrowers. Bangladesh joined the ADB in 1973 and became one of the largest borrowers of concessionary Asian Development Fund (ADF) resources. For project loans from ADF window (i.e., other than quick-disbursing program loans) the terms are: 32-year maturity including an 8-year grace period, 1-percent interest charge during the grace period and 1.5% during the amortization period and equal amortization. For quick-disbursing program loans the terms are: 24-year maturity including an 8-year grace period, 1% interest charge during the grace period and 1.5% during the amortization period and equal amortization. There is no commitment fee associated with ADF-financed loans. Most lending from OCR have been London interbank offered rate (LIBOR)-based loans (LBL). LBL may be denominated in US dollars, euros, yen, or other foreign currencies in which ADB can efficiently intermediate. Initially, LBLs carry a floating lending rate consisting of the 6-month LIBOR or another

relevant floating rate benchmark and an effective contractual spread and, where applicable, a maturity premium fixed over the life of the loan. For OCR loans the terms are: 20-year maturity including a 5-year grace period. There is a commitment fee associated with OCR-financed loans.

- **Japan Bank for International Cooperation (JBIC)**

JBIC is a government financial institution that provides long-term, low-interest project loans for development projects and programmes. Since independence, JBIC has extended soft loans to Bangladesh with an interest rate of 0.01% and repayment period of 40 years with 10 years grace period.

- **JICA ODA Loan (Long term, Low Interest)**

Since establishing diplomatic relations, JICA has been giving Official Development Assistance (ODA) loans in development of much-needed physical infrastructure in Bangladesh. For example, JICA recently finalised modalities of the $2.1 billion credit under its 33rd Official Development Assistance (ODA) package for a metro-rail project, with a tenure of 13 years. BEZA and private investors are looking for a similar soft loan facility for the country's EZ program with particular focus on public sector investment.

Table 5.10.1-1: Major Conditions of JICA ODA Loan

Project Type	**Government Project**
Financing Tool	Loan
Terms of Loan - Interest Rate - Repayment Period - Grace Period - Maximum Share	 Normal ODA loan: 1.4% Special Condition: 0.2% Normal ODA loan: 30 years Special Condition: 40 years (Revised periodically) 10 years 85%
Procedure	-Initiated by official request of government of recipient countries
Security	-Sovereign guarantee or Government borrowing

5.10.2 Private Developer/ Operator Financing

Financing options for a private operator may be one or a combination of equity sources and debt sources. The Anwara economic zone developer/ operator external equity and debt financing is expected to be obtained from the following sources:

5.10.2.1External Equity Financing

i. IFC's Equity Financing

As the demand for infrastructure grows, governments are increasingly looking to public private partnerships as an innovative way of financing costly infrastructure projects. IFC investments

typically range from $5 million to $100 million, with a limited number of investments in the $100,000 to $5 million range. To ensure the participation of investors and lenders from the private sector, IFC typically finances no more than 25% of the total estimated project costs.

- For new projects, the maximum is 25% of the total estimated project costs, or, on in an exceptional circumstance, up to 35% in small projects.
- For expansion projects, the IFC may provide up to 50% of the project cost, provided its investments do not exceed 25% of the total capitalization of the project company

ii. Equity Fund from Asian Development Bank

The ADB may invest directly in an enterprise. It offers financing through equity investments, including direct equity investments in the form of common shares, preferred stock, or convertibles. Equity investments in enterprises, especially financial institutions, occur before an initial public offering. The ADB does not seek a controlling interest in an investee company and will not assume any management responsibilities. It will, however, typically wish to reserve the right to appoint a nominee or an observer to the board of directors of each of its investee companies and to selected board committees and will exercise voting rights as a shareholder. It will maintain regular contact with company management and require periodic reports on the progress of capital projects, operating performance, financial condition of the enterprise and economic value added. The ADB also requires reports on specific indicators for development outputs and outcomes and monitors continued compliance its environmental and social safeguards.

Potential ADB participation in Anwara EZ will help the private sector of Bangladesh to mobilize additional investment from top tier international partners in the days to come.

iii. Private Sector Investment Finance (Equity Funding), JICA

In April 2008, the government announced its "New Strategies for the Enhancement of Collaboration between ODA programs and Japanese Companies: Public Private Partnership for Growth Acceleration".

Major Conditions: Equity Finance (Investment)

- Investees

  JICA invests in commercially viable projects (or fund) e.g. PPP infrastructure project company (SPC), individual project sponsors
  .
- Share of Equity

  JICA cannot take majority share, maximum 25 % of the total capital
- Exit Policy

  Pre-arrangement of exit plan required for successful transition to sustainable private business.

5.10.2.2 Debt Financing

i. Investment Promotion and Financing Facility (IPFF)

The Government, through the Bangladesh Bank (BB), has come forward with an Investment Promotion and Financing Facility (IPFF) project with the assistance of the World Bank to make partial debt financing available for private infrastructure projects. The Anwara EZ operator can take advantage of such loans through participatory financial institutions (BB approved financial intermediaries).

The Bangladesh Bank provides loans to a participating financial institution (PFI) upon the request of private investors to the PFI for such a loan. The PFI upon receiving a request from the private investor makes an application to the facility for funding. The BB considers the application based on the operational directives of the facility and disburses the fund to the PFI. The PFI then extends the loan to the private investor. The loan is received by the PFI from the BB under the facility. Syndication amongst PFIs and with non-participating institutions is permitted but the PFIs are responsible for credit administration and recovery.

The private sector promoter needs at least 30% equity contribution to access an IPFF loan, whereas PFIs need to finance at least 14% of the project cost and of the rest 56% may be financed by IPFF. The maximum term of the loan repayment is 20 years with 3-10 years grace period. The interest rate for PFI is a weighted average yield of 1 year Treasury bill plus 50 basis points (if a floating loan). A Facility loan can also be taken in dollars or other currencies with a rate of 50 basis points above the relevant interbank rate.

ii. Debt Fund from the Asian Development Bank

The ADB supports PPP modalities Projects ranging from build–operate–transfer, build–own–operate–transfer, concession, private independent power producers, joint ventures, service contracts, build–own–operate, design–build–finance–operate, financing facility, and purely private sector investments such as direct loans to SPVs of PPP projects.

Interest rates and other terms vary, depending on a company's, or a project's, needs and risks.

- **Rates** - In pricing its loans, the ADB considers prevailing market rates in the relevant country and sector, factoring in country and transaction risks. The ADB provides floating rate loans at a spread above the London interbank offered rate (LIBOR) or Euro interbank rate, depending on the currency. It also offers fixed rate loans at the fixed-rate swap equivalent of floating-rate loans.
- **Fees** - Market-based fees are charged. Typically, on floating-rate loans, ADB charges a once-only front-end fee as well as an ongoing commitment fee on the undisbursed balance. We may also charge a fee to cover upfront costs associated with due diligence. Project sponsors or clients will reimburse out-of pocket expenses, such as travel and external advisory services (i.e., legal counsel, technical consultants, and environmental and insurance advisors, if any).
- **Security** - We will seek security appropriate for the loan and type of financing.

iii. JICA Debt (Concessional Loan for Private Sector)

Private Companies gaining access to JICA debt fund to build infrastructure and that previously had been reserved for the public sector.

Major Conditions

- Fixed rate (Base rate : GOJ bond plus), JPY – denominated*
- Long tenure up to 20 years with grace period (up to 10 years)

  (Exceptionally up to 25 years dependant on necessity)
- JICA provides loan up to 70% of the total project cost

  (Exceptionally up to 80% dependant on necessity)
- Future possibilities of providing PSIF in US$

iv. IDA Guaranteed Loan

Partial Risk Guarantees (PRG) support private sector investment projects, including Public-Private Partnership (PPP) projects, green-field and rehabilitation/expansion projects, and concession and privatization transactions. PRG can be structured to protect lenders of limited-recourse project finance debt, or to protect the project company ("Letter of Credit" or "Deemed Loan" PRGs). Country eligibility - PRGs are available to all IBRD and IDA countries, PCGs and PBGs only to IBRD-eligible countries. IBRD may provide PRGs for enclave projects in IDA-only countries. IDA would make payments under its Guarantee in accordance with the amortization schedule pre-agreed with commercial lenders or prepay the loan, at its option. Partial Risk Guarantees (PRG) will help the Private developer/operator of the SPV Company of Anwara EZ to receive long term international financing. The successful financial closure of Anwara EZ through the deployment of the IDA Guarantee will serve as an important milestone in establishing a track record for facilitating financial capital flows to the country's EZ program.

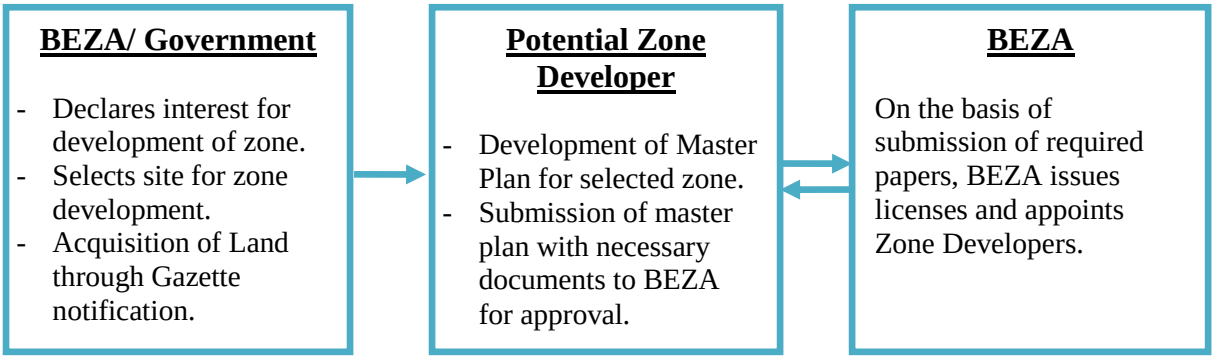
v. Offshore Financing

With the rising foreign exchange reserve of Bangladesh Bank and remittance encouraged, offshore banking units of foreign and local private banks can arrange long term lower interest rate fund for private sector economic zone investors. For this purpose, banks will collect resources from remittances, borrowing from foreign banks, deposits of foreign banks and EPZs and foreign exchange reserves.

5.11 Approval Process of Economic Zones

In Bangladesh, the Bangladesh Economic Zones Act 2010 has opened up a new window and will allow the private sector to own, develop and manage economic zones, and establish infrastructure and services for the companies in them. In the backdrop of the Bangladesh Economic Zones Act, the process of approval of a zone developer is presented in the following figure.

Figure 5.11-1: Approval Process of Economic Zone



According to the Bangladesh Economic Zones Act 2010, BEZA or any government agency will develop economic zones or specialised zones for industrial or particular sector development. In this regard, BEZA will seek an expression of interest for prospective zone developers under a suitable PPP model. After receiving proposals with all required documents from interested zone developers, BEZA will approve proposals.

CHAPTER 6

FINANCIAL AND ECONOMIC MODELING

(COMPONENT 4)

6.1 Financial Analysis

The Government of Bangladesh will allow the private sector to participate and bear the burdens and rewards of developing infrastructure—power generation, bridges, economic zones, in a partnership approach. It is therefore assumed in the study that the economic zones will have a large degree of private sector participation especially when the local private sector and foreign investors have shown interest in developing economic zones. Accordingly, this Section analyzes the financial viability of the Anwara, Chittagong EZ based on net financial benefits under the different degree of participation of private sectors and cash flows accruing to investors, who provide equity in developing economic zones.

The analysis is based on the demand for serviced industrial land set out in the section on demand projections and construction and development costs, detailed in annex-5 (A, B &C). Assumptions on the operation and maintenance (O&M) costs are also presented. The model developed proceeds to analyze revenues generated by the zone, and the IRR (both for the zone and equity investors), and the NPV of the project.

The project's sensitivity to various factors is examined in the financial model. In addition, the key issues — the cost of the land, land development, utilities, water connection to border, water supply and waste water supply, an off-site super dike system to be borne and provided by whom — Government, or Private Sector or a combination of both are analyzed in terms of different PPP models. All these issues are run through the financial model to see what the impact would be on the final IRR if the government or the private sector develops them, or some combination of both. Table 6.1-1 presents key assumptions.

Table 6.1-1: Overview of Key Assumptions

Category	Key Assumptions
Land	1,389.50 acres or 5,623,100 gross square meters of land, 4,169,500 square meters of industrial plots,
Sales Revenue	Service Land ($60/m^2) or (Tk. 4,800 /m^2) initially & then price increase to $70/m^2 in 2020)
Service Revenue	Full charge fee for water & waste water and other service revenue equivalent to 15% of applicable utility rent/bill
EZ Service Fee	$1.92/m^2/year
Depreciation	25 years (Infrastructure & Buildings) 5 years (Equipment)
Viability Gap Funding (VGF)	Grant
Govt. Partial Guarantee	For availing soft long term loan by SPV company
Debt/Equity Ratio	70% (70% LTD, 30% Equity or Reinvested Cash)
Long-Term Loan	Loan arrangement fee equal to 2% of the maximum credit line

6.1.1 Methodology

The financial assessment enables us not only to assess the financial viability of the project, but also to guide any pricing and timing issues that may be able to influence the profitability of the project, and identify any requirements for public support. A model was developed in a spreadsheet to calculate projected revenue streams, and capital and O&M costs, to enable the testing of a number of parameters for their effects on the finances of the Anwara EZ. The primary outputs of the model are estimates of the Internal Rate of Return (IRR) and Net Present Value (NPV) of the net benefits flow generated by the Anwara EZ for the project. The analysis is based on the Base Case, which considers demand projections presented in this report and assumes land costs, relocation and compensation costs, all on-site infrastructure development costs including the costs of provision of a super dike, being provided by the private sector, while jetty and coal power plant are provided through an IPP.

The financial viability of the Anwara Economic Zone is assessed through the following estimations:

i) Costs of public lands
ii) Capital costs of acquiring the EZ inclusive of Relocation and Compensation Costs
iii) Capital costs of developing/constructing the zone
iv) Capital costs of provisioning a super dike system (on-site)
v) O&M costs of operating and maintaining the zone
vi) Costs of maintenance of annual dredging
vii) Revenues accruing to the zone owner/operator
viii) Government support necessary to make the project viable for private sector ownership, development, and/or operation

It is proposed that the Anwara EZ funds almost all capital expenditures through debt financing. This soft long-term debt is secured through partial government guarantees and all the assets of the project. The equity share of initial capital expenditures is funded by investors. Subsequent requirements are funded from investors through the use of retained cash whenever possible, and additional injections of external equity from investors whenever necessary.

6.1.2 Assumptions

In light of the master plan and development cost estimate and demand projections, certain non-financial assumptions are made in this feasibility study and are listed in Table 6.1.2-1.

The Financial Analysis of Anwara EZ covers only capital costs of acquiring the EZ, inclusive of relocation and compensation costs, cost of public land, on-site infrastructure development costs only, and O&M costs and revenues of the economic zone. It is assumed that the government of Bangladesh will develop all off-site infrastructure. This includes the off-site super dike costs, access roads on the off-site dike, communication and utility (water and electrical) connections to the border of the economic zone. It is also assumed that the government will be responsible for the acquisition of land. The super dike system is essential to protect the peninsula of Anwara. The costs of both the on-site and off-site super dike systems are $79.7 million. Alternatively, using Viability Gap Funding (VGF) may be justified since the unproductive area will be converted to a productive area, creating employment.

Table 6.1.2-1: Anwara Economic Zone Financial Model Assumptions

Variables	Assumed Value	Notes
Size of gross land	5,623,100 square meters	Parcel of land along the mouth of the Sangu River in Anwara, Chittagong of which 1,175,200m^2 to be acquired and purchased by the Govt/owner and 3,149,900m^2 of land to be reclaimed at the beginning of project.
Gross/net land ratio	76.76%	76.18% of gross land will be serviced industrial land to be saleable lease [224] and 0.58% of gross land will be commercial and dry-port plot to be saleable leasable. 21.51% will be devoted to road, utilities, green space, and common zone facilities and 1.73% of gross land will be kept for settlement.
Super Dike (Off-Site)	675,000 square meters	Purchased, developed, owned and operated by the government as a part of off-site costs.
Earth filling	3.35 meters	Average depth shown.

[224] Saleable lease implies the lease on sale rather than lease on rent having lease period of 30 years and transferability conditions as well for the purpose of SPV.

Variables	Assumed Value	Notes
requirement		
Average market price ($/m^2)	$8.0/m^2	The average price is for land other than river, khal & road may be fully/partially provided by government under some PPP arrangements.
Relocation and compensation costs	$17.80 million (using $1 = Tk 80)	Information provided by UNO office, Anwara, cost may be borne by the government under some PPP arrangements. This includes a 50% premium over current market prices as required by law.
Corporate tax/VAT	0%	Assumed government will waive corporate tax and VAT for the developer as an incentive
Phasing of Development	No Phasing of Development 562.3 gross hectares	Infrastructure development in the zone is not phased. The project starts in 2017 and completes in 2020. In the base case, this occurs in Year 3 and ends in year 6.

6.1.3 Capital Costs

Capital costs are based on the market value of the land, including the cost of the public portion of land, estimated relocation and compensation costs to be paid to landowners and residents, and the costs of on-site infrastructure for the zone. These costs include land preparation and dredging, roads, super dike, access road on dike, jetty and deck (IPP), coal-fired power plant (IPP), institutional buildings, utilities, and waste water treatment plant in line with the master plan. According to the master plan, these items are disaggregated and developed over the period of a certain fixed schedule. The costs of the on-site coal power plant and jetty are on an IPP and hence these costs are not considered in the financial analysis.

Land is assumed to become available for saleable lease in the later part of the same year as it is developed. However, 70% of the available saleable lease land is assumed to be sold in the year and the rest in the next year for a conservative estimate. The full annual break down of site development and building costs is provided in Annex-5.

In the base case, the project is developed by year 6 (2020). The total fixed costs for the development of the Anwara EZ over the 20 year period in the base case is projected to be approximately US$186.21 million except for off-site costs in terms of 2014 prices. The cost is divided as follows:

- Public Land, Land Acquisition and Compensation, and Relocation US$26.79 million;
- Land Development ¬ preparation and land reclamation through dredging US$49.39 million;
- On-site Super Dike System costs US$33.89 million;
- Other Site development, infrastructure, and common building US$76.14 million

The Off-site costs amounting to US$67.14 million are as follows:

- Off-site Super Dike System costs US$45.77 million
- Other off-site costs including water connection, access roads etc. - US$21.37 million

6.1.4 No Phasing of Development

In line with best practice in economic zone development, the Anwara EZ is perceived to be developed in a single intensive development phase. While the entirety of the land will be acquired at the beginning of the project, the additional land will also be required to be reclaimed through dredging initially, especially for the coal power plant. The infrastructure should be constructed to accommodate the outcome of the Demand Forecast. Thus, no phasing of development of the Anwara EZ project is

required because land acquisition and land reclamation, and the construction of super dikes and other basic infrastructure, have to be made initially to satisfy expected demand.
The analysis is carried out at a 21-year period of the Anwara EZ project, with a 19 year actual operation. The project starts in year 3 (2017) and should be completed by the year 6 (2020) within a 4 year period. The estimated timing of development is matched to the demand projections given in Chapter 3.

6.1.5 Operation and Maintenance Costs

Operation and Maintenance costs (O&M) for the Anwara EZ are assumed for six areas — administration/staffing costs, promotion costs, provision of costs for operating and maintaining utility services, costs of maintenance of annual dredging, and provision of security services.

Administration costs are based on 3 upper level managers, 3 mid/low level officer, 16 technical workers, and 45 unskilled workers including security personnel, initially. Based on the level of human resources, the initial wage bill for the Anwara EZ administration and security personnel would be US$0.079 million (just above Tk. 6.28 million). Annual marketing and promotion costs are set to Taka 10 million (US$0.125 million), which will continue and be sustained for the first five years and taka 5 million for the remaining periods. Annual provision of O&M costs is assumed to be 2% of capital costs other than land, its development & dredging, which amounts to US$2.15 million initially. Ten per cent of the dredging capital cost is assumed to be required for maintenance of annual dredging.

6.1.6 Prices for Saleable Lease of land

The price level for a saleable lease of serviced land was considered by analyzing prevailing rates in the region in the context of competing free zones, industrial estates, and commercial space, and in terms of the provision of a super dike system/access road, Jetty and channel, while the Anwara EZ is being planned and constructed. The Anwara EZ is also assumed to provide better infrastructure and service to its tenants than competitive locations. In order to attract investors, the developer/operator should start leasing at an attractive sale leasing price of $60/m^2 for 2018 and 2019 and increase the price by $10 to $70/m^2 for 2020 and 2021. For the sale lease of industrial land for the coal power plant and jetty, the sale lease price of industrial plots is reduced by $5/m^2 to cover the cost of provision of the distillation plant, in order to supply water for the coal-fired power plant. For the commercial plots, the land sale lease price would be $70/m^2 for 2018 and 2019, and increased by $10 to $80/m^2 for 2020 and 2021.

A full charge for the provision of water and treatment of waste water and other service charges are assessed on all the occupants of the EZ under the financial model. The service charge depends on the consumption of utility services by the occupants of the EZ and is equivalent to 15 percent of the applicable utility bill. In addition, an EZ service fee of $1.92/m^2/year is assessed to be charged on all occupants depending on the usage of the land and covers the provision of common services to the occupants of the Anwara EZ. This EZ service fee ensures that the owners/operators of the Anwara EZ have a continuing solid basis for management of the zone when all the developed land has been passed on to investors.

6.1.7 Capital Structure

The development of Anwara EZ is assumed to require at least a 30 percent share of equity to secure any needed loans. All capital expenditures are assumed to be leveraged at a 70 percent debt-equity ratio to maximize returns to investors. Equity requirements are funded, if possible, through retained cash from operations of the Anwara EZ. When retained cash is not available (such as for the initial

investment), the model assumes that equity is provided from an external source (the investor). The sole investor in the development of the Anwara EZ is assumed to be the developer/operator — herein referred to as Anwara Special Purpose Vehicle (SPV) Company.

The model assumes that all new borrowing must be fully repaid within 7 years of the issuance of debt. The interest rate on soft long term commercial loans (with partial guarantees of government) is assumed to be 8 percent considering riskiness of the project. For the first two years after new borrowing, there is a moratorium on principal and interest repayments. For years 3-7 after borrowing, it is assumed that the Anwara SPV Company pays its annual interest obligations and repays 20 percent of the principal borrowed annually. It is also assumed that Anwara SPV Company must pay upfront a one-time loan arrangement fee equivalent to 2 percent of the size of credit facility.

Anwara SPV Company may not be able to meet its debt service obligations during early years of operations. If Anwara SPV Company is unable to meet its debt obligations, it is assumed that additional equity provided to clear the deficit. Debt considerations may require Anwara EZ to lower its debt-equity ratio from 70 percent to provide for better debt service coverage ratios. These issues are explored for each PPP scenario in the Results section.

6.1.8 Public Private Partnership Structure

As part of the financial analysis, several PPP structures are assessed to determine impact on the viability of the Anwara EZ.

1. The first scenario is the ***base case*** scenario, where it is assumed that land costs, relocation and compensation costs, all on-site infrastructure development costs, would be borne by the private sector owner/developer/operator. The private entity would:
    - acquire all land through the government's right of domain, following all necessary stipulations required under Bangladeshi law and pay for the acquisition of land and bear costs of public land as well;
    - bear relocation costs associated with acquiring the land;
    - pay for all on-site infrastructure including the costs of provision of the super dike/access road;
    - pay for the maintenance of annual dredging;
    - pay all O&M costs throughout the life of the project;
    - retain all profits;
    - bear responsibility and risk for any and all losses;

The government, for its part in the base case scenario, provides the following:

- Off-site infrastructure such as the off-site super dike, the access road on the off-site super dike, communication, and utility connectivity - Water and Electricity -- to the border of the zone;
- Waiver of corporate and VAT taxes for the zone developer/operator;

The other scenarios are also considered where government involvement/support in developing the zone is increasingly received in areas such as acquisition of land, provision of government land at no cost, provision of partial guarantees enabling private investors to have access to soft long term debt, and in the area of providing Viability Gap Funding (VGF) as a grant, for the purpose of financial viability of the project.

2. Scenario 2 is defined by increased government involvement in the acquisition of land and differs in that the government provides VGF equivalent to a certain percentage (10%, 12.5%, and 15%) of capital costs as a grant to the private developer. The private entity would:
    - bear compensation costs for the acquisition of private land;

- bear relocation costs associated with acquiring the land;
- pay for all on-site infrastructure including the costs of provision of the super dike/access road;
- pay for the maintenance of annual dredging;
- pay all O&M costs throughout the life of the project;
- pay for all off-site infrastructure including the costs of provision of the super dike and the access road on the super dike, communication, and utility connectivity --water and electricity - to the border of the zone;
- retain all profits;
- bear responsibility and risk for any and all losses;

The government, for its part in scenario 2, provides the following:

- acquisition of land;
- Government land at no cost to the private developer;
- Viability Gap Funding (VGF) equivalent to a certain percentage (10%, 12.5%, and 15%) of capital costs as a grant to the private developer;
- Waiver of corporate and VAT taxes for the zone developer/operator

6.1.9 Net Present Value

The results of the financial analysis of the Anwara EZ using the base case scenario are presented below. For the purpose of this model, the discount rate of 12, 15, and 20 percent were used. NPV is calculated according to the formula:

$$NPV = \sum_{t=0}^{n_t} Net\ Cash\ Flow_t /(1+rate)^t$$

...where the time period, n_t is 20 years. Detailed capital costs, O&M costs and revenue calculations to support the project cash flow analysis are provided in Annex 2.

6.1.10 Results of the Base Case and Scenario-2

Key financial indicators for the Anwara EZ are presented in Table 6.1.10-1 below in terms of US dollars including the NPV of the project under each discount rate, the project's IRR, equity IRR, average debt load, the maximum debt load in a single year, and the equity required to fund development.

Project IRR of 34.67% in the base case scenario is estimated, in which government bears and provides the costs of off-Site infrastructure amounting to US$67.14 million. A base case FIRR of 34.67% is viable but is contingent on provision of large off-site costs by the government and implementation of off-site infrastructure, either by the government or private developer, as the off-site costs constitutes around 27% of total project costs. Instead of committing funds for huge off-site infrastructure, the Government of Bangladesh can provide Viability Gap Funding (VGF) as a grant for the purpose of financial viability of the project, attractive enough to ensure the private sector's participation, described in scenario-2. Scenario-2 shows the IRRs and NPVs at different discount rates associated with the different VGF to be contributed by the government. The VGF will be US$24.44, $30.55 and $36.66 million for the government contribution of 10%, 12.5% and 15% of capital costs respectively. However, it is notable that the VGF amounts are staggered in a six year period (2015-2020) and hence, the present value of these amounts would be smaller. Using VGF (15% of the capital costs) may be justified since the unproductive area will be converted into productive area protected by super dike and the required fund of VGF along with the cost of the public land is still much lower by around $22 million than that of off-site costs. Therefore, BEZA should provide support in terms of (1)

acquisition of land and (2) soft long term commercial loans guaranteed by the GoB and arranging the VGF of 15% of capital costs from the government as a grant.

Table 6.1.10-1: NPV, IRR, Debt and Equity for the Anwara EZ (US $ Millions)

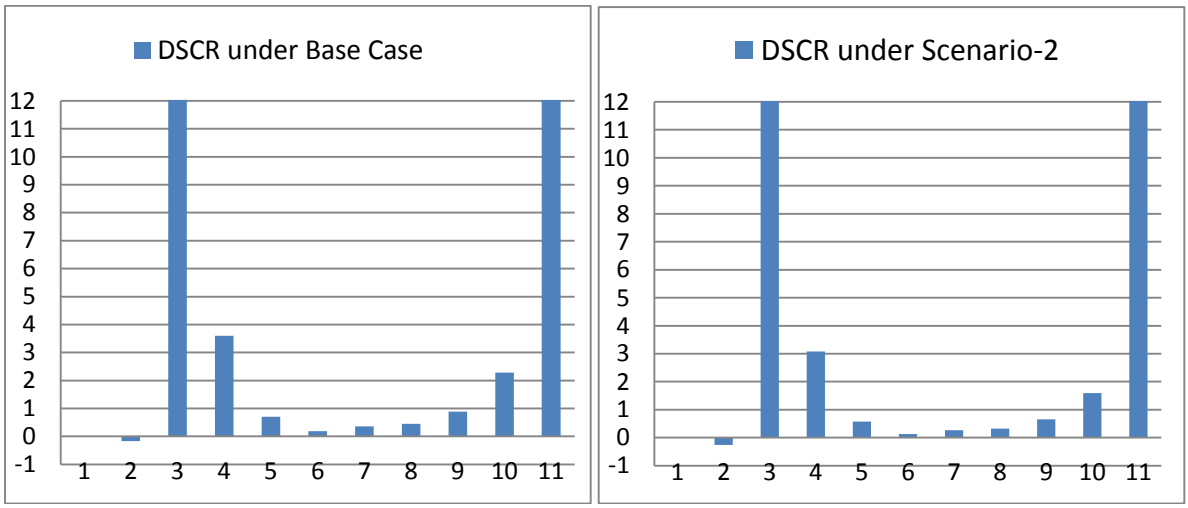
	Base Case (Scenario-1)	Scenario-2		
		VGF =10% of CC	VGF =12.5% of CC	VGF =15% of CC
	Off-site Costs Excluded	Off-site Costs Included	Off-site Costs Included	Off-site Costs Included
Project IRR	34.67%	23.10%	25.28%	27.65%
Project NPV @12%	63.51	32.75	37.33	41.92
Project NPV @15%	47.52	20.38	24.68	28.98
Project NPV @ 20%	28.53	6.17	10.04	13.92
Equity IRR	124.82%	125.76%	131.92%	138.15%
Equity NPV @ 12%	72.79	43.35	47.64	51.93
Equity NPV @ 15%	63.00	38.05	41.86	45.67
Equity NPV @ 20%	51.24	31.91	35.07	38.23
External Equity Required	57.15	63.86	62.15	60.44
Average Debt Balance	47.40	55.98	54.42	52.87
Maximum Debt Balance	108.27	132.56	128.88	125.20

CC = Capital Costs

The project IRR implies that the IRR of 34.67% in the base case and 27.65% in scenario-2, using VGF equivalent to 15% could be achieved by funding all capital expenditures through cash rather than debt. It can be said here that with the debt/equity ratio utilized by Special Purpose Vehicle (SPV) Company, equity investors can obtain a rate of return (Equity IRR) higher than the project IRR in both scenarios, as the project IRR is above the interest rate on long-term commercial debt. Anwara SPV Company's ability to repay its debt servicing obligations under each scenario is best shown by debt service coverage ratio (DSCR) defined in below that is calculated on annual basis (See figure 6.1.10-1).

$$Debt\ Service\ Coverage\ Ratio\ (DSCR) = \frac{EBITDA}{Annual\ Debt\ Service\ Requirement}$$

Figure 10.1.10-1: Debt Service Coverage Ratio



As shown in figure above, Anwara SPV Company does not have a strong ability to repay its debt in either of the two scenarios. Typically, a bank would feel comfortable lending to a developer whose debt service coverage ratio (DSCR) remains above 1 throughout debt repayment period.

6.1.11 Results of Simulation of Different Scenarios and Sensitivity to Capital Costs and Prices

The purpose of simulation of different scenarios, and sensitivity to sale lease price of serviced land and/or capital costs, is to identify the critical factors responsible for failure of the viability of the EZ.

- ***Impact of Lease price reduced by 10% and EZ service fee reduced by 10% upon the IRR***
  If the lease price of serviced land is reduced by 10%, the project IRR and equity IRR decline from 34.67% and 124.82% to 27.00% and 105.75% respectively in the base case scenario, and from 27.65% and 138.12% to 19.97% and 112.99% respectively in scenario-2 using VGF equivalent to 15%. The impact of reduction of the lease price by 10% coupled with reduction of the EZ service fee by 10% would reduce the project's IRR and equity IRR to 26.39% and 105.49% respectively in the base-case, and to 19.14% and 112.68% respectively in scenario-2.

- ***Impact of Water Supply System being developed by the Govt.***
  If the water supply system is being developed by the government, the project IRR and equity IRR would increase to 39.87% and 131.94% respectively in the base case, and to 32.33% and 146.33% respectively in scenario-2 using VGF equivalent to 15% of capital costs respectively. If the water supply system is being developed by the government and private sector equally, the project IRR and equity IRR would increase to 37.23% and 128.41% respectively in the base case, and to 29.93% and 142.27% respectively in scenario-2. The impact of the water supply system being developed by the government coupled with the reduction of the lease price by 10% and of the EZ service fee by 10%, would be reduction of the project IRR and equity IRR to 31.15% and 113.59% respectively in the base case and to 23.03% and 122.10% respectively in scenario-2. The impact of the water supply system being developed equally by the government and private sector, coupled with the reduction of the lease price by 10% and of the EZ service fee by 10% would bring the project IRR and equity IRR to 28.57% and 109.60% respectively in the base case, and to 21.02% and 117.46% respectively in scenario-2.

- ***Impact of the Waste Water System being developed by the Government***
  If the waste water system is being developed by the government, the project IRR and equity IRR would increase to 39.32% and 131.52% respectively in the base case, and to 31.81% and 145.89% respectively in scenario-2 using VGF equivalent to 15% of capital costs. If the waste water system is being developed by the government and private sector equally, the project IRR and equity IRR would increase to 36.96% and 128.19% respectively in the base case, and to 29.68% and 142.04% respectively in scenario-2. The impact of the waste water system being developed by the government coupled with the reduction of the lease price by 10% and of the EZ service fee by 10% would bring the project IRR and equity IRR to 30.62% and 113.05% respectively in the base case, and to 22.58% and 121.51% respectively in scenario-2. The impact of the waste water system being developed equally by the government and private sector, coupled with the reduction of the lease price by 10% and of the EZ service fee by 10% would bring the project IRR and equity IRR to 28.46% and 109.32% respectively in the base case, and to 20.81 and 117.14% respectively in scenario-2.

- ***Impact of Incorporation of the Cost of Coal Power Plant upon the IRR***
  When the cost of developing a coal-fired power plant is considered to be incorporated, the IRR comes down to 21.63% and 22.23% in the base case, and scenario-2 using the VGF equivalent to 15% of capital costs taking the revenue of sale of electricity and operation cost of the power plant into account. It is needed to be mentioned that the financial analysis of EZ for 20 years operation does include the cost impact of the power plant for 16 years of its operation only as electricity generated by the coal-fired power plant is presumed to be sold in the beginning year of 2020 and forward up to the end of 2035.

Table 6.1.11-1: Impact of cost of a coal-fired power plant upon IRR and NPV

	Base Case (Scenario-1)	Scenario-2 VGF =15% of CC Off-site Costs Included
Project IRR	21.63%	22.23%
Project NPV @12%	107.47	109.44
Project NPV @15%	59.33	61.95
Project NPV @ 20%	10.46	13.67
Equity IRR	85.68%	100.05%
Assumption regarding rate of sale of electricity[225]	Tk 6.7/kwh US$0.08375/kwh	

6.1.12 Conclusions from Financial Analysis

The results of the financial analysis show that the Anwara EZ is a financially feasible project for a developer &/or operator. Both in base case and scenario-2, the project generates an IRR much higher than the cost of capital (assumed to be 10-12% for such an infrastructural industrial development sites)—making it a good investment choice. In Anwara case, the project is financially viable but comes along with high costs of off-site infrastructure amounting to US$67 million to be borne by Govt. It is not financially viable when to consider off-site costs as compared to other two sites, while economic viability is quite high. Instead of providing large off-site costs, the Govt. provides VGF equivalent to a 15% of capital costs as a grant to the private developer alternatively in the second scenario. The VGF will then be US$36.66 million only for the government contribution of 15% of capital costs. Not only the government bears lower costs in providing VGF, but also this will ensure the implementation of the provision of an off-site super-dike by the private developer along with the provision of on-site super dike simultaneously. Indeed the super dike system is essential to protect the Anwara peninsula.

The Anwara EZ project is suitable for a PPP in which the private sector is expected to contribute equity with soft commercial debt arrangements having partial guarantees by the government, as it could provide a rate of return (equity IRR) of 124.82% in the base case, and of 138.15% in scenario-2 using VGF of 15% of capital costs to equity investors higher than targeted/benchmark equity IRR of 18-20 percent for investment. The conclusion made for the Anwara EZ project is robust as the equity IRR in the base case and scenario-2 remains above 100 percent even after considering either an increase of all costs by 10% and/or a reduction of lease price and EZ service fees by 10%. Therefore, BEZA may provide support in terms of (1) acquisition of land and (2) soft long term commercial loans partially guaranteed by the GoB and (3) arrangement of the VGF of 15% of capital costs from the government as a grant instead of bearing off-site costs of US$67 million by the Government of Bangladesh (GoB).

[225] This rate is recently agreed by PDB under MOU for the purchase of electricity from coal based power plant.

6.2 Economic Analysis

The objective of this subsection is to present the methods used and results obtained from carrying out the economic analysis of the Anwara economic zone (EZ).

It answers the following questions - (1) what is the economic internal rate of return (EIRR), based on a base-case involving a number of core assumptions on both the cost and the benefits side compliant with the requirements of the World Bank's comments on an earlier draft and measured by using 'economic' prices; and, (2) how robust are its IRRs in the face of negative economic shocks, whether related to benefits-contraction or cost-push, in compliance with the requirements of the terms of reference (TORs)?

6.2.1 The Highlights of the Methods Used

At the very outset of this section, the highlights relating to the methods used in calculating the economic internal rates of return are presented.

All values in market prices were obtained from the JDI engineering team/calculations in financial modelling in the foregoing Section 6.1. Apportionment of all onsite project costs into net of relevant taxes and 'para-tariffs' (such as supplementary duties and the like), and the government's tax yield has been done, with the latter being added to the government revenue from the implementation of the economic zone in question. Allowance has been made for subsidies provided by the government for a very tiny percentage of all capital outlays involving energy-sensitive inputs, assumed to be especially important for equipment or vehicle rentals.

All offsite costs are incorporated net of tax and para-tariff (s), with the difference that such taxes are *not* deemed to be government revenue. The details regarding the conversion of values as determined by using market prices are presented subsequently in this narrative.

The zone's benefits are assumed to equal the sum of:

- ✓ (i) the direct economic benefits represented by all manners of sale of land;
- ✓ (ii) second-order benefits to the economy and/or society arising from sources of induced income growth outside the zone itself;
- ✓ (iii) a measure of dynamic, agglomeration, economies, arising from the fact of the inception of the zone, assumed to equal 2% of direct benefits;
- ✓ (iv) second-order benefits arising from major forms of transfers from the private-sector to the government by way of tax-yields at the borders or value-added tax (VAT), etc.[226]; and,
- ✓ (v) The government revenue loss arising from companies relocating totally to the zone, after its establishment, and becoming eligible to enjoy a tax holiday (whereas they would not be tax-exempt were they to remain outside the zone) is also taken into account.

The Government's exchequer is assumed to gain revenue arising from (i) the issuance of registration rights by new start-up companies; (ii) the payment of fees for renewing trade licenses by new start-up companies; (iii) income taxes paid by employees of new start-up companies; (iv) company income taxes paid by new start-up companies. Estimates to be made wherever necessary in this context were made in consultation with the Bangladesh Export Processing Zones Authority (BEPZA).

[226] To reiterate, all off-site capital costs enter into our calculations net of relevant taxes and 'para-tariffs'. The keyword is 'relevant': average combined tax and para-tariff rates on "tradables" is assumed to be 22%.

6.2.2 The Policy and Institutional Framework Conditioning the Formation of Prices

The pricing of investment goods has an abiding influence on what building the EZ will cost. The prevailing policy and institutional framework, within which such pricing takes place naturally, influences the price determination process. It is therefore necessary to introduce the policy interventions that shape the pricing of investment goods in the domestic markets, especially relative to their international or border prices. Three strands of policies will be seen to inform this discussion, namely, the nominal protection policy pursued by the government; the exchange rate policy pursued by the Bangladesh Bank; and the policy of (modest) subsidization of various kinds of fuel.

The following policy interventions drive a wedge between domestic prices of goods and their opportunity costs to the society.

- ✓ The border taxation regime.
- ✓ Second, the on-going management of the float of the Taka using Bangladesh Bank's interventions in the US Dollar exchange-rate markets. The Taka remains slightly over-valued. According to recent research published by BIDS analysts Drs. Hossain and Ahmed (2009), Taka is overvalued by about 3%. That means that the standard conversion factor (SCF) which is usually used to convert financial prices of largely non-tradable production goods and services would have the value of $1/(1 + .03)$ or 0.97.
- ✓ Both policies raise the unit costs to domestic users of imported goods, raw materials, parts, and components, and harbor a well-known bias against exports. Both policies raise domestic prices higher compared with their 'social opportunity costs.' For the most part, the users of tradable inputs and resources are implicitly taxed - they pay prices which overstate the overall economy's opportunity costs at the margin. There is then a need to apply a downgrade to the financial costs of implementing investment projects to obtain parity with the 'economic prices.' It is necessary to find out conversion factors to complement the SCF found in the earlier paragraph.
- ✓ On the other hand, Bangladesh subsidizes the use of diesel, petrol, and natural gas and electricity in certain uses. Fuel or interest-rate subsidies pull in the opposite direction, warranting a scaling-up of the financial costs in economic analysis. We make an appropriate allowance for this fact in the economic analysis to follow.

Besides policy interventions, institutional rigidities matter to the pricing of primary factors of production, such as unskilled-worker labour input. Wage-setting typically allows a certain degree of influence of *institutional factors*. Market wages in construction or manufacturing do not clear the market. The adjustment between the demand for and supply of labour don't really push the market wages rates to the 'equilibrium' wage rate. The equilibrium wage rate is, by definition, the wage rate that will drive the unemployment rate to zero, signalling the achievement of full employment. Under those circumstances, market wages overstate the opportunity cost to the society of hiring people. A correction on this score would be necessary in an economic analysis.

6.2.3 The Border-taxation Regime

Customs duties (CDs) levied in Bangladesh range from between 0 and 5 per cent on primary commodities and raw materials, to intermediate rates of between 10 and 15% on parts and components, finally to rates that equal or exceed 25%. The diversity of customs duties betrays the cascading characteristic of the structure of protection found in many a developing country that is evolving through cycles of import-substituting industrialization. Within the given broad grouping of Harmonic-systems (HS) codes, higher CDs are levied on import substitutes that are the subject of strong producer interest, whether actual or perceived, of domestic manufacturers than elsewhere within the HS grouping.

When imports arrive at the Chittagong port, they carry with them a *cost & freight* (C & F) tag, which typically has been foisted as a result of a *pre-shipment inspection*---a service that can sometimes be bought on by the importers. If the customs authorities accept the PSI-induced C & F valuation as legitimate, a 1% charge over and above the C & F unit valuation is triggered preparatory to the assessment of customs duties payable. However, the import trade is stigmatized by an allegedly long-standing and previously wide-spread practice of *under-invoicing* of C & F costs as an instrument of shielding oneself from CD liabilities. The customs authorities very often brush aside the PSI results, and resort to their own assessment. When this happens, then the 1% charge of the customs duty on account of the PSI is waived, and the unit assessed value becomes the one and the same thing as the unit C & F value as assessed by the customs. Regulatory Duty (RD), Supplementary Duty (SD), and value-added taxes (VAT) are three additional levies upon imports. Even though VAT belongs strictly speaking to the category of indirect taxes and not border taxes, it is so ubiquitous that it is convenient to cluster it along with the RD and SD. Then there are para-tariffs, to be covered below. The total tax incidence, which is closely related to the nominal rate of protection (NRP), is in fact typically much higher compared with customs duties, because the supplementary duties and the para-tariffs raise the actual tax incidence considerably more.

The RD rate for FY2012/13 was 5.0% applied almost uniformly on all products subject to the top rate of 25%, thus making the effective top customs duty (CD) rate to be at least 30%, when supplementary duty (SD) is applied. The base for computation of RD is the same as CD, i.e. assessable value (AV) of imports. For all practical purposes, RD is an additional CD applied on all goods subject to the highest CD rate of 25%. Historically, RD has been applied intermittently, having been eliminated in some years in response to the requirement for simplification of the tariff structure under the World Bank's budget support facility, Development Support Credit, but remerging once the obligation was no longer binding.

Supplementary Duty (SD) was introduced in 1991 under the VAT Act, and was meant to be a trade-neutral tax. However, increasingly it has come to be applied in a non-neutral fashion, i.e. it is not applied equally on imports as well as domestic sales. Indeed it has become an expedient instrument of protection through its differential application (higher rates on imports; lower or zero rates applied to import substitutes). The VAT authority also issues exemptions on SD through SROs, betraying the discriminatory nature of the intervention. SD was applied as a percentage of "assessable value" (AV) but, from 1997-98, SD has been levied on the basis of duty paid value (assessable value plus customs duty plus regulatory duty).

We estimate that the average total tax incidence (TTI) for tradeable capital costs applicable for Anwara calculations is 128%. This is a result of central importance.

Any reasonable analysis of an investment project warrants calculating internal rates of return (IRR) using economic prices. To be systematic, it is necessary to know beforehand the *structure of investment costs in gross fixed capital formation*. This is because the relative share of labour versus non-labour varies a great deal across different kind of investment activities Site clearing and dredging, will have very different composition compared with works involving reinforced concrete casting (RCC), and RCC will have very different composition of tradable versus non-tradable investment goods. The spending data needs to be disaggregated in terms of its components because the motivating interventions that evaluate the various conversion factors differ from one kind of tradable investment good compared with another. In this study, all financial-price capital cost estimates have been broken into a five-way disaggregation--- 'labour,' 'non-tradable construction,' 'tradables,' 'rentals,' and finally 'financial overheads.' The weight for each such category was obtained in coordination with consultants, in the know, to the World Bank on this project. Conversion factor for labour at Anwara site was calculated at 0.95. The tradable component of investment outlays was downgraded by good-specific conversion factors whose values (relative to 1) were pivoted by the value(s) of the total tax incidence (TTI). The TTIs themselves are the sum-total of both levels of tariff (customs duties, regulatory duty, supplementary duty and the para-tariffs). Para-tariffs are represented by advance income taxes, VAT and two other specimens. Some of the statutory border-taxes are

applied on *ad valuation* basis that incorporates compounding. Some of the para-tariffs also involve a valuation-base that involves compounding.

Our estimates of nominal rates of protection (NRP) build on the estimated TTI, but in addition, measuring them to equivalent values for the Anwara EZ by taking into account what it will take to transport tradable goods from Chittagong port to the Anwara project site. Our NRP estimates are therefore specific to the EZ site. Finally, for non-tradable capital and maintenance costs and other non-tradable but non-labour costs, we use the assumption that the shadow exchange rate factor is 1.03. To reiterate, the associated SCF is estimated to be 0.97.

Likewise, when it comes to costs other than capital ones, such as the organization & management (O & M costs), we took the same componential approach of disaggregation. This is because the non-capital cost is a 'hodge-podge,' too, and comprises (i) wages and salaries paid to blue-collar and white-collar workers, (ii) marketing and promotional costs; and (iii) other miscellaneous cost items.

The conversion factors in Table-6.2.2-1 are obtained by dividing unity by an expression equal to 1 plus the total tax incidence expressed as a fraction. Roughly speaking, the TTI can be expressed as equivalent to the nominal rate of protection (NRP). In adjusting downwards the market-price spending on all tradable capital costs, whether on or off-site, arising from outlays on various investment goods, we multiply the former by 0.78. We calculate the applicable average value of the TTI to 128%. We obtain the value of 0.78 by dividing unity by 1.28. The only case where the conversion factor is greater than 1 is subsidized sources of energy - there is still a modest subsidy on most kinds of fuel used in running machinery and transport equipment, which are mostly rented.

For all capital costs of a non-tradable nature (such as on account of locally-procured construction items, various kinds of rental payments, etc.) the incidence of VAT is about 4%, with proceeds from VAT being appropriated as indirect benefits of the zone. The rest is assumed to equate the economic cost.[227]

O & M costs were divided up into two broad categories: personnel costs, and others. For the first, the conversion factor used to convert market values into their economic counterparts is 0.95. The resultant values were multiplied further by 0.97 before retention in our calculations. The conversion factor for the second ('others') is 0.97, this being the standard conversion factor.

Table 6.2.2-1: The conversion factors used for tradable components of capital outlays

	Tradable goods		**Tradable goods**	
	Names of the production inputs	**Conversion factor**	**Names of the production inputs**	**Conversion factor**
1	Cement	0.511	Electrical sub-stations	0.765
2	PVC pipes	0.712	Power-distribution lines	0.712
3	Mild-steel (MS) rods	0.712	Water-treatment plant	0.765
			Waste-water treatment plant	0.765
4	Galvanized iron wires	0.712	Shadow wage rate factor	0.95
5	Transformers	0.511	Shadow Exchange rate factor	0.97
6	Pipes carrying natural gas	0.712	Fuel conversion factor	1.098

Sources: World Bank Study Team, 2014.

[227] We might have multiplied this left-over term by 0.97 before accounting for them as economic costs, but we didn't do so on purpose. Given the several sources of uncertainty surrounding our estimates of both costs and benefits, we wanted to err on the side of conservatism when it comes to measuring costs in economic terms.

6.2.4 Benefits evaluation

Our calculations make allowance for the following static benefits:

- ✓ Revenue from selling developed industrial and commercial land.
- ✓ Second-order benefits to the economy and/or society arising from sources of induced income growth outside the zone itself;
- ✓ a measure of dynamic, agglomeration economies arising from the fact of the inception of the zone;
- ✓ second-order benefits arising from major forms of transfers from the private-sector to the government by way of tax-yields at the borders, value-added tax (VAT), etc.[228]
- ✓ The government revenue loss arising from companies relocating totally to the zone after its establishment and becoming eligible to tax holiday (whereas they would not be tax-exempt were they to remain outside the zone) is also accounted for.[229]

As well, the calculations will make allowance for the following dynamic benefits attendant upon the formation of the EZ:

- ✓ the gains in technical and economic efficiency within the EZ and its attendant diffusion to the rest of the economy through technology spill-over.
- ✓ Encouragement of entrepreneurism.

Technical efficiency is about producing goods at leaner unit costs measured physically (such as in man-hours, or tonnes of iron ore mined). Economic efficiency additionally brings prices into the fray. If the EZ is able to attract one or more *practice-leaders* into tenancy, and if tenant-enterprises are well-integrated in the domestic economy, the EZ is likely to create waves of technology spill-over benefit to the rest of the country. The occurrence and the fall-out from such a spill-over effect is usually an empirical question.

When it comes to evaluating the benefits stream, we mostly take the same benefit stream that the financial model takes, that is, without probing further into whether the tenant represents an act of FDI or an investment by a national investor. We recognize two broad kinds of benefits; (i) the direct benefits; and (ii) the second-order benefits. The category (i) comprises benefits that will stem from selling/enforcing, as appropriate:

- ✓ the zoned land that the EZ will render saleable;
- ✓ the residential and commercial land whose supply will grow;
- ✓ a tenant user-charge;
- ✓ a charge for piped water;
- ✓ a charge for the services of the waste-water treatment plant;

Second-order benefits are assumed to arise from two broad sources that have already been mentioned.

[228] To reiterate, all off-site capital costs enter into our calculations net of relevant taxes and 'para-tariffs'. The keyword is 'relevant' - average combined tax and para-tariff rates on tradables are assumed to be 22%.

[229] We have accounted for direct employment effect due to the zone as one element of our calculation of second-order benefits. We have not included our team's estimate of indirect increases in employment levels in the economy. As well, we have not made any effort to claim the alleged benefit on account of an incremental 'export-penetration' benefit. This actually adds credence to our estimates of EIRR being conservative underestimates.

6.2.5 Taking Into Account Other Static Benefits of an EZ

Some enterprises that move to the EZ will be those that have already been in existence, who plainly re-locate to the EZ site in search of agglomeration benefits, technology spill-over benefits, and the benefits of skills-pooling. Unless better recruitment terms and social protections were to be wrung from the employers on the EZ, the act of establishment through re-location means that *incremental employment due solely to the creation of the EZ is zero.* The remainder of the enterprises on the EZ will be start-ups going in. For this second category, the moot issue is whether the marginal product of this bunch of workers in their alternative employment is zero or not. However, one thing that is sure is that the direct value-added that tenant-enterprises generate on the EZ cannot be attributed in its entirety as a benefit of the EZ. This is because of the following:

- ✓ The assumption that the entire work-force of start-up enterprises that find employment on the Anwara economic zone (EZ) has a marginal product of zero in the alternative, 'without-Anwara EZ,' situation. Many of the textile mills on the Anwara EZ will be dealing with complex, high-value, manufacturing processes with more intricate requirements that would require more customized machine-handling. The test of skills that this implies, for not only production workers 'in the trenches,' but also for the line-supervision and quality-control staff, is very demanding. The significantly greater skill requirements of high-end, high-value, apparel production are an open secret. Clearly, the recruitment of both the white-collar and the blue-collar workers by the firms that become tenants on the EZ will heavily factor in the skills of the applicants. Clearly, skills, prior job-references, and strong performances in the job interviews will drive recruitment. These workers would have been working at some other firms in the 'without-project' situation. Their marginal product in that alternative employment would decidedly be positive, not zero. The issue is - what were the 'net' benefits from employing workers on the EZ. Only the *additionality* should be ascribed as a benefit of the EZ.
- ✓ Some of the re-locators into the EZ will have left behind their own manufacturing premises on rented space elsewhere in the economy in favour of their industrial leases on the EZ. Most of the value-added per worker they would typically generate on their new premises would be carried over from their incarnation in the 'without-Anwara' EZ situation. Of course, compared with the rest of the economy, there would be capital-deepening, represented by more modern machinery being brought into use. There would be more attention paid to total quality-control, reducing wastages. All of that is likely to raise labour and capital productivity of the workers in the zone. As a result, the value-added per worker in the new situation in the Anwara EZ would be expected to out-perform what existed in the 'without Anwara' situation. This additionality will be included in the benefits of the EZ.
- ✓ New evidence suggests the appearance of relative scarcity of labour in rural areas of Bangladesh compared with urban areas. The evidence involves quite sharply divergent real-wage trends across both a rural-urban divide and a gender-divide (IFPRI, 2012). Rural real wages have out-performed urban real wages since about 2005. Women's real earnings have out-grown the corresponding male earnings, on a Bangladesh-wide basis---erasing a considerable part of the gender-gap in earnings. Madani's observation (1999), "for workers, the alternative to EZ employment is often unemployment, underemployment, or a return to village subsistence life." This is a caricature for Bangladesh. For a female worker employed by one of the textiles factory, according to a report published in the mass-circulation daily *The Prothom-Alo* in August 2013, the alternative is most probably an unregistered partnership among several such female returnees to a peri-urban location in Syedpur in Nilphamari district that sews apparel for sale across the border. That alternative is almost certainly not returning to village subsistence life. We would do well to disabuse ourselves of some pointed misperceptions of alternatives open to female workers in Bangladesh's textiles industry;
- ✓ What percentage of the tenant enterprises are mere re-locaters? The minimum size of plots prospectively coming to the market in Anwara happens to be one hectare, or about 2.471 acres. Most of today's medium or large-scale manufacturing enterprises in Bangladesh started

off on more modest land-areas than that. A majority of the tenant-enterprises would be of the're-locator' variety. This would redound to the validity of the argument, previously made, that the additionality of second-order benefits to be attributed to the EZ *per se* should be less than 1. Perhaps, this ought to be deemed to be well less than one.

Agglomeration Efficiencies

The TORs speak of gains in allocative efficiencies. Typically, allocative inefficiencies are caused by the mis-pricing of capital or labour. Because the various incentives accorded by the BEZA will very largely leave the factor pricing regime intact, the EZ will not have any perceptible effect upon any prevailing allocative inefficiencies on the ground. However, EZs will trigger agglomeration efficiencies that will likely be notable initially and fairly powerful in the long-run.

These efficiencies will stem from:

- ✓ labor market pooling--- skilled laborers entering the area and are able to lower the cost of doing business through stimulating the informal exchange of capabilities and practical knowledge. The more firms there are in this area, the greater the competition is to obtain workers and therefore results in higher wages for the workers.
- ✓ facilitating access to specialized goods and services provided for the clustering firms, and,
- ✓ most importantly, from technological spill-over effects.

The agglomeration benefits of an EZ are undeniable, even if it requires a great deal of reliable data to accurately gauge their extent. Despite an extensive search on the Web, we have not been able to locate a single study containing an actual estimate of the percentage positive effect that owed to a living special economic zone or an industrial park. Anecdotal evidence about the quite palpable favourable effect that the coming of Suzuki to India had on the techno-managerial efficiency of the automotive operations in India exists, but that happens to be true of India. In Bangladesh, no similar evidence, anecdotal or otherwise, seems to exist to our knowledge. We assume that agglomeration economies translate into a fixed step-up of roughly 2% over and above the direct economic benefits (not counting the incremental benefits from the stream of wages and salaries paid on the EZ).

Benefits from enhanced company- and personal-taxation

The tax holiday accorded to the investors in the Anwara economic zone has been taken to be 10 years. The effect of the tax holiday has been thus calculated in the Anwara case, and, the first batch of sales of industrial land takes place in 2017. We allow two years for a gestation lag between land sales and the investor's company becoming a 'resident' for purposes of profit taxation. Therefore, calculation of the effect on tax-holiday on government's tax-yield for new start-up firms who set up operations on the economic zone begins as of 2019 for Anwara. The Government's tax yield registers a positive entry on account of new start-up firms in 2029. That said, companies that relocate entirely from outside the zone into the zone have been treated differently, as required by the World Bank. In this particular case, these companies were assumed to be paying taxes on profits. After moving to the zone, they become profit-tax exempt for the first 10 years. Profit taxes that they were paying before moving to the zone have been *deducted from the government's tax yield*.

A certain percentage of the white and blue-collar workers in the new start-up enterprises will of course contribute to the public revenue from taxes to be imposed on personal incomes above the threshold of taxability of such incomes. These additional benefits are also accounted for, on informed basis, in the calculation of EIRR.

The economic internal rates of return (EIRR) are presented in four definitive scenarios, presently narrated.

The effect of the gains in the agglomeration efficiencies is inserted in the base-run iteration, to the description of which we now turn.

The base-run: In the base-run, we cluster all categories of costs---including land, whether privately or publicly owned. To reiterate, all outlays and benefits have, ultimately, been corrected for the shadow-exchange rate being greater than 1, by using Standard Conversion Factor (SCF) of 0.97. We assume that the entire regime of the border-taxation is binding on the level and structure of domestic prices, and that there is no 'water-in-the-tariff.' We also assume that the Standard Conversion Factor (SCF) to be used is 0.97. (This is also the assumption underpinning the other subsequent run).

Iteration-1: In this set of iterations, there will in fact be **three** sub-iterations. In the first of these sub-iterations we assume, as offered in the JDI proposal, a 10% ratcheting of all capital and other costs. In the second of these sub-iterations, we assume a 10% roll-back of all benefits while costs stay the same. In the final of these sub-iterations, we assume both a 10% roll-back of all benefits while costs gain by 10%.

6.2.6 The Internal Rates of Returns

Table 6.2.6-1 presents the IRRs in economic prices.

Table 6.2.6-1: Presenting the Economic Internal Rates of Return, and Economic Net Present Values of the Anwara Economic Zone

Iteration	Assumptions underpinning the iterations	EIRR (%)	ENPV (r=0.12) (US $ million)	ENPV (r=0.15) (US $ million)	ENPV (r=0.20) (US $ million)
Base-run	All costs clustered, first- and second-order benefits all included	35.2	125.6	90.5	51.6
Iteration-1	Baserun, modified by 10% gains in costs	29.1	104.5	71.3	34.8
Iteration-2	Baserun, modified by 10% roll-back in benefits	29.4	100.3	68.6	33.8
Iteration-3	Baserun, modified by 10% gains in costs *plus* 10% roll-back in benefits	24.2	79.2	49.3	16.9

Note: The Standard Conversion Factor (SCF) underlying the computations in the table is everywhere equal to 0.97; the Shadow Wage Rate Factor is everywhere 0.95.
Source: World Bank Study Team, 2014

6.2.7 Major Conclusions

- ✓ The Anwara Economic Zone is economically justified as it has a base-run EIRR of 35.2%.
- ✓ If all costs were to gain, and if those gains were allowed to work their way through to make a difference to the EIRRs based on base-run, the EIRR was seen to come down to 29.1%. Whereas if costs held but benefits were squeezed downward by 10%, the EIRR was found to be 29.4%.
- ✓ Finally, when both cost-push and benefits-contraction both come to pass simultaneously, the EIRR is found to fall to 24.2%. That said, the EZ at Anwara remains economically viable even in the midst of the combination of benefit-contraction and cost-push.

ANNEX

ANNEX 1

PRESENTATION SLIDES FOR THE THIRD STAKEHOLDER WORKSHOP AND SUPPORTING DOCUMENTS

Presented by – Dr. Shoichi Kobayashi
Date – 23 February 2013
Location – The Westin, Dhaka

Workshop on Draft Final Report of the Feasibility Study of Three Proposed Economic Zones (Sherpur of Maulvibazar District and Mirershorai and Anwara of Chittagong District).

PROGRAMME

09:30	:	Registration
10:20	:	Guests take their Seats
10:25	:	Arrival of the Chief Guest and Special Guests
10:30	:	Recitation from the Holy Quran
10:35	:	Welcome Address by Mr. Fakhrul Islam (Secretary in Charge), Executive Chairman, BEZA.
10:45	:	PowerPoint Presentation on Draft Final Reports by Dr. Shoichi Kobayashi, Team Leader, Feasibility Study Team.
11:30	:	Address by the Special Guests.
11:45	:	Address by the Chief Guest Engr. Mosharraf Hossain, MP, Honorable Minister, Ministry of Housing and Public Works.
12:00	:	**Tea/Coffee Break**
12:10	:	Statement by the Representative from the World Bank
12:20	:	Open Discussion on Draft Final Reports
13:25	:	Address by Dr. Mashiur Rahman, Adviser to the Honorable Prime Minister, Economic Affairs.
13:30	:	Vote of Thanks by Dr. Md. Nurannabi Mridha, Project Director, BEZA Project.
13.45	:	Closing Session & Lunch

Technical Advisory Services for Feasibility Studies for Economic Zones (3rd Stakeholders Workshop)

23 February 2014

Dr. Shoichi Kobayashi, Team Leader
PSDSP (World Bank) – BEZA Project

JDI Japan Development Institute MAXWELL STAMP LTD শেল্‌টেক্ SHELTECH Since 1988

Background & Objective of EZ

1. Bangladesh Economy is growing well at 6.3% in the Past 5y.
2. However, need to accelerate GDP growth to 8% -10% to reduce the poverty level from 40% now to 15% and targeting to be a Middle Income Country by 2021 .
3. In order to achieve the above goals, private investment must increase to 32% of GDP from just 19% now.
4. Economic Zone (EZ) program is aiming to achieve the above goals by attracting private investment (FDI & DI), accelerating GDP growth & creating 10 millions of new employments .
5. EZ Act was approved in August 2010 and now WB & DFID is supporting this EZ Master Plan Study as pilot EZ Projects.
6. Three EZs: Sherpur, Mirershorai and Anwara are selected by BEZA as pilot EZ projects under PPP Scheme.

Type of Economic Zones in Bangladesh

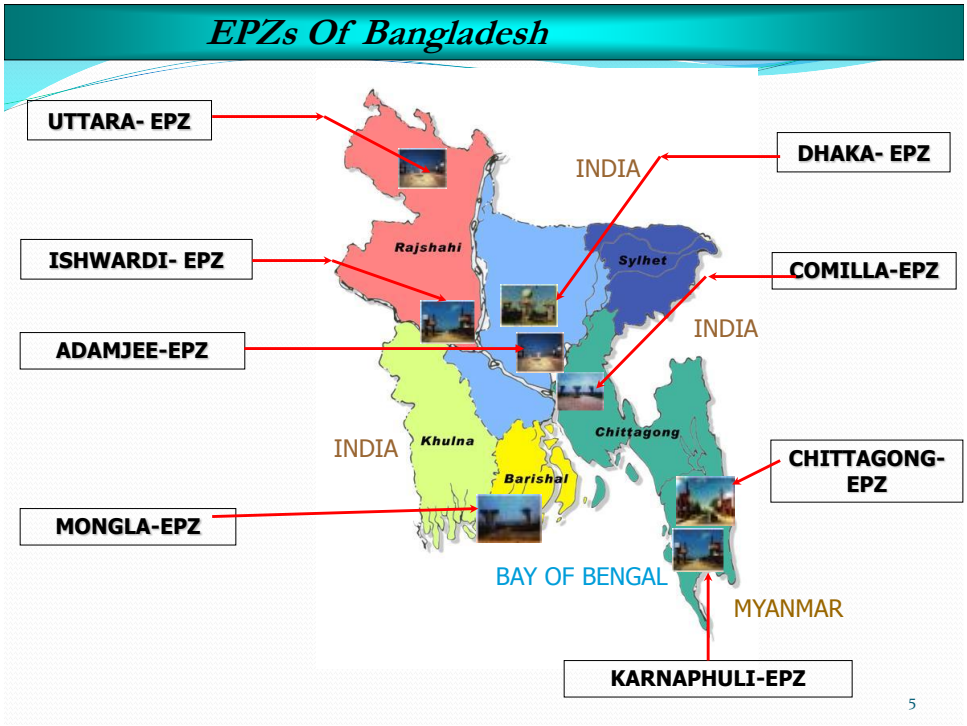
(Only 8 EPZ s are in operation now- Needs More!)

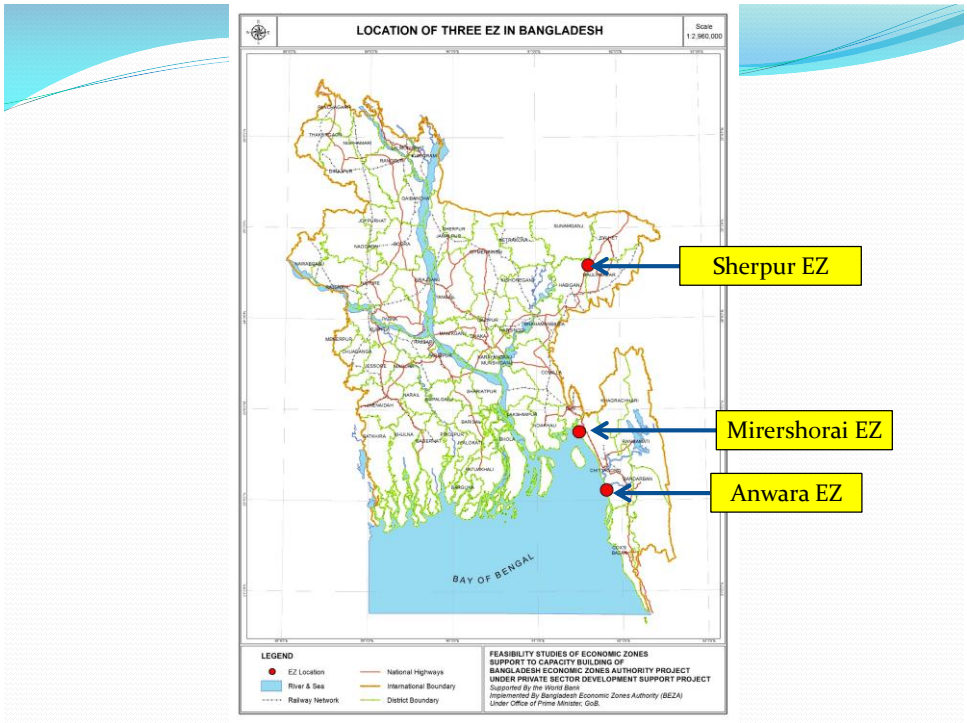
Type of Industrial Park	Characteristics
1. Export Processing Zone (EPZ) (8 EPZ: 2,572 Acre: 1042 hectare 354,722 Employees (2013): Nearly Sold out! Only 7% (20 hectare) at three remote area EPZs are still vacant.	1. Export Oriented Industry (100%) 2. BEPZA Administration Office 3. One Stop Service (OSS) 4. 5 EPZs are already full & only 3 remains : but 93% are already filled! Net 900 hectare
2. Private Export Processing Zone (PEPZ) (Korean EPZ)	1. Export Oriented Industry (100%) 2. BEPZA Administration Office 3. One Stop Service (OSS) 4. One KEPZ is partially operating
3. Economic Zone(EZ) Program (BEZA) (Just starting with a big hope: May start from this year 2014 using PPP scheme)	1. Both Export Oriented Industry & Domestic Oriented Industry 2. BEZA Administration Office setup 3. One Stop Service (OSS) 4. Ready to start soon.
4. Industrial Estate (IE) (Domestic Industries for SME in nearly each major district)	1. Domestic SME 2. BSCIC Office 3. Small IP in nearly all provinces accommodating SME.

BEPZA History & Current Condition

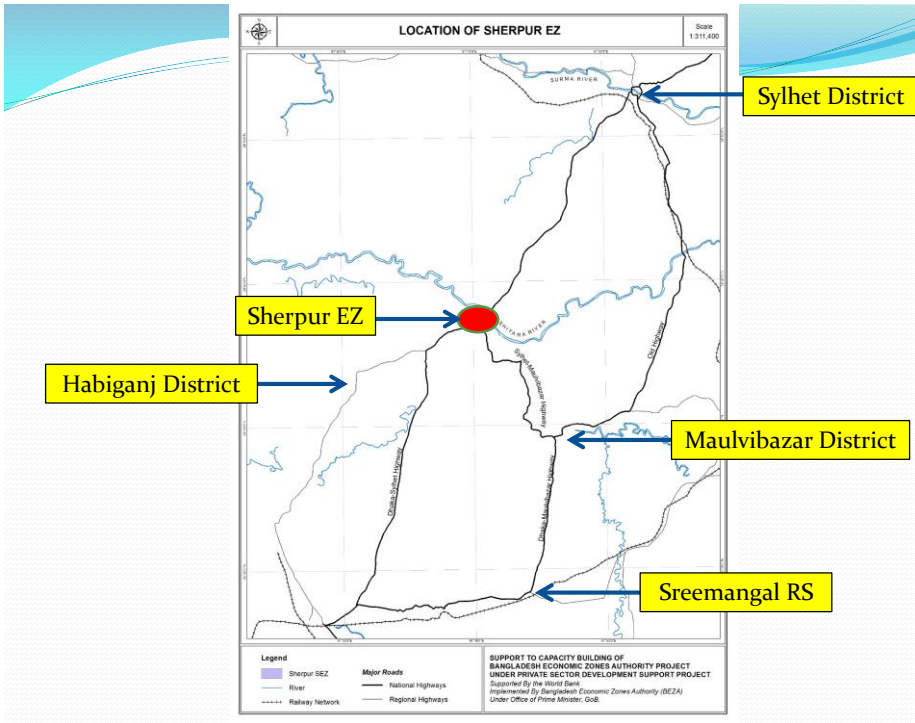
(93% is Occupied & Only 74 Acres Remain !)

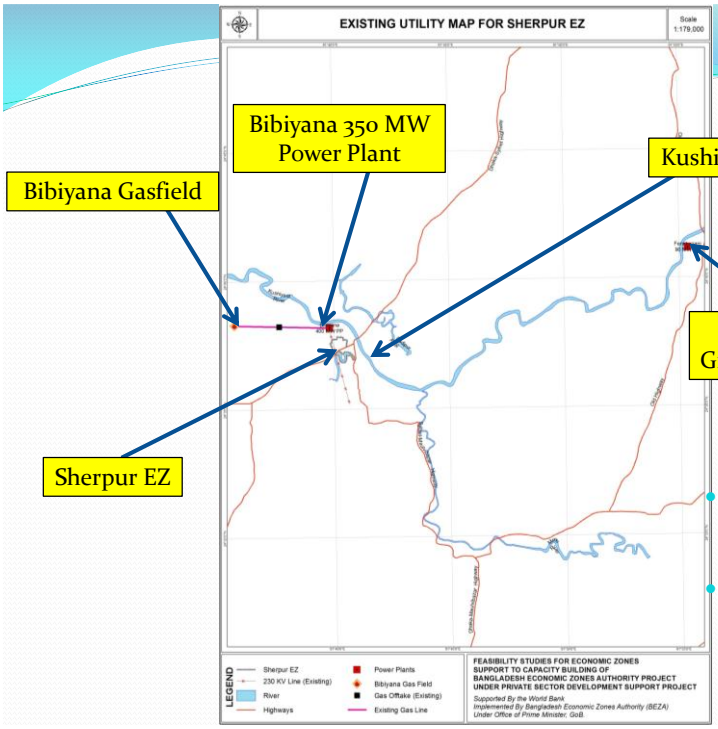
EPZ	Year Area (Ac)	Plots	Occupied Period	Remaining Plots
1. Dhaka	1993 361	442	1993-2008	0
2. Chittagong	1983 453	502	1983-2005	0
3. Comilla	2000 267	213	2001-2011	0
4. Adamjee	2006 293	234	2006-2013	0
5. Karanaphuli	2006 222	254	2006-2011	0
6. Uttara	2001 212	202	2001-	13 (6%)
7. Ishwadi	2001 309	158	2004- Original Occupied	116 (2nd Phase) (73%)
8. Mongala	1999 255	124	2008-	18 (15%)
Total	2372 (Gr) 1779 (Net)	2103	1956 (93%) 147 (7%)	147 (74 Ac)


EPZs Of Bangladesh
UTTARA- EPZ
ISHWARDI- EPZ
ADAMJEE-EPZ
MONGLA-EPZ
DHAKA- EPZ
COMILLA-EPZ
CHITTAGONG-EPZ
KARNAPHULI-EPZ
INDIA
INDIA
INDIA
Rajshahi
Sylhet
Khulna
Barishal
Chittagong
BAY OF BENGAL
MYANMAR
5

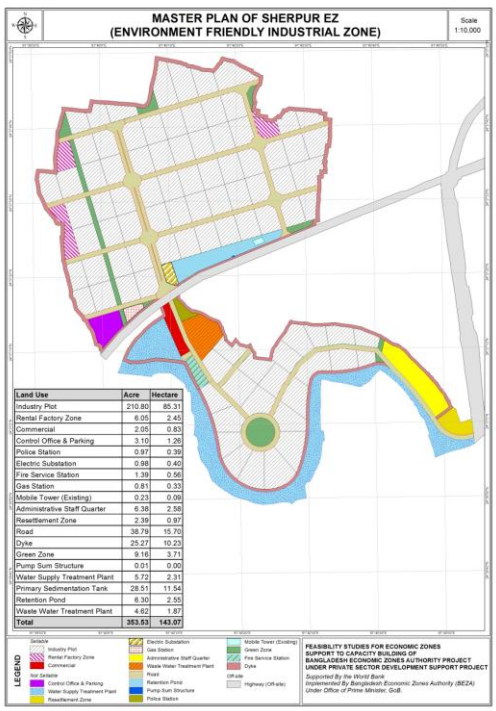

LOCATION OF THREE EZ IN BANGLADESH
Sherpur EZ
Mirershorai EZ
Anwara EZ
BAY OF BENGAL
LEGEND
EZ Location
River & Sea
Railway Network
National Highways
International Boundary
District Boundary
FEASIBILITY STUDIES OF ECONOMIC ZONES
SUPPORT TO CAPACITY BUILDING OF
BANGLADESH ECONOMIC ZONES AUTHORITY PROJECT
UNDER PRIVATE SECTOR DEVELOPMENT SUPPORT PROJECT
Supported By the World Bank
Implemented By Bangladesh Economic Zones Authority (BEZA)
Under Office of Prime Minister, GoB.

SHERPUR
ECONOMIC ZONE





- No Water Supply Network Available on site
- Surface Water source: Kushiyara River @ 1Km from site



Land Use	Acre	Hectare
Industry Plot	210.80	85.31
Rental Factory Zone	6.05	2.45
Commercial	2.05	0.83
Control Office & Parking	3.10	1.26
Police Station	0.97	0.39
Electric Substation	0.98	0.40
Fire Service Station	1.39	0.56
Gas Station	0.81	0.33
Mobile Tower (Existing)	0.23	0.09
Administrative Staff Quarter	6.38	2.58
Resettlement Zone	2.39	0.97
Road	38.79	15.70
Dyke	25.27	10.23
Green Zone	9.16	3.71
Pump Sum Structure	0.01	0.00
Water Supply Treatment Plant	5.72	2.31
Primary Sedimentation Tank	28.51	11.54
Retention Pond	6.30	2.55
Waste Water Treatment Plant	4.62	1.87
Total	353.53	143.07

Land Use	Total		Percentage
	Acre	Hectare	
Leasable Land	218.90	88.59	61.92
Land for Administration	11.84	4.79	3.35
Infrastructure	82.73	33.48	23.40
Green Zone & Other	37.67	15.24	10.65
Resettlement Zone	2.39	0.97	0.68
Total	353.53	143.07	100.00

Sherpur: Consultation with Stakeholders




Sherpur: Site



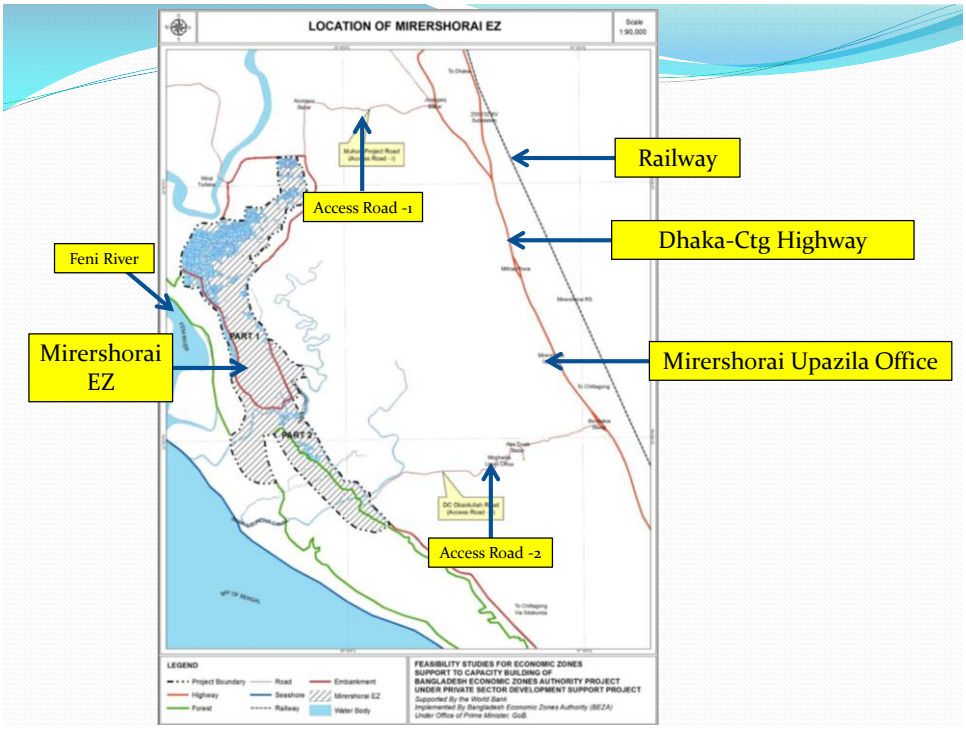

Sherpur: Sreemangal Railway Station

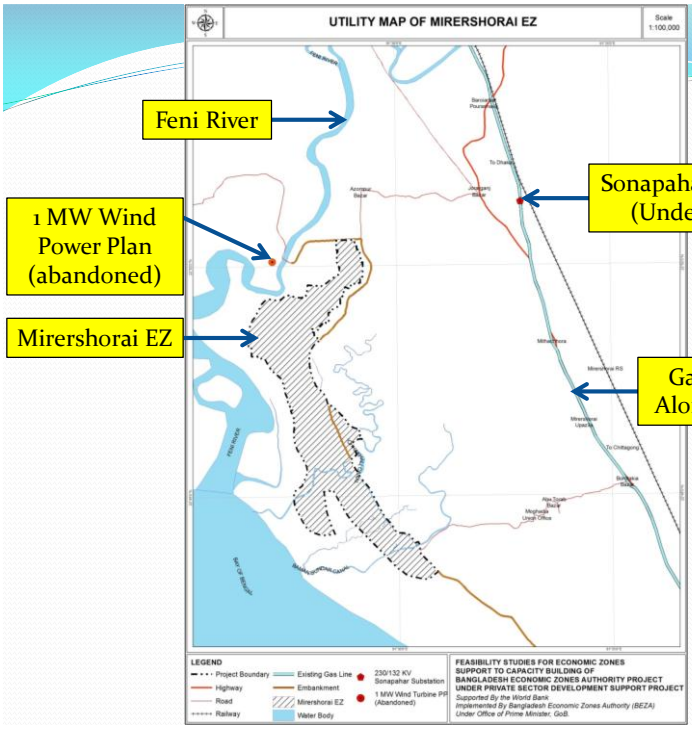



Profile of Sherpur EZ

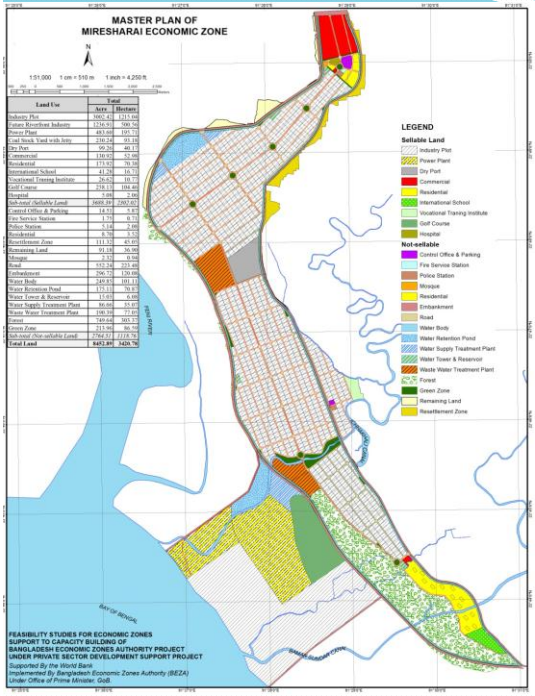
Item	Detail Comments
Access & Utility	55 Km Airport, 435 Km to Chittagong Port and 208 Km to Dhaka
Land Gross & Net	Gross Area: 143.09 ha and Net Area for Sale: 88.59 ha
Type of Industry	***Textile, Ceramics, Pharmaceuticals, Food processing***
Price of Land Lease	$50 per Sqm
Cost for On & Off Site	$ 82.87 million for On-Site and $7.7 million for Off-Site
Financial & Economical IRR	Financial IRR Base Case: **21.13% & 26.44%** for Case 2 Economical EIRR **47%**
Competitiveness	Considering the current shortage of well equipped EZ, Sherpur EZ Power and Gas supply will be competitive. Benchmark Analysis indicates No 1 out of 7 Asian EZ.
Employment Creation	Employment creation is expected to be **40,706 workers**
Expected Schedule	Construction start from 2016 and complete by 2019
Market Demand	169 ha (18 Firms) out of 103 Surveyed : Exceed Supply.

MIRERSHORAI
ECONOMIC ZONE





- No Water Supply Network Available on site
- Surface Water source: 16 Km upstream of Feni River



Land Use	Total		Percentage
	Acre	Hectare	
Leasable Land	4211.26	1704.24	49.82
Future Development	1261.53	510.53	14.92
Land for Administration	32.42	13.12	0.38
Infrastructure	1098.49	444.55	13.00
Green Zone & Others	1737.87	703.30	20.56
Resettlement Zone	111.32	45.05	1.32
Total Land	**8452.89**	**3420.78**	**100.00**

- Existing Land: **6615.12 acre**
- Reclaimed: **1836.59 acre**

Mirershorai: Consultation with Stakeholders




Mirershorai: Site




Mirershorai: Access Roads

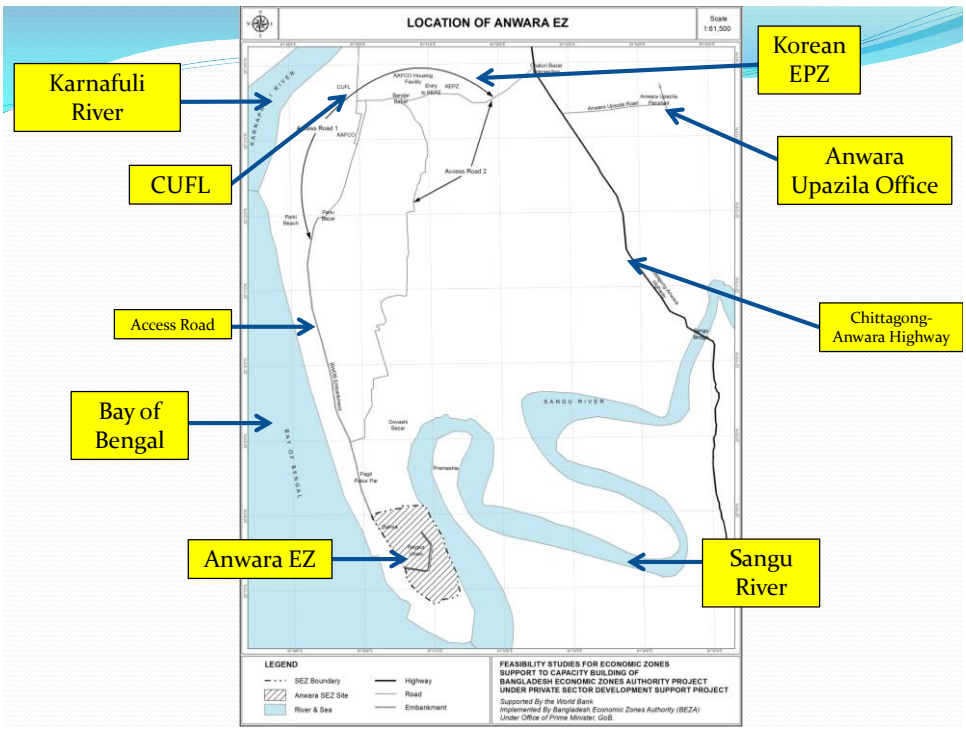
Access Road (i): Muhuri Project Road

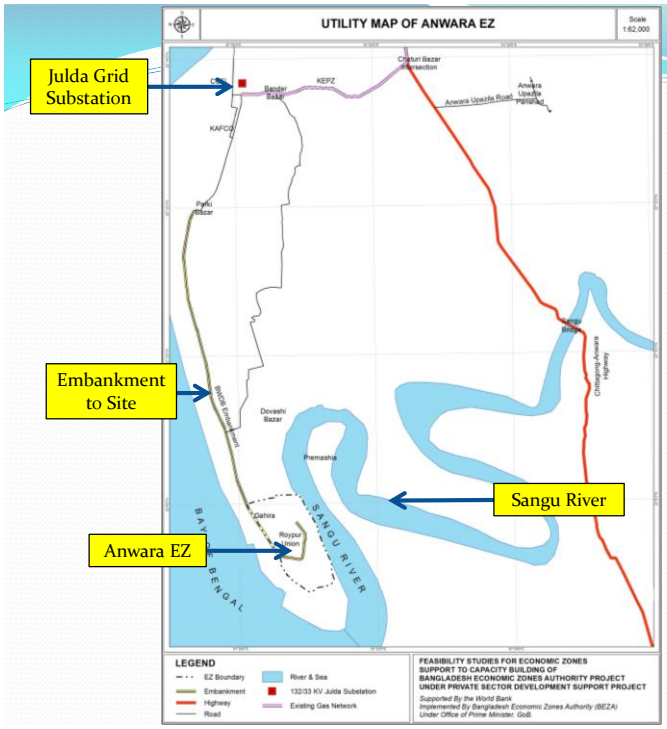
Access Road (ii): Abu Torab Bazar Road

Profile of Mirershorai EZ

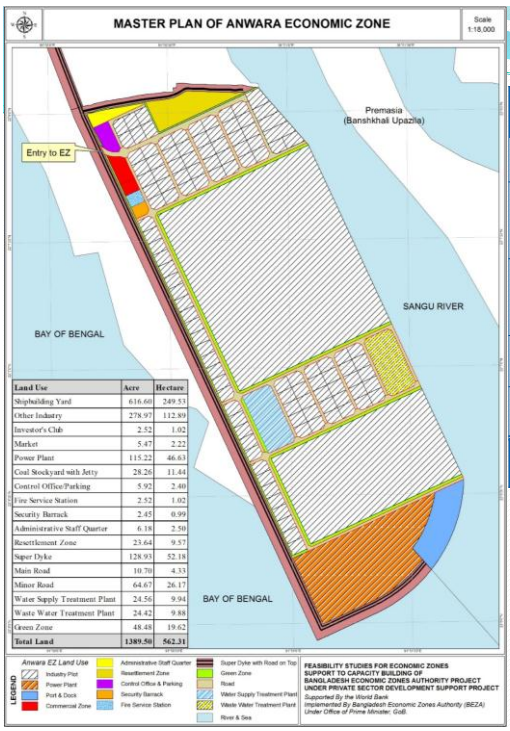
Item	Detail Comments
Access & Utility	182 Km fm Dhaka, 66Km to Chittagong, 79Km Airport, 67 Km to Sea Port: Own Port & Coal Power (600MW)
Land Gross & Net	**Gross: 3420 ha and Net Saleable Land: 1704 ha**
Type of Industry	**Garment, G. Accessory, Textile, Machinery Parts , Bike & Automobile Assembly later.**
Price of Land Lease	**$50/sqm (2016-2020) $70/sqm (2023-2024) $80/sqm after 2024**
Cost : On & Off-Site	**$818 million for On-Site & $29 Million for Off-Site**
Financial IRR	**Financial IRR 28.0% and Economic EIRR is 49.85%**
Competitiveness	Along the Dhaka-Chittagong Corridor with own power & other infrastructure, Mirershorai EZ will be competitive.
Employment s	**578,751 Workers**
Expected Schedule	Construction start from 2017 and Phase 3 will end 2025
Marcket Demand	275 ha (28 Firms) of 103: If include FDI and Universe : 10 times More ? 2750 ha which is likely to exceed the demand for 17-25.

ANWARA
ECONOMIC ZONE





- No Water Supply Network Available on site
- Surface Water source: 26 Km upstream of Sangu River
- Gas line up-to CUFL



Land Use	Total Land		Percentage
	Acre	Hectare	
Leasable Land	1047.04	423.72	75.35
Land for Administrative Purposes	17.06	6.91	1.23
Land for Infrastructure Development	253.28	102.50	18.23
Land for Green Zone & Others	48.48	19.62	3.49
Resettlement Zone	23.64	9.57	1.70
Total	**1,389.50**	**562.31**	**100.0**

- Existing Land: **611.47 acre**
- Reclaimed: **778.03 acre**

Anwara: Consultations with Stakeholders

Anwara: Site

Anwara: Embankment & Access Road




Profile of Anwara EZ

Item	Detail Comments
Access & Utility	45Km to Chi.Port, 28Km to City and 46 Km to Airport W, Ws, Tel, Own Port and Power (300MW)
Land Gross & Net	**Gross: 562 ha and Net: 423 ha**
Type of Industry	**Shipbuilding, Steel, Power plant, Leather Products, Auto Parts**
Price of Land	**$60 - $70/sqm**
Cost	**On-Site cost of $172.87 Mill. & Off-Site cost of $67 Mill.**
Financial IRR & Economic ERR	**Financial IRR 35.2% with 15% VGF** **Economic EIRR is 32.16% with 15% VGF**
Competitiveness	Anwara EZ has advantage of Sea access directly able to attract the waterfront industries such as shipbuilding, steel and cement and supporting industries.
Employment Creation	**53,420 workers**
Expected Schedule	Start construction from 2017 and complete by 202
Market Demand	170 ha (24 Firms) out of 103: actual demand may be 5-7 times.

Summary of 3 EZ: Sherpur, Anwara and Mirershrai

EZ and Item	Sherpur	Anwara	Mirershrai
1. Gross &Net Area	143.0 ha & 88.6 ha	562 ha & 423 ha	3420 ha & 1704 ha
2. Utilities	P, W, Ws, Gas, Tel	P, W, Ws, Tel, Jetty	P, W, Ws, Tel, Jetty
3. Type of Industry	Textile, Ceramics, Pharmaceuticals, Food processing	Shipbuilding, Steel, Power plant, Leather, Auto Parts	Garments, Textiles, Machinery Parts, and Auto-industry
4. Cost : On& Off	$82& $7.7 million	$172 & $67 Million	$818 & $29 Million
5. Land Price/sqm	$50	$50-80	$60-70
6. Financial & Economical Re.	FIRR 21.13% EIRR 47.0%	FIRR 28% wVGF EIRR 49.85% w VGF	FIRR 35.2% EIRR 32.16%
7. Schedule Plan	2016-2019	2017-2020	2017-2025
8. Employment	40,706 workers	53,420 workers	578,751Workers
9. Competitive	Power & Gas No1 out 7 EZs	Direct Access to Sea Port	Own Power & Sea Port & Good Acc.
10. Key Points	Plenty W, P & G First Pilot Project!	Own Port & Power Access to Sea . VGF may be used:	Large size (3420h) Own P & Port First Sea Board EZ
11. Market Demand	169 ha (18)by Survey	170 ha (24)by survey	275 ha (28) by survey

Social & Environment Aspects

EZ	Sherpur EZ	Mineshtorai EZ	Anwara EZ
Social Aspect: Family Relocation Employments	5 households 40,706	650 households 578,750	980 households 46,600
Environment Aspect Natural Physical	Loss of paddy Minor risk of de-Gradation	Erosion Loss of paddy	Erosion Loss of paddy

- Detailed EIA (Environmental Impact Assessment) is proposed for the three sites

Other Consultations: 1st Workshop

Other Consultations: 2nd Workshop

Other Consultations: Meeting with Chambers

Prospect of BEZA & EZ Program

- Successful EZ Program quickly is needed for Bangladesh because creating millions of new employments will be needed for coming years.
- Need a strong top level **political support & political will** for successful implementation.
- Three related institutions: BEZA, BEPZA and Private EZP needs to be simplified, strengthened and perhaps unified in the future.
- BEZA Capacity must be improved with experienced professional staffs.
- Clear Future Vision, Targets and Road Map will be needed to convince Government and the developers/investors.
- Market Driven & "A to Z" Approach in all process will be needed.
- First EZ project should be implemented successfully with all support by everyone by PPP scheme. Then, Expand!
- Land acquisition process/implementation scheme need to improved allowing (1) PPP Scheme and/or (2) Private- Private Scheme.
- Trouble Shooting Mechanism must be established from the beginning.

Guidelines for BEZA (EZ): More Specific Environment Control Guideline is needed!

1. Guidelines and Regulations for EZ is also one of the key factors.
2. BEZA guidelines is drafted and pending for an approval .
3. Proposed BEZA guidelines are fairly good except lacking specific guidelines for pollution control at the pre-treatment and final treatment stages.
4. Infrastructure connection & Green Zone Guideline may be improved .
5. For BEZA, EZ Guidelines should be the improved the best practice of Asian country leaning from other EZs.

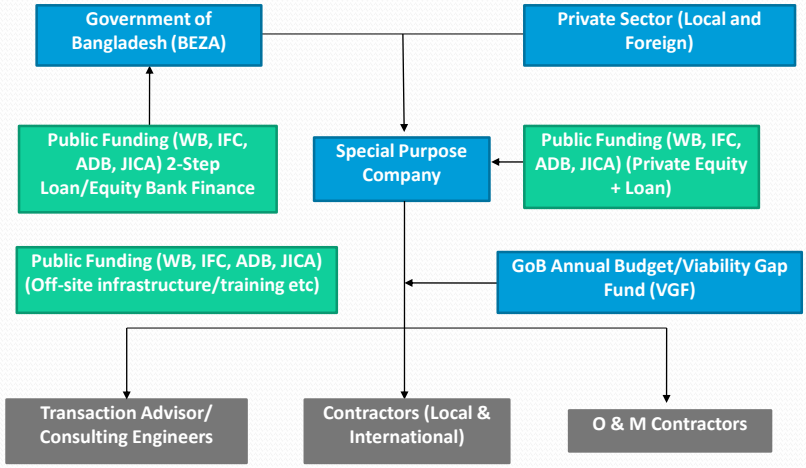
Guideline s & Regulation s of EZ
1. Architectural Plans guidelines
2.Open Space Requirement
3. Architectural Requirements : Setback & height etc.
4.Ventilation & Sanitation Guidelines
5.Strucutre Guidelines
6. Facilities for Workers : Canteens & clinics etc.
7.Anti –pollution Measure
8.Power, water, waste-water, gas connection
9.Approval of Contractors

One Stop Service (OSS) System (One of Keys for Successful EZ)

1. Nearly all permits and approvals will be given at EZ OSS Office.
2. BEZA inherit the best practice of BEPZA and other EZ /SEZ in Asia.
3. BEZA to adopt the best practice & improve OSS further in the areas of (1) Renewal of Bond license,(2) Gas Operation and (3) Security clearance for investors.

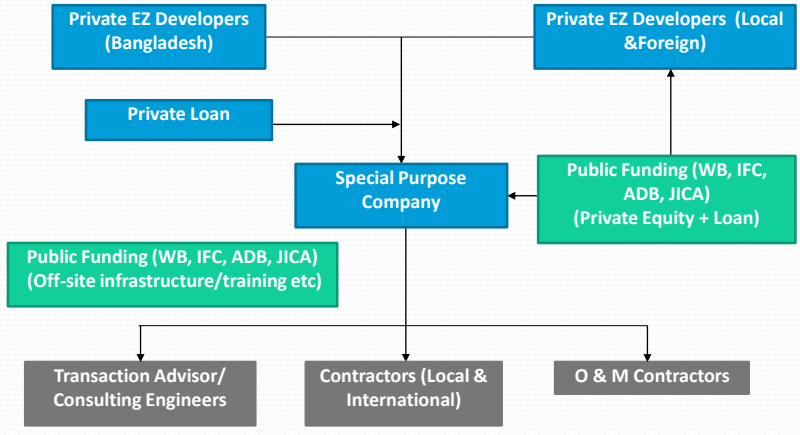
Item	BEPA	Other Agency
Investment License	Yes	
Construction & Op/Permit	Yes	
Import & Export License	Yes	Custom Office
Tax Registration	Yes	Tax Office
Working Permit	Yes	M of Labor
Multi Visa Issues	Yes	Immigration
Incentive Arrangement	Yes	
Environmental Issues &Permit	Yes	M of Environment

Public, Private Partnership (PPP) Funding Scheme



Data Collection Survey in EZs Bangladesh

Private, Private Partnership Funding Schema



Data Collection Survey in EZs Bangladesh

Possible EZ Implementation Scheme: PPP supported by Public F

1. BEZA implement & operate EZ themselves (Just as BEPZA)

   Old style system up to 1980's and not recommended now.

2. Private -Public Partnership (PPP: P & G JV)

   Land can be acquired by BEZA, Local Government or other Government agencies and form a JV and develop /operate EZ. (e.g. some SEZ/IP in Vietnam, China and Thailand)

3. Private and Private (Local Alone or JV with Foreign)

   This scheme has been the case of most of Asian countries since 1980's successfully. Land acquisition & off site infrastructure : coordination are the key for success.

4. Start from the Case 2 and swiftly shift to the Case 3 just as other Asian countries.
5. Set up a Package Loan Scheme for the BEZA Program mainly Off Site infrastructure/Acquiring of Land purpose.

Some Evidences for Demand for Fully Serviced EZ land for Bangladesh

- Bangladesh is 10th destination in Japanese investors' poll in 2013 by JETRO.
- 200 Investors/m are visiting JETRO & 100 investors/m are visiting BEZA for suitable land indicating many potential investors are waiting.
- Due to higher wages in China and Asean, many labor intensive investors are looking for cheaper production countries (Myanmar and Bangladesh are competing in)
- Nearly all Bangladesh Industry associations have future expansion plan but difficult to find suitable industrial land where all requirements (Power, Energy, water and access)are met.
- Bangladesh Textile Mills Association (BTMA) alone requires over 100 hectare industrial land immediately and Pharmaceuticals Association is trying to develop own SEZ of 200 acre.
- 8 EPZs by BEPZA is nearly filled with factories(93%): only 117 Plots (7%) remain indicating huge demand for EPZ/EZ but no plots available.
- Over 100 visitors to BEPZA per month asking possible plots in the recent years.
- ED land demand is estimated fro 2025-2035 is 66,560 ha for Base Case & 52,034 ha for pessimistic Case. Market Survey indicates sufficient demand for three EZs: 64% of Surveyed Yes.
- Sherpur EZ: 169 ha (18 Firms) ; Anwara EZ: 170 ha (24 Firms): and Mirershrai : 275 ha (28 firms)
- Strong potential demand for fully serviced EZ exist and If BEZA prepares fully serviced EZs with competitive Guidelines & OSS, large number of investors (Domestic and Foreign)are likely to be attracted to these EZs.
- Several potential developers from Japan, China, Singapore and Korea and Thailand have shown interest to invest in EZ projects if the conditions are met.
- These evidences are only potential not real demand: BEZA/PPP developers must shown ability to implement the fully serviced and competitive EZs quickly.

EZ Program will solve 5 problems?

Considering all of Macro-Micro Problems faced by Bangladesh,

- Major problems:
  1) Shortage of Meaningful Employments,
  2) Weak Infrastructure (Especially Power & Energy),
  3) Weak Business Competitiveness (114 out of 144),
  4) Serious major urban area congestions and
  5) Limited Government budget.

Proper EZ Program may solve all of the above problems as other ASEAN countries achieved.

Is it possible to attract Investors to Bangladesh in large number? Yes and No!

Yes! You can!

If BEZA with Government & Private sector work together with strong **Peoples & Political will** : Orchestrated way.

EZ should provide full serviced EZs to Investors are looking for and solve any problems arises Development & Operation period : Need a **Trouble Shooting Mechanism.**

No!

If every one goes own way selfishly as "Business as usual" and creating only a big smoke but no fire.

It is not easy to successfully attract investors at new EZs without knowing what investors are looking for and everyone work hard enough for developing attractive EZs .

The Key is how BEZA/Government together able to develop fully serviced EZs which is equal or better compared with ASEAN countries.

Suggestions for Bangladesh EZ

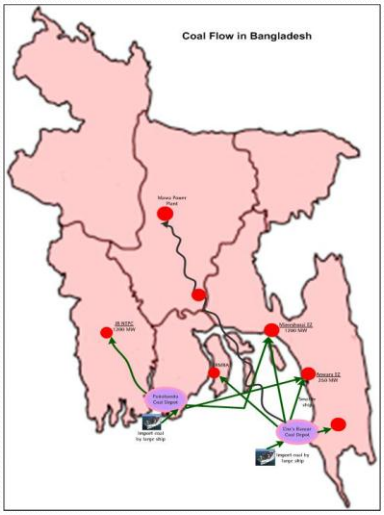
- Initiating one Pilot EZ project (one EZ out of 3 at least) ASAP & implement successfully.
- Formulate a clear EZ Vision & Target: 10 Million Job Creation! By 2030 by developing at least 100 EZs.
- EZ Guidelines & Regulations including OSS system should be approved and make operational ASAP.
- Packaged EZ with Key infrastructure such as Power, Port and access road at several key regions stabilizing power. Mirershorai EZ can be one of such case.
- EZ Authority should delegated power to each EZ to operate efficiently by OSS reducing Red Tapes.
- Once EZ is operational, Manpower skill program based on Market Driven should be initiated and implemented quickly.

Specific Recommendations for BEZA Program

1. **Start Sherpur EZ first** fully supported by the Prime Minister Office with **Strong Political-Will** and demonstrate BEZA is able to implement EZ quickly and successfully. Then follow Mirershorai and Anwara.
2. Remember: **No Fully Serviced Industrial Land! No Investment!** Without Investments, No Jobs /Income in Bangladesh.
3. Backlog of well prepared EZ industrial land is building up to nearly 2,000 hectare now and 7465 hectare for coming 2015-2020 period projected based on both Macro projection and Market Survey support the Macro Demand Projection.
4. Achievement of National Goal of 2021 is heavily depend on successful implementation of EZ Program by BEZA.
5. **Get on Asian Express Bus!** Now and Move on AFASP.
6. BEZA has a full mandate to develop EZ. So, develop as many EZs and as fast as possible with **"Can Do Spirit!**

Critical Pass for EZ Program

1. Power & Energy Stabilization is needed.
2. Ports & Highway should be developed as well.
3. Use of more River Waterway is recommended.
4. Package Approach of Power/Port/EZ is needed.
5. Use of Clean Coal & LNG gas Power is a solution.



Thank you!

Meeting Minutes: 23rd February, 2014

Workshop on Draft Reports of the Feasibility Study of the Three Proposed Economic Zones

(Sherpur of Maulvibazar District and Mirershorai and Anwara of Chittagong District)).
Date & Time: Sunday, 23 February, 2014 at 10:30 AM
Venue: Ball Room, The Westin
Gulshan, Dhaka.

The third and final workshop was held on February 23, 2014 at the ball room of The Westin Hotel with Honourable Minister, Ministry of housing and public works Engr. Mosharraf Hossain as the chief guest. Honourable State Minister, Ministry of land Mr Saifuzzaman Chowdhury (Javed), Honourable Economic Adviser to the Honourable Prime Minister Dr. Mashiur Rahman and Secretary, Prime Minister's office Mr Abul Kalam Azad and FBCCI President Mr Kazi Akram Uddin Ahmed were present in the meeting as special guests. The meeting was presided over by the Executive Chairman, BEZA Mr Fakhrul Islam.

The program started with the recitation from the Holy Quran with large number of distinguished participants both from the private and public sector.

With a short introduction of the distinguished guests, BEZA chairman has delivered the welcome address to the attending guests. In his speech Mr Islam expressed that it is high time for developing economic zones in the country and attract potential investors. In order to create facilities for potential investors, full support and co-operation from the government is needed. He sought guidance and blessings from the chief guest and special guests' for successful implementation of the Economic Zones.

Dr. Kobayashi presented his speech followed by power point presentation. While presenting the draft final report on Technical Advisory Services for Feasibility Studies for the proposed Economic Zones he mentioned that to obtain national goal of becoming a middle-income country's status by 2021, depend mainly on successful operation of EZs in the country. Dr. Kobayashi has also observed that Bangladesh presently requires more EZs for providing job opportunities to its unemployed and under-employed people who are still living in poverty. Many Asian countries have come out of poverty by developing EZs. Bangladesh can solve many of its problems such as poverty and unemployment to a great extent, by following the same path.

President FBCCI Mr Kazi Akram Uddin Ahmed supported to create more economic zones in Bangladesh. He made strong commitment to provide full support and co-operation needed from FBCCI to implement economic zones.

Mr Abul Kalam Azad, Secretary Prime Minister's Office appreciated the work carried out by Dr. Kobayashi and his team and drew attention of the guests to the "Critical Pass" shown in the power point presentation of the EZ project. He stated that all those issues are being addressed by the Government of Bangladesh and moreover government has identified six projects as fast track projects and Economic Zone project is among those projects.

Saifuzzaman Chowdhury Javed, State Minister for land, said attracting foreign direct investment would not be a problem if the country can set up economic zones. He stated that all the indicators are very positive in the present context and to accelerate economic growth, the economic zones are needed to be established.

The following points were raised and discussed in the open discussion session. The session was conducted by Mr Abul Kalam Azad, Secretary, PMO.

Mr Arastoo Khan, additional secretary of the Economic Relations Division has lauded the presentation of the feasibility study of Dr. Kobayashi and presumed that the points which were raised by the World Bank on draft final reports have been already incorporated in the report. He also mentioned that BEZA's capacity building shall have to be increased to shoulder higher responsibility of implementing projects as the feasibility study is going to be completed very soon. He also mentioned the possible amalgamation of the two authorities (BEZA and BEPZA) to increase the capabilities to undertake the huge task of construction and management of the zone. In answering to this question, Dr. Kobayashi said that most of the points have been taken into consideration in the final version of the report. Regarding amalgamation Dr. Kobayashi also recommended the same as he also thinks these two organizations should merge together.

Mr A F M Afzal Hossain, Joint Secretary, Privatization Commission, mentioned that Sherpur is located far away from Dhaka and two port city of Mongla and Chittagong. Thus the cost of carrying goods discourages investors in setting up industries there. He referred that a state owned textile mills was offered for sale and a tender was invited to the public but the response was not positive. The study made Sherpur EZ project viable which is located far from the Sylhet city centre. He also questioned whether the price of land to be US $ 50 per square meter is not in the very high side? In reply Dr. Kobayashi pointed out that the demand survey was conducted, the responses from the potential investors were very positive. It is mentionable Ceramic industries, Textiles sector, Paint and Chemicals, Food processing and leather goods manufacturing industries show have keen interest to make investment in Sherpur EZ. Dr. Kobayashi also said the proposed EZ in Sherpur has the potential to become one of the top seven economic zones in Asia and advised the government to roll out the Sherpur Economic Zone first with required infrastructure such as power, water and gas etc. So, it has the potential to attract investors. Regarding the cost of the land, Dr. Kobayashi pointed out that the cost of land in Sherpur EZ is still less than other neighbouring countries; hence the price of US $ 50 per square meter is justified at the initial stage.

Mr Kaikobad Hossain, Member BEZA asked a question to Dr. Kobayashi regarding IRR. He wanted to know how the FIRR 28% and EIRR 49% for the Anwara project can be viable? In reply, Dr. Kobayashi stated that since the rate is above the present opportunity cost of capital and also higher than the present bank interest rates, the project is therefore has been considered viable.

Mr Md. Abdul Mannan DC Chittagong appreciating Kobayashi's effort and his team for the study mentioned that public land which remains as 'khas land' will not be any problem but for acquisition of the land those are under private ownership, there might be disputes and the process may become complex. He ensures to do everything possible and expects full support from the government and the related authority.

Mr Md. Kamrul Islam DC Maulvibazar raised a question to whether the study conducted considered the fact that Sherpur area is under high risk of earthquake area in Bangladesh. The point mentioned shall be taken into consideration at the time of developing the economic zones and in the construction stage Dr. Kobayashi replied.

Another speaker wanted to know whether the Kushiyara River can be used for transportation of the goods of the proposed economic zones? In regard to this, Dr. Kobayashi explained that there is no possibility of transporting goods through Kushiyara River. In another question he pointed out that in Sherpur EZ how food processing, ceramic and pharmaceuticals industries can be set up side by side. In regard to this Dr. Kobayashi mentioned that in designing the master plan of the EZs this issue has been addressed and will be accommodated accordingly.

Bangladesh Inland Water Transport Authority (BIWTA) representative raised the point of analysing the prospects of Ashuganj river port. Dr. Kobayashi stated that this issue has been addressed in the report. The Ashuganj river port will be used by the EZ companies.

Special guest Honourable Advisor Economic Affairs to the Honourable Prime Minister Dr. Mashiur Rahman expressed the need for setting up economic zones in the proposed locations and indicated that he personally visited the Mirershorai location along with the local MP who is eventually the chief guest of the function. He personally convinced that the location is ideally suited for establishment of Economic Zone at Mirershorai. He however, stressed the need for making required infrastructure development on the offsite as explained by the team leader. Dr. Mashiur Rahman emphasized for setting up a complete township in the proposed economic zones to give workers a better life and their families' better access to education and health.

Dr. Md. Nurannabi Mridha Project Director BEZA in his thanks giving speech mentioned all investments for EZ will come from both local and foreign investors. Since there were no other questions from the participating guests he expressed his thanks to all the attending guests including the chief guest and special guests in the chair.

WORKSHOP ON DRAFT FINAL REPORTS
Feasibility Study of Three Proposed Economic Zones
(Sherpur of Moulvibazar and Mirshorai & Anwara of Chittagong District)

Date: 23 February, 2014

Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
31	SAIFUZZAMAN CHOWDHURY	STATE MINISTER [redacted]	LAND MINISTRY	01711723456	SZCHOWDURY@yahoo.com	
32	Kazi Akram uddin Ahmed	President FBCCI				
33	MD. ABUL KALAM AZAD	SECRETARY DMO			azad2113@gmail.com	
34.	MD. TOUHID HOSSAIN	F FAVP STANDARD BANK		01716951693	touhid-77@yahoo.com	
35.	Salahuddin Bablu	Business Editor	SA TV	01552302510	salahuddinbablu@yahoo.com	Bablu
36.	MA Babor	~~Manobkantha~~ Staff Reporter	Manobkantha	01713027234	babardhara@gmail	
37.	Ismail Ali	Staff Reporter	Bonik Barta	01915044734	ismail_ecc@yahoo.com	
38.	Kazi. Amin.	Rtd. Secretary		0192-474-4704	kazimardia1@gmail.com	
39.	Rahat Raja	Staff Correspondent	daily sun	01673-688114	b_raja1726@yahoo.com	Raja
40.	[illegible]	[illegible]				

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Date: 23 February, 2014

Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
51.	Biplob	Cam.	BTV	01739196893		[signature]
52.	DEBASHISH ROY	Reporter Somoy TV	Somoy	01710-439664	3hishoxrw@gmail	[signature]
53.	Faiyez Ahamed	PS To Minister	Ministry of Housing & Public Works	01817578806	faiyez.ahamed@yahoo.com	[signature]
54	Antara Biswas	Ekattor TV Reporter	Ekattor TV	01841710214	biswasantara16@gmail.com	[signature]
55.	Md. Kamal AKHTAR	Study coordinator	Maxwell Stamp Ltd	01711-583519	kamal.akhtar49@gmail.com	[signature]

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Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
40.	Ratan Kumar Hogumder	Deputy Chief Conservators of Forests	Forest Department	01738360221	rtnmzndr@gmail.com	
41	Nila Hosnat	Staff Reporter	~~Business~~ Asian TV	01744969161	nila_hasnat@yahoo.com	
42	MD. CHAN MIAH	P.I.D				
43	Md. Nurul Mostafa	PO	Ministry of Housing + Public Works			
45	MD. Shamsuzzaman	A.S.I	S.B	01719-555558	—	
46	Ahad Hossain Tutul	Staff Reporter	SA TV	01716027665	ahad_tutul@yahoo.com.	
47	Mofazal Islam Sarker	Ministry of Works (P)		01923608074		
48.	Md. Alin Hosain	MLLSS	BEZA proj.	01763282010		
49.	Salahuddin Babu	Business Editor	SA TV	01552302510	salahuddinbablu@yahoo.com	
50.	Jinni	Reporter	BTV	01684585147		

WORKSHOP ON DRAFT FINAL REPORTS

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Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
01.	S. A. Hasan	Env Spl	BEZA	01818530780	nasonoda 229@gmail	[signature]
02	Md. Azizul Islam	Member Finance	BPDB	01819225947	Mem fin@bpdb.gov.bd	[signature]
03.	Md. Delwar Hossain	Consultant	Shelltech.	01730326225	dhdelwarhossain@gmail.com	[signature]
04.	ShyamSunder Sikder	Chairman	BSCIC	01718334640	SS.Sikder@yahoo.com	[signature]
05	Mohammad Abul Kashem	EMember, BEZA (P&D)	BEZA	01715172448	abulkashem1505@yahoo.com	[signature] 23/02/14
06	Suroj	FMS	BEZA			[signature]
07	Md. Selim Akhter	Manager (law)	BEZA	01749-306080	Selim286@gmail.com	[signature] 23.02.14
08	Md. Shamsul Karim Bhuiyan	Joint Chief	Ministry of Shipping	01819939519	karim.eco@hotmail.com	[signature]
09	AHM AFZAL HOSSAIN	Jt. SECY	PRI. COMMI	9563767	afzal@Ymail.com	[signature] 23/2/14
10	Muhammad Abdus Samad	Secy, BEZA	PMO	8180119	masamad7@Yahoo.com	[signature] 23/2/14

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Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
11.	Akram Siddiq Chowdhury	M.D	Thai Bangla Hatchery Ltd	01819313712	Shah@gmail.com	[signature]
12.	Jagodish Roy	Mem (Ad&F) BEZA	BEZA	01190-258149	jagodishroy@gmail.com	[signature]
13	Naeem Chowdhury	MSL				[signature]
14.	MD. AL-AMIN	URBAN PLANNER	SHELTECH	01671020876	alamin.spl@gmail.com	[signature]
15.	MD. SHAHJAHAN	Additional Director General	DOE	01819258177	shahjahan@doe-bd.org	[signature]
16.	MD. RUHUL AMIN	D.G. Food (Ex)	Ministry of Food	01720343863	ruhul3130@gmail.com	[signature]
17	Farrare Ahmed	Ex President	Sylhet Chamber of Com	0171192207[illegible]	fa.MISBAH.	[signature]
18	SUDDL	CEO	[illegible]	0194379159[illegible]	ceo@[illegible].gov.bd	[signature]
19	Shah Nur Quayyum	Financial Sector Specialist	FPD World Bank	01713017133		[signature]
20	Caroline Smith	Economist	USAID			[signature]

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Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
21.	Md. Shafiqul Islam	SE	BBA	01711-64101	shafiq.bba65@gmail.com	[signature]
22.	Kamaluddin Ahmed	Addl. Secy	ICT Division	01552-309-185	kamaluahmed2009@yahoo	[signature]
23	Obaidur Rahman	Director	FBCCI	01199-850935	trade@dorasco.com	[signature]
24.	HARUN-UZ-ZAMAN	JOINT SECRETARY	MINISTRY OF COMMERCE	01711-905818	mhz.bhuiyan@yahoo.com	[signature]
25.	S. M. MAHBUBOR RAHMAN	DG	EPB	01923612851	mahbubor_r@yahoo	[signature]
26.	MAHMUD HASAN SALIM	Director (planning)	BIWTA (MOS)	01911914636	dpl@biwta.gov.bd	[signature]
27.	Md. Kaikobad Hossain	Member BEZA	BEZA	01711-175875	kaikobadh@gmail.com	[signature]
28.	Md Kabirul Islam	Prof, BUET	CIVIL	01819282200	raja9bd@gmail.com	[signature]
29	C Kkesh	Consultant	B	01943217846	[illegible]	[signature]

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Date: 23 February, 2014

Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
30.	Dr. M. Mahmudur Rahman	Director General	PMO	9140331	enumahmud@yahoo.com	
31	MJ. Shoaib	Manager	BEZA	-	-	
32	Sheikh Jahangir Alam	Reporter	ATN Times	01914023544	sagor.JRN@gmail.com	Jahangir
33.	AKM Nowsari	Consultant	Maxwell BEZA	01726293476		
34.	Arsalan Zaman	Project Support Officer	Maxwell Stamp Ltd.	01674777778	arsalanzaman@gmail.com	
35.	Abu Lahel	Asst. Manager (Admin) BEZA	BEZA	01718201856	lahel_jnbd@yahoo.com	
36	RIFAT RASHID	Director CCIFB		02 8821450	ccifb@qwbeemail.com.bd	
37	S.M Rashidul Islam	Senior Reporter	BSS	01712946211	shorif.rashed@yahoo.com	
38	Rasheed Rahimi	Manager (Log)		01819532508		
39	S. M. Shihab Ullah Noor	Asst. Manager HR	Maxwell Stamp	01817520309	sunoor@maxwellstamp.com	

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Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
01	Salma Akhter	Professor Sociology DU,	Map Hell Step Ltd	01816380118	salmaakhter1@hotmail.com	Salma
02	Kamal Krishna Bhattacharyya.	Additional Secretary	M/o Railways	01715018512	bhattacharyya.kamal@yahoo.com.	[signature]
03	Abu Saleh Md. Shahidullah	Urban Planner	Sheltech (Pvt.) Ltd.	01720249158	abu_saleh40@yahoo.com	[signature]
04	Shimul Sarker	Urban Planner	Sheltech (Pvt) Ltd	01717232615	planner.shimul0304@gmail.com	[signature]
05	Md. Kamrul Hasan	DC, Moulvibazar,	GOV	01715171786	dcmoulvibazar@mopa.gov.bd	[signature]
06	Md. Muazzam Hossain	Addl. Secy	M/o Land	01716201100	[illegible]	[signature] 23.2.14
07	Zeenat Nahreen	Director Planning	Sheltech Pvt. Ltd	01715008953	zeenat.nahreen@gmail.com	nahreen 23.02.14
08	A.H.M. Jahangir	Deputy Chief	ERD	01713199932	ajahangir07@yahoo.com	[signature]
09	Swapan Kumar Saha	Member Distribution	BPDB	01819229805	membPdb@Yahoo.com	[signature]
10	Md. Abdul Mannan	Deputy commissioner ctg	D.C	01713104332		[signature]

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Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
11.	G. C. Sutradhar	Chief planning	BWDB	9560937	eplan...@yahoo.com	[signature]
12	Md. Abdul Quader [illegible]	Resettlement and Rehabilitation Expert	Shushilan	01716681456	kader...@gmail.com	[signature]
13	HABIBUL AZIZ	Procurement Specialist	BEZA Project	01712521991	vibubdoyahoo.com	[signature]
14	MD. BONI AMIN BIN HASHIM	Manager Admin BEZA Project	BEZA Project	01712180066	boniamin1969@gmail.com	[signature]
15.	Md. Moniruzzaman. Manager (Dy. Sec) BEZA.	Manager (BEZA)	BEZA	01712-628360	monirani610@gmail.com	[signature]
16	Dr. Md. Nuannabi Mridha P.D. BEZA, PMO.	PD, BEZA	BEZA	01554633192	bezaprojectgov.gmail.com	[signature]
17	Mika Saito	Chittagong chamber		01791319290	mk.saito.23@gmail.com	[signature]
18	Md. Nazrul Islam	Member (A&P) CPA	CPA	01199375278	map@cpa.gov.bd	[signature]
19	K. K. ROY.	Member (Admin)	BTCL	01550152047	khagenkroy@gmail.com	[signature] 23/2/2014
20	Dr. Mahmood Osman Imam.	Financial Analyst, Study	Maxwell Ltd	01713036211	osman@du.ac.bd	[signature] 23/2/14

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Sl. No.	Name	Designation	Department	Phone No.	Email ID	Signature
21.	Fazlur Rahman	Reporter	Daily Star	01732424548		
22	Quazi Khan	Addl.	ERD	01711837803		
23	Dr. Khandaker Afzal Zafar	Consultant	Shelter	01674835212		
24.	M. A. Kalam	Consultant	"	01817505820		
25.	G.M. Jainal Abedin Bhuiya	Additional Secretary	Mo Industries	0175555 8880	Ja_bhuiya@yahoo.com	
26.	Bijon Kumar Baishya	Addl. Secretary	RJSC M/O Comerce	8189401	bijon_kumar@hotmail.com	
27	Stuart Dawes	Economist	DFID	0171 344 9930	S-dawes@dfid.gov.uk	
28	Md. Mahbub Sarwar	General Manager	Petrobangla	01190591460	pmm@petrobangla.org.bd	
29	Md. Monower Zahid Khan	Assistant Engineer	BPDB	01718228830	monower.khan@gmail.com	
30.	Toufiqul Alam	Urban planner	Shelter	01818-366574		

ANNEX 2

CHAPTER 2: COMPETITIVE ADVANTAGE AND INDUSTRY ASSESSMENT (COMPONENT 1)

1. Competitive analysis of Anwara Economic Zone

Before launching into the sources used themselves, there are several preliminaries to be noted.

First, the employment number shown for Sherpur is arrived at while multiplying the industrial saleable land in hectares by 400.For the other SEZs and IPs, they are, as far as practicable, estimates about the direct employment generated by the enterprises there. That said, the quotation from Ms Kim, of the Amata City Bien Hoa Industrial Park, cited in the body of the report must be accounted for. Kim makes the point that authorities promoting the SEZ or IP have no business interest in keeping up-to-date with the combined employment level of their tenants on the SEZ. The estimates often cited in the literature, either popular or specialist are several steps removed from the managers actually doing the hiring and firing on the underlying enterprises. It is virtually impossible to get at the total employment generated by all the firms on the MWC, Chennai, for instance. The very large volume of promotional material on various web-sites representing either Mahindra Lifespaces Limited is completely reticent about the total employment by those who carry on their businesses on the World City. We ran into an episodic mentioning in one of the web-sites that InfoSys, which runs the world's largest information-technology (IT) campus the size of 3.5 million sq.-ft. at the MWC, alone hires more than 30000 employees (http://www.mahindracity.com/content.aspx?act=cust&id=36). But next to nothing is known in the public sphere about the employment level for the other companies, including many of them on the Fortune-500 list of name-brand corporations, located at the MWC. We must surmise that the total employment of all those companies including InfoSys must run into hundreds of thousands. We wrote directly to the authorities at MWC requesting access to certain essentially promotional information, including total employment generated on the MWC.MWC, like several other authorities have not responded to our questionnaire. The number on account of employment of at least 150000 for MWC is based on an informed guess of the JDI team working on this project. Additionally, as one article related to Myanmar and cited among the sources listed below, made clear, the SEZ/IPs in this sample, suffer from considerable but varying levels of workers turnover, which only makes any estimate of employment very dynamic in nature. The upshot is that what we have presented for employment levels in the zones/IPs may not strictly be comparable.

In addition to this, there have been reports that some employers on the Cambodian SEZs such as the Manhattan SEZ report a significant difference between the employment level maintained with the SEZ's developer and the actual employment situation. As the authors of the report at http://www.sciencespo.fr/coesionet/sites/default/files/GMS%20Capstone%20Report%20May%2017.pdf show, Taiwanese bicycle producers, Best Bicycle Factory, reported an employment level of about 582 workers (352 men, 230 women; 549 local, 33 foreign)to the SEZ's One-stop-service (OSS), whereas the actual employment of the enterprise was actually 1500.This is according to this firm's 'high-level manager' who showed the authors around. The article written by the French team quoted earlier in the report shows that, as of February, 2011, enterprises located on the PPSEZ had generated direct employment of 4972 and indirect employment on the SEZ of another 142 in services. And yet a journalist reporting in the New York Times in 2012 stated that the PPSEZ had generated as many as 20000 jobs (source quoted below). The higher figure in the table is quoted so as to give the PPSEZ the benefit of the doubt. All-in-all, there is a need to take with a grain of salt employment figures that originate from the OSS or the authorities of the SEZs themselves. The employment numbers are therefore unlikely to be comparable across the EZs/IPs. The employment numbers cited for Anwara are based on 'planning exercises', due to the JDI/MSL/Sheltech team.

The following exchange rates are used in this chapter (all to the United States dollar): 4104 Cambodian Riel; 58 Indian rupees; 21000 Vietnam Dong; 30 Baht; 9765 Indonesian Rupiah and 857 Myanmarkyat.

The estimates presented for the availability of electricity supplied to the EZ/IPs will once again not really be comparable. The literature at times only presents the maximum capacity of the transmission lines used to carry power to the industrial park(s), but not the total availability of electricity in

question. For Anwara and several other IPs, the desired information, to which the team has had access, is included in the material. However, for several other IPs, in the range of information available, in the public arena, has been limited. As a result, the information presented on the important aspect of the availability of power is not strictly comparable across the comparator EZs/IPs.

Placeholders relating to several dimensions of tax incentives have been included. As far as practicable, they have been defined so that they can be enumerated in chronological units such as years. They are: (1) length of tax-holidays; (2) tenure of lower tax rates, if any, after tax-holidays have expired.

Two international cargo rates are included. Cargo rate-1 denotes shipping costs between the port nearest to the EZ/IP in question and the Japanese port of Yokohama. Cargo rate-2 denotes shipping costs between the port nearest to the EZ/IP in question and the Japanese port of Los Angeles. Telecoms rates are measured using (i) a one-time charge to be paid to the national incumbent telecoms service provider for the basic connectivity; (ii) a basic monthly charge for using a fixed-line telephone from the national incumbent telecoms service provider.

All prices, whether they are unit values or total values, are provided in US dollars. The rates of exchanges have already been provided in the foregoing.

Two indicators, both from IFC's Doing Business-2011, are selected to denote the rigidity of working hours. They are (i) premium for night-work as % of hourly wage; (ii) premium for work on weekly rest-day, as % of hourly wage. Four indicators, from the same source, are selected to denote the difficulty in hiring workers. They are (i) are fixed-term contracts prohibited for permanent tasks?; (ii) maximum length of fixed-term contracts in months; (iii) minimum-wage of a 19-year-old worker or an apprentice to be hired; and (iv) ratio of minimum wage to value-added per worker.

Sources: A large number of websites and a large volume of secondary information from elsewhere in the World Wide Web have been utilized in the preparation of the competitive benchmarking of the proposed Anwara zone.

(1) Phnom Penh Special Economic Zone (PPSEZ)

The sources consulted for the information relating to PPS EZ are as follows:

- http://www.cambodiainvestment.gov.kh/investment-enviroment/cost-of-doing-business/utility-cost.html for power-, water-charges;
- http://www.opendevelopmentcambodia.net/tag/electricity-price/ about the electricity charges in Cambodia as of 2013;
- http://www.ppsez.com/the-zone/infrastructure.html;
- http://www.ppsez.com/the-zone/facilities-a-services.html
- http://www.ppsez.com/investment/incentives.html;
- http://www.skyscrapercity.com/showthread.php?t=1169503 for the distances of PPSEZ from the city of Phnon Penh, from the international airport and the fact that PPSEZ provides 24*7 security;
- http://www.skyscrapercity.com/showthread.php?t=1133119 for PPSEZ area;
- http://www.emergingfrontiers.com/2013/04/26/cambodias-first-dairy-plant/#more-14002 for the length of the land-lease agreement at the PPSEZ; all three distances for PPSEZ are from http://www.acledabank.com.kh/kh/assets/pdf_zip/Conference2007_08.pdf;
- http://www.ppsez.com/the-zone/facilities-a-services.html for information concerning 24*7 security, solid-waste disposal, recreational facilities;
- http://www.ppsez.com/investment/incentives.html about all incentives offered by PPSEZ and the conditions of the land-lease;

- http://www.nytimes.com/2013/04/09/business/global/wary-of-events-in-china-foreign-investors-head-to-cambodia.html?hpw&_r=1& for non-wage labour costs for PPSEZ, of roughly 4%, the same as for Amata Vietnam and also of the PPSEZ employment level of 20000 by 2012/2013;
- http://www.ide.go.jp/English/Publish/Download/Brc/pdf/06_chapter1.pdf furnishes the institutional arrangements of the One-stop-service (OSS) at the PPSEZ;
- http://www.cambodiainvestment.gov.kh/investment-enviroment/cost-of-doing-business/telecommunication-cost.html, page 1 for telecommunications costs in Cambodia

(2) Mahindra World City (MWC), Chennai

- http://www.mahindraworldcity.com/Docs/downloads/Mwc_Brochure_Prepress_19_DEC_2007.pdf for MWC's land area (of 1400 acres), information about 24*7 security, international school, tax-holiday, fiscal incentives;
- http://www.mahindraworldcity.com/mwc.aspx?id=7 leads to the Environmental Clearance issued to MWC by TNPCB, which contains information about the capacity of the sewage treatment plant on MWC;
- http://www.thehindubusinessline.com/features/brandline/the-city-that-mahindra-built/article2656273.ece for information that MWC provides for industrial-park security on 24*7 basis; http://www.mahindraworldcity.com/ is the source of the Environmental Impact Assessment (EIA of MWC);
- http://www.mahindraworldcity.com/chennai/business-zone/technopark-it-sez/formats.aspx is the source of whether MWC allows ready-to-use facilities;
- http://www.thehindu.com/todays-paper/tp-national/tp-tamilnadu/cag-finds-irregularities-in-land-deals-involving-two-sez-properties/article4719483.ece is the source of the tenure of the lease, which is 99 years;
- http://www.projectsinfo.in/News.aspx?nId=7ZOzvkDubU6bGPXkm28zXQ== for information about MWC's sewage treatment plant;
- http://www.mahindraworldcity.com/chennai/about-mahindra-world-city/the-mahindra-world-city-advantage/highlights-of-plug-and-play-infrastructure.aspx for MWC infrastructure;
- http://www.mahindralifespaces.com/pdf/1_Mahindra_World_City_Developers_Ltd_2013.pdf is the source of the employment generated by MWC;

(3) MM2100 Industrial Park (MMIP), Indonesia

The sources consulted for the information relating to MM2100 are as follows:

- http://www.balidiscovery.com/messages/message.asp?Id=9266 for power charges;
- http://www.ubs.com/microsites/ib-conferences/apac/aseanconf2013/en/material/_jcr_content/par/table.1958697584.file/dGFibGVUZXh0PS9jb250ZW50L2RhbS91YnMvbWljcm9zaXRlcy9JQiBldml0ZS9hcGFjL2FzZWFuMjAxMy9jb3JwLW1hdGVyaWFsL0Jla2FzaSBGYWphci5wZGY=/Bekasi%20Fajar.pdf for information regarding the number of plots/clients in MM2100 IP;
- http://www.mm2100.co.id/main_industrialtown.php?id=1 on the numbers of infrastructure on MM2100;
- http://mingaladon.com/infrastructure_services.htm and http://www.mm2100.co.id/main_industrialtown.php?id=3 related to the number and nature of commercial, recreational and quality-of-life (QoL) aspects concerning MM2100 IP;
- http://www.mm2100.co.id/main_industrialtown.php?id=2 for infrastructure details, for security and police checkpoint, golf driving range, for MM2100;
- http://lnweb90.worldbank.org/ECA/Transport.nsf/ExtECADocByUnid/B9A56DE687D977AD85256BFB007248E1/$file/industrial%20parks.pdf, page 49-50, is the source on MM2100 for availability of350 MW power, daily capacity of drinking water, waste-water treatment

plant capacity64800 m3 of, natural gas connection, the water-charges and waste-water charges, lease tenure 30 years but extendable by another 40 years, making it 70 years.

(4) Mingaladon Industrial Park (MIP), Myanmar

The sources consulted for the information relating to Mingaladon are as follows:

- http://www.rfa.org/english/news/myanmar/electricity-11072013202738.html [Myanmar paper reporting on November 7, 2013]; Electricity Demand and Supply in Myanmar Prepared for Proximity Designs | Myanmar December 2012, available at http://www.ash.harvard.edu/extension/ash/docs/electricitydemand.pdf;
- Myanmar electricity price is from the BOI booklet, p. 123;
- http://www.ide.go.jp/English/Publish/Download/Brc/PolicyReview/pdf/07.pdf for semi-skilled workers working on the Dawei deep-sea port SEZ;
- http://mingaladon.com/introduction.htm for the sector-mix of the plots tenanted on Mingaladon IP;
- http://www.iist.or.jp/en-m/2012/0212-0863/ for additional information concerning wages of semi-skilled and skilled workers;
- http://www.uncrd.or.jp/env/3r_02/presentations/BG1/1-3%20Myanmar-2nd-3R-Forum.pdf for whether solid-waste disposal exists;
- http://www.iges.or.jp/en/archive/wmr/pdf/activity100728/6_Myanmar_Day1_Session2.pdffor what system exists in Myanmar for solid-waste disposal.

(5) Amata City Bien Hoa Industrial Park, Vietnam

The sources consulted for the information relating to Amata City Bien Hoa Industrial Park Vietnam (in short, Amata Vietnam) are as follows:

- http://www.amata.com/eng/industrial_amatavietnam.html;
- http://www.amata.com/eng/industrial_amatavietnam_factsheet.html for import duty exemptions in Vietnam;
- http://www.amata.com.vn/ on the power availability for tenants in Amata City Bien Hoa Vietnam industrial park, of 80 MVA from national grid sourced from a64 MW power-plant and Amata's own private power plant with a net capacity of 13 MW; the same source for water-treatment plant capacity of 30000 cu-metre per day and combined sewage/waste-water treatment plant of 7000 cu-metre per day;
- http://www.amata.com.vn/en/industrial-zone-c29.html for Amata Vietnam's land-use in terms of various industry-sectors;
- http://www.amata.com/eng/industrial_amatavietnam.html, for the size of 1353 hectares;
- http://www.sembcorp.com/en/src/docx/usrdocx/FacilitiesAtAGlance.pdf;
- http://www.industryhk.org/fhki_share/bdd/VSIP_Presentation_English_201.ppsx.pdf on incentives accorded to locations on SEZs in Vietnam and outside;
- http://www.sembcorp.com/en/src/docx/usrdocx/FacilitiesAtAGlance.pdf on the subject of power, water, waste-water in VSIP;
- http://www.vsip.com.vn/default.aspx?pid=0013&mid=0013&mdl=2&nid=000021&lang=en about VSIP general information and incentives;
- http://www.accessvietnam.net/vietnam_industrial_estates/investment_binhduong_2.html for the management fee to be paid by tenants on VSIP of seven cents per sq.-metre per month;
- http://www.miga.org/documents/asiareport.pdf, page 17 for non-wage labour costs in Vietnam;
- http://www.accessvietnam.net/vietnam_industrial_estates/investment_binhduong_2.htmlisthe source of a large number of details about the VSIP.

(6) Vietnam-Singapore Industrial Park, Binh Duong

The sources consulted for the information relating to Vietnam Singapore Industrial Park (VSIP) are as follows:

- http://www.iesingapore.gov.sg/Content-Store/Industrial-Parks-and-Projects/Overview-of-the-Vietnam-Singapore-Industrial-Park, for estimates of the employment effect of the VSIPs. It says that in all the four VSIPs, 4,845 hectares have since created 100,000 jobs. So, that is 20.6 jobs per ha;
- http://www.thanhniennews.com/index/pages/20130620-vietnam-power-price-hike-shocks-struggling-industry.aspx;
- water tariff and sewer-tariffs in Vietnam are from http://en.wikipedia.org/wiki/Water_supply_and_sanitation_in_Vietnam

(7) Amata City, Thailand

The sources consulted for the information relating to Thailand's Amata City Industrial Estate are as follows:

- http://www.amata.com/eng/industrial_utilities.html, for all the utilities' details (water-treatment plant capacity, waste-water treatment plant capacity, unit power charges to be paid, land maintenance fee; security related to Amata City Industrial Estate, Thailand ; http://www.amata.com/eng/industrial_amata_etate.html is the source of employment generated and number of factories on Amata City Thailand;
- http://amata.listedcompany.com/company_overview.html;
- http://asian-power.com/power-utility/in-focus/electricity-bills-rise-35-in-thailand (for 2013 user-cost of electricity for industrial users);
- the presentation by Dr. Pallapa Ruangrong, member of Thailand's Energy Regulatory Commission, available at http://www.eria.org/events/Power%20Tariff%20Structure%20in%20Thailand.pdf (accessed on November 30, 2013);
- http://asiafoundation.org/in-asia/2013/01/30/thailand-adopts-nationwide-minimum-wage-policy-amid-controversy/ about wages and corporate income tax (CIT) being lowered from 22% to 20%; also pp. 122-123 of the BOI booklet, Investing in Bangladesh handbook and guidelines, fifth edition, December 2012;
- http://www.pattayapropertynews.com/thailand-property-news/eia-approval-amata-for-its-3500rai-expansion-in-thailand showing that pre-built factories are allowedhttp://www.amata.com/eng/why_economic_%20incentives.html on incentives in Amata Thailand;
- http://www.amata.com/eng/industrial_amatanacity_factsheet.html for employment generated OF 28866 workers;
- http://www.ide.go.jp/English/Publish/Download/Brc/pdf/06_chapter1.pdf on tax incentives available to investors in Amata City Thailand;
- http://www.miga.org/documents/asiareport.pdf, page 17,for non-wage labour costs in Thailand

2. Details of the calculations driving the competitiveness benchmarking ranking

Multivariate competitive benchmarking across ten EZs/IPs

Benchmarks	Bangladesh			Cambodia	India	Indonesia	Myanmar	Vietnam		Thailand
	Sherpur	Anwara	Mirershorai	Phnom Penh	Mahindra City	MM2100	Mingalado	Amata	VSIP	Amata
Zone Size (ha)	143	562	2911	360	607	805	90	700	500	1353
Lease Duration (Year)	30	30	30	99	99	70	49	50	50	50
Power-charges (kWh)	0.066	0.066	0.066	0.28	0.105	0.1354	0.12	0.077	0.078	0.15
Water-charges (cu.-m)	0.3	0.3	0.3	0.3	0.6	0.4	0.05	0.383	0.31	0.65
Waste-water charges (cu.-m/mth)	0.35	0.35	0.35	0.26	0.06	0.55	0.05	0.364	0.19	0.233
Land-lease Charges	56	60	56	60	65	175	58	90	117	125
Cargo rates (40 Container):										
Export to Yokohama	900	900	900	1500	979	800	1600	500	500	1162
Export to Los Angeles	3675	3675	3675	4000	2817	2600	6500	2600	2600	3863
Telecoms rates (min)	1.12	1.12	1.12	5	21	6.28	0.67	1.05	1.05	3.16
Wage rates:										
Mgmt wage rates	578	578	578	700	1510	995	600	1146	1146	1565
Skilled wage rates	251	251	251	180	607	414	145	521	521	641
Semi-skilled wage rates	78	78	78	120	264	209	92	128	128	286
Water-treatment plant capacity (per hectare)	419.58	12.00	96.19	14.72	37.78	52.17	55.56	60.00	60.00	13.30
Waste-water treatment plant capacity (per hectare)	335.66	9.60	76.95	11.11	29.06	46.96	55.56	10.00	36.00	10.35
Is school provided	0	0	1	0	1	0	0	1	1	1
Tax holiday length (yr)	7.00	5.00	5.00	9	5	7.5	5	0	4	8
GCI Index ranking of country	110.00	110.00	110.00	88.00	60.00	38.00	139.00	70.00	70.00	37.00
Benchmarked rank_version2	0.698	0.557	0.648	0.548	0.500	0.473	0.545	0.561	0.608	0.425
Benchmarked rank_version1	0.658	0.534	0.668	0.521	0.481	0.460	0.513	0.541	0.581	0.426

Note: version1 is based on all indicators. Version 2 excludes land area of the zones/Ips

3. Transport Assessment

1. Goods Train Schedule

A. EAST ZONE (East of Jamuna/Meghna River)

Train No	Name	From	Departure	To	Arrival
801	Container Express	Ctg Port Yard	02:00	Dhaka ICD	12:05
802	Container Express	Dhaka ICD	10:50	Ctg Port Yard	01:10
803	Container Express	Ctg Port Yard	11:00	Dhaka ICD	23:10
804	Container Express	Dhaka ICD	13:00	Ctg Port Yard	05:55
805	Container Express	Ctg Port Yard	17:00	Dhaka ICD	03:00
806	Container Express	Dhaka ICD	20:30	Ctg Port Yard	05:55
807	Container Express	Ctg Port Yard	19:00	Dhaka ICD	04:05
808	Container Express	Dhaka ICD	23:45	Ctg Port Yard	09:30
951	Tank Special	Ctg Port Yard	23:30	Sylhet	16:20
952	Tank Special	Sylhet	01:00	Ctg Port Yard	18:20
961	Tank Special	Ctg Port Yard	23:30	Srimongal	00:20
962	Tank Special	Srimongal	04:40	Ctg Port Yard	03:50
971	Tank Special	Ctg Port Yard	22:30	Dhaka Cantonment	11:45
972	Tank Special	Dhaka Cantonment	01:00	Ctg Port Yard	14 :40
981	Tank Special	Ctg Port Yard	22:30	Parbatipur	03:10
982	Tank Special	Parbatipur	20:30	Ctg Port Yard	04:40
JT	Express Goods	Ctg Port Yard	22:30	Tejgaon	11:45
TJ	Express Goods	Tejgoan	01:30	Ctg Port Yard	01:55
JB	Express Goods	Ctg Port Yard	12:00	Dewangonj Bazar	06:00
DJ	Express Goods	Dewangonj Bazar	12:10	Ctg Port Yard	20:30

B. Goods Train Schedule WEST ZONE (West of Jamuna/ Meghna River)

Train No	Name	From	Departure	To	Arrival
KP-1	Express Goods	Khulna	22:45	Parbatipur	12:35
Pk-2	Express Goods	Parbatipur	17:45	Khulna	07:35
DI-1	Express Goods	Darsana	07:00	Ishardhi	10:20
ID-2	Express Goods	Ishardhi	02:00	Darsana	05:20
KI-1	Express Goods	Khulna	10:00	Ishardhi	14:10
IK-2	Express Goods	Ishardhi	03:30	Khulna	15:25
ND-1	Express Goods	Noapara	02:30	Darsana	08:00
DN-2	Express Goods	Darsana	19:30	Noapara	00:15
IS-1	Express Goods	Ishardhi	02:30	Santahar	06:10
SI-2	Express Goods	Santahar	17:30	Ishardhi	22:05
SP-1	Express Goods	Santahar	22:15	Parbatipur	02:50
PS-2	Express Goods	Parbatipur	23:00	Santahar	04:10
IR-1	Express Goods	Ishardhi	22:00	Rohanpur	06:35
RI-2	Express Goods	Rohanpur	09:45	Ishardhi	18:50

Source: http://www.railway.gov.bd/good_tsrain_schedule.asp

2. Statistics of Chittagong Port Authority

A. Cargo Handled

Calendar Year	Import (Tones)	Export (Tones)	Total (Tones)
2006	2,39,36,103	30,89,550	2,70,25,653
2007	2,42,36,261	33,92,974	2,7629,235
2008	2,44,92,707	37,04,862	2,81,97,569
2009	3,05,86,680	39,57,894	3,48,44,574
2010	3,66,70,356	45,12,439	4,11,82,795
2011	3,82,66,480	48,73,562	4,31,40,042

B. Containers Handled

Calendar Year	Chittagong Port(TEUs)	Cargo (Tones)	Dhaka ICD (TEUs)	Cargo (Tones)
2006	8,76,186	85,17,130	77,567	3,25,305
2007	9,58,020	96,06,032	80,714	3,31,216
2008	10,69,999	102,16,055	82,458	4,34,628
2009	11,61,470	12,27,321	63,780	4,94,525
2010	13,43,448	1,43,70,217	64,369	4,83,039
2011	13,92,104	1,47,62,762	69,723	5,56,781

C. Vessels Handled

Calendar Year	No. of Vessels
2006	1957
2007	1945
2008	2099
2009	2167
2010	2249
2011	2248

D. Cargo Handling Including Inland & ICD

Calendar Year	Import (Tons)	Export (Tons)	Inland(Tons)	ICD (Tons)	Grand Total (Tons)	Growth
2006	2,39,36,103	30,89,550	26,33,565	4,80,439	3,01,39,657	1.93%
2007	2,42,36,261	33,92,974	26,77,509	4,92,644	3,07,99,388	2.19%
2008	2,44,92,707	37,04,862	25,18,564	4,34,628	3,11,50,761	1.14%
2009	3,08,86,680	39,57,894	28,30,025	4,94,525	3,81,69,124	2.53%
2010	3,66,70,356	45,12,439	37,30,829	4,83,039	4,53,96,663	18.93%
2011	3,82,66,480	48,73,562	55,77,114	5,56,781	4,92,73,937	8.54%

Source: http://cpa.gov.bd/portal/home.php?option=article&page=82&link=statistical_info&item=cargo_handle_1#

3. List of items to allowed to be handled at the Off –docks:

(As per Customs Circular - REF: CPA Circular # 01/06 DD 04-11-06/ Circular #3/07 DD 22-01-07 REF: NBR File #3 (1) Customs Export & Bond/96/545 (6) DD02-09-10 called Items to be unstuffed outside CPA Premises).

1. Raw Cotton
2. Metal Scrap
3. Wheat
4. Rice
5. Lentils
6. Mustard Seeds
7. Waste Paper
8. Chick Peas
9. Animal Feed (Meat & Bone Meal)
10. Hard Coke
11. Carbon Block
12. Marble Chips
13. Ball Clay (Bulk)
14. Onion (Dry Container)
15. Ginger (Dry Container)
16. Garlic (Dry Container)
17. Fertilizer
18. Soda Ash
19. PVC Resin
20. Staple Fiber
21. Round Log
22. Dates
23. Sugar
24. Bitumen
25. Cane
26. Marble
27. Sodium Sulphate
28. Wood Pulp
29. Salt

Freight, Charges, Container Cycles and Off Dock Facilities

Location	Distance from Chittagong	20ft. Container	40ft. Container	10T/30 CBM truck
Anwara	40 Km	10,000/-	12,000/-	7 – 8,000/-
Source: based on interview with a transporter from Chittagong who owns 15 trucks and trailers				

✓ **CHA/ Clearing Agent Fees**

Customs Clearance Charge levied by Clearing Agents: The Clearing Agents charge their fees on the basis of percentage of the value of the cargo and not on box basis.

Value (in BDT)	Charge basis
Up to 500,000 BDT	1%
5 -15,00,000 BDT	0.75%
1.5 million to 20 million	0.50 %
Above 20 million	To be negotiated

Source: Interview with a forwarding agency

✓ **IMPORT Cycle**

- Port to Off-docks (ICDs):
  Load Port--> CY (Port Container Yard) --> ICD -->Delivery (either de-stuffed or FCL out): in this case, all payments from hook to delivery a/c. Importer
- Cargo Clearance and Delivery
- Sea Cargo
  1. Preparation of Data Sheet
  2. Noting by Customs
  3. Examination of Papers by Customs & Physical Inspection
  4. Assessment
  5. Payment of Duty
  6. Indent Placement (Placement of Vehicles)
  7. Delivery
     - Under normal circumstance, with complete documentation, import clearance and delivery takes about 3 -4 days for import
     - For export, 1 – 2 days is required.
-

- Air Cargo
    1. Documentation as above
        - Import clearance takes about 2-3 days (for urgent and perishable cargo – 1 day)
        - Export clearance takes about 1-2 days.

✓ **EMPTY Container Cycle at Off-dock ICD**

2. Empty container arriving from Import de-stuffing
3. Empty container coming from Port (export CY) as per MLO instruction
4. Repositioning from hook or CY
5. Factory de-stuffed containers
6. As per instruction of MLOs – by internal repositioning.

Off-Dock: The team visited K & T Logistics Ltd. Located inside the Chittagong Export Processing Zone (CEPZ) and discussed about the services provided by this Off-dock facility.

✓ **Facilities at the K&T ICD: (Off-dock)**

1. There are 14 reefer points at the facility, but K&T not interested in handling reefers
2. EDI connectivity with Maersk Line
3. MLOs want data of their container on 24-hr cycle
4. K&T ICD covers an area of 8 Acres (44,000 sq. ft. = 1 Acre)
5. Capacity: Ground slot of 400 (can handle about 2000 TEUS @ 5 high)
6. In operation since 1st May, 2001.
7. ICD on lease for 30 years, now running 13th year
8. Throughput: (annual about 1,20,000 TEUs)

On an average, container stays about 10 days at the

Container Tariff at the K & T Logistics ICD –CEPZ Facility

Container size	IMPORT	EXPORT
20ft.	5,000/- (remove container from port and cargo delivery to consignee)	3,000/- (stuffing and despatching to port)
40ft.	6,000/-	4,000/-
Other charges as per Port Tariff		

7. Ocean Freight

EXPORT	**20ft. (in US$)**	**40ft. (in US$)**
Ocean Freight to International Destinations (from Chittagong Port)		
Major European Ports (Rotterdam)	1,300	2,600
USA - East Coast (New York)	3,000	4,000
USA - West Coast (Los Angeles)	3,000	4,000
Canada (Toronto/ Montreal)	3,500	4,500
Australia (Melbourne)	1,200	2,400
New Zealand	1,200	2,400
Hong Kong	1,000	2,000
UAE (Dubai)	1,100	2,200

Source: National Agencies, Dhaka, Bangladesh

IMPORT	20ft. (in US$)	40ft. (in US$)
Ocean Freight from International Destinations (to Chittagong Port)		
Major European Ports (Rotterdam)	1,500	3,000
USA - East Coast (New York)	3,000	4,000
USA - West Coast (Los Angeles)	3,000	4,000
Canada (Toronto/ Montreal)	3,500	4,500
Australia (Melbourne)	1,100	2,200
New Zealand	1,500	3,000
Hong Kong	1,200	2,400
UAE (Dubai)	1,200	2,400

Source: National Agencies, Dhaka, Bangladesh

8. Air Freight:

Air Freight (Export from Dhaka Airport)	Up to 1 kg(US$)	Up to 10 Kg(US$)	Up to 50 Kg(US$)
Dubai	50	4.50/kg	3.70/kg
London	50	7.50/kg	3.70/kg
Rotterdam	50	7.87/kg	3.70/kg
Montreal	75	9.50/kg	7.10/kg
Melbourne	50	6.50/kg	3.70/kg
Hong Kong	50	4.50/kg	3.70/kg
Shanghai	50	4.50/kg	3.70/kg
New York	75	9.50/kg	7.20/kg
Los Angeles	75	9.50/kg	7.20/kg

Source: National Agencies, Dhaka, Bangladesh

Air Freight (Import to Dhaka Airport)	Up to 1 kg(US$)	Up to 10 kg(US$)	Up to 50 kg(US$)
Dubai	100	3.50/kg	3.20/kg
London	100	3.50/kg	3.20/kg
Rotterdam	100	3.50/kg	3.20/kg
Montreal	100	5.50/kg	5.10/kg
Melbourne	100	3.50/kg	3.20/kg
Hong Kong	100	3.50/kg	3.20/kg
Shanghai	100	3.50/kg	3.20/kg
New York	100	5.50/kg	5.10/kg
Los Angeles	100	5.50/kg	5.10/kg

Source: National Agencies, Dhaka, Bangladesh

Similarly, air freight shipments to/from Dubai, Hong Kong, Shanghai followed by Melbourne, London, Rotterdam and Montreal are in order of the freight charges.

ANNEX 3

CHAPTER 3: MASTER PLANNING AND INFRASTRUCTURE (COMPONENT 2)

A. Engineering Design

1. Analysis of Flood Protection System

1.1. Discharging System

Once the Economic Zone is developed and the whole area covered by the factory roofs, rain water will accumulate inside the Economic Zone within a very short period of time since the rainfall pattern occurs within 2～5 hours. It is quite normal that the Economic Zone has a retention pond to retain a certain volume of rain water inside the zone. The retention pond system includes the retention pond itself, a pump sump structure and RCP.

Since the rain intensity is relatively high, this results in a high volume of rain inside the entire economic zone.

463 mm/day x 562.55 ha = 2,604,606 m^3 / day

Given this situation, the design concept of the drainage system is to discharge the water by gravity. In the meantime, a retention pond is to be built to catch a certain volume of rain water for recycling water which can be applied to the water supply treatment. Since the rain water is relatively clean, the retained water in the retention pond will be used for the water supply system, especially during the rainy season. This will reduce the total operation cost in the long term.

Since the area of the retention pond is 40,000 ㎡ available, suppose the depth of retention pond is 4.5m, the retention volume becomes;

40,000 m^2 x 4.5m = 180,000m^3

Since the rain intensity is 463 mm/day, the catchment area requirement is;

180,000 m^3 / (0.463 m x 0.8) = 485,961 m^2 (48.6 ha)

The total area of the commercial zone and factory lot behind the super dike has approximately the same area as 48.6 ha. Therefore, the system is designed so that the rain falling on this area is will reach the retention pond through a u-drain. The rain falling on the other areas expected to discharge directly into the river. By having two rain discharging routes, the drainage system becomes energy efficient and free from local floods.

The volume of 180,000㎥ needs to be discharged by the following process;

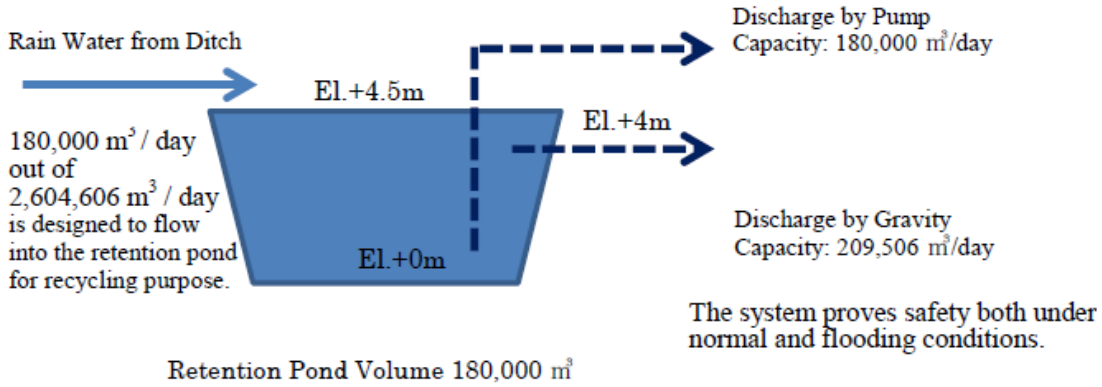
5 pumps (capacity of one pump is 30㎥/min) in case of flooding:
Discharging volume is given by the next calculation.
30㎥/min x 60 x 20hrs x 5 pumps = 180,000 ㎥/day (This is the same volume of retained rain volume inside the zone.)

4 lines of RCP (reinforced concrete pipe, diameter 1m, length is 10m) in normal condition:
From the table 3.2.5.3-3, the discharging volume of one RCP is 2,182.355㎥/h. By four lines of RCP, the following volume can be discharged.
2,182.355 ㎥/h x 24hrs x 4 lines = 209,506㎥/day > 180,000㎥/day

Therefore, having 5 pumps (capacity of one pump is 30㎥/min) improves the safety in case of flooding when the retained water cannot be discharged by gravity. Having 4 RCP (reinforced concrete pipe, diameter 1m, length is 10m) lines improves efficient discharge in normal conditions.

Retention Pond:
The basic design of the discharging system is shown in the following figure.

Figure 1.1-1: Discharging System



1.2. Drainage System

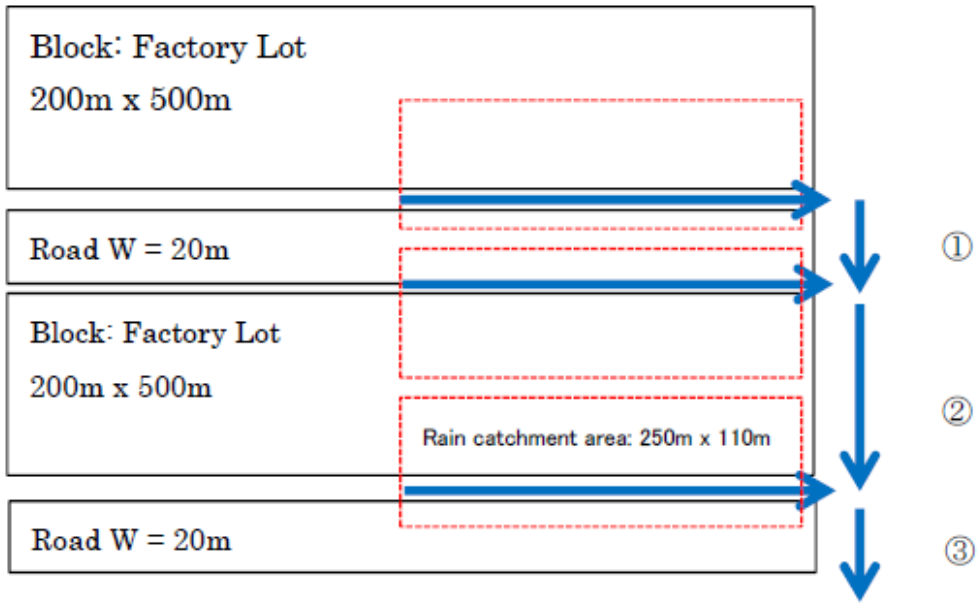
The dimension of the U-channel (width 0.7m ～2.0m, average depth 1m) is selected through engineering analysis.

Investigation of U-channel Dimension

As a first step, the rain flow route needs to be planned in order to decide the dimension and alignment of the u-channel. As explained previously, the road was designed in order to divide the factory block by approximately 200m x 500m on average and the following rain discharging rout is considered.

By making a slight slope from the centre of the factory block and covering half the area of the road, the basic rain catchment area becomes 250m x 110m approximately.

Figure 1.2-1: Rain Flow Route



From the rain intensity pattern, the maximum intensity is 65.3mm/h. From the rain catchment area, the rain volume on the red rectangle becomes;

65.3mm/h x 250m x (100m + 10m) = 1,796㎥/h

The discharging velocity of u-channel "V" is given by Manning Equation.
$V = 1/n \times R^{2/3} \times I^{1/2}$
Where
n (roughness factor) = (concrete case: 0.013)
R (hydraulic radius) = A (flow cross section) /S (wetted perimeter)
I (slope) = (assumed 1/1000)
The discharging volume (Q) is given by Q = A x V. The discharging volume of each u-channel is shown in the following table.

Table 1.2-1: Discharging Volume of U-channel using the Manning Formula

Type of u-channel **Height is assumed 1m. Water Depth is assumed 80cm.**	**V (m/s)**	**Q (㎥/h)**
W = 70cm	0.948	1,912.00
W = 1m	1.109	3,193.00
W = 1.2m	1.192	4,120.00
W = 1.5m	1.292	5,581.00
For reference: RCP, **Diameter 1m**	0.965	2,182.355

From figure 1.2-1;
At point ① :
Rain Volume 1,796㎥/h <1,912 ㎥/h, if u-channel W = 70cm is used.

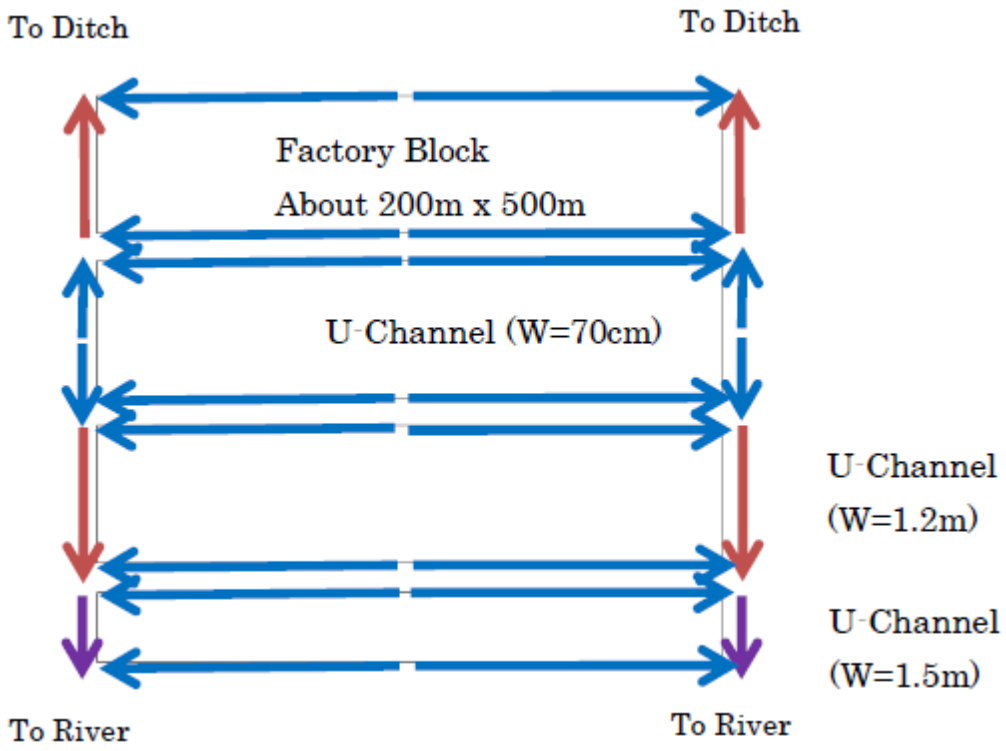
At point ② :
Rain Volume 1,796 + 1,796 = 3,592㎥/h< 4,120㎥/h, if u-channel W =1.2m is used.

At point ③ :

Rain Volume 3,592 + 1,769 = 5,361㎥/h<5,581 ㎥/h, if u-channel W = 1.5m is used.

The dimensions of u-channel and flow design are shown in the following Figures.

Figure 1.2-2: Dimensions of U-Channel



2. Design of Water Supply Treatment Plant

Mixing basin

Considering the capacity of the treatment plant is about 10,000m^3/day i.e. 24 hrs. The total quantity will be treated in 3 shifts; 8 hours in one shift.

Flow per minute:
40,000 m3/day = 13,333.33 m3/8hrs
= 2,932,923 gallon/8hrs
= 366,615.38 gallon/hr.
= 6,110.26 gallon/min
= 980.96 cuft/min

Considering the mixing period to be 30 min,

The capacity of the mixing tank 980.964x30 = 29,428.8 cu.ft.

In order to prevent sedimentation in the mixing tank, the flow velocity should preferably be somewhat greater than 1 fpm.

If the minimum velocity is considered as 1 fpm and length is 30 ft. then the required cross section is 29,428.8/30 = 981 sq. ft.

This could be supplied by a section 12ft deep and 82 ft wide. Because it is desirable to have velocity somewhat greater than 1 fpm then the width of the tank maybe reduced to15 ft and depth 12 ft. the length of the tank will be $\frac{7357}{10x15}$ = 49 ~ 50 ft.

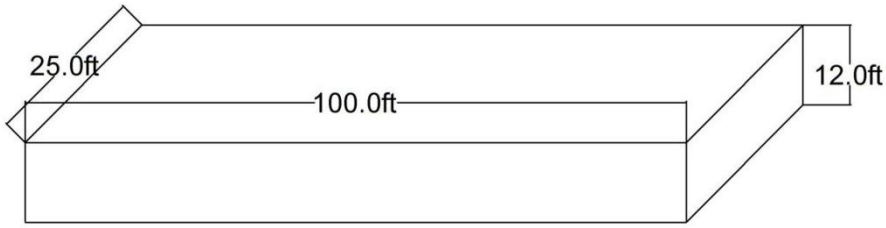
Desired velocity of flow $\frac{50}{30}$ = 1.66 fpm, which is satisfactory.

Sedimentation Tank

Since the estimated flow is 245 cu. ft. /min = 14,700cu.ft/hr. and the settling time is 4 hrs. The required capacity of the sedimentation tank must be 14,700x4 =58,800 cu. ft.

In order to provide flexibility of control, there must be at least two sedimentation tanks, in which each basin will have a capacity of 29,400 cu. ft. Since the rate of flow is 0.4 fpm and then the maximum permissible length of each tank would be 60 x 4 x 0.4 = 96 ft. ~ 100 ft., considered the velocity the flow will be $\frac{100}{240}$ = 0.416 fpm which is satisfactory. The cross sectional area will be $\frac{29400}{100}$ = 294 sq. ft. A width of 25 ft. and depth 12ft the capacity of each tank will then be 100x25x12 ft.= 30,000 cu. ft.2 Units will be required.

Figure 2-1: Typical dimension of sedimentation tank unit



Chemicals to be used:

Coagulants commonly used are Alum or Aluminium Sulphate, Copper Sulphate, Iron Sulphate and lime.

Other less commonly used coagulants are Sodium aluminate, ferric chloride, ferric sulphate, Chlorinated coppers and activated silica etc.

Chemical Reactions:

1. $Al_2(SO_4)_3 + 3\,Ca(HCo_3)_2 \rightarrow Al_2(OH) + 3CaSo_4 + 6Co_2$
   ↓Floc

For water having low natural alkalinity, it would be necessary to add alkalies such as lime or soda ash in order that the coagulant remains active and is completely precipitated out during the chemical action.

2. $FeSo_4 + Ca(HCo_3) \rightarrow Fe(HCo_3)_2 + CaSo_4$

The bicarbonate of iron is changed to iron hydroxide by the addition of caustic lime.

Thus, $Fe(HCo_3)_2 + 2\,CaOH \rightarrow Fe(OH)_2 + 2\,Ca\,Co_3 + 2\,H_2O$

The reaction continues with the oxidation of the ferrous hydroxide by the oxygen present in the water to Ferric hydroxide.

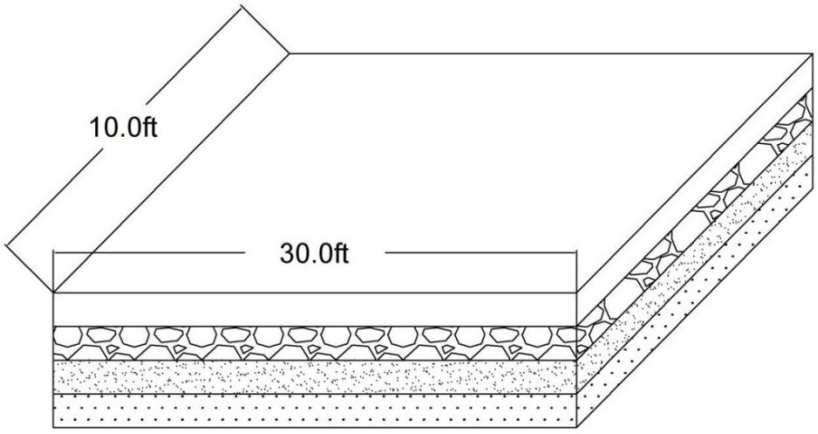
$$Fe(OH)_2 + O_2 + H_2O \rightarrow Fe(OH)_3 \downarrow Floc$$

Filters

Since the flow is 1,834gpm and the rate of filtration is 2 gallon/ sq. ft. of filter area the required filter area is $\frac{1834}{2}$ = 917sqft. Every filter plant should have at least three filtering units each with minimum area of $\frac{917}{3}$ = 305sq. ft.

For the purpose of design, it will be assumed that a filter unit is washed, drained and returned to service in 15 minute which is about 3% of 8 hrs. run. Since not more than one filter will be washed in any one day, it may be assumed that all three units will be out of service only $^3/_3$ = 1% of the time and the surface area of the filters should be about 1% greater than that required for full time operation. Therefore 302 sq. ft. represents 99% of the required area of the filter unit. If each unit is made 30x 10 = 300 sq. ft., this is nearer to 302sft - a point which may be taken into consideration.

Figure 2-2: Typical diagram of a filter basin



Clear Water Reservoir

A clear water reservoir should be constructed after the filter bed. It may be rectangular or circular having a capacity of 5,000 m^3 of water. The pipe gallery should be placed between the filter or at the end of the filter bed and connected to the clear water reservoir. From the clear water reservoir, the delivery pipe will deliver water through the pumping system to the distribution network directly or to the elevated tank for supply to the basement of the customer.

Back Wash Water Tank

Washing of filters requires 15 gpm per sq. ft. Therefore a surface area i.e. 305x15 = 4,575gpm of water is required. The wash water should not enter the filter with a velocity greater than 10 fps and the pressure at the strainer should be about 15 psi. This is equivalent to 35 ft. of head. Thus the wash water tank, in which the low-water level should be 40ft above filter, will provide satisfactory pressure. The wash water tank must have a capacity of at least 0.04x880520 = 35,220 gallon tank may be used. Since the low water level of the wash water in the tank is to be 4' above the water surface in the filters, the tank will have to be mounted on supports. An elevated tank of standard type will be provided.

3. On-site Infrastructure Requirement and Cost

The requirement and the cost of on and off- site infrastructure are shown in each section.

3.1 Preparation (Land Clearing, Dredging and Grading)

The development area is basically a flat area and simple clearing work might be necessary for the private land (about 315 acres). It is assumed that surface soil will be stripped by 30cm. According to the topographical analysis (section 3.1.3), the designed elevation for soil grading should be EL+5.0m. This finished elevation will be adjusted by clearing and leveling of the private land. On the other hand, dredging is necessary in the public land side (about 285 acres). In order to provide space for plenty of tenants, land reclamation is necessary (about 789.5 acres) by the dredging. According to the recommended finishing level of dredging (section 3.1.6.2), the finishing elevation is designed to be EL+5.0m.

The costs for clearing, dredging, and levelling are summarized.

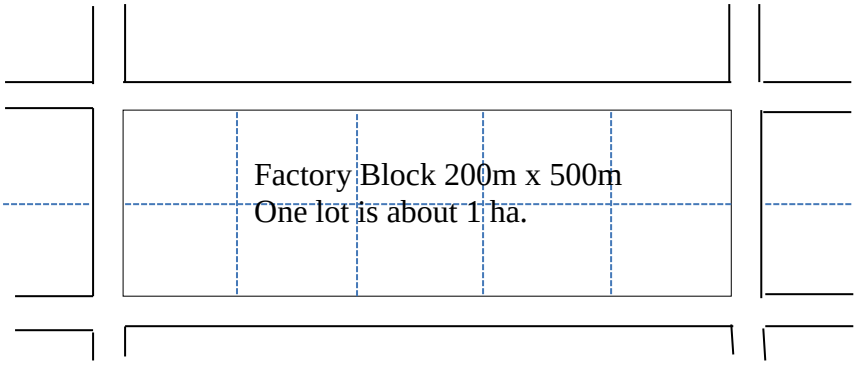
Table 3.1-1：Cost Estimate of Preparation

Scope	Quantity	Unit	Amount	
			BDT	US$
Clearing	5,625,499	m^2	56,255,000	703,188
Dredging	19,304,671	m^3	3,513,450,031	43,918,125
Levelling	1,275,000	m^3	381,225,000	4,765,313
Total			3,950,930,031	49,386,625

3.2 Road Network Inside the Economic Zone

A concrete road surface is planned for the internal road in the Economic Zone, suitably resistant against heavy rain and a heavy truck load which is very common in the economic Zone. Two types are selected for the road network design; Main Road (width: 33m) and Minor Road (width: 19.5m). The main road is divided by the central median. The carriageway of each direction of traffic is 7.50 m. (3.75 m. per lane) with 2.50 m. shoulder. The 5.00 m. sidewalk is also provided on both sides of the road beyond the shoulder. Plants are provided on the median and street lighting is provided on the median of the main road. Minor road is supposed to be an undivided 2-lane type. The carriageway of each direction of traffic is 3.75 m. with a 2.50 m. shoulder. The 3.50 m. sidewalk is to be also provided on both sides of the road beyond the shoulder. Street lighting is to be provided on both sides of the sidewalk. The cross section of the main and minor road is shown in the following figures. The main Road is planned from the entrance crossing from the west sea side to the east river side which connects the internal minor road for a smooth traffic flow of incoming and outgoing vehicles. The road network is designed surrounding the factory lot block by approximately 200m x 500m on average for optimizing the traffic flow.

Figure 3.2-1: Standard Factory Block and Road Network



3.3 Drainage System

3.3.1 Rain Fall Volume

According to the rain data of Chittagong (section 3.1.4), the following figures are selected for the drainage design.

Table 3.3.1-1Rain Data for Drainage Design

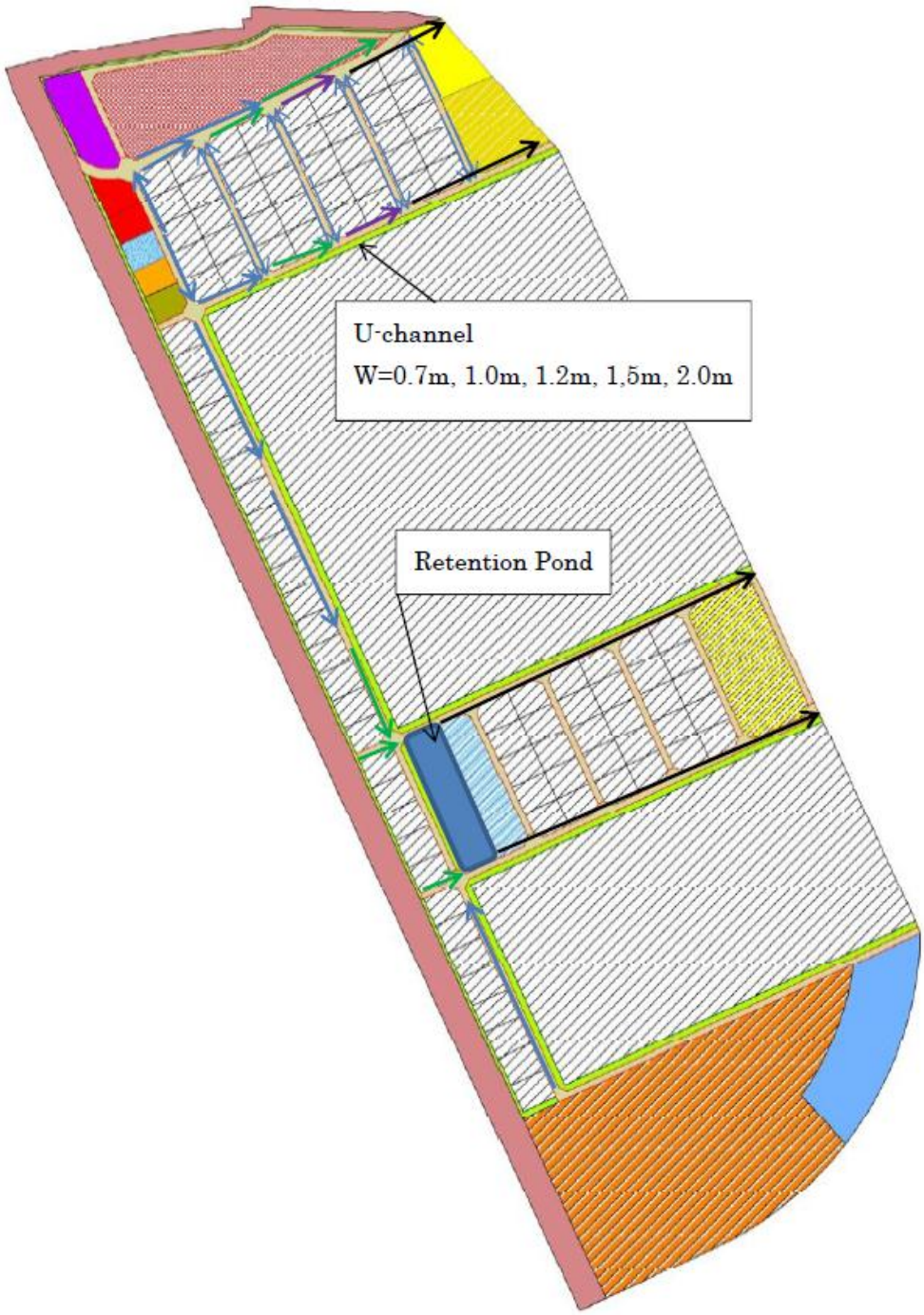
Rain Data of Chittagong (Maximum Figures)			**Reference (PPSEZ in Cambodia)**
Yearly data	3,643 mm/year	Year of 2012	2010
Monthly data	1,337 mm/year	June of 2012	
Daily data	463 mm/day	June27 in 2012	147.2 mm/day
3 hourly data	196 mm/3 hours (65.3mm/hour)	12-15pm, June 26 in 2012	
Hourly Max	65.3 mm/hr.	June 26, 2012	32 mm/hour

The rain intensity pattern (147.2mm / day, October 2000 was the maximum data in past 10 years, when PPSEZ was designed), which was applied to PPSEZ design, is shown in the right hand column for reference.

From the above data, 65.3 mm/hour and 463 mm/day are chosen for the design criteria.

Through the flood protection analysis (Annex 1: Analysis of Flood Protection), the dimension of the u-channel is determined.

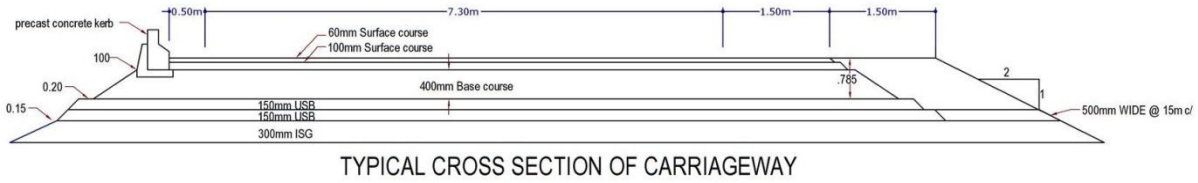
Figure 3.3.1-1: Drainage System



3.4 Road on top of Dike (On and Off-site)

This road will be a 4-lane highway as it is the only access through land which is to connect the EZ with the other parts of the country. The following is a cross section of the proposed road.

Figure 3.5-1: Section of carriageway (BC) of proposed road on top of dike



Total cost estimate for this road is given below.

3.5 Jetty and Stockyard

The major portion (sides) of the project site is surrounded by the Bay of Bengal and the Sangu River. So opportunity of access to the sea led the Anwara EZ site to be planned for the shipbuilding industry and its supporting industries. Also, considering the present situation regarding power lines nearby, a Coal-fired Power Plant (250MW) is planned to be constructed within the Anwara Project site.

In view of the above, and to make the Anwara EZ site economically viable with an increased project benefit, a small jetty (6m deep) will need to be constructed by the side of the EZ site along the Sangu River side. The water level in the Sangu River near the EZ site is shallow in the dry season. So, to retain soil along the river bank/jetty, use of sheet piling is planned. Details are given in the following figures.

Figure 3.6-1: Section and Elevation of Sheet Pile

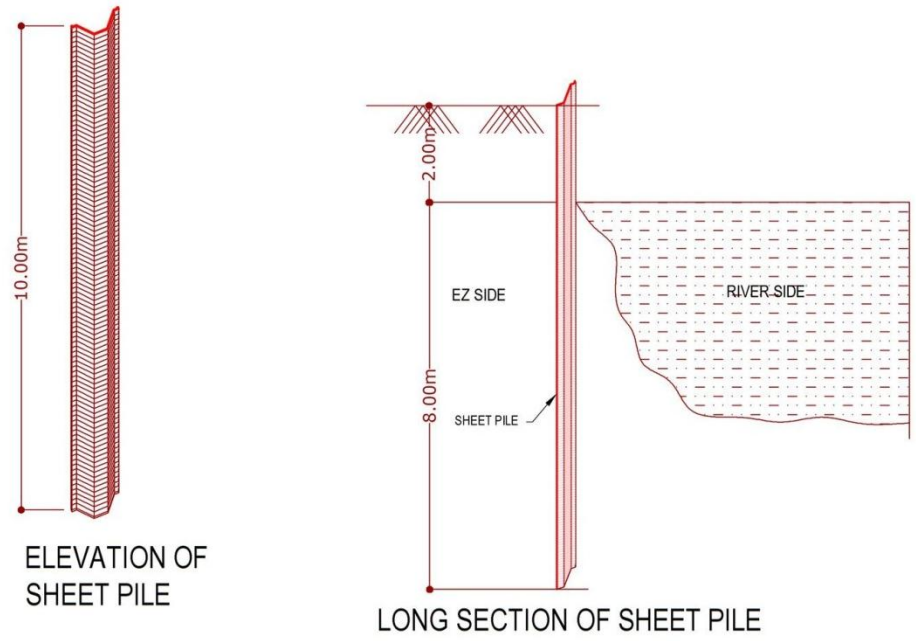


Figure 3.6-2: Sectional Plan of Sheet Pile

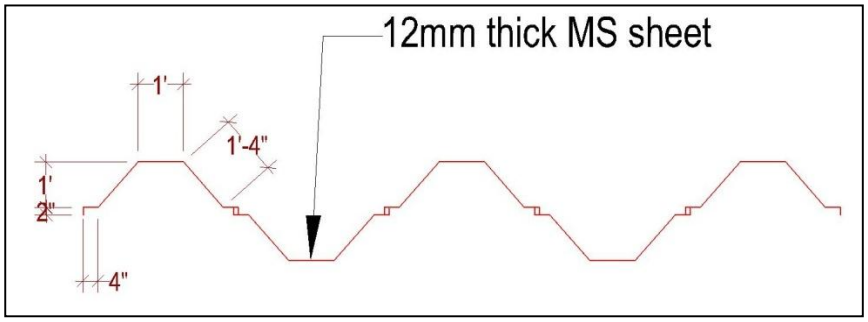
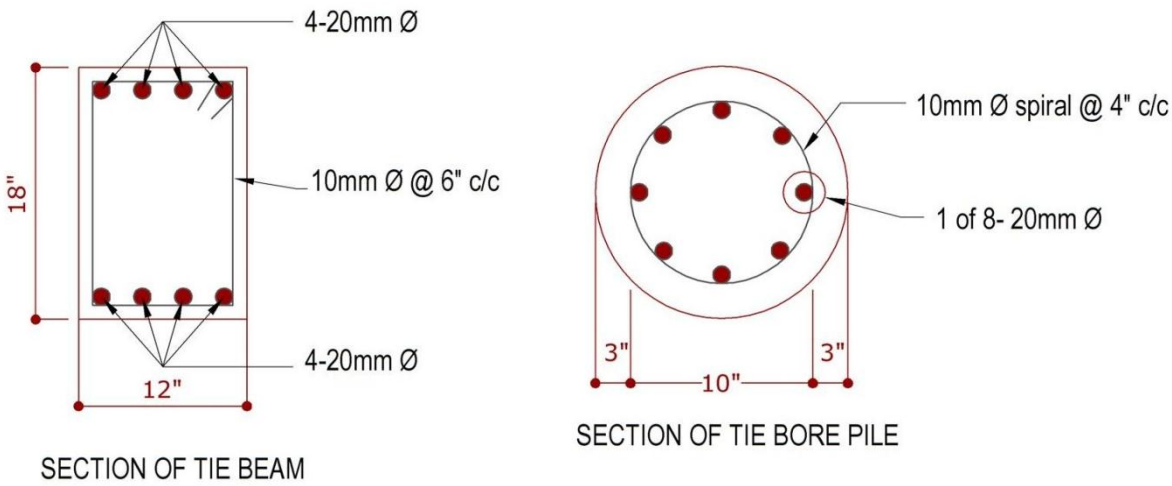


Figure 3.6-3: Cross Section of Bore Pile and Tie Beam showing reinforcement



3.6 Water Supply System (Connection and Plant Design in EZ)

a) Standard of Water Supply

The following table shows the standard for industrial water in Bangladesh.

Table 3.7-1: Water Quality General Standard for Industrial Water

No.	Item	Unit	General Standard in Japan	General Standard in Bangladesh
1	Turbidity	NTU	20	
2	pH		6.5 – 8.0	6-9
3	Total Alkalinity	$CaCO_3$ mg/L	75	120
4	Total Hardness	$CaCO_3$ mg/l	120	500
5	Iron	mg/L	0.3	1.0
6	Mn	mg/L	0.2	5.0
7	Evaporation residual substance	mg/L	250	
8	Ion Chlorine	Cl^- mg/L	80	600
9	Total Coli form	Count/100mL	0	
10	Arsenic	mg/l	0	0.05
11	BOD	mg/l		50

Table 3.7-2: Water Quality Standard for Drinking Water

Test			WHO	Cambodia	Bangladesh
No.	Parameter	Unit			
I	Basic Measurement				
1	Colour	TCU	‘1/15	‘1/5	15
2	Temperature	°C			20-30
3	Conductivity	µs/cm	400	1500	
4	pH		6.5 – 8.5	6.5 – 8.5	6.5-8.5
5	Turbidity	NTU	5	5	10
6	Suspended Solid	mg/l	1		10

b) River Water Intake and Connection

River Intake:-

For extraction of good quality of water, the river intake should be placed at a distance free from habitation, so that less contamination of river water should occur and less turbid and suspended solid free water may be available.

The surface water contains both organic and inorganic impurities, which may be in the form of suspended, colloidal, and dissolved forms. Water analysis is to be carried out to ascertain various types of impurities present. It is the analysis of water on which the outline for water treatment is based. Analysis of the water will show the types and extent of impurities and what units are necessary. If the water level between the dry and rainy season is too large and the river becomes almost dry in the winter, work should start by constructing a small wire across the river. When the level of water in the river is fairly constant and the river bank is steep, the intake work can be constructed adjacent to the bank. In this case water is drawn from the river through a pipe laid horizontally.

The following points should be considered in the location of the water intake–

- Water intake should be located in a place where there is no fast current which may endanger the intake causing interruption of the water supply.
- The ground near the intake should be stable. A straight section of the river is always preferable as the risk of erosion of the bank in this case is minimal.
- Approach to the intake should be free from obstacles.
- The intake should be well below the surface of the river for receiving clear water and for preventing the entry of floating matter. To prevent the entry of suspended matter near the bottom, the inlet point should also be well above the bottom of the water body.
- To avoid possible contamination of the bank, the intake should be located at some distance from the bank.
- In-take should be located on the upstream of the town.

The main current, lowest water level in the river and navigation facilities should be considered in locating the intake. A curtain wall may be constructed for diverting water in to the intake structure at the bank in order to draw clear water from the stream. The intake structure and coarse and fine screens should be provided so that floating matter may not enter the supply system. Considering the fluctuation in water level, the intake is provided in the well at various levels.

Since the quality of water varies from source to source and also season to season, it is absolutely essential to take daily samples and analyze the samples. The river intake and treatment plant should be set so that it can be run from time to time according to the demand.

c) Basic Design of Water Supply Treatment Plant in EZ

Water Treatment

Water available from various sources contains various types of impurities. The raw water available from various sources cannot be used unless it is made safe for the purpose. The object of treatment of water is to eliminate all such impurities which cause trouble and make water unsafe. All the harmful impurities need not be fully eliminated, but should be reduced to such an extent that water becomes suitable for the intended use. Therefore, the nature of treatment to be given to raw water depends upon the initial quality of the raw water and the desired degree of purity to be attained after treatment.

Impurities in the Water

The impurities in the water may be physical, chemical, and bacteriological. Physical impurities which give colour, taste and odour, are the least important, though they assume importance from the point of view of the consumers. The chemical impurities may be either inorganic or organic. The bacteriological impurities are the most important from the public health point of views. The presence of pathogenic variety of B. coli bacteria makes water unfit for human consumption.

Objectives of Treatment

The objectives of treatment processes are to remove all the undesirable impurities, to the extent where they do not cause any trouble to human health and water is available to the consumers as per health standards. The following are the objectives.

- To remove colour, dissolved gases and murkiness of water.
- To remove objectionable taste and odour from the water.
- To kill the troublesome bacteria.
- To eliminate the corrosive and tubercular properties of water. This treatment is essential from a pipes and pipe fittings safety point of view.
- To make water safe for drinking and domestic purposes and also for various industrial purposes like brewing, dyeing, steam boilers etc.

Treatment Process:
Treatment processes are given below. It is not essential that all these processes will have to be employed at all the places, but it depends upon the quality of raw water. In the case of raw water, obtained from rivers, aeration is generally not required. Similarly, in the case of water obtained from lakes, screening and sedimentation are not required because suspended and floating debris have already settled in the lake basin. But aeration is a must because lake waters have generally objectionable odour. If raw water is obtained from deep wells, practically, no treatment is required. Only disinfection may be done and supplied to the consumers. Therefore, the character and degree of treatment directly depends upon the nature of water or in other words on the source.

1. Screening**:** It is used to exclude floating matter. This is accomplished just at the intake.
2. Aeration: This process is employed, where elements causing taste and odour have to be removed.
3. Plain Sedimentation**:** In this process suspended impurities like silt, clay and sand etc. are removed.
4. Sedimentation with coagulation: Fine suspended particles and some bacteria are removed.
5. Filtration: This process is employed to remove very fine particles and colloidal matter which may have escaped from sedimentation processes. Micro-organisms are also removed largely.
6. Disinfection: To render water safe against disease producing bacteria.
7. Other process: There are some processes which are used in some specific cases only.
   (i) Removing hardness if it is beyond permissible limits.
   (ii) Removing colour taste and odour if any.
   (iii) Removing iron and manganese if present.
   (iv) Maintaining fluorides between 1 to 1’5 ppm. By adding if in deficiency and removing if in excess.

Methods of Treatment
The sole aim of treatment of water is to render it safe for domestic and other purposes. There is no hard and fast rule in regard to the sequence of various treatment units in a water treatment plant. It actually depends on the nature of raw water and the desired standard of treated water. All the treatment processes are not necessarily always required. For example, if raw water is being taken from deep well, it will not require any treatment except disinfection or possibly softening along with disinfection. Similarly water obtained from river requires the treatments like screening, sedimentation, filtration and disinfection, but not like aeration, softening etc. Lake water does not require screening and sedimentation, but may require aeration, coagulation, filtration and disinfection.

If ground water or surface water sources are well protected and turbidity of water is less than 10 JTU and also water is free from odour and colour, only plain disinfection by chlorination is considered adequate, before water in supplied to the consumers.

Where ground water contains excessive iron, dissolved CO_2 and odorous gases, aeration followed by flocculation and sedimentation, rapid gravity or pressure filtration and chlorination may be necessary. In case it contains only CO_2 or odorous gases, aeration followed by disinfection may be sufficient. If surface water contains turbidity not more than 50 JTU and where sufficient area is available, plain sedimentation followed by slow sand filtration and disinfection may be adopted.

Conventional treatment including pre-chlorination, aeration, flocculation and sedimentation, rapid gravity filtration and post-chlorination are adopted for highly polluted surface waters, laden with algae, or microscopic animals. Water with excessive hardness needs softening followed by rapid sand filtration and post-chlorination. For removal of dissolved solids, de-mineralization by ion exchange may form a part of the domestic or industrial water treatment units.

Location of Treatment Plants:-
Correct location of the treatment plant plays a very important role in its success. Location of the treatment plant depends, greatly, on the relative position of the source of water. As far as possible the treatment plant should be located in a place from where water can be distributed tithe buildings in all

plans easily. Then, the treated water reaches the consumers immediately and the chances of its contamination during transmission from treatment plant to the consumers are reduced. Loss of head is also reduced and water at the top becomes available at more head. However, if the area is located near the bank of the river, the treatment plant should be located near the source. This will reduce the length of the rising main, in which wear and tear due to muddy water may be more.

If the source of the water supply is a tube-well, practically no treatment is required. However, if a filter has to be set up for removal of hardness or for disinfection purposes, it should be located in the central part of the project. If the project area is quite large and water cannot be supplied from one tube well, the area may be divided into zones and each zone provided with a separate tube-well or well field system, with all necessary treatment plant attached to it. There should be inter-connection between them.

Layout of Treatment Plants:-
A complete water treatment plant consists of:

a. Intake works including pumping plant.
b. Plain sedimentation.
c. Sedimentation with coagulation.
d. Filtration.
e. Disinfection.
f. Pure water storage reservoir.
g. Pumping plant for pumping purified water from clear water storage reservoir to the elevated service reservoir.
h. If water is hard, sometimes, softening plant is used, before the filtration plant.
i. Distribution system.

Around 30 acres of land will be required for construction of a complete water treatment plant.

While planning the layout of the treatment plant, the following points should be considered:-

1. All the processes should be located in such a sequence that water may flow form one process to the other, automatically.
2. Elevations of different processes should be such that no pumping is required and water keeps on flowing from one plant to the other, but for houses or flats, pumping is necessary.
3. All the plants should be located in such a way that a minimum area is covered by it. Adequate space should remain available for future extension.
4. Residential colonies should be located by the side of the water works. This facilitates better working and control of different processes.
5. A well-established laboratory should be located at the site, so that the quality of water may be checked, before treatment and after treatment. Turbidity, test for solids, hardness, pH values, chlorides, biological tests, etc. can be carried out in the laboratory. Even research work may also be undertaken in order to suitably modify any process.

Quality of Water:
Wholesome Water-It is not possible to find absolutely pure water in nature. Pure water is that which contains two parts of hydrogen and one part of oxygen (H_20) and nothing else. Water drops just emitting from the clouds, may be considered pure water. But as the drops fall, certain gases are dissolved in it and make water impure. After falling over the ground, the water starts flowing, during which it dissolves certain minerals and salts and thus water becomes more and more impure. If this water, before being supplied to the consumer is to be completely purified, it will require a very exhaustive treatment. Absolute purification of water is not required, because certain dissolved salts are good for health and make water taste good. By purification of water, we mean that only those impurities which are not good for health are to be removed. Impurities that are not harmful and some useful impurities are not to be removed during treatment. Water which does not contain harmful

impurities and does contain other salts and impurities, either good for health or not harmful, is called potable or wholesome water. The degree of purity of water also depends upon its use. The purity of water required for civic purposes may not be enough for the water used in domestic purposes. Therefore, the term 'pure water' is a relative term and it has to be interpreted in relation to its use. The concept of pure water, potable water, or wholesome water, in relation to its various uses is described below:

1. Domestic Use: the degree of purity required for this purpose is highest in relation to other uses of water. Water for this purpose should be free from suspended impurities, dissolved harmful salts and disease producing bacteria. Water should not be very hard, but some hardness is tolerable.
2. Civil uses**:** water requirements for this purpose are large and the nature of use of water is such that any degree of impurity of water will do. But water mixed with waste and other refuse cannot is tolerated. Purified effluent from waste treatment plants which is more or less pure water may be tolerated for this purpose. In other words, the water having a large amount of suspended and dissolved impurities may be allowed for this purpose.
3. Trade use**:** purity of water for this purpose depends upon the nature of trade. For example, water required for laundry should not be hard, but if required in stables for cattle etc., it may contain impurities.
4. Commercial use: for this purpose water should be chemically pure. Various manufacturing units require absolutely pure water because even a slight amount of impurity may considerably influence the final product. The nature of water required by different factories may be so variable that normally, factories install their own water supply plants, suiting their requirements.

The following are the requirements of potable water for domestic use:

(i) It should be free from disease producing bacteria.
(ii) It should be colourless, odourless, and clear.
(iii) It should be tasty.
(iv) It should not corrode pipes and other fittings.
(v) It should be free from harmful salts and other objectionable matter.

Design of Water Supply Treatment Plant

The calculation for the design of the water supply treatment plant is given in Annex 4 (Engineering Design). The following table shows the dimensions of some parameters of the WSTP.

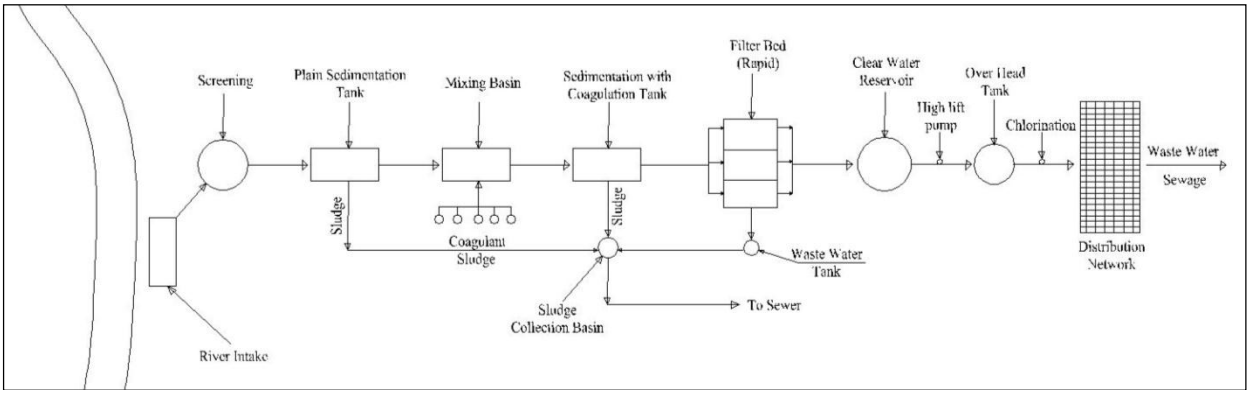
Table 3.7-3: Design of treatment Plant

Name of Unit	Depth	Width	Length
Mixing Basin	12'	50'	15'
Sedimentation Tank	12'	25'	100'
Filter 4 units		10'	30'

Grain size of filter materials will have to be determined after sieve analysis.

Size of clean water Reservoir= 5,000 m3, Back wash water tank= 35,220 gallon

Figure 3.7-1: Diagrammatic sketch (Flow Diagram) Typical Water Supply System



Rainwater:-

Bangladesh is a tropical country and receives heavy rainfall due to north-easterly winds during the rainy season. Rainwater can be a potential source of water supply in Bangladesh. In the coastal districts, particularly in the offshore islands of Bangladesh, rainwater has been used for drinking purposes since time immemorial. The protected ponds annually replenished by rainwater are a main source of water supply in the coastal area. Since various uses and unhygenic practices pollute these ponds, rainwater harvesting can be an alternative option for good quality water supply. In some areas having a high salinity problem, as many as 36% of households has been found to harvest rainwater in the rainy season for drinking purposes. But the collection, storage, and use of rainwater are often not well organized activities and need development through adoption of appropriate technologies.

The average yearly rainfall in Bangladesh varies from 2,200 to 2,800mm, 75% of which occurs between May to September. The highest rainfall occurs in the eastern part of Bangladesh, including the eastern part of the coastal area and the highest rainfall occurs in the north-eastern region of the country. Low rainfall, less than 1,500 mm, occurs in the western part of Bangladesh. The coastal and hilly area with high source intensity problems lies in the high rainfall areas. The high rainfall intensity in these difficult areas provides a good opportunity for rainwater harvesting. The unequal monthly rainfall distribution over the year indicates that a water supply system completely based on rainwater requires large rainwater storage reservoirs.

3.7 Water Supply System (Distribution Design in EZ)

3.7.1 Demand Forecast of Water

The maximum total water demand (37,108.51 m^3 / day) is assumed.

3.7.2 Water Supply Station

The Water Supply System has two functions - a water supply treatment plant and a water distribution network. River water is selected as the main water supply source. At the water intake station, the river water is pumped in and cleaned by passing the special facilities installed at each water supply station.

3.7.3 Water Distribution Networks

Water Distribution Networks deliver water to each factory along the roads. The treatment system is composed of the following:

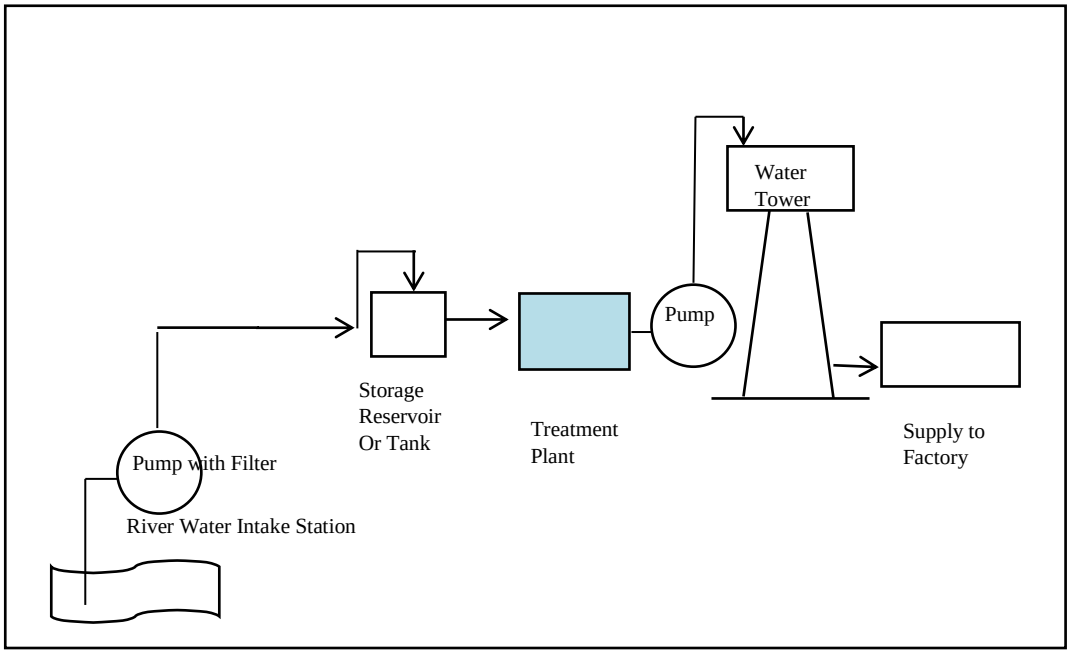
- River water intake
- Reservoir
- Treatment Plant
- Tank and Tower
- Distribution Pipe Network

A gravity feed system will be used to supply water to the water supply pipe line located along the footpath of the road inside the Project. The size of the main water supply pipe will be from 150 mm. – 300 mm. and water supply pressure is in the range of 1.0 – 3.0 bars. The main water supply pipe will be of high density polyethylene (HDPE), if available, to avoid corrosion as well as breaking.

Fire Protection System
For the fire protection system, besides a fire station and fire truck, fire hydrants will be provided along the project roads at intervals of approx. 200 meters or according to the local standard to supply water in case of fire.

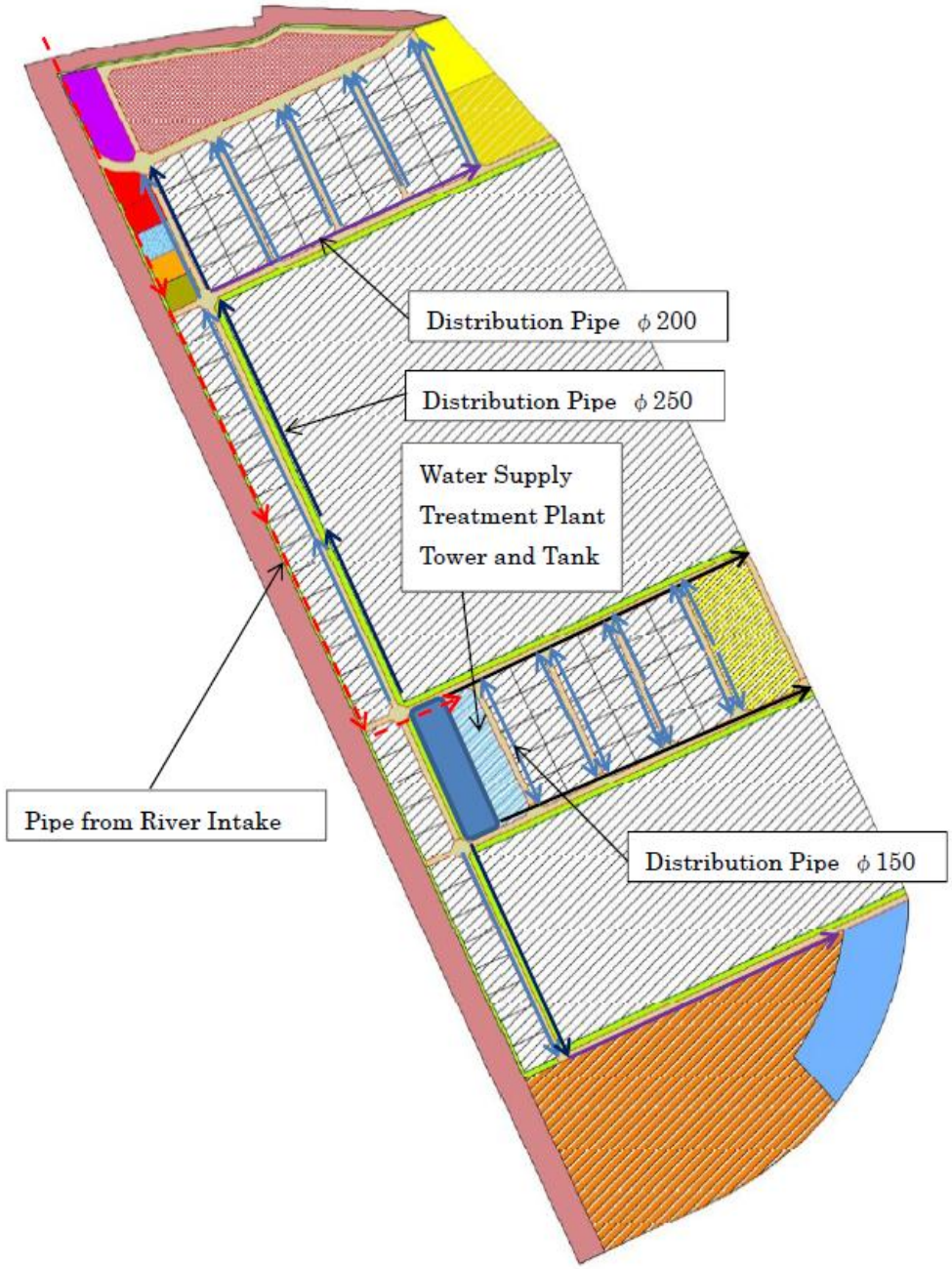
Basic Concept Drawing of Water Supply System
The basic water supply system is shown in the following figures.

Figure 3.8.3-1: Diagram for Water Supply System



The supply pipe network is shown in the following figure.

Figure 3.8.3-2 : Water Supply Network System



3.8 Sewerage System

a. Standard of Waste Water

Table 3.9-1: Waste Water Effluent Standard

No	Parameters	Unit	Cambodia		Bangladesh
			Allowable limits for pollutant substance discharging to		
			Protected public water area	Public water area and sewer	
1	Temperature	^{0}C	< 45	< 45	40
2	pH		6 – 9	5 – 9	6-9
3	BOD5 (5 days at 200 C)	mg/l	< 30	< 80	250
4	COD	mg/l	< 50	< 100	400
5	Total Suspended Solids	mg/l	< 50	< 80	150
6	Total Dissolved Solids	mg/l	< 1000	< 2000	2100
7	Grease and Oil	mg/l	< 5.0	< 15	10
8	Detergents	mg/l	< 5.0	< 15	
9	Phenols	mg/l	< 0.1	< 1.2	1.0
10	Nitrate (NO3)	mg/l	< 10	< 20	10
11	Chlorine (free)	mg/l	< 1.0	< 2.0	
12	Chloride (ion)	mg/l	< 500	< 700	600
13	Sulphate (as SO4)	mg/l	< 300	< 500	400
14	Sulphide (as Sulphur)	mg/l	< 0.2	< 1.0	2.0
15	Phosphate (PO4)	mg/l	< 3.0	< 6.0	5.0
16	Cyanide (CN)	mg/l	< 0.2	< 1.5	2.0
17	Barium (Ba)	mg/l	< 4.0	< 7.0	
18	Arsenic (As)	mg/l	< 0.10	< 1.0	0.05
19	Tin (Sn)	mg/l	< 2.0	< 8.0	
20	Iron (Fe)	mg/l	< 1.0	< 20	2.0
21	Boron (B)	mg/l	< 1.0	< 5.0	2.0
22	Manganese (Mn)	mg/l	< 1.0	< 5.0	5.0
23	Cadmium (Cd)	mg/l	< 0.1	< 0.5	0.05
24	Chromium (Cr)+3	mg/l	< 0.2	< 1.0	1.0
25	Chromium (Cr)+6	mg/l	< 0.05	< 0.5	1.0
26	Copper (Cu)	mg/l	< 0.2	< 1.0	3.0
27	Lead (Pb)	mg/l	< 0.1	< 1.0	1.0
28	Mercury (Hg)	mg/l	< 0.002	< 0.05	0.01
29	Nickel (Ni)	mg/l	< 0.2	< 1.0	2.0
30	Selenium (Se)	mg/l	< 0.05	< 0.5	0.05
31	Silver (Ag)	mg/l	< 0.1	< 0.5	
32	Zinc (Zn)	mg/l	< 1.0	< 3.0	10
33	Molybdenum (Mo)	mg/l	< 0.1	< 1.0	
34	Ammonia (NH3)	mg/l	< 5.0	< 7.0	5.0
35	DO	mg/l	> 2.0	> 1.0	4.5-8.0
36	Polychlorinated Biphenyl	mg/l	< 0.003	< 0.003	
37	Calcium	mg/l	< 150	< 200	
38	Magnesium	mg/l	< 150	< 200	
39	Carbon tetrachloride	mg/l	< 3	< 3	
40	Hexachloro benzene	mg/l	< 2	< 2	
41	DTT	mg/l	< 1.3	< 1.3	
42	Endrin	mg/l	< 0.01	< 0.01	
43	Dieldrin	mg/l	< 0.01	< 0.01	

No	Parameters	Unit	Cambodia		Bangladesh
			Allowable limits for pollutant substance discharging to		
			Protected public water area	Public water area and sewer	
44	Aldrin	mg/l	< 0.01	< 0.01	
45	Isodrin	mg/l	< 0.01	< 0.01	
46	Perchloro ethylene	mg/l	< 2.5	< 2.5	
47	Hexachloro butadiene	mg/l	< 3	< 3	
48	Chloroform	mg/l	< 1	< 1	
49	1,2 Dichloro ethylene	mg/l	< 2.5	< 2.5	
50	Trichloro ethylene	mg/l	< 1	< 1	
51	Trichloro benzene	mg/l	< 2	< 2	
52	Hexaxhloro cyclohexene	mg/l	< 2	< 2	

b. Recommendation for Waste Water Discharge Standard

The waste water will be collected from the industries through a waste water pipe network. The industries will be liable to do preliminary treatment for their waste and to maintain the recommended standard in table 3.4.8-1. The following figure shows the sketch for preliminary treatment and CETP treatment system.

Figure 3.9-1: Proposed treatment system for waste water

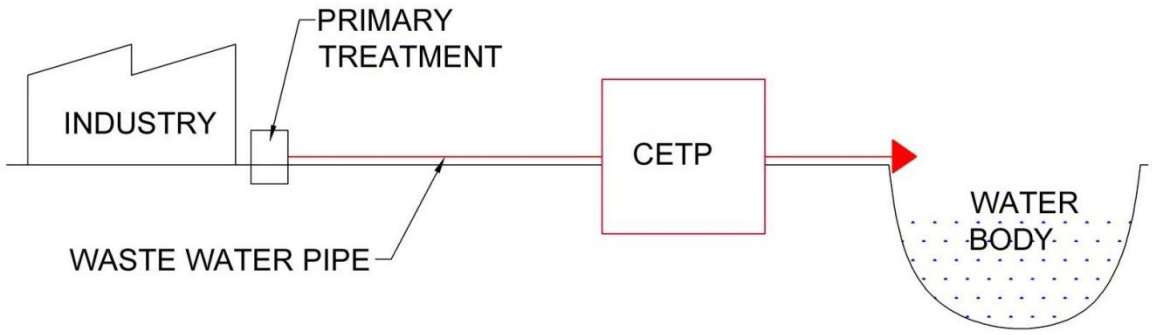


Table 3.9-2: Recommended first and second level standard for the EZ

Sl. No.	Parameters	Unit	First Level Standards for the Industries	Standards for CETP
1	Temperature	^{0}C	< 45	40
2	pH		10	6-8
3	BOD5 (5 days at 20 °C)	mg/l	<50	< 30
4	COD	mg/l	< 50	< 30
5	Total Suspended Solids	mg/l	< 50	< 30
6	Total Dissolved Solids	mg/l	< 1200	< 1000
7	Grease and Oil	mg/l	<10.0	< 5
10	Nitrate (NO3)	mg/l	< 15	< 10
12	Chloride (ion)	mg/l	<600	< 500
13	Sulphate (as SO4)	mg/l	<400	<400
14	Sulphide (as Sulphur)	mg/l	<1	< 0.75
15	Phosphate (PO4)	mg/l	<5.0	< 3.0
16	Cyanide (CN)	mg/l	<1	< 0.75
18	Arsenic (As)	mg/l	< 0.10	<0.03

Sl. No.	Parameters	Unit	First Level Standards for the Industries	Standards for CETP
20	Iron (Fe)	mg/l	<3.0	< 1.5
21	Boron (B)	mg/l	<2.0	< 1.0
22	Manganese (Mn)	mg/l	<5.0	< 3.0
23	Cadmium (Cd)	mg/l	< 0.1	<0.05
24	Chromium (Cr)+3	mg/l	<1.0	< 0.5
25	Chromium (Cr)+6	mg/l	<1.0	< 0.5
26	Copper (Cu)	mg/l	<2.0	< 1.5
27	Lead (Pb)	mg/l	<1.0	< 0.3
28	Mercury (Hg)	mg/l	< 0.005	<0.002
29	Nickel (Ni)	mg/l	<2.0	< 0.5
30	Selenium (Se)	mg/l	< 0.1	<0.05
32	Zinc (Zn)	mg/l	<15.0	<10.0
34	Ammonia (NH3)	mg/l	<8.0	<5.0
35	DO	mg/l	> 2.0	> 7.0

c. Basic Design of Waste Water Treatment Plant in EZs

It is extremely important that the sewerage project is properly planned. The following points should be considered:

i) Size of the area, when congested open or well planned.
ii) Whether the streets and roads are narrow, broad, straight, etc. to be considered.
iii) The general topography of the area.
iv) Estimate of industries and population.
v) Average water supply quantity needed because the volume of sewerage is directly proportional to the water supply quantity.
vi) General nature of the population, type of industry should be noted.
vii) Proximity of water courses e.g. sea, river, lagoon etc. should be noted.
viii) General climate, annual average rainfall, distribution of rain fall and general temperature should be noted.
ix) Position of sub soil water level should also be known.
x) Possibilities of expansion of industry as well as population
xi) Feasibility of installing sewerage system.
xii) System of waste to be adopted; system may be separated, combined or partially combined.
xiii) Quantity of waste to be expected in each sewer line and then total quantity of waste to be handled at the outfall point.
xiv) Disposal of Waste on land a by dilution can be decided.

For industrial areas and those having international importance, a combined system can be particularly adapted. Where rainfall is evenly distributed throughout the year, a combined system is more desirable.

In Bangladesh, separate systems are not usually installed. In this system, there may be one sewer for sanitary industrial waste and another for storm waste. However, installing two sewer systems is a costly affair. Mostly sanitary industrial sewers continue to work as designed, but storm water sewers come into use only during the rainy season. Even during the rains their working is dubious, because on dry days people dump garbage and other waste in the storm sewer through the openings,which may block the sewer line.

The best course will be sewer lines for sanitary industrial waste only but with suitable allowance for rain water. During the dry season there is no problem but during the rains these sewers start flowing full and within a matter of hours, the whole accumulated storm water is disposed. Water can be allowed to accumulate for some time because it is not dirty and does not create a nuisance.

If plenty of land area is available, the best method of waste disposal is by irrigation. This method is very economical because it may give good returns from crops. If a big river is flowing by the side of the project area (Anwara), waste can be disposed of in that river. If the situation demands, a treatment may be given to the waste before its disposal by dilution. In such cases the aquatic life is to be considered.

The waste obtained from spent water in different industrial and commercial establishments is known as industrial waste. The quality and the degree of foulness depend upon the nature of the industry and processes involved. The nature of this waste is different from domestic waste and sometimes has to be treated before being discharged into public sewers.

Waste Disposal:
Waste starts polluting after about four or five hours of its development. If waste is disposed of within this period, treatment required to be given to the waste will be relatively less exhaustive. Scientific disposal of waste will protect the health of the community and save it from bad smells, mosquitoes, obnoxious gases, and other foul conditions. This will also reduce the danger of the spread of diseases and symtoms of diseases like typhoid, cholera, dysentery, diarrhoea, etc.

Methods of Waste Water disposal can be classified as follows:

1. Natural methods :
   (i) By dilution and
   (ii) Land treatment
2. Artificial methods :
   (i) Primary treatment and
   (ii) Secondary treatment

In artificial methods of waste disposal, waste is given treatment which may be only primary or exhaustive before discharging the effluent into natural water.

Disposal by Dilution
The disposal of waste, by discharging into water courses such as streams, rivers, or large bodies of water such as lakes, seas, etc. is called the method or simply dilution. This method of disposal is only possible where the natural water, in the required quantity, is available in an area nearby. While discharging waste into a body of water, it should be ascertained that the water is not polluted to such an extent that it becomes unfit for any other use. The waste to be disposed of may be raw or partially treated.

In due time gets purified by what is known as the self-purification capacity of natural waters. The limit of Waste discharge and degree of treatment of Waste are determined by the capacity of self-purification of natural waters. The important factor in determining, whether or not dilution is sufficient, is the relationship between the organic loads due to Waste.

Methods of Waste Treatment
Waste contains minerals and organic matter (1) in suspension (2) in the colloidal state and (3) in solution. Living organisms notably bacteria and protozoa are found in the organic constituents of waste and are an abundant source of energy. The activities of the organisms result in the decomposition of the organic matter. Uncontrolled decomposition of waste renders offensive to the senses of smell and sight. The presence of disease producing organisms makes waste dangerous. Removal or stabilization of organic matter is accomplished in treatment works by a number of different operations or by a suitable combination of these operations into effective treatment processes. The individual units or operations and the purification affected in them.

Removal of settle-able solids by screening, skimming sedimentation and chemical precipitation filtration, stabilization of putrescible matter in suspension and sludge treatment is called primary treatment.

Further removal of solids with the aid of living organisms is called secondary treatment. The combination of primary and secondary treatments constitutes complete treatment.

Industrial waste may be liquid, solid, in gaseous form. Gas waste directly goes into the atmosphere and is disposed of automatically. If gas waste is large, it may pollute the atmosphere, but they do not pollute the physical environment much. Solid dry wastes resulting from the manufacturing process, if stabilized, do not create any problems in their disposal. But if they are un-stabilized, they are generally mixed with water and converted into liquid form. Liquid wastes, which mostly result from industry, are the wastes creating problems. The resulting waste water or industrial waste therefore, varies in quantity and nature according to what use is has in industry. It is not possible to lay down a common standard for industrial waste, because the industrial waste differs widely from industry to industry.

The quantity and strength of waste water from an industry very widely depending upon the manufacturing process employed and the method of control in different plants.

There are two methods of disposing of industrial wastes. One is to discharge the waste into a standard sewer system. The other method is to design and construct a separate plant to treat the industrial waste alone. When, in case of strong industrial wastes, they are to given pre-treatment by the owners of industry before admitting them into the normal waste system. those wastes may have to be neutralized for excess acidity, alkalinity, or other objectionable characteristics. Pre-treatment of industrial waste is generally the responsibility of the industry owners.

When the industrial waste and general waste are treated together, it may be assumed that the characteristics of the mixture of waste and industrial wastes are similar to domestic waste. Treatment will therefore follow the general procedure in the treatment of domestic waste. When separate treatment is provided for industrial waste, some units of the treatment plant differ considerably in design from the units employed in waste treatment, though the same general method is to be used.

The general methods are, screening grit removal, sedimentation, and chemical participation, biological processes such as filter, neutralization, and chlorination. In all sorts of industrial wastes, it is not necessary that all these methods have to be adopted.

a) Screening –
   The solids suspended in industrial waste are often so coarse that screens and racks achieve a degree of removal.
b) Skimming-
   Grease traps and skimming tanks are used for the removal of grease and oil from industrial waste. Aeration and chlorination prove helpful in the removal of these substances.
c) Sedimentation and coagulation –
   The sedimentation facilitation is often relatively simple using lagoon settling ponds in an earth basin. Low laying areas may provide storage space for several years.
   Coagulating chemicals are widely used. Draw and fill operation of tanks for the chlorination of chemically treated waste is commonly employed.
d) Adsorption and Biological treatment –
   Some waste materials themselves possess useful adsorptive properties. Much industrial waste is very rich in organic matter.
   Their anaerobic decomposition at a higher temperature is possible when the waste is especially thick.
e) Irrigation :-

In the disposal of industrial wastes by irrigation for crops is simple. Preliminary treatment may be required to handle the waste water.

f) Sludge Disposal :
Much industrial sludge is sufficiently stable to be disposed of directly to the field or dumping area. Others may require digestion or incineration.

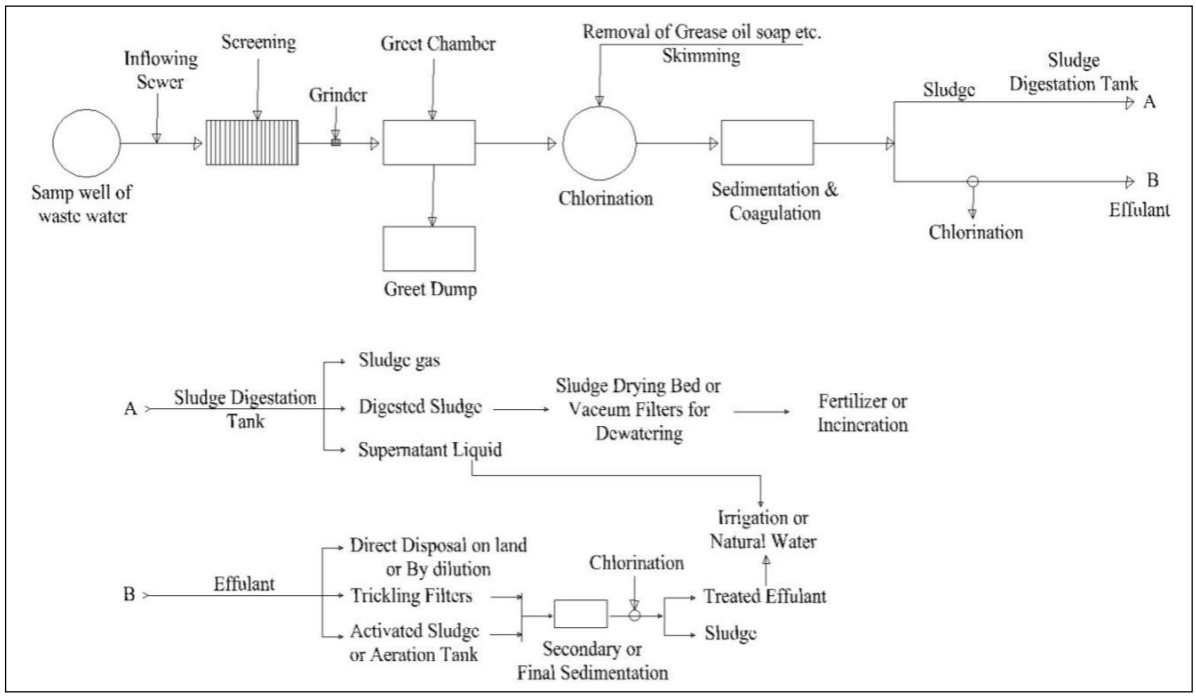
g) Other treatment Methods :
The destruction of toxic metals in industrial waste water is normally achieved by chemical methods. There are various chemical methods. Its application for different chemicals is different.

h) Radio-active waste :
Radioactive waste is produced by the nuclear activities in that type of industry.

i) Storage for long time.
ii) Dilution in natural water course.
iii) Burial in ground
iv) Burial in sea.

Disposal by dilution in the natural bodies of water is not completely satisfactory as it needs a huge amount of water. If wastes are small they can be easily disposed by dilution. For larger amounts, disintegration is the only satisfactory method, but it takes a very long time. The requirement of land for a sewage treatment plant would be 24 acres for this EZ.

Figure 3.9-2: Waste Water Treatment Flow Diagram



Sewage Pumping

Necessity of Pumping:
Although sewage flows in sewers are under gravity only, still there are occasions where it may have to be lifted from lower to higher levels. The following are conditions for which sewage pumping is required:

i) To lift the sewage of low lying areas and to a higher level.

ii) If the out fall sewer lies at a lower level, then the level of the disposal sewage has to be lifted.
iii) At treatment plants also, sewage may have to be lifted at certain places to make it possible for the sewage to flow to its various treatment units under gravity.
iv) In modern treatment plants, recirculation of the effluent is very common to achieve better purification.
v) Recirculation is possible only, if sewage is lifted after completion of each cycle.
vi) Pumping is essential for transferring sludge from sludge digestion tank etc.

Problem in Sewage Pumping:

Pumping of sewage is not as simple as pumping of water. The following are some of its special characteristics:

1) Sewage has a lot of suspended and floating solids. They cause very frequent clogging of pumps.
2) Sewage contains organic and inorganic wastes. They may act upon the pumping equipment and cause corrosion, thus reducing its useful life.
3) Biological life of sewage including disease producing bacteria is dangerous for health. Slackness with sewage pumping or any other problem with pumping has to be attended to immediately.
4) The flow of incoming sewage is not constant and fluctuates from time to time. Due to this aspect, pumping has to be adjusted accordingly by operating different units of pumps having different pumping capacity.
5) Wet wells or sump wells are built with a smaller capacity. This is done with a view to avoiding prolonged detention times, which way otherwise cause deposition of grit and organic solid. Deposited grit and organic solids start putrefying and cause a nuisance for the operating staff. Sump wells or wet wells are designed to give only a little effect and the rate of pumping has to be adjusted continuously to the rate of inflow of sewage.
6) The sewage pump has to be very reliable, otherwise it will cause flooding and a nuisance, since sewage also carries a number of disease-producing bacteria, it may prove even worse for public health if flooding is allowed to occur. Therefore, the reliability of pumps is of the utmost importance.

Preparation of sewage for pumping:

It is desirable to remove as much of the coarser floating material as possible, before sewage is pumped. Such removal of coarser floating material is difficult at the lift station, because it involves in screening out large solids and removing and disposing of them daily. A Lift station is a small pumping station, installed on the sewer line at a certain point where the depth of excavation for sewer laying has become prohibitive. From this point onwards, the sewer line is laid with a very small excavation. When a sewer line again goes into heavy excavation, a similar lift station is again installed.

At large pumping stations, however, screens are commonly used in advance of pumps to reduce the possibility of pumps being clogged and damaged by large sticks and rags. Grit is also removed in advanced of pumping where possible. These measures reduce wear and tear of pumps. A greet chamber and screening device are commonly included in the units of a sewage treatment plant.

Centrifugal Pumps – Sewage contains rags, sticks, and such other materials which are difficult to pump. Therefore an important characteristic of a sewage pump should be its ability to operate without clogging.

As an added precaution, this inner side of the pump should be easily accessible for cleaning or removal of obstructions.

Centrifugal pumps are almost exclusively used in the pumping of sewage. They are available in a non-clog design and may be may be automatic and remotely controlled. They may be a large or small unit.

Their operational cost is low and easy to maintain. They require less space for installation and the noise level is lower than other pumps.

These pumps are designed to avoid clogging. Clogging of the pumps can be partly avoided by adopting a large size. Smooth channels and the impellers permit the passage of solids through pump. Various types of non- clogging impellers are available in the market. To prevent clogging, it is essential that the pump passages are as large as or larger than the sanction pipe and that the discharge pipe be not smaller than the pump passage.

Sometimes it is specified that non-clog pumps are automatic, should pass through 5 cm diameter ball and combined domestic and industrial sewage should be 6.5 cm ball. Ordinary sewage has very little corrosive action on the various parts of a pump.

Priming of the centrifugal pump with sewage is a must; otherwise it will only pump air. Priming may be done by hand by pouring water on sewage water in the pump. It cans also be done by a self-priming device.

Setting of Centrifugal Pumps:

i) Pumps submerged below the sewage in wet wells.
ii) Pumps in dry wells should be below the level of the sewage.
iii) Pumps should be set higher than the sewage in the wet wells.

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A dry well is a well, constructed adjacent to the wet well for installing the pump and other connected equipment. This eliminates the need for priming of the pumps. This setting is commonly adopted for medium size plants. The driving units are kept one separate floor above, so that they are protected against dampness and there is never a danger of accidental flooding of the dry well. The best of all positions for pump installation is probably, the pump in dry well but set above the level of sewage. A series of pumps of various sizes are needed, for example with a minimum flow of 10 million litres per day and a maximum flow of 60 million litres per day, it would be a good practise to install three pumps with capacities of 20 mld (million litres per day) each and two pumps with capacity of 10 mld each. One of the smaller pumps could handle the flow during most of the night hours. And the other pumps would be put into service by float control or any other control as and when required.

3.9 Sewerage System (Distribution Design)

3.9.1 Treatment System

The following criteria will be used for designing the wastewater system:

- Wastewater quantity discharged to the system will be 80% of the water supply.
- Wastewater collection pipes shall not be used for rain water drainage purpose.
- Gravity flow will be used for the sewerage pipe design as much as possible. In case the pipe depth is more than 3.5 – 4.0 meters, wastewater lifting station will be required.
- Sewer manhole will be provided at an interval of approx. 40 meters.
- Wastewater pipe material will be selected with consideration of corrosion problem as well as optimum in cost. (RCP is recommended.)
- The pre-treatment for toxic and chemical constituent elimination from each factory is required prior to discharging to the wastewater system.
- Maximum value for some critical wastewater parameters that can be discharged to the central wastewater treatment plant will be set up to prevent overloading of the treatment operation.
- Suitable building guideline shall be prepared before beginning the operation.
- Treated water can be used for recycled water for maintaining trees or greenery inside the zone through underground u-pvc pipes.

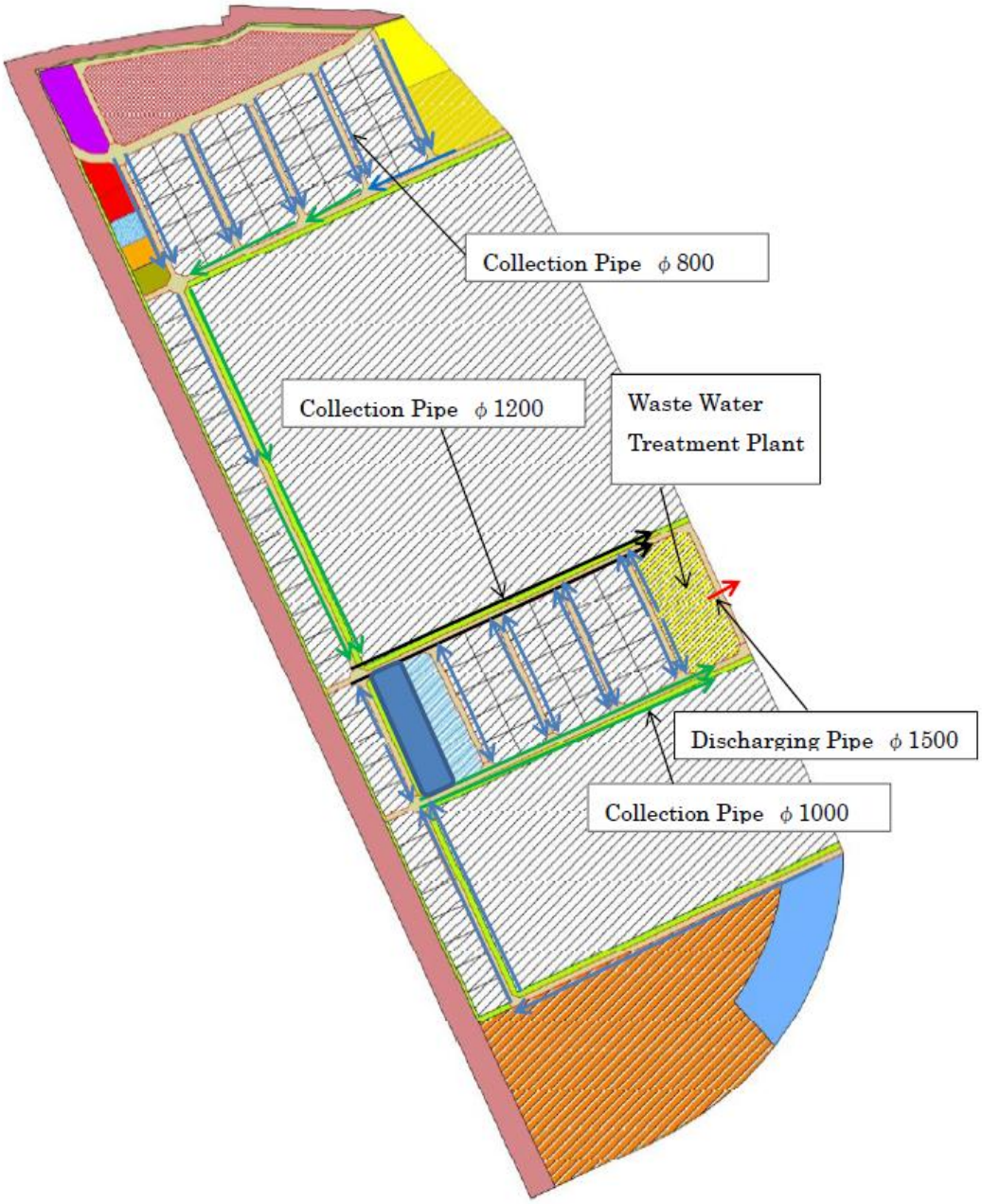
3.9.2 Forecast of Waste Water Volume

A wastewater flow volume (29,686 m^3 / day) is assumed (Section 3.4.3).

3.9.3 Basic Diagram of Wastewater Collection System

The basic process of the waste water treatment plant is explained in the section 3.8 (Waste Water Treatment System). The waste water collection pipe network is shown in the following figure.

Figure 3.10.3-1: Waste Water Collection Network



3.10 Electrical System

a) Clean Coal-fired Power Plant inside the EZ

There is a proposal for a coal fired power plant to be constructed inside the EZ.

- The proposed capacity of the plant: 250MW
- Mode of operation: Base load
- Fuel: Imported coal

The items of the power plants are described below.

- Cooling water requirement source and system :

  The source of water for the project is saline water drawn from Shangkha (Sangu) river beside the site. This is primarily a back water of the sea.

  Fresh water required for meeting the requirements for potable water, plant service water, cycle make-up (DM water) etc. shall be produced using a desalination process. It is proposed to adopt a reverse osmosis process for desalination of raw water.

- The make-up water requirement for this project would be about 2,000 cum/hr. It is observed that the water has very high silt content. In a once-through system, a huge quantity of work will be required. De-silting of such a huge quantity of water would be uneconomical. In a cooling tower system, only make-up water needs to be provided and can be de-silted. Therefore, a re- circulating type CW system with cooling towers and open intake channel has been envisaged for the project.

- Coal requirement, availability and linkage:

  The coal shall be imported coal having GCV as 6,000 Kcal/kg with maximum - 15% ash and max 0.6% sulphur. The daily coal requirement for 250MW units will be about 2,500 tonnes on average gross calorific value of 6,000 kcal/kg at 100% plant load factor.

- Coal transportation:

  It is envisaged that coal will be unloaded from barges at the jetty near the power plant. From the jetty to the power plant, the coal will be transported by a conveyor system.

- The landed cost of coal per ton at the plant end is considered to be US$145.

- Coal stock: Coal stock for 90 days is envisaged.

- Ash pond: An ash pond of 50 acres is assumed. The dike will require ground improvement.

- Steam generator technology:

  The steam generator will be super critical, once through type, water tube, direct pulverized coal fired, top supported, balanced draft furnace, single reheat, radiant dry bottom type, suitable for outdoor installation.

  The gas path arrangement will be single pass (Tower type) or two pass type. Steam pressure and temperature at the superheater outlet shall be 256 kg/cm2 and 568 C and temperature at re heater outlet shall be 596 C.

  Boiler design will be suitable for variable pressure operations from 30% to 100% BMCR with and without 5%throttle margin.

- Steam turbines:

  The steam turbines will be of proven design directly coupled to a 50 HZ generator. Design criteria shall be applied for a long creep life, cyclic duty and fast start-up. Last stage blade materials and exhaust steam wetness shall be selected with the objective of minimizing blade erosion. The

steam turbine shall be installed with an acoustic, ventilated enclosure. If provided, the turbine house shall incorporate fire detection and protection facilities.

The steam turbine exhaust and condenser shall be in accordance with the manufacturer's standard design.

- Generators:

  Generators should comply with IEC 34:1994 and shall be rated to match the steam turbine and the steam turbine output over the full range of ambient temperatures.

  Generator and exciter windings shall possess insulation that is non –hydroscopic and class F type in accordance with IEC 85 standard or any other class/standard acceptable.

  The generator shall be capable of operating within 48.5 HZ and 51.5 HZ and +/- 10% of nominal rated voltage within the power factor range 0.85 lagging on 0.95 leading at this delivery point.

- Water treatment plant:

  A water treatment plant shall be provided to treat raw river water that will provide plant cooling water make-up, service water and de-mineralised water. The water treatment plant will comprise both primary (sand and activated carbon filters or micro filtration) and secondary treatment (combination of reverse osmosis, mixed bed and/or ion exchange)

Power Transmission:

- The entire region is connected to the national grid by a double circuit 132KV transmission line from Sikalbaha Grid Substation to Julda switch yard.

  There is no 230KV grid transmission line in this area.

  In view of the above, power generated from this coal-fired power plant will be delivered to the 132KV switchyard planned for construction near the power station. About 10 Km from there 132KV transmission line on towers and 132kv switch yard needs to be connected along with the power transformer of the required capacity, switch gears, protection system etc. to connect Julda/Korean EPZ 132KV grid substation or to the coal power plant(to be constructed) ultimately to the national grid system.

- Environmental requirements:

  The facility shall be designed to be capable of complying with the laws of Bangladesh and the Environmental guidelines as applicable.

As Anwara EZ is very near to the existing grid network and a new power station of 1,320MW is to be established in Anwara. It is not required to establish a power plant within the EZ site. As the 1,320MW power plant is planned to be in operation by 2020 (tentatively) it can be expected that the Anwara EZ can have power directly from that new power plant.

Figure 3.11-1: A Typical Cross Section of a Coal Power Plant

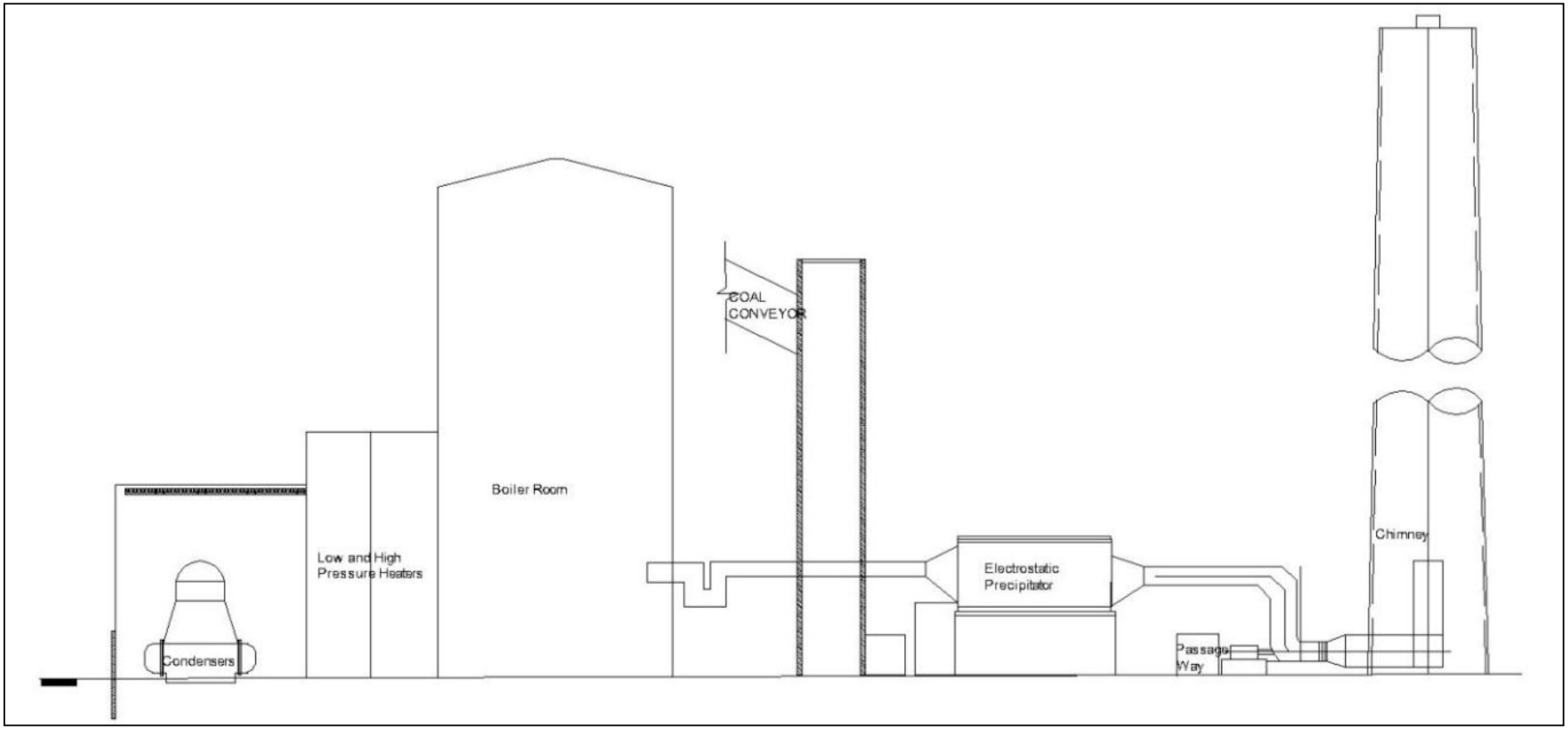


Figure 3.11-2: Typical Water Balance Diagram for Coal Power Plant

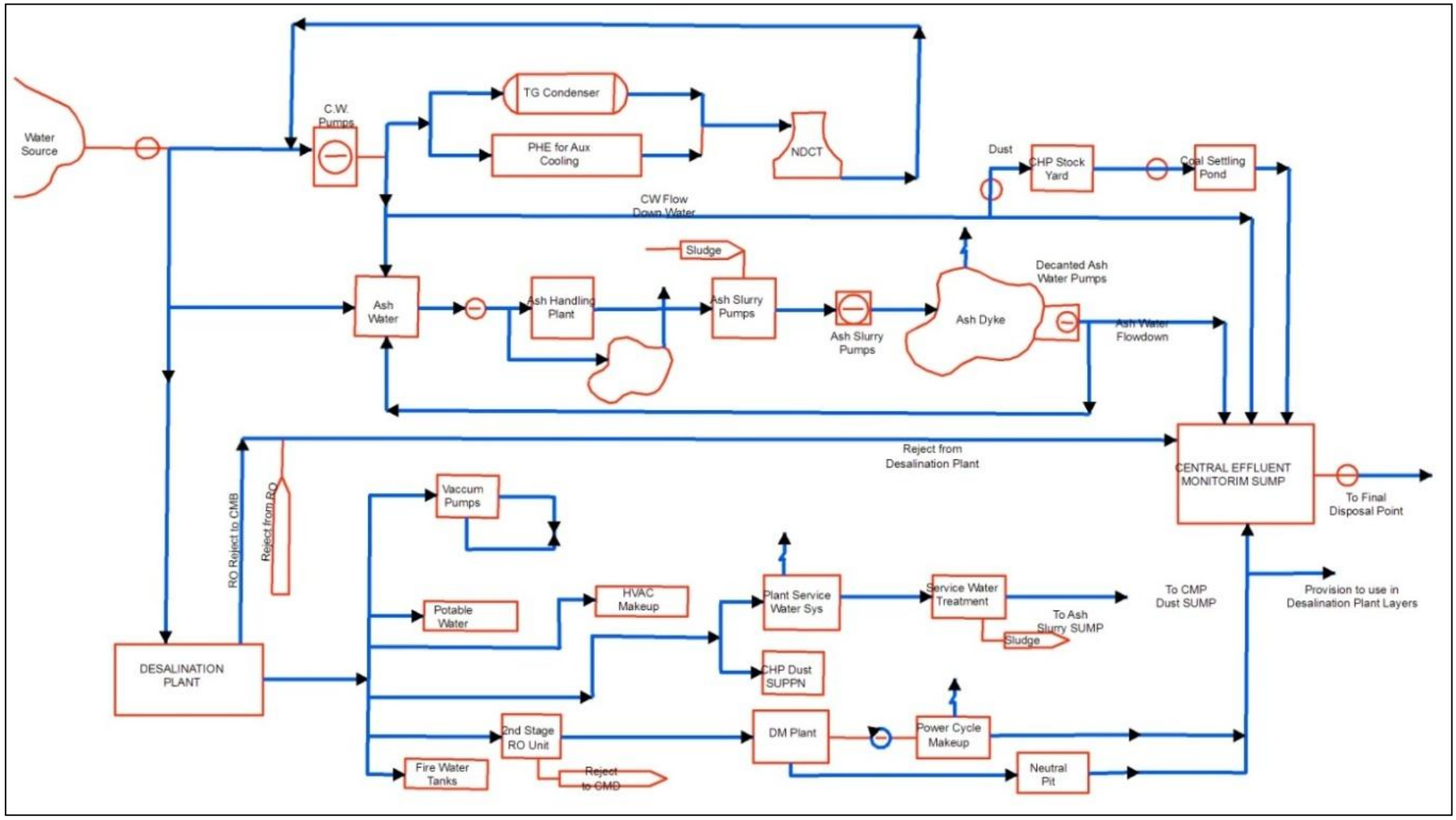
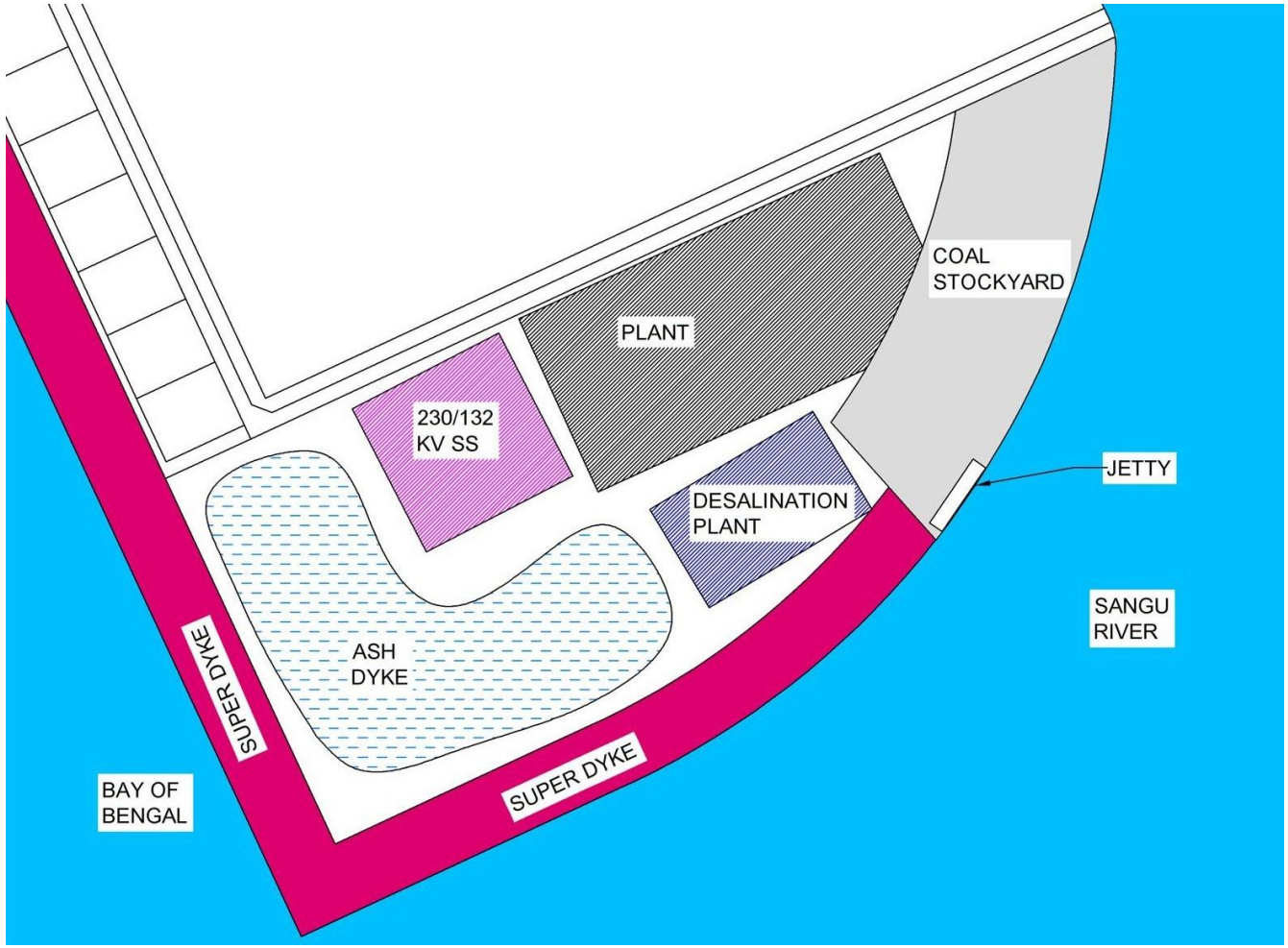


Figure 3.11-3: Typical Layout for Power Plant and Jetty



b) Power Connection from National Grid

The following figure shows the connection from Julda Grid Substation to Anwara EZ 132KV substation.

Figure 3.11-4: Single Line Diagram of Julda 132KV S/S Showing Outgoing Proposed Double Circuit 132x2 Line to Anwara EZ (Off Site)

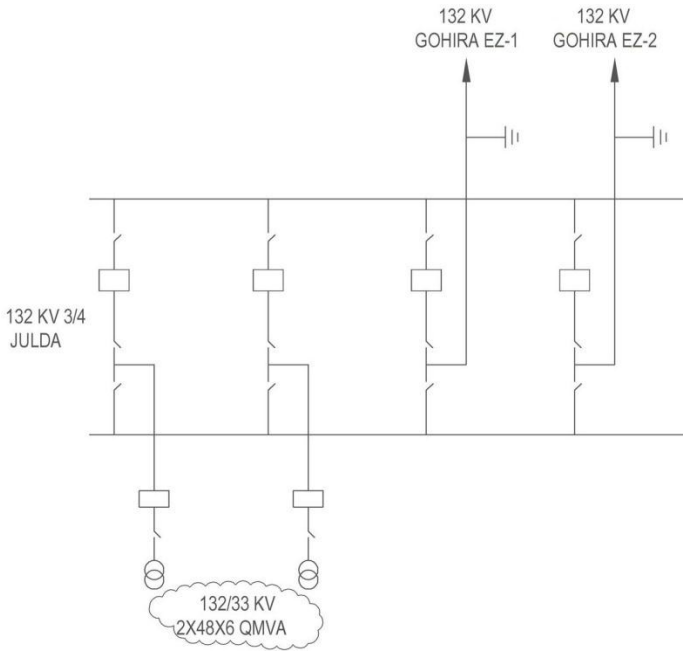


Figure 3.11-5: Single Line Diagram of Anwara EZ 132KV SS

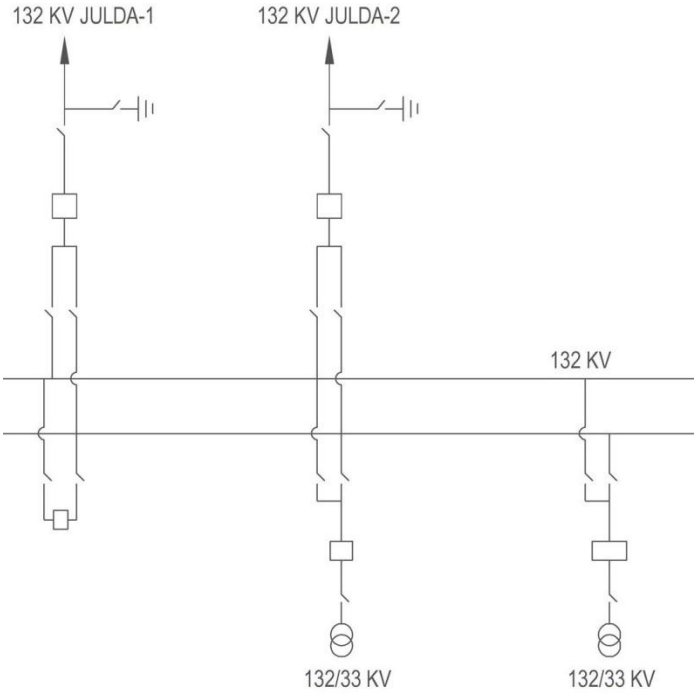
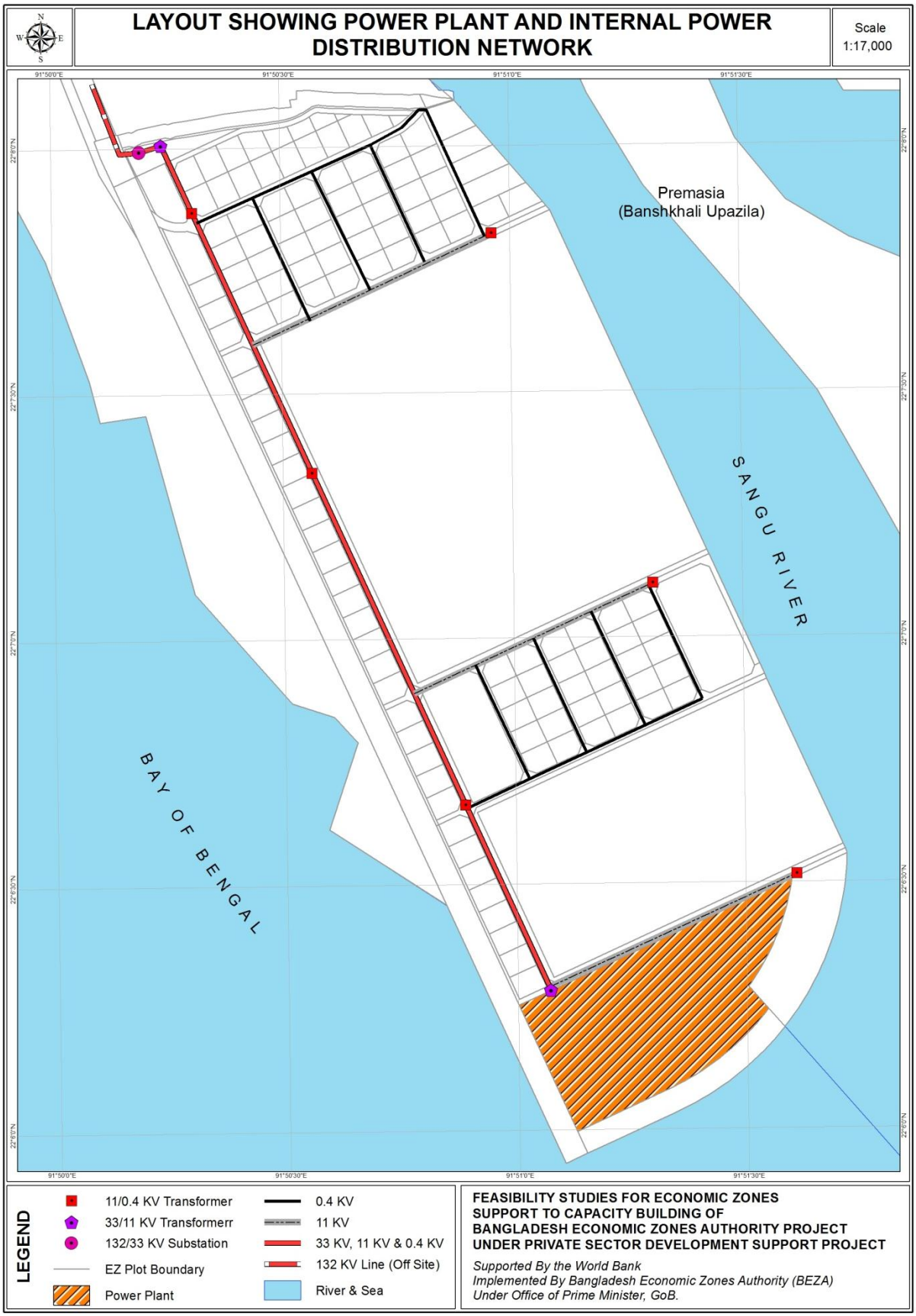
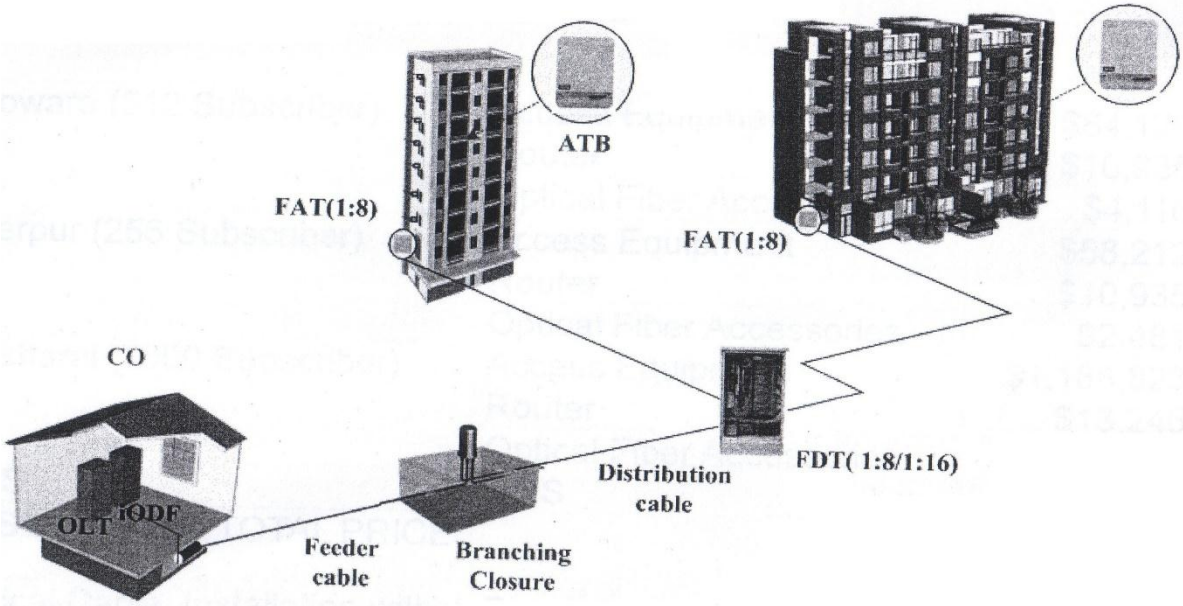


Figure 3.11-6: Map Showing the Proposed Power Plant and Internal Power Distribution Network



3.11 Telecommunications System

Figure 3.12-1: Communication diagram for Anwara EZ



3) Recommendation:

As in all EPZs in Bangladesh, BTCL have their PSTN network, it is recommended that Telecom development works in EZs shall be offered to BTCL. BTCL has two modes of financial systems, a) contributory work and b) self- financed work.

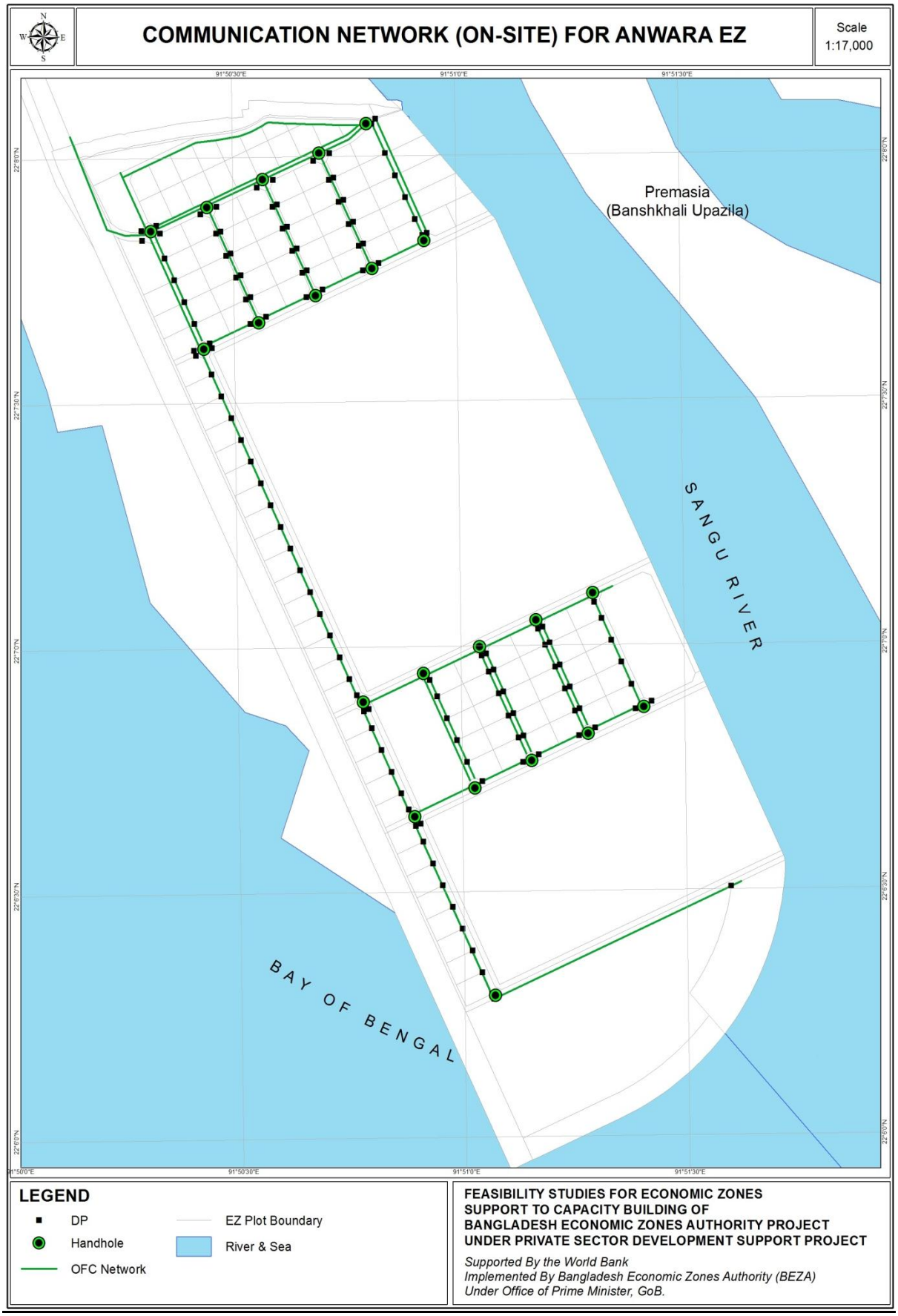
a) **Contributory work:** When a corporate body asks BTCL to establish a telephone network, BTCL submits estimates for contribution of funds. After placing of fund by corporate body BTCL expands the network as asked by the corporate body.
b) **Self- financed work:** when BTCL finds that an area is under development, BTCL includes expansion work in ongoing or in future projects and expands their network for expansion of their own business from their own fund.
c) Due to the abrupt fall of revenue rate of BTCL service, BTCL has become reluctant to do any self- financed work. One BTCL responsible person remarked that, if the government is interested in these works and places the required budget, BTCL can do it with their own finance.

Finally, it is proposed that BEZA shall write to BTCL through the Ministry of Telecommunication, informing them of the future prospect and demand that, three EZs are going to be built, at (a) Sherpur, Maulvibazar in Sylhet Division, (b) Mirershorai, Chittagong in Chittagong Division and (c) Anwara (Gahira), Chittagong in Chittagong Division as part of the infrastructure development of Bangladesh. Finally request the Ministry to instruct BTCL to include these places in their future expansion project.

As a matter of urgency BTCB can be asked, showing demand of EZ sites, to submit estimates for contributory work. Particularly as Anwara is EZ is going to be developed on a priority basis, BTCL may be requested by BEZA to include the development work of telecom in future development work in an ongoing Project of BTCL.

Also, information can be given to the approved private PSTN Operators, Mobile Phone Operators and ISPs that, they can expand their network for their own business expansion. It is recommended that Bangla Phone can be offered to establish their network without any condition.

Figure 3.12-2: Connection diagram (on-site)



3.12 Administration/One-stop Service Building and Other Supporting Buildings

Administration/One-Stop Service Building shall be built at the right side of the entrance with a two (2) storied building having a total floor area of 4,000 m^2 (2000 m^2 on each floor).

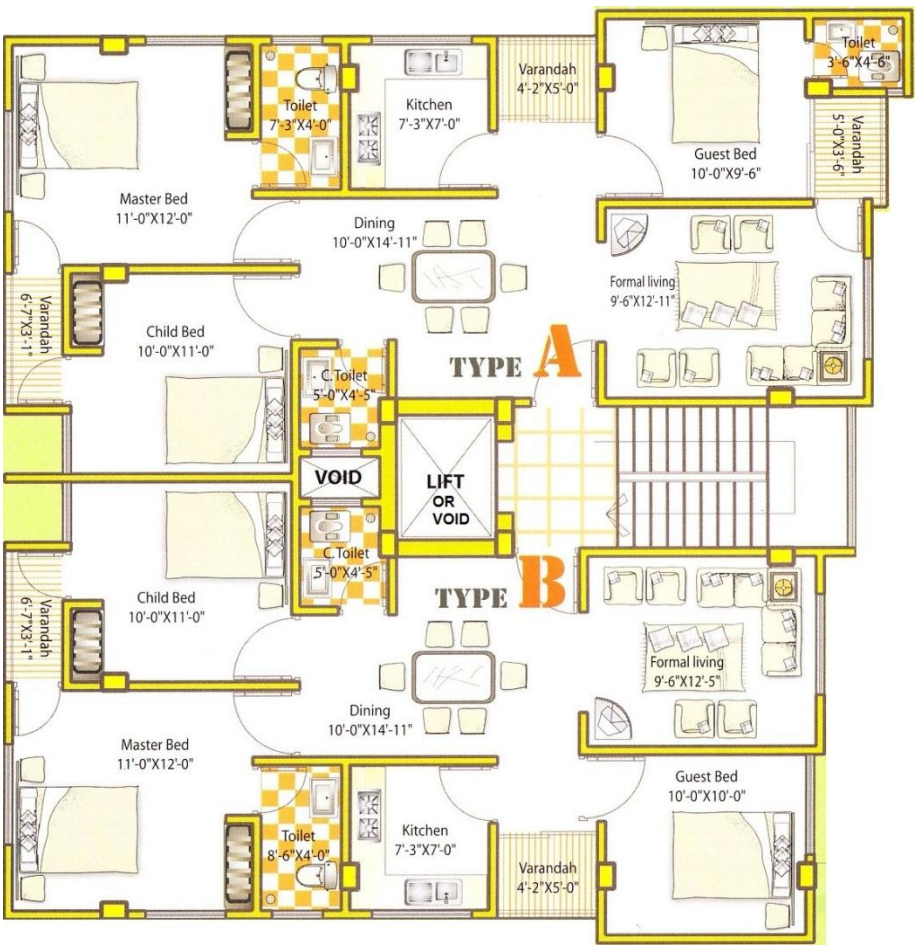
The following functions shall be included:

- One-Stop Service Division (about 10 staffs)
- Economic Zone Administration Division (about 30 staffs)
- Security Office (10 staffs: 24 hours)
- Presentation/Seminar Room (50 people can be accommodated)
- Meeting Rooms (3 Rooms)
- Small clinic for workers
- Bank
- Canteen

Supporting Buildings: Fire Station, Clinic and Police Station

In order to support the Anwara Economic Zone investors with fire safety and medical facilities, a fire station, a small clinic and a police station shall be constructed near the control building. All of these supporting buildings are one floor with the total area of 500 m².

Figure 3.13-1: Typical plan for a 1,000 sq. ft. Residential building



B. Data for Unit Rate (Utility Demand)

For the calculation of demand forecasting, the following data is used. The particular industries are selected from several samples of existing tenants in Bangladesh according to the industry mix chosen by the marketing investigation.

Administrative Office (General Manager Mr. Ashraful Kabir) and Factories (Owners)
Date: 21-Sep-13

Integrated Textile Industry

Company Selected	Queen South Textile Mills Ltd (QST)		
EPZ	Dhaka EPZ		
Land Area	10,566.57	m2	1.06 hector
Monthly Water Consumption	52,771	m3 / month	
Daily Water Consumption	2,030	m3 / day	
Unit Rate (m3/day/ha)	1,921	m3 / day / ha	
Electrical Monthly Consumption	1,051,390.00	kwh/month	
Data	June 2013		
Daily Consumption	35,046.33	kwh/day	assuming 30 days / month
			assuming 3 shifts / day,
Hourly Consumption	1460.26	kw	working hours are 24
		kw	
Unit Rate (kw/ha)	1,381.97	kw/ha	
Unit Rate (MW/ha)	1.38	MW/ha	
Gas Consumption	Captive	74,548	
	Industrial	449,266	
	Total	449,266	m3/month
Daily Consumption	14,976	m3/day	
Unit Rate (m3 /day/ ha)	14,173	m3/day/ha	

Spinning Industry

Company Selected	Adjusted Data from QST		
EPZ	Dhaka EPZ		
Land Area	10,566.57	m2	1.06 hector
Monthly Water Consumption	52,771	m3 / month	
Daily Water Consumption	2,030	m3 / day	
Adjustment	203	10% of Integrated Industry	
Unit Rate (m3/day/ha)	192	m3 / day / ha	
Electrical Monthly Consumption	1,051,390.00	kwh/month	
Data	June 2013		
Daily Consumption	35,046.33	kwh/day	assuming 30 days / month
			assuming 3 shifts / day,
Hourly Consumption	1460.26	kw	working hours are 24
Unit Rate (kw/ha)	1,381.97	kw/ha	
Adjustment	207.29	15% of Integrated Industry	
Unit Rate (MW/ha)	0.21	MW/ha	
Gas Consumption			
Adjustment	15% of the integrated textile industry		
Unit Rate (m3 /day/ ha)	2,126	m3/day/ha	

Weaving Industry

Company Selected	Adjusted Data from QST		
EPZ	Dhaka EPZ		
Land Area	10,566.57 m2	1.06 hector	
Monthly Water Consumption	52,771 m3 / month		
Daily Water Consumption	2,030 m3 / day		
Adjustment	203	10% of Integrated Industry	
Unit Rate (m3/day/ha)	192 m3 / day / ha		
Electrical Monthly Consumption	1,051,390.00 kwh/month		
Data	Aug. 2013		
Daily Consumption	35,046.33 kwh/day	assuming 30 days / month	
		assuming 3 shifts / day,	
Hourly Consumption	1,460.26 kw	working hours are	24
Unit Rate (kw/ha)	1,381.97 kw/ha		
Adjustment	207.29	15% of Integrated Industry	
Unit Rate (MW/ha)	0.21 MW/ha		
Gas Consumption			
Adjustment	15% of the integrated textile industry		
Unit Rate (m3 /day/ ha)	2,126 m3/day/ha		

Dyeing / Finishing Industry

Company Selected	Adjusted Data from QST		
EPZ	Dhaka EPZ		
Land Area	10,566.57 m2	1.06 hector	
Monthly Water Consumption	52,771 m3 / month		
Daily Water Consumption	2,030 m3 / day		
Adjustment	1,624	80% of Integrated Industry	
Unit Rate (m3/day/ha)	1,537 m3 / day / ha		
Electrical Monthly Consumption	1,051,390.00 kwh/month		
Data	Aug. 2013		
Daily Consumption	35,046.33 kwh/day	assuming 30 days / month	
		assuming 3 shifts / day,	
Hourly Consumption	1,460.26 kw	working hours are	24
Unit Rate (kw/ha)	1,381.97 kw/ha		
Adjustment	967.38	70% of Integrated Industry	
Unit Rate (MW/ha)	0.97 MW/ha		
Gas Consumption			
Adjustment	70% of the integrated textile industry		
Unit Rate (m3 /day/ ha)	9,921 m3/day/ha		

Ceramics

Hearing from Director of Mono Ceramic Ltd — Sep 15 2013

Hearing from Mr. Asif (Director of Great Wall Ceramic Ltd) — Nov 23 2013

Company Selected	Mono Ceramic ltd		
Location	Dhaka		
Land Area	21 acres	4.00 hector	
Monthly Water Consumption	9,600 m3 / month		
Daily Water Consumption	320 m3 / day		
Unit Rate (m3/day/ha)	80 m3 / day / ha		
Electrical Consumption	Great Wall Ceramic Ltd		
Production Capacity	24,000 m2/day		
Electrical Monthly Consumption	264,137.00 kwh/month		
Land Area	8.5 hector		
Daily Consumption	8,804.57 kwh/day	assuming 30 days / month	
		assuming 3 shifts / day,	
Hourly Consumption	366.86 kw	working hours are	24
Unit Rate (kw/ha)	43.16 kw/ha		
Unit Rate (MW/ha)	0.04 MW/ha		
Gas Consumption	Great Wall Ceramic Ltd		
	1,509,872 m3/month		
	58,072 m3/day		
Unit Rate (m3 /day/ ha)	6,832 m3/day/ha		

Ceramics

Hearing from Engr Rezaul Karim (Engineer of China Bnglabangla Tiles Ltd)

Nov 24 2013

Company Selected	China Bnglabangla Tiles Ltd)		
Location	Dhaka		
Land Area	19 acres	4.00 hector	
Monthly Water Consumption	1,800 m3 / month		
Daily Water Consumption	60 m3 / day		
Unit Rate (m3/day/ha)	15 m3 / day / ha		
Electrical Consumption	Great Wall Ceramic Ltd		
Electrical Monthly Consumption	180,000.00 kwh/month		
Land Area	8.5 hector		
Daily Consumption	6,000.00 kwh/day	assuming 30 days / month	
		assuming 3 shifts / day,	
Hourly Consumption	250.00 kw	working hours are	24
Unit Rate (kw/ha)	29.41 kw/ha		
Unit Rate (MW/ha)	0.03 MW/ha		
Gas Consumption	Great Wall Ceramic Ltd		
	0 m3/month		
	0 m3/day		
Unit Rate (m3 /day/ ha)	0 m3/day/ha		

Food Processing Industry

Hearing from Mr. Mohammad Kader (DGM of FU-WANG) 23-Nov-13

Company Selected	FU-WANG (Food Processing Company)		
Location	Gazipur		
Land Area	12,100 m2	1.21 hector	
Monthly Water Consumption	1,200 m3 / month		
Daily Water Consumption	40 m3 / day		
Unit Rate (m3/day/ha)	33 m3 / day / ha		
Electrical Monthly Consumption	38,400.00 kwh/month		
Data			
Daily Consumption	1,280 kwh/day	assuming 30 days / month	
		assuming 3 shifts / day,	
Hourly Consumption	53.33 kw	working hours are	24
Unit Rate (kw/ha)	44.08 kw/ha		
Unit Rate (MW/ha)	0.04 MW/ha		
Gas Consumption	1,400 m3/month		
	54 m3/day		
Unit Rate (m3 /day/ ha)	45 m3/day/ha		

Packaging Industry

Hearing from Mr. Atikullah (MG of Alfa Packageing Ltd) Sep 21 2013

Company Selected	Alfa Packaging Ltd		
EPZ	Dhaka EPZ		
Land Area	2,000 m2	0.2 hector	
Monthly Water Consumption	468 m3 / month		
Daily Water Consumption	16 m3 / day		
Unit Rate (m3/day/ha)	78 m3 / day / ha		
Electrical Monthly Consumption	3,362.00 kwh/month		
Data			
Daily Consumption	112.07 kwh/day	assuming 30 days / month	
		assuming 1 shifts / day,	
Hourly Consumption	14.01 kw	working hours are	8
Unit Rate (kw/ha)	70.04 kw/ha		
Unit Rate (MW/ha)	0.07 MW/ha		

Shipbuilding Industry

Company Selected	Khnina Shipyard Ltd (KSL)	
EPZ		
Land Area	70 acres	28.34 hector
Historical Data	Numbers of workers: 250	
Dayly Water Consumption	500 m3 / day	(Facility and workers)
Unit Rate (m3/day/ha)	18 m3 / day / ha	
Electrical Monthly Consumption	4,500,000.00 kwh/month	
Data	Data from ClassNK	
Dayly Consumption	150,000.00 kwh/day	assuming 30 days / month
		assuming 2 shifts / day,
Hourly Comsumption	9375.00 kw	working hours are 16
Unit Rate (kw/ha)	330.80 kw/ha	
Unit Rate (MW/ha)	0.33 MW/ha	

Shipbuilding Parts Manufacturing Industry

Company Selected	Khulna Shipyard Ltd (KSL)	
EPZ		
Land Area	70 acres	28.34 hector
Historical Data	Numbers of workers: 250	
Dayly Water Consumption	500 m3 / day	(Facility and workers)
Ratio (30% of Shipbuilding Ind.)	150 m3 / day	(Facility and workers)
Unit Rate (m3/day/ha)	5 m3 / day / ha	
Electrical Monthly Consumption	4,500,000.00 kwh/month	
Data	Data from ClassNK	
Dayly Consumption	150,000.00 kwh/day	assuming 30 days / month
		assuming 2 shifts / day,
Hourly Comsumption	9375.00 kw	working hours are 16
Ratio (30% of Shipbuilding Ind.)	2812.50 kw	multiply by 0.3
Unit Rate (kw/ha)	99.24 kw/ha	
Unit Rate (MW/ha)	0.10 MW/ha	

Port / Stock Yard Industry

Company Selected	Khulna Shipyard Ltd (KSL)	
EPZ		
Land Area	70 acres	28.34 hector
Historical Data	Numbers of workers: 250	
Dayly Water Consumption	500 m3 / day	(Facility and workers)
Ratio (10% of Shipbuilding Ind.)	50 m3 / day	(Facility and workers)
Unit Rate (m3/day/ha)	2 m3 / day / ha	
Electrical Monthly Consumption	4,500,000.00 kwh/month	
Data	Data from ClassNK	
Dayly Consumption	150,000.00 kwh/day	assuming 30 days / month
		assuming 2 shifts / day,
Hourly Comsumption	9375.00 kw	working hours are 16
Ratio (10% of Shipbuilding Ind.)	937.50 kw	multiply by 0.1
Unit Rate (kw/ha)	33.08 kw/ha	
Unit Rate (MW/ha)	0.03 MW/ha	

Steel Mill

Hearing from Engr. Santosh (Chief Engineer) Nov 23 2013

Company Selected	Rahim Steel Mills		
Location			
Land Area	150 acres	60.73 hector	
Historical Data			
Dayly Water Consumption	2400 m3 / day	with 2 shifts	
Unit Rate (m3/day/ha)	40 m3 / day / ha		
Electrical Monthly Consumption Data	kwh/month		
Dayly Consumption	kwh/day	assuming 30 days / month assuming 2 shifts / day,	
Hourly Comsumption	kw	working hours are	16
Ratio (10% of Shipbuilding Ind.)	55000.00 kw	multiply by	0.1
Unit Rate (kw/ha)	905.67 kw/ha		
Unit Rate (MW/ha)	0.91 MW/ha		

Cement using ashes + clinker Nov 24 2013

Hearing from Mr. Hafizur Rahman (Chief Process Manager)

Company Selected	Cemex Cement Industry		
Location	Bandar Narayanganj		
Land Area	2.5 acres	1.01 hector	
Production Capacity	1,800 ton/day		
Dayly Water Consumption	30 m3 / day	(Facility and workers)	
Unit Rate (m3/day/ha)	30 m3 / day / ha		
Electrical Monthly Consumption Data	960,000.00 kwh/month		
Dayly Consumption	32,000.00 kwh/day	assuming 30 days / month assuming 2 shifts / day,	
Hourly Comsumption	2,000 kw	working hours are	16
Unit Rate (kw/ha)	1,976.00 kw/ha		
Unit Rate (MW/ha)	1.98 MW/ha		

Moto Bike & Components

Data from monthly bill of EPZ in Bangladesh (June 2013)

Company Selected	ALITA			
EPZ	Chittagong EPZ			
Land Area	0.5	acres	0.2	hector
Monthly Water Consumption		m3 / month		
Dayly Water Consumption	14	m3 / day	(Data of June 2013)	
Unit Rate (m3/day/ha)	70	m3 / day / ha		
Electrical Monthly Consumption	50,564.28	kwh/month		
Data	Monthly Report			
Dayly Consumption	1,685.48	kwh/day	assuming 30 days / month	
			assuming 3 shifts / day,	
Hourly Comsumption	70.23	kw	working hours are	24
Unit Rate (kw/ha)	351.14	kw/ha		
Unit Rate (MW/ha)	0.35	MW/ha		

Auto, Electronics and Precision Machinery Parts Indutry

Company Selected	Meiji			
EPZ	Chittagong EPZ			
Land Area	4,000	m2	0.4	hector
Monthly Water Consumption	210	m3 / month		
Dayly Water Consumption	7	m3 / day		
Unit Rate (m3/day/ha)	18	m3 / day / ha		
Electrical Monthly Consumption	79,726.96	kwh/month		
Data	Monthly Report			
Dayly Consumption	2,657.57	kwh/day	assuming 30 days / month	
			assuming 2 shifts / day,	
Hourly Comsumption	166.10	kw	working hours are	16
Unit Rate (kw/ha)	415.24	kw/ha		
Unit Rate (MW/ha)	0.42	MW/ha		

Auto Assembly Indutry

Company Selected			
EPZ			
Land Area		m2	hector
Monthly Water Consumption		m3 / month	
Dayly Water Consumption		m3 / day	
Unit Rate (m3/day/ha)	56	m3 / day / ha	Assuming 80% of Motor Bike Industry
Electrical Monthly Consumption		kwh/month	
Data			
Dayly Consumption		kwh/day	assuming 30 days / month
			assuming 2 shifts / day,
Hourly Comsumption		kw	working hours are
Unit Rate (kw/ha)		kw/ha	
Unit Rate (MW/ha)	0.42	MW/ha	Assuming 120% of Motor Bike Indusry

Textile (Spinning & Weaving) Indutry

Company Selected	Queen South Textile Mills Ltd (QST)		
EPZ	Dhaka EPZ		
Land Area	10,566.57	m2	1.06 hector
Monthly Water Consumption	52,771	m3 / month	
Dayly Water Consumption	2,030	m3 / day	
Adjustment	406	m3/day	20% of Integrated Industry
Unit Rate (m3/day/ha)	384	m3 / day / ha	
Electrical Monthly Consumption	1,051,390.00	kwh/month	
Data			
Dayly Consumption	35,046.33	kwh/day	assuming 30 days / month
			assuming 3 shifts / day,
Hourly Comsumption	1460.26	kw	working hours are 24
Unit Rate (kw/ha)	1,381.97	kw/ha	
Adjustment	414.59	kw/ha	30% of Integrated Industry
Unit Rate (MW/ha)	0.41	MW/ha	

Garments (high Tech & Knitting) Indutry

Company Selected	Ring Shine		
EPZ	Dhaka EPZ		
Land Area	74,000	m2	7.4 hector
Monthly Water Consumption	442,381	m3 / month	
Dayly Water Consumption	14,746	m3 / day	
high tech and knitting	2,949		20%
Unit Rate (m3/day/ha)	399	m3 / day / ha	
Electrical Monthly Consumption	2,276,394.89	kwh/month	
Data	Monthly Report		Multiply by 2 (gas use)
Dayly Consumption	75,879.83	kwh/day	assuming 30 days / month
			assuming 3 shifts / day,
Hourly Comsumption	3,161.66	kw	working hours are 24
Unit Rate (kw/ha)	427.25	kw/ha	
high tech and knitting	85.45		20%
Unit Rate (MW/ha)	0.09	MW/ha	

Garments (Supporting) Indutry

Company Selected	YKK		
EPZ	Dhaka EPZ		
Land Area	22,000	m2	2.2 hector
Monthly Water Consumption	19,949	m3 / month	
Dayly Water Consumption	665	m3 / day	
Unit Rate (m3/day/ha)	302	m3 / day / ha	
Electrical Monthly Consumption	264,137.00	kwh/month	
Data	Monthly Report		
Dayly Consumption	8,804.57	kwh/day	assuming 30 days / month
			assuming 3 shifts / day,
Hourly Comsumption	366.86	kw	working hours are 24
Unit Rate (kw/ha)	166.75	kw/ha	
Unit Rate (MW/ha)	0.17	MW/ha	

For All Economic Zones Investigation on Unit Rate

Commercial, Housing, Residential
Data from Phnom Penh Economic Zone in Cambodia (Aug 2013)

Economic Zone Selected	Phnom Phen Special Economic Zone (PPSEZ)
Water Consumption	
Unit Rate (m3/day/ha)	20 m3 / day / ha
Electrical Monthly Consumption	
Unit Rate (MW/ha)	0.25 MW/ha

A. Detailed Information of the Project

ANWARA EZ

COST ESTIMATE OF ONSITE INFRASTRUCTURES

PER PHASE

Road Network Costs

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Minor Road (Northern Area)					**1**	**2019 ~ 2020**			
Replacing unsuitable soils	252,852	m3	353	**89,256,910**					Assuming 1.5m thickness Required CBR Test CBR > 11%
Subgrade	168,568	m2	90	**15,171,146**					Assuming 0.5m thickness Field Density Test FDT > 95%
Sub-basecourse	168,568	m2	746	**125,751,944**					Designed thickness 25cm Laterite CBR > 30%
Basecourse	168,568	m2	392	**66,078,770**					Designed thickness 15cm Aggregate C30, CBR > 90%
Concrete Pavement									
Form Works	168,568	m2	355	**59,841,743**					
Re-bar Works	168,568	m2	930	**156,768,510**					Diameter of re-bar 12mm @250mm c/c both way weight = 7.14 kg/m2 for single layer (14.28 kg/m2 for double layer)
Concrete Works	33,714	m3	8,858	**298,635,583**					Designed thickness = 20cm Designed strength = 21N/cm2
Labor	168,568	m2	240	**40,456,390**					
Curb and Gutter	24,973	m	900	**22,475,772**					
Side Walk									Both sides
Clearing and Compacting Work	74,919	m2	556	**41,655,097**					
Asphalt Pavement	74,919	m2	654	**48,997,195**					
Sub-Total (Minor Road: Northern Area)				**965,089,060**					
Minor Road (Southern Area)					**1**	**2020**			
Replacing unsuitable soils	42,731	m3	353	**15,084,166**					Assuming 1.5m thickness Required CBR Test CBR > 11%
Subgrade	28,488	m2	90	**2,563,881**					Assuming 0.5m thickness Field Density Test FDT > 95%
Sub-basecourse	28,488	m2	746	**21,251,723**					Designed thickness 25cm Laterite CBR > 30%
Basecourse	28,488	m2	392	**11,167,125**					Designed thickness 15cm Aggregate C30, CBR > 90%
Concrete Pavement									
Form Works	28,488	m2	355	**10,113,086**					
Re-bar Works	28,488	m2	930	**26,493,435**					Diameter of re-bar 12mm @250mm c/c both way weight = 7.14 kg/m2 for single layer (14.28 kg/m2 for double layer)
Concrete Works	5,698	m3	8,858	**50,468,570**					Designed thickness = 20cm Designed strength = 21N/cm2
Labor	28,488	m2	240	**6,837,016**					
Curb and Gutter	4,220	m	900	**3,798,342**					
Side Walk									Both sides
Clearing and Compacting Work	12,661	m2	556	**7,039,594**					
Asphalt Pavement	12,661	m2	654	**8,280,326**					
Sub-Total (Minor Road: Southern Area)				**163,097,264**					
Main Road (Northern Area)					**1**	**2018 ~ 2019**			
Replacing unsuitable soils	31,564	m3	353	**11,141,977**					Assuming 1.5m thickness Required CBR Test CBR > 11%
Subgrade	21,042	m2	90	**1,893,821**					Assuming 0.5m thickness Field Density Test FDT > 95%
Sub-basecourse	21,042	m2	746	**15,697,668**					Designed thickness 25cm Laterite CBR > 30%
Basecourse	21,042	m2	392	**8,248,640**					Designed thickness 15cm Aggregate C30, CBR > 90%
Concrete Pavement									
Form Works	21,042	m2	355	**7,470,070**					
Re-bar Works	21,042	m2	930	**19,569,479**					Diameter of re-bar 12mm @250mm c/c both way weight = 7.14 kg/m2 for single layer (14.28 kg/m2 for double layer)
Concrete Works	4,208	m3	8,858	**37,278,804**					Designed thickness = 20cm Designed strength = 21N/cm2
Labor	21,042	m2	240	**5,050,188**					
Curb and Gutter	3,117	m	900	**2,805,660**					
Side Walk									Both sides
Clearing and Compacting Work	9,352	m2	556	**5,199,823**					
Asphalt Pavement	9,352	m2	654	**6,116,430**					
Sub-Total (Main Road)				**120,472,560**					
Road on Super Dyke					**1**	**2018 ~ 2019**			
Road on Dyke	75,680	m2	1,760	**133,197,050**					
Sub-Total (Road on Super Dyke)				**133,197,050**					
Total				**1,381,855,934**					

Water Supply Costs

Description of items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Pipe Work inside EZ (Northern Area	14,600	m	841	**12,276,705**	**1**	**2017**			U-pvc ϕ150～ϕ250
Pipe Work inside EZ (Southern Area	800	m	2719	**2,175,200**	**1**	**2019**			U-pvc ϕ150～ϕ250
Valve Work (Northern Area)	36	ea	36,194	**1,303,000**	**1**	**2017**			Valve for ϕ150～ϕ250
Valve Work (Southern Area)	5	ea	39,600	**198,000**	**1**	**2019**			Valve for ϕ150～ϕ250
Fire Hydrant (Northern Area)	74	ea	342,230	**25,324,995**	**1**	**2017～2018**			Hydrant for ϕ150～ϕ250
Fire Hydrant (Southern Area)	21	ea	402,619	**8,455,000**	**1**	**2019**			Hydrant for ϕ150～ϕ250
Reservoir Tank	1	set	99,999,961	**99,999,961**	**1**	**2017～2018**			Reserving Volume 15,000 m3
Water Tower	1	set	28,000,075	**28,000,075**	**1**	**2017～2018**			900 m3, 4 towers
Water Supply Treatment Plant					**1**	**2017～2018**			
Office and Other Supporting Struc	1	set	51,445,986	**51,445,986**					650 m2 Office and 90 m2 Supporting Structure
Tanks	1	set	449,132,332	**449,132,332**					Total Capacity 40,000 m3
Pumps, Electrical Works and Acce	1	set	299,421,554	**299,421,554**					Aeration pump, Centrifugal pump and Electrical Works
Sub-Total (Water Supply Treatment Plant)				**799,999,872**					
Total				**977,732,808**					

Waste Water Costs

Description of items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Pipe Work inside EZ (Northern Area	16,091	m	5,235	**84,240,640**	**1**	**2017**			RCP ϕ800～ϕ1200
Pipe Work inside EZ (Southern Area	3,300	m	4,970	**16,400,000**	**1**	**2019**			RCP ϕ800～ϕ1200
Pipe Joint Work between EZ and Se	50	m	8,000	**400,000**	**1**	**2017**			RCP ϕ1500
Manhole Work (Northern Area)	403	ea	178,740	**72,032,280**	**1**	**2017**			Manhole for ϕ800～ϕ1500
Manhole Work (Southern Area)	80	ea	181,250	**14,500,000**	**1**	**2019**			Manhole for φ800
Recycling Pipe Work (Northern Area	17,131	m	1,228	**21,037,406**	**1**	**2017**			U-pvc ϕ200
Recycling Pipe Work (Southern Area	3,919	m	1,225	**4,800,900**	**1**	**2019**			U-pvc ϕ200
Lifting Tower and Pumps for Recycl	1	set	3,999,990	**3,999,990**	**1**	**2019**			
Total				**217,411,216**					

Power Costs (average voltage)

Description of items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Sub Station (132/33kv line)	1	set	400,000,023	**400,000,023**	**1**	**2017～2018**			
Sub Station (33/11kv line)	2	set	15,000,021	**30,000,042**	**1**	**2017～2018**			
Transformer (11/0.4kv) (Northern Area)	5	set	1,000,000	**5,000,000**	**1**	**2019**			
Transformer (11/0.4kv) (Southern Area)	1	set	1,000,000	**1,000,000**	**1**	**2020**			
Transmission Line (Northern Area)	19	km	1,272,520	**24,177,880**	**1**	**2019**			0.4KV, 11KV, 33KV Lines
Transmission Line (Southern Area)	3	km	1,637,785	**4,913,355**	**1**	**2020**			0.4KV, 11KV, 33KV Lines
Testing and Commissioning	1	set	500,003	**500,003**	**1**	**2020**			
Total				**465,591,303**					

Electricity BT & Public Light (Low Voltage)

Description of items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Street Lighting (Northern Area)	281	set	5,000	**1,405,012**	**1**	**2019**			
Street Lighting (Southern Area)	42	set	5,000	**210,000**	**1**	**2020**			
Total				**1,615,012**					

Waste Water Treatment Pl

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Waste Water Treatment Plant					**1**	**2017～2018**			
Office and Other Supporting Struc	1	set	51,445,986	**51,445,986**					650 m2 Office and 90 m2 Supporting Structure
Tanks	1	set	353,132,390	**353,132,390**					Total Capacity 32,000 m3
Pumps, Electrical Works and Acce	1	set	235,421,593	**235,421,593**					Aeration pup, Centrifugal Pump and Electrical Works
Total				**639,999,969**					

ICT Network Costs

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Cable Works (Northern Area)	1	set	19,749,594		**1**	**2020**			
Access Equipment	1	set	4,151,801	**4,151,801**					
OFC Cable Networking	1,405	m	1,543	**2,167,915**					OFC: Optical Fiber Connection
Optical Fiber Accessories	1	set	203,154	**203,154**					
NMS	1	set	12,307,081	**12,307,081**					NMS: Network monitoring system
Router	1	set	539,643	**539,643**					
AC Installation	2	set	90,000	**180,000**					
Room Preparation	1	set	200,000	**200,000**					
Sub-Total (Cable Works Northern Area)				**19,749,594**					
Cable Works (Southern Area)	1	set	13,166,388	**13,166,388**	**1**	**2020**			
Access equipment	1	set	2,340,338	**2,340,338**					
OFC Cable Networking	2,110	m	1,543	**3,255,730**					
Optical Fiber Accessories	1	set	114,516	**114,516**					OFC: Optical Fiber Connection
NMS	1	set	7,050,148	**7,050,148**					NMS: Network monitoring system
Router	1	set	304,192	**304,192**					
AC Installation	1	set	101,464	**101,464**					
Sub-Total (Cable Works Southern Area)				**13,166,388**					
Total				**32,915,982**					

Fencing, Open Spaces (Plantation), and Drainage

Description of items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Fencing					**1**	**2018**			
Fencing Work	8,899	m	4,400	**39,155,372**					
Sub-Total (Fencing)				**39,155,372**					
Plantation					**1**	**2020**			
Plantation (Northern Area)	6,557	ea	1,019	**6,682,830**					
Plantation (Southern Area)	1,651	ea	382	**631,125**					
Sub-Total (Plantation)				**7,313,955**					
Drainage System									
U-drain inside EZ (Northern Area	8,873	m	15,338	**136,095,418**	**1**	**2017 ~ 2018**			U-channel Width = 0.7 m ~ 2.0 m
U-drain inside EZ (Southern Area	3,527	m	14,738	**51,981,300**	**1**	**2019**			U-channel Width = 0.7 m ~ 2.0 m
Sub-Total (Drainage System)				**188,076,718**					
Total				**234,546,045**					

COST ESTIMATE OF OFFSITE INFRASTRUCTURES

PER PHASE

Road Network

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Access Road on Super Dyke									
Road on Dyke	135,000	m2	1760	**237,600,000**	**1**	**2018 ～ 2019**			BC Road
Total				**237,600,000**					

Other Infrastructure and Utilities for last mile connection

DETAIL EACH UTILITY SEPARATELY

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Super Dyke System (Off-Site)					**1**	**2017 ～ 2019**			
Embankment by Carried Earth	2,700,000	m3	353	**953,100,000**					
RCC in Bore Pile	17,952	m3	11,058	**198,513,216**					Pile Length = 8m, Dia = 40cm
Sheet Piling	185,000	m	505	**93,425,000**					Pile length 15m, W = 30cm
RCC Tie Beam (Sea Side)	1,743	m3	8,858	**15,439,494**					Cap 12" x 18" x 18"
Mechanical Compaction	2,700,000	m3	299	**807,300,000**					
Concrete Block (Sea side)	139,640	m3	8858	**1,236,931,120**					Light and Heavy Block
MS Bar 400mps	3,018	ton	81,000	**244,458,000**					
Geotextile on Seaside Slope	420,750	m2	254	**106,870,500**					2mm thickness, two layers
Form Work	17,151	m2	320	**5,488,170**					
Sub-Total (Super Dyke System Off-Site)				**3,661,525,500**					
Electrical Connection					**1**	**2017**			
132KV Line from Julda	10,000	m	15,000	**150,000,000**					
Sub-Total (Electrical Connection)				**150,000,000**					
Water Connection					**1**	**2017**			
River Intake Pipe	26,000	m	48,800	**1,268,800,000**					Iron ductile pipe ϕ 1000mm
River Intake Jetty	1	set	12,120,080	**12,120,080**					
Pump	4	set	960,000	**3,840,000**					500m3/h
GI Sanction Pipe	1	set	500,000	**500,000**					ϕ 200mm
Sub-Total (Water Connection)				**1,285,260,080**					
Communication Connection					**1**	**2017**			
OFC Connection	36	km	1,015,834	**36,570,030**					OFC: Optical Fiber Connection
Terminal Equipment	2	set	150,000	**300,000**					
(Communication Connection)				**36,870,030**					
Total				**5,133,655,610**					

COST ESTIMATE OF ALL EARTHWORKS

PER PHASE

Land Leveling and Filling

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Preparation									
Site Clearing (Northern Area)	3,835,796	m2	10	**38,357,960**	**1**	**2017**			
Site Clearing (Southern Area)	1,789,706	m2	10	**17,897,058**	**1**	**2017**			
Sub-Total (Preparation)				**56,255,018**					
Dredging									
Dredging (Northern Area)	7,671,588	m3	182	**1,396,229,016**	**1**	**2017**			
Dredging (Southern Area)	12,895,324	m3	182	**2,346,948,950**	**1**	**2017 ～ 2018**			
Leveling (Northern Area)	506,679	m3	299	**151,497,064**	**1**	**2017**			
Sub-Total (Dredging)				**3,894,675,030**					
Total				**3,950,930,048**					

Other Works

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Sheet Piling Work									
Sheet Piling (Shipbuilding Yard)	2,169	m	100,000	**216,861,000**	**1**	**2017**			
Concrete Caps	2,062	m	3,312	**6,829,572**	**1**	**2017**			
Sub-Total (Sheet Piling Work)				**223,690,572**					
Deck Wall and Stock Yard									
Sheet Piling	1,608	m	100,000	**160,845,000**	**1**	**2017**			
Concrete Cap	1,609	m	3,312	**5,329,024**	**1**	**2018 ～ 2019**			
Coal Stock Yard	122,646	m2	10,175	**1,247,923,068**	**1**	**2019**			
Sub-Total (Deck Wall and Stock Yard)				**1,414,097,092**					
Total				**1,637,787,665**					

Cost of Dyke Construction

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Dyke System (Super Dyke)					**1**	**2017 ～ 2018**			
Embankment by Carried Earth	1,513,602	m3	353	**534,301,506**					
Sheet Piling	4,204	m	150,000	**630,600,000**					Pile length 15m, W = 30cm
Concrete Cap	4,204	m	43,582	**183,218,728**					Cap 12" x 18" x 18"
Mechanical Compaction	1,513,602	m3	299	**452,566,998**					
Concrete Block (Sea side)	95,500	m3	8858	**845,939,000**					Light and Heavy Block
MS Bar 400mps	101	ton	81,000	**8,181,000**					
Geotextile on Seaside Slope	214,427	m2	254	**54,464,458**					2mm thickness, two layers
Form Work	6,042	m2	320	**1,933,310**					
Sub-Total (Dyke System)				**2,711,205,000**					
Retention Pond System					**1**	**2017**			
Retention Pond (Northern Area)	160,000	m3	136	**21,760,000**					
Membrane (Northern Area)	49,000	m2	250	**12,250,000**					
Pump Sum Structure									
Foundation	1	set	2,282,870	**2,282,870**					
Pumps	5	set	500,000	**2,500,000**					
RCP	4	set	60,000	**240,000**					
Sub-Total (Pump Sum Structure)				**5,022,870**					
Earth Work (Leveling)	160,000	m3	136	**21,760,000**					
Sub-Total (Retention Pond)				**60,792,870**					
Total				**2,771,997,870**					

Power Plant by IPP

Description of Items	Quantity	Unit	Unit price (Taka)	Total cost (with Taxes*)	List Phase of Project	List Years of Construction	First Year Construction Costs	Second Year Construction Costs	Specification
Power Plant by IPP	1	set	20,000,000,157	**20,000,000,157**	**1**	**2018 ～ 2020**			Coal Power Plant 250 MW by IPP
Total				**20,000,000,157**					

Master Planning

Number of Phases	1		
Total m2 per phase	5,623,137		
Year when each phase is to be developed	Northern Area: 2019	Southern Area:	2020
Total number of plots per phase	115		
Total leasable plots per phase	115	(Number of plots)	
Total m2 of leasable plots per phase	3,624,233		
Total number of rentable plots per phase	0		
Total m2 of rentable plots per phase	0		
Total non-leasable plots per phase	0		
Total non-leasable plots per phase	0		
Yearly cost for maintenance of the project	8.244	($ million)	
Total number of households to be resettled	991		
Total cost of resettlement	2.501	($ million)	

Pre-built Factory Costs

Description of Items	Total Size	Unit	M2 Cost (Taka)	Total cost (with Taxes*)
		m2		**0**
Total				**0**

Administration and Custo

Description of Items	Total Size	Unit	M2 Cost (Taka)	Total cost (with Taxes*)
Customs Building	220	m2	34,091	**7,500,000**
Administration Building	2,000	m2	33,750	**67,500,000**
Total				**75,000,000**

Other Building Costs

Description of Items	Total Size	Unit	M2 Cost (Taka)	Total cost (with Taxes*)
		m2		**0**
Total				**0**

Residential Facilities and

Description of Items	Total Size	Unit	M2 Cost (Taka)	Total cost (with Taxes*)
Administration Staff Quarter	9,453	m2	38,708	**365,903,568**
Total				**365,903,568**

ANNEX 4

CHAPTER 4: ENVIRONMENT & SOCIAL REVIEW

1. Other Environmental Impacts and Mitigation Measures for the Anwara EZ Project Component

Impact Description	Magnitude & Significance of the Impact	Mitigation Measures	Implementation Responsibility	Preliminary Costing
Location impacts				
Effects of jetty Environmental Resources and Values Fisheries reproduction zones; Fragile marine ecology; Coastal forest/mangroves and terrestrial ecology, Oil leakage and spills within the EZ etc.	S/P	Special care must be exercised in planning and designing the jetty & EZ to appropriate the needed control in the plan.	The PIU at Anwara/Chittagong, will prepare the Plan, with assistance from the project consultants. Implementation of the Plan will be undertaken by EA (BEZA).	Part of Planning cost
Shipbuilding and Repair Operations	S/P	Implementing opportunities and best management practices (BMPs)of: Abrasive Blasting; Marine Coatings; Vessel Maintenance; Environmental Regulations and Compliance of air, water quality, Hazardous/Solid Waste, etc.	The PIU at Anwara/Chittagong, will prepare the Plan, with assistance from the project consultants	Part of Environmental monitoring cost
Coal fired power plant For electricity-generating plants, typically withdraw and consume water from nearby water bodies, to create steam for turning their turbines. When water is drawn into a coal power plant, millions of fish eggs, fish larvae and juvenile fish may also come along with it. In addition, millions of adult fish may become trapped against the intake structures. Many of these fish are	S/P	Apply appropriate planning and technology for carbon capture and storage (CCS) technology—equipment that would allow a plant to capture CO2 before it is released and then stores it underground.	The PIU at Anwara/Chittagong, will prepare the Plan, with assistance from the project consultants	

Impact Description	Magnitude & Significance of the Impact	Mitigation Measures	Implementation Responsibility	Preliminary Costing
injured or die in the process. Air quality deterioration.				
Design Impacts				
Groundwater contamination The installation of wells may lead to pollution of the aquifer from possible sources of contamination such as surface run-off, garbage dumps, latrines, etc.	I/P	Approved DOE and WHO guidelines and protocols will be strictly followed in the construction of EZ Site, approach road and associated industries. Establishment of a test or production well in order to ensure the integrity of the aquifer.	Incorporation of measures in the Project design - Project Consultant	Measures shall be integrated in the detailed design
Seismic hazards The EZ is located in the medium risk area (zone-2) on the national Seismic Zoning Map (Annex-2)	I/P	The EZ site including industrial establishment and facilities will be designed consistent with internationally accepted standards related to the seismicity risk of the area so to minimize or prevent damage to the structures during earthquakes.	Project consultant	Measures shall be integrated in the detailed design
Construction Impacts				
Health hazards due to construction activities	I/T	Standard environment health and safety guidelines of WB will be followed to ensure health hazards to workers and neighbouring settlement Exposure to dust, noise can be prevented by containment, regular inspections and proper precautions when working around or with the material.	Construction Contractor, Construction Supervision Consultant	Cost included in Contract
Pollution of water resources Direct discharge of construction run-off may cause siltation of surrounding surface water bodies.	M/T	Adequate run-off and drainage control in construction areas will be provided. Sediment laden construction water will be discharged into settling ponds prior to final discharge. Direct discharge into surface watercourses will not be allowed. Earth, stones and solid wastes will be properly stockpiled and disposed of so that these do not block rivers and streams, thereby avoiding	Contractor	-

Impact Description	Magnitude & Significance of the Impact	Mitigation Measures	Implementation Responsibility	Preliminary Costing
		adverse impact on water quality and flow regime		
Dust and noise from construction of EZ facilities. Elevated noise levels and dust emission may be experienced by nearby households	M/T .	The following measures will be implemented to minimize impacts to local communities during construction of EZ and associated structures:(i) provision of cover on haul trucks transporting filling materials, gravel, excavated soil and other construction materials, (ii) water spraying on exposed areas to suppress dust emission, (iii) proper maintenance of equipment and use of mufflers, as appropriate, to minimize noise and (iv) scheduling of noise generating activities during daytime, as much as possible, to avoid disturbance to nearby households.	Contractor	minimal
Removal of vegetation The construction of EZ as well as approach road will require vegetation clearing.	M/T	Much of the clearing will be undertaken along the roads where the dominant vegetation is various species of grasses. Although cutting of trees may be necessary in some areas, impacts may not deemed significant as the Project will involve removal of common tree species that are widely found in the area. There are no endangered or rare species of vegetation in the Project area that may be affected during construction. However, the proposed detailed EIA study will further address these issues including land acquisition.	-	-
Safety hazards during construction This impact is considered negligible provided appropriate safety precautions are observed at all	I/T	Workers will be oriented on safe practices and will be provided with appropriate personnel protective gear (e.g., safety shoes, hard hats, etc.). There will be provision of adequate protection to the general public, such as safety barriers where excavation is being undertaken and other	Contractor	Orientation shall be undertaken by EHS Officer to be hired by the contractor

Impact Description	Magnitude & Significance of the Impact	Mitigation Measures	Implementation Responsibility	Preliminary Costing
times.		measures, as necessary.		
O & M Impacts				
Hazard of land subsidence Land subsidence may occur due to over extraction of groundwater.	I/P	Geotechnical investigations will be conducted to appropriately design the site stability and associated establishment	Project Consultants	Orientation shall be undertaken by EHS Officer to be hired by the contractor
Pollution due to improper treatment of wastes, sludge disposal methods	M/P	Impacts due to improper treatment of wastes, disposal of sludge will be avoided through the implementation of a sludge management plan.	BEZA	Formulation of sludge management plan: US$???

Note: Magnitude: I-insignificant, M-moderate or S-significant and impact duration: T-temporary or P-permanent

2. Earthquake Zones of Bangladesh

Source: Geological Survey of Bangladesh

3. Coal Burning Power Station

Coal burning power stations continue to speed up global warming by filling the atmosphere with vast amounts of carbon dioxide. Coal burning leads to acid rain and smog and emits more than 60 different hazardous air pollutants such as a variety of toxic metals, organic compounds, acid gases, sulphur, nitrogen, carbon dioxide, and particulate matter. As such, the location of these plants should be more than 25 Km from sensitive areas (human settlement, forest, archaeology and cultural sites, game reserves, etc.). Emissions include the following:

Carbon dioxide (CO2)

On average one 500-megawatt coal-fired power plant produces approximately 3 million tons/year of CO2. Each plant's emissions depend on its size and efficiency. A single power station in Martins Lake, Texas emitted more than 21 million tonnes of CO2 in 2006 - more CO2 than Slovenia, Estonia, Bolivia, or Afghanistan emitted in 2004.

Worldwide, the 25 worst CO2 polluting power plants all burn coal. According to Carbon Monitoring for Action (CARMA), these plants are responsible for over 570 million metric tonnes of CO2 emissions, the equivalent to the UK's yearly fossil fuel related CO2 emissions.

Other Gases

Coal-burning power plants are a significant source of Sulphur dioxide (SO2) and nitrogen oxides (NOx), which are major players in acid rain and ground level ozone (smog).

Nitrogen oxides are also greenhouse gasses that react with organic compounds to form smog, which damages plant life, making it vulnerable to disease and extreme weather. It can also impair human health by causing increased risk of asthma, lung damage, and premature death.

Acid rain occurs when SO2 and NOX interact with water, oxygen and other chemicals in the air to form sulphuric acid and nitric acid. This toxin can fall from the sky in rain over a widespread area, killing fish and plants. Forests are also impacted via direct damage to foliage and where forest soils have been stripped of nutrients by acid rain. The shocking impacts of acid rain on forests around the world have led to progress, in curbing toxic rain in the US and Europe for example, but it is estimated that acid rain still falls on 30% of the land in China and on hundreds of its cities.

The fact remains that coal is still by far the single biggest source of sulphur emissions caused by power generation. In 2004, 95% of the 10.3 million tons of SO2 and 90% of the 3.9 million tons of NOx, released into the atmosphere by US power plants came from ones fuelled by coal.

Mercury Poisoning

Burning coal releases large amounts of the neurotoxin mercury into the air. Globally, coal-fired power plants are the single largest emitter of mercury emissions, accounting for over 50% of the mercury pollution caused by humans.

Once released, mercury settles in streams, lakes, and rivers and on the earth itself, where it infiltrates the groundwater. From there, it enters the food chain via algae and infects all life forms, from minnows to predator fish to birds and mammals, whose diets include fish. As it goes up the food chain, the concentration of mercury intensifies. Forty-nine American states have issued fish consumption advisories due to high mercury concentrations in freshwater bodies throughout the country.

Mercury is especially damaging to foetuses, infants and young children because it affects the development of the nervous system. Exposure to mercury can cause brain damage, mental retardation,

blindness, seizures and the inability to speak. Every year, about 410,000 children around the world are born having been exposed to dangerous levels of methyl mercury in the womb. At any one time, eight percent of women of childbearing age have more mercury in their blood than is deemed safe by the US Environmental Protection Agency. Mercuric chloride and methyl mercury have been classified as possible human carcinogens by the US Environmental Protection Agency.

Particle emissions

Coal-burning power plants release fine particles of sulphate, nitrates, ammonia, sodium chloride, carbon and mineral dust, smaller than the width of a human hair, that penetrate deep into the lung. Breathing these fine particles can decrease lung function, aggravate asthma and contribute to cardiovascular disease. They cause thousands of premature deaths. As the particles are so small, they are more likely to escape the cleaning mechanisms of coal power stations.

Every year, in the US alone, fine particle emissions from power plants are believed to cut short the lives of 30,000 people. Every year, 38,000 heart attacks, 12,000 hospital admissions and an additional 550,000 asthma attacks are a result of power plant pollution.

In India, a study in 2001 found that the inhabitants of 14 of India's 20 largest cities breathe air the government deems “dangerous.” Particle emissions from coal-fired power plants are a major contributor to poor air quality.

The concerned agencies and Ministries of the Government of Bangladesh should review the information stated above before establishing a Coal-fired Power Plant in Chittagong and Rampal (10 Km away from the Sundarban) as well.

4. Environmental Management and Monitoring

Table 4-1: Environmental Management and Monitoring

A. Project Management

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measure	Location	Estimated Mitigation Cost	Responsibility	
					Implementation	Supervision
Site clearance	Vegetation removal	Tree clearances for easement establishment to only involve cutting trees off at ground level or pruning as appropriate, with tree stumps and roots left in place and ground cover left undisturbed.	Throughout the site	N/A	Construction Supervision Consultant	Contractor
Mechanized construction	Noise, vibration and operator safety, efficient operation	Construction equipment to be well maintained.	Throughout the site	N/A	Construction Supervision Consultant	Contractor
Air Quality	-Emissions from vehicles	-Limitations of size, weight or	Throughout the site	N/A	Construction Supervision	Contractor

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measure	Location	Estimated Mitigation Cost	Responsibility	
					Implementation	Supervision
	-Emissions through burning of waste -Dust emissions	axle loads of vehicles using particularly difficult roads. -Reduction of speed and limited movement of vehicles. -Routine service and regular maintenance of vehicles and machines to reduce engine emissions. -Burning of rubbish on site must be strictly forbidden. -Construction equipment shall be maintained to a good standard and idling of engines discouraged. -Machinery causing excessive pollution (visible smoke) shall be banned from construction sites. -Despite its dust reduction potential, access roads shall only be sprayed in exceptional cases due to scarcity of water			Consultant	
Waste Production	-Waste generation	-Development of a Waste Management Plan within the HSE Management Plan considering following principles: (i)	Construction yard, workers camp	N/A	Construction Supervision Consultant	Contractor

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measure	Location	Estimated Mitigation Cost	Responsibility	
					Implementation	Supervision
		waste management hierarchy of avoidance-minimisation-reuse-treatment-disposal; (ii) segregation of waste; (iii) minimisation of construction waste by good technical planning; (iv) training of staff. - Implementation of a Waste Management System. -Provision of construction sites and workers' camps with functional sanitary equipment. -Training of workers regarding proper waste and waste water handling according to environmental management requirements. -Solid waste and garbage will be collected in bins and disposed of daily, according to a brief and basic waste management plan prepared by the contractor and approved by BEZA-PMO, prior to commencement of civil works. - All solid waste will be				

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measure	Location	Estimated Mitigation Cost	Responsibility	
					Implementation	Supervision
		collected and removed from the work camps and disposed of in local waste disposal sites -Any spoil generated by the construction activity should be disposed at an approved location. -Littering should be prevented by providing adequate number of containers which shall be emptied regularly. -After completion of construction the site shall be properly cleaned and properly rehabilitated or re-vegetated.				
Oil spillage	Contamination of soil and water bodies	Oil storage facilities and located within secure and impervious bunded areas with appropriate storage capacity. Safe handling and disposal of phased out equipment	Construction yard, workers camp	N/A	Construction Supervision Consultant	Contractor
Health and Safety	General Health and Safety impacts	Development of an EHS Policy for the construction phase. -Development of an EHS Management Plan for construction (shall include a	Construction yard, workers camp	N/A	Construction Supervision Consultant	Contractor

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measure	Location	Estimated Mitigation Cost	Responsibility	
					Implementation	Supervision
		Waste Management Plan). -Installation of an EHS Management System (EHS-MS) during the construction phase. -Clean work environment including good drainage around camp sites will be provided to avoid creation of stagnant water bodies -Provide adequate sanitation and waste disposal facilities at campsites -Provide education to the workforce on prevention of communicable				

B. Monitoring Plan

Environmental Indicator	Parameters/ Units	Location	Means of Monitoring	Frequency/ Duration Standards	Responsibilities		Estimated Cost
Soil and Water Resources	-Removal of temporary infrastructure -Replanting of unneeded access roads, lay down areas, and other work sites -Provision of separate storage tanks for further treatment of oily wastewater	Throughout the project	-Visual control of downstream water quality (turbidity), -Regular measurements of upstream / downstream basic water parameters,	Regular/DoE-WB Regulations	Implementation	Supervision	N/A
Flora	Supervision of	Specific	Visual	Periodica	Implementation	Supervision	

	maintenance procedures	sites	(Quantity check)	l Inspectio n			
Waste Production	Quality and quantity of solid and liquid wastes	Specific sites	Instrumental quality check	Regular monitori ng	Implementation	Supervision	

Source: Review of environmental analysis, January 2014

5. References

- BEZA Project documents, May, 2013
- Department of Environment, Environmental Policies, Act and Regulations 1995, 1997
- Inception Report, "Support to Capacity Building of Bangladesh Economic Zones Authority Project" Under Private Sector Development Support Project, Japan Development Institute, In association with Maxwell Stamp Ltd., Sheltech (Pvt.) Ltd. July 2013
- Interim Report, "Support to Capacity Building of Bangladesh Economic Zones Authority Project" Under Private Sector Development Support Project, Japan Development Institute, In association with Maxwell Stamp Ltd., Sheltech (Pvt.) Ltd. October, 2013
- The Bangladesh Economic Zones Act, 1st August 2010, Act No. 42 of 2010
- World Bank, Environmental Assessment Sourcebook, Volume II, Sectoral Guidelines, Washington DC, 1991

6. Details of Land Compensation

Class of land		Size of land					comments
According to record	According to inquiry	total	proposed	Rate per Acre	Value in Taka	Value in $	
river	Sandy island (baluchar)	148.86	60	2699200	161,952,000	2,024,400	88.86 acre
khila	Sandy island	81.28	45	2699200	121,464,000	1,518,300	36.28
river	Sandy island	107.98	107.98	2699200	291,459,616	3,643,245	38.28 acre private
Shikasti	Sandy island	105.45	10	2699200	26,992,000	337,400	95.45 acre sikhati
nal	nal	0.12	0.12	2164700	259,764	3,247	
nal	nal	0.73	0.73	2164700	1,580,231	19,753	
Road/path	road	0.19	0.19		-	-	
road	road	0.3	0.3		-	-	
nal	nal	0.1	0.1	2164700	216,470	2,706	
nal	nal	0.04	0.04	2164700	86,588	1,082	
nal	nal	2.32	2.32	2164700	5,022,104	62,776	
nal	nal	0.25	0.25	2164700	541,175	6,765	
nal	nal	0.11	0.11	2164700	238,117	2,976	
khai	khai	0.15	0.15	3087063	463,059	5,788	
nal	nal	0.03	0.03	2164700	64,941	812	
nal	nal	0.11	0.11	2164700	238,117	2,976	
khila	khila	0.27	0.27	3087063	833,507	10,419	
nal	nal	0.64	0.64	2164700	1,385,408	17,318	
nal	nal	0.56	0.56	2164700	1,212,232	15,153	
nal	nal	0.23	0.23	2164700	497,881	6,224	
nal	nal	0.08	0.08	2164700	173,176	2,165	
nal	nal	0.5	0.5	2164700	1,082,350	13,529	
Sandy island	Sandy island	0.69	0.69	2699200	1,862,448	23,281	
nal	nal	0.14	0.14	2164700	303,058	3,788	
nal	nal	0.6	0.6	2164700	1,298,820	16,235	
nal	nal	0.1	0.1	2164700	216,470	2,706	
nal	nal	0.09	0.09	2164700	194,823	2,435	
nal	nal	0.42	0.42	2164700	909,174	11,365	
khal	Khal	0.25	0.25		-	-	
khila	khila	0.16	0.16	3087063	493,930	6,174	
road	road	0.02	0.02		-	-	
nal	Nal	0.07	0.07	2164700	151,529	1,894	
nal	nal	0.07	0.07	2164700	151,529	1,894	
sikasti	Sandy island	113.24	7	2699200	18,894,400	236,180	
nal	nal	0.07	0.07	2164700	151,529	1,894	
nal	nal	0.16	0.16	2164700	346,352	4,329	
homestead	homestead	0.28	0.28	3250000	910,000	11,375	
homestead	homestead	0.15	0.15	3250000	487,500	6,094	
road	road	0.07	0.07		-	-	
nal	nal	0.13	0.13	2164700	281,411	3,518	
nal	nal	0.1	0.1	2164700	216,470	2,706	
nal	nal	0.52	0.52	2164700	1,125,644	14,071	
khila	khila	0.12	0.12	3087063	370,448	4,631	
Govt khas land		**567.75**	**240.92**		**644,128,271**	**8,051,603**	
		567.75	240.92	2,673,619		33,420	

Class of land		Size of land				
According to record	According to inquiry	total	proposed	Rate per Acre	Value in Taka	Value in $
khila		16.89	16.89	3087063	52,140,494	651,756
khila		3.22	3.22	3087063	9,940,343	124,254
noyonjali	dam	5.62	5.62			-
dam	dam	5.62	5.62			-
dam	dam	1.74	1			-
sikosti	Sandky island/baluchar	31.6	5	2699200	13,496,000	168,700
Water dev board total land		88.78	49.35			
Private land ownership in attached form: total land		**321.2**	**321.2**	2500000	803,000,000	10,037,500
	TOTAL	**977.73**	**611.47**			

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5400	0.13		0.13	2,164,700	281,411	3,518
5401	0.17		0.17	2,164,700	367,999	4,600
5402	0.14	Nal	0.14	2,164,700	303,058	3,788
5403	0.14		0.14	2,164,700	303,058	3,788
5404	0.07	Nal	0.17	2,164,700	367,999	4,600
5405	0.07		0.07	2,164,700	151,529	1,894
5406	0.2		0.2	2,164,700	432,940	5,412
5407	0.01		0.01	2,164,700	21,647	271
5408	0.03		0.03	2,164,700	64,941	812
5409	0.09		0.09	2,164,700	194,823	2,435
5410	0.03		0.03	2,164,700	64,941	812
5411	0.03		0.03	2,164,700	64,941	812
5412	0.06		0.06	2,164,700	129,882	1,624
5413	0.11		0.11	2,164,700	238,117	2,976
5414	0.01	Nal	0.01	2,164,700	21,647	271
5415	0.12		0.12	2,164,700	259,764	3,247
5416	11	Nal	0.11	2,164,700	238,117	2,976
5417	0.14		0.14	2,164,700	303,058	3,788
5418	0.04		0.04	2,164,700	86,588	1,082
5419	0.08		0.08	2,164,700	173,176	2,165
5420	0.07		0.07	2,164,700	151,529	1,894
5421	0.03		0.03	2,164,700	64,941	812
5423	0.03	Nal	0.03	2,164,700	64,941	812
5424	0.02		0.02	2,164,700	43,294	541
5425	0.08		0.08	2,164,700	173,176	2,165
5426	0.05		0.05	2,164,700	108,235	1,353
5427	0.07		0.07	2,164,700	151,529	1,894
5428	0.06		0.06	2,164,700	129,882	1,624
5429	0.13	Nal	0.13	2,164,700	281,411	3,518
5430	0.24		0.24	2,164,700	519,528	6,494
5431	0.46		0.46	2,164,700	995,762	12,447
5432	0.03		0.03	2,164,700	64,941	812
5433	0.14		0.14	2,164,700	303,058	3,788
5434	0.11		0.11	2,164,700	238,117	2,976
5435	0.26		0.26	2,164,700	562,822	7,035
5436	0.09		0.09	2,164,700	194,823	2,435
5437	0.05		0.05	2,164,700	108,235	1,353
5438	0.05		0.05	2,164,700	108,235	1,353
5439	0.1		0.1	2,164,700	216,470	2,706
5440	0.11		0.11	2,164,700	238,117	2,976
5441	0.42		0.42	2,164,700	909,174	11,365

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5442	0.1		0.1	2,164,700	216,470	2,706
5443	0.09		0.09	2,164,700	194,823	2,435
5444	0.2	Nal	0.2	2,164,700	432,940	5,412
5445	0.07		0.07	2,164,700	151,529	1,894
5446	0.09		0.09	2,164,700	194,823	2,435
5447	0.18		0.18	2,164,700	389,646	4,871
5448	0.2		0.2	2,164,700	432,940	5,412
5449	0.16		0.16	2,164,700	346,352	4,329
5450	0.24		0.24	2,164,700	519,528	6,494
5451	0.17		0.17	2,164,700	367,999	4,600
5452	0.67		0.67	2,164,700	1,450,349	18,129
5453	0.1		0.1	2,164,700	216,470	2,706
5454	0.11		0.11	2,164,700	238,117	2,976
5455	0.05		0.05	2,164,700	108,235	1,353
5456	0.04		0.04	2,164,700	86,588	1,082
5457	0.04		0.04	2,164,700	86,588	1,082
5458	0.1		0.1	2,164,700	216,470	2,706
5459	0.18		0.18	2,164,700	389,646	4,871
5460	0.06		0.06	2,164,700	129,882	1,624
5461	0.12		0.12	2,164,700	259,764	3,247
5462	0.11		0.11	2,164,700	238,117	2,976
5463	0.07		0.07	2,164,700	151,529	1,894
5464	0.08		0.08	2,164,700	173,176	2,165
5465	0.31		0.31	2,164,700	671,057	8,388
5466	0.27.		0.27	2,164,700	584,469	7,306
5467	0.11		0.11	2,164,700	238,117	2,976
5468	0.13		0.13	2,164,700	281,411	3,518
5469	0.11		0.11	2,164,700	238,117	2,976
5470	0.67		0.67	2,164,700	1,450,349	18,129
5471	0.08		0.08	2,164,700	173,176	2,165
5472	0.07		0.07	2,164,700	151,529	1,894
5473	0.03		0.03	2,164,700	64,941	812
5474	0.01		0.01	2,164,700	21,647	271
5475	0.01		0.01	2,164,700	21,647	271
5476	0.02		0.02	2,164,700	43,294	541
5477	0.02		0.02	2,164,700	43,294	541
5478	0.06		0.06	2,164,700	129,882	1,624
5479	0.13		0.13	2,164,700	281,411	3,518
5480	0.19	Nal	0.19	2,164,700	411,293	5,141
5481	0.61	Nal	0.61	2,164,700	1,320,467	16,506
5482	0.01		0.01	2,164,700	21,647	271
5483	0.02		0.02	2,164,700	43,294	541
5484	0.04		0.04	2,164,700	86,588	1,082
5485	0.07		0.07	2,164,700	151,529	1,894
5486	0.34		0.34	2,164,700	735,998	9,200
5487	0.1		0.1	2,164,700	216,470	2,706
5488	0.22		0.22	2,164,700	476,234	5,953
5489	0.1		0.1	2,164,700	216,470	2,706
5490	0.09		0.09	2,164,700	194,823	2,435
5491	0.07		0.07	2,164,700	151,529	1,894
5492	0.07		0.07	2,164,700	151,529	1,894
5493	0.03		0.03	2,164,700	64,941	812
5494	0.15		0.15	2,164,700	324,705	4,059
5495	0.06		0.06	2,164,700	129,882	1,624
5496	0.07		0.07	2,164,700	151,529	1,894
5497	0.02		0.02	2,164,700	43,294	541
5498	0.19		0.19	2,164,700	411,293	5,141
5499	0.15		0.15	2,164,700	324,705	4,059
5500	0.01		0.01	2,164,700	21,647	271
5501	0.23		0.23	2,164,700	497,881	6,224

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5502	0.14		0.14	2,164,700	303,058	3,788
5503	0.1		0.1	2,164,700	216,470	2,706
5504	0.2		0.2	2,164,700	432,940	5,412
5505	0.68		0.68	2,164,700	1,471,996	18,400
5506	0.11		0.11	2,164,700	238,117	2,976
5507	0.12		0.12	2,164,700	259,764	3,247
5508	0.41		0.41	2,164,700	887,527	11,094
5509	0.13		0.13	2,164,700	281,411	3,518
5510	0.12		0.12	2,164,700	259,764	3,247
5511	0.03		0.03	2,164,700	64,941	812
5512	0.07		0.07	2,164,700	151,529	1,894
5513	0.07		0.07	2,164,700	151,529	1,894
5514	0.11		0.11	2,164,700	238,117	2,976
5515	0.16		0.16	2,164,700	346,352	4,329
5516	0.08		0.08	2,164,700	173,176	2,165
5517	0.05		0.05	2,164,700	108,235	1,353
5518	0.04		0.04	2,164,700	86,588	1,082
5519	0.1		0.1	2,164,700	216,470	2,706
5520	0.05		0.05	2,164,700	108,235	1,353
5521	0.06		0.06	2,164,700	129,882	1,624
5522	0.12		0.12	2,164,700	259,764	3,247
5523	0.09		0.09	2,164,700	194,823	2,435
5524	0.07		0.07	2,164,700	151,529	1,894
5525	0.21		0.21	2,164,700	454,587	5,682
5526	0.26		0.26	2,164,700	562,822	7,035
5527	0.28		0.28	2,164,700	606,116	7,576
5528	0.16		0.16	2,164,700	346,352	4,329
5529	0.12		0.12	2,164,700	259,764	3,247
5530	0.1		0.1	2,164,700	216,470	2,706
5531	0.17		0.17	2,164,700	367,999	4,600
5532	0.18		0.18	2,164,700	389,646	4,871
5533	0.05		0.05	2,164,700	108,235	1,353
5534	0.04		0.04	2,164,700	86,588	1,082
5535	0.05		0.05	2,164,700	108,235	1,353
5536	0.03		0.03	2,164,700	64,941	812
5537	0.01		0.01	2,164,700	21,647	271
5538	0.15		0.15	2,164,700	324,705	4,059
5539	0.1		0.1	2,164,700	216,470	2,706
5540	0.2		0.2	2,164,700	432,940	5,412
5541	0.04		0.04	2,164,700	86,588	1,082
5542	0.04		0.04	2,164,700	86,588	1,082
5543	0.04		0.04	2,164,700	86,588	1,082
5544	0.08		0.08	2,164,700	173,176	2,165
5545	0.09		0.09	2,164,700	194,823	2,435
5546	0.18		0.18	2,164,700	389,646	4,871
5547	0.06		0.06	2,164,700	129,882	1,624
5548	0.08		0.08	2,164,700	173,176	2,165
5549	0.05		0.05	2,164,700	108,235	1,353
5550	0.02		0.02	2,164,700	43,294	541
5551	0.02		0.02	2,164,700	43,294	541
5552	0.04		0.04	2,164,700	86,588	1,082
5553	0.03		0.03	2,164,700	64,941	812
5554	0.04		0.04	2,164,700	86,588	1,082
5555	0.04		0.04	2,164,700	86,588	1,082
5556	0.04		0.04	2,164,700	86,588	1,082
5557	0.02		0.02	2,164,700	43,294	541
5558	0.02		0.02	2,164,700	43,294	541
5559	0.63		0.63	2,164,700	1,363,761	17,047
5560	0.1		0.1	2,164,700	216,470	2,706
5561	0.13		0.13	2,164,700	281,411	3,518

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5562	0.14		0.14	2,164,700	303,058	3,788
5563	0.15		0.15	2,164,700	324,705	4,059
5564	0.19		0.19	2,164,700	411,293	5,141
5565	0.07		0.07	2,164,700	151,529	1,894
5566	0.07		0.07	2,164,700	151,529	1,894
5567	0.21		0.21	2,164,700	454,587	5,682
5568	0.03		0.03	2,164,700	64,941	812
5569	0.03		0.03	2,164,700	64,941	812
5570	0.11		0.11	2,164,700	238,117	2,976
5571	0.05		0.05	2,164,700	108,235	1,353
5572	0.03		0.03	2,164,700	64,941	812
5573	0.12		0.12	2,164,700	259,764	3,247
5574	0.06		0.06	2,164,700	129,882	1,624
5575	0.43		0.43	2,164,700	930,821	11,635
5576	0.16		0.16	2,164,700	346,352	4,329
5577	0.15		0.15	2,164,700	324,705	4,059
5578	0.12		0.12	2,164,700	259,764	3,247
5579	0.14		0.14	2,164,700	303,058	3,788
5580	0.22		0.22	2,164,700	476,234	5,953
5581	0.05		0.05	2,164,700	108,235	1,353
5582	0.1		0.1	2,164,700	216,470	2,706
5583	0.28		0.28	2,164,700	606,116	7,576
5584	0.12		0.12	2,164,700	259,764	3,247
5585	0.1	Nal	0.1	2,164,700	216,470	2,706
5586	0.08		0.08	2,164,700	173,176	2,165
5587	0.11		0.11	2,164,700	238,117	2,976
5588	0.32		0.32	2,164,700	692,704	8,659
5589	0.38		0.38	2,164,700	822,586	10,282
5590	0.03		0.03	2,164,700	64,941	812
5591	0.07		0.07	2,164,700	151,529	1,894
5592	0.04		0.04	2,164,700	86,588	1,082
5593	0.07		0.07	2,164,700	151,529	1,894
5594	0.06		0.06	2,164,700	129,882	1,624
5595	0.31		0.31	2,164,700	671,057	8,388
5596	0.11		0.11	2,164,700	238,117	2,976
5597	0.01		0.01	2,164,700	21,647	271
5598	0.87		0.87	2,164,700	1,883,289	23,541
5599	0.24		0.24	2,164,700	519,528	6,494
5600	0.23		0.23	2,164,700	497,881	6,224
5601	0.15		0.15	2,164,700	324,705	4,059
5602	0.14		0.14	2,164,700	303,058	3,788
5603	0.27		0.27	2,164,700	584,469	7,306
5604	0.1		0.1	2,164,700	216,470	2,706
5605	0.05		0.05	2,164,700	108,235	1,353
5606	0.04		0.04	2,164,700	86,588	1,082
5607	0.06		0.06	2,164,700	129,882	1,624
5608	0.19		0.19	2,164,700	411,293	5,141
5609	0.26		0.26	2,164,700	562,822	7,035
5610	0.02		0.02	2,164,700	43,294	541
5611	0.04		0.04	2,164,700	86,588	1,082
5612	0.04		0.04	2,164,700	86,588	1,082
5613	0.02		0.02	2,164,700	43,294	541
5614	0.15		0.15	2,164,700	324,705	4,059
5615	0.18		0.18	2,164,700	389,646	4,871
5616	0.13		0.13	2,164,700	281,411	3,518
5617	0.15		0.15	2,164,700	324,705	4,059
5618	0.11		0.11	2,164,700	238,117	2,976
5619	0.27		0.27	2,164,700	584,469	7,306
5620	0.2		0.2	2,164,700	432,940	5,412
5621	0.04		0.04	2,164,700	86,588	1,082

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5622	0.26		0.26	2,164,700	562,822	7,035
5623	0.06		0.06	2,164,700	129,882	1,624
5624	0.05		0.05	2,164,700	108,235	1,353
5625	0.06		0.06	2,164,700	129,882	1,624
5626	0.16		0.16	2,164,700	346,352	4,329
5627	0.23		0.23	2,164,700	497,881	6,224
5628	0.08		0.08	2,164,700	173,176	2,165
5629	0.02		0.02	2,164,700	43,294	541
5630	0.12		0.12	2,164,700	259,764	3,247
5631	0.11		0.11	2,164,700	238,117	2,976
5632	0.11		0.11	2,164,700	238,117	2,976
5633	0.05		0.05	2,164,700	108,235	1,353
5634	0.11		0.11	2,164,700	238,117	2,976
5635	0.09		0.09	2,164,700	194,823	2,435
5636	0.04		0.04	2,164,700	86,588	1,082
5637	0.09		0.09	2,164,700	194,823	2,435
5638	0.09		0.09	2,164,700	194,823	2,435
5639	0.04		0.04	2,164,700	86,588	1,082
5640	0.24		0.24	2,164,700	519,528	6,494
5641	0.04		0.04	2,164,700	86,588	1,082
5642	0.09		0.09	2,164,700	194,823	2,435
5643	0.24		0.24	2,164,700	519,528	6,494
5644	0.09		0.09	2,164,700	194,823	2,435
5645	0.06		0.06	2,164,700	129,882	1,624
5646	0.05		0.05	2,164,700	108,235	1,353
5647	0.09		0.09	2,164,700	194,823	2,435
5648	0.03		0.03	2,164,700	64,941	812
5649	0.04		0.04	2,164,700	86,588	1,082
5650	0.05		0.05	2,164,700	108,235	1,353
5651	0.06		0.06	2,164,700	129,882	1,624
5652	0.11		0.11	2,164,700	238,117	2,976
5653	0.06		0.06	2,164,700	129,882	1,624
5654	0.05		0.05	2,164,700	108,235	1,353
5655	0.06		0.06	2,164,700	129,882	1,624
5656	0.1		0.1	2,164,700	216,470	2,706
5657	0.38		0.38	2,164,700	822,586	10,282
5658	0.09		0.09	2,164,700	194,823	2,435
5659	0.1		0.1	2,164,700	216,470	2,706
5660	0.1		0.1	2,164,700	216,470	2,706
5661	0.09		0.09	2,164,700	194,823	2,435
5662	0.3		0.3	2,164,700	649,410	8,118
5663	0.08		0.08	2,164,700	173,176	2,165
5664	0.02		0.02	2,164,700	43,294	541
5665	0.07		0.07	2,164,700	151,529	1,894
5666	0.1		0.1	2,164,700	216,470	2,706
5667	0.13		0.13	2,164,700	281,411	3,518
5668	0.1		0.1	2,164,700	216,470	2,706
5669	0.08		0.08	2,164,700	173,176	2,165
5670	0.13		0.13	2,164,700	281,411	3,518
5671	0.07		0.07	2,164,700	151,529	1,894
5672	0.05		0.05	2,164,700	108,235	1,353
5673	0.04		0.04	2,164,700	86,588	1,082
5674	0.21		0.21	2,164,700	454,587	5,682
5675	0.07		0.07	2,164,700	151,529	1,894
5676	0.11		0.11	2,164,700	238,117	2,976
5677	0.49		0.49	2,164,700	1,060,703	13,259
5678	0.07		0.07	2,164,700	151,529	1,894
5679	0.13		0.13	2,164,700	281,411	3,518
5680	0.22		0.22	2,164,700	476,234	5,953
5681	0.06		0.06	2,164,700	129,882	1,624

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5682	0.15		0.15	2,164,700	324,705	4,059
5683	0.14		0.14	2,164,700	303,058	3,788
5684	0.04		0.04	2,164,700	86,588	1,082
5685	0.19	Path	0.19		-	-
5686	0.63		0.63	2,164,700	1,363,761	17,047
5687	0.08		0.08	2,164,700	173,176	2,165
5688	0.02		0.02	2,164,700	43,294	541
5689	0.02		0.02	2,164,700	43,294	541
5690	0.02		0.02	2,164,700	43,294	541
5691	0.03		0.03	2,164,700	64,941	812
5692	0.03		0.03	2,164,700	64,941	812
5693	0.03		0.03	2,164,700	64,941	812
5694	0.02		0.02	2,164,700	43,294	541
5695	0.09		0.09	2,164,700	194,823	2,435
5696	0.14		0.14	2,164,700	303,058	3,788
5697	0.1		0.1	2,164,700	216,470	2,706
5698	0.06		0.06	2,164,700	129,882	1,624
5699	0.08		0.08	2,164,700	173,176	2,165
5700	0.07		0.07	2,164,700	151,529	1,894
5701	0.05		0.05	2,164,700	108,235	1,353
5702	0.04		0.04	2,164,700	86,588	1,082
5703	0.04		0.04	2,164,700	86,588	1,082
5704	0.07		0.07	2,164,700	151,529	1,894
5705	0.15		0.15	2,164,700	324,705	4,059
5706	0.17	Path	0.17		-	-
5707	0.38		0.38	2,164,700	822,586	10,282
5708	0.06		0.06	2,164,700	129,882	1,624
5709	0.06		0.06	2,164,700	129,882	1,624
5710	0.09		0.09	2,164,700	194,823	2,435
5711	0.07		0.07	2,164,700	151,529	1,894
5712	0.03		0.03	2,164,700	64,941	812
5713	0.03		0.03	2,164,700	64,941	812
5714	0.08	Household	0.08	3,250,000	260,000	3,250
5715	0.1		0.1	2,164,700	216,470	2,706
5716	0.18		0.18	2,164,700	389,646	4,871
5717	0.08	Path	0.08		-	-
5718	0.11		0.11	2,164,700	238,117	2,976
5719	0.19		0.19	2,164,700	411,293	5,141
5720	0.17		0.17	2,164,700	367,999	4,600
5721	0.22		0.22	2,164,700	476,234	5,953
5722	0.02	Path	0.02		-	-
5723	0.07		0.07	2,164,700	151,529	1,894
5724	0.54		0.54	2,164,700	1,168,938	14,612
5725	0.19		0.19	2,164,700	411,293	5,141
5726	0.05		0.05	2,164,700	108,235	1,353
5727	0.04		0.04	2,164,700	86,588	1,082
5728	0.09		0.09	2,164,700	194,823	2,435
5729	0.07		0.07	2,164,700	151,529	1,894
5730	0.13		0.13	2,164,700	281,411	3,518
5731	0.02		0.02	2,164,700	43,294	541
5732	0.13		0.13	2,164,700	281,411	3,518
5733	0.11		0.11	2,164,700	238,117	2,976
5734	0.06		0.06	2,164,700	129,882	1,624
5735	0.13		0.13	2,164,700	281,411	3,518
5736	0.13		0.13	2,164,700	281,411	3,518
5737	0.96		0.96	2,164,700	2,078,112	25,976
5738	0.13		0.13	2,164,700	281,411	3,518
5739	0.09		0.09	2,164,700	194,823	2,435
5740	0.06		0.06	2,164,700	129,882	1,624
5741	0.25		0.25	2,164,700	541,175	6,765

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5742	0.07		0.07	2,164,700	151,529	1,894
5743	0.03		0.03	2,164,700	64,941	812
5744	0.06		0.06	2,164,700	129,882	1,624
5745	0.07		0.07	2,164,700	151,529	1,894
5746	0.09		0.09	2,164,700	194,823	2,435
5747	0.05		0.05	2,164,700	108,235	1,353
5748	0.04		0.04	2,164,700	86,588	1,082
5749	0.09		0.09	2,164,700	194,823	2,435
5750	0.21		0.21	2,164,700	454,587	5,682
5751	0.04		0.04	2,164,700	86,588	1,082
5752	0.07		0.07	2,164,700	151,529	1,894
5753	0.09		0.09	2,164,700	194,823	2,435
5754	0.11		0.11	2,164,700	238,117	2,976
5755	0.07		0.07	2,164,700	151,529	1,894
5756	0.06		0.06	2,164,700	129,882	1,624
5757	0.07		0.07	2,164,700	151,529	1,894
5758	0.2		0.2	2,164,700	432,940	5,412
5759	0.05		0.05	2,164,700	108,235	1,353
5760	0.05		0.05	2,164,700	108,235	1,353
5761	0.03		0.03	2,164,700	64,941	812
5762	0.12		0.12	2,164,700	259,764	3,247
5763	0.08		0.08	2,164,700	173,176	2,165
5764	0.02		0.02	2,164,700	43,294	541
5765	0.04		0.04	2,164,700	86,588	1,082
5766	0.03		0.03	2,164,700	64,941	812
5767	0.01		0.01	2,164,700	21,647	271
5768	0.09		0.09	2,164,700	194,823	2,435
5769	0.13		0.13	2,164,700	281,411	3,518
5770	0.13		0.13	2,164,700	281,411	3,518
5771	0.07		0.07	2,164,700	151,529	1,894
5772	0.25		0.25	2,164,700	541,175	6,765
5773	0.02		0.02	2,164,700	43,294	541
5774	0.03		0.03	2,164,700	64,941	812
5775	0.11		0.11	2,164,700	238,117	2,976
5776	0.01		0.01	2,164,700	21,647	271
5777	0.09		0.09	2,164,700	194,823	2,435
5778	0.26		0.26	2,164,700	562,822	7,035
5779	0.1		0.1	2,164,700	216,470	2,706
5780	0.02		0.02	2,164,700	43,294	541
5781	0.13		0.13	2,164,700	281,411	3,518
5782	0.08		0.08	2,164,700	173,176	2,165
5783	0.14		0.14	2,164,700	303,058	3,788
5784	0.02		0.02	2,164,700	43,294	541
5785	0.02		0.02	2,164,700	43,294	541
5786	0.06		0.06	2,164,700	129,882	1,624
5787	0.08		0.08	2,164,700	173,176	2,165
5788	0.02		0.02	2,164,700	43,294	541
5789	0.11		0.11	2,164,700	238,117	2,976
5790	0.03		0.03	2,164,700	64,941	812
5791	0.03		0.03	2,164,700	64,941	812
5792	0.26		0.26	2,164,700	562,822	7,035
5793	0.12		0.12	2,164,700	259,764	3,247
5794	0.08		0.08	2,164,700	173,176	2,165
5795	0.12		0.12	2,164,700	259,764	3,247
5796	0.11		0.11	2,164,700	238,117	2,976
5797	0.06		0.06	2,164,700	129,882	1,624
5799	0.19	Khal	0.19	2,164,700	411,293	5,141
5800	0.19	Path	0.19		-	-
5801	0.3	Path	0.3		-	-
5802	0.05	Math	0.05		-	-

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5805	0.06	Nal	0.06	2,164,700	129,882	1,624
5806	0.28	Nal	0.28	2,164,700	606,116	7,576
5807	0.82	Pond	0.82	2,680,000	2,197,600	27,470
5808	0.12	Nal	0.12	2,164,700	259,764	3,247
5809	0.17	Nal	0.17	2,164,700	367,999	4,600
5810	0.26	Nal	0.26	2,164,700	562,822	7,035
5811	0.18	Nal	0.18	2,164,700	389,646	4,871
5812	0.02	Nal	0.02	2,164,700	43,294	541
5813	0.12	Nal	0.12	2,164,700	259,764	3,247
5814	0.22	Nal	0.22	2,164,700	476,234	5,953
5815	0.14	Nal	0.14	2,164,700	303,058	3,788
5816	0.14	Household	0.14	3,250,000	455,000	5,688
5817	0.18	Nal	0.18	2,164,700	389,646	4,871
5818	0.04	Khai	0.04		-	-
5819	0.02	Khai	0.02		-	-
5820	0.12	Nal	0.12	2,164,700	259,764	3,247
5821	0.03	Khai	0.03		-	-
5822	0.02	Pond	0.02	2,680,000	53,600	670
5823	0.04	Pond	0.04	2,680,000	107,200	1,340
5824	0.05	Household	0.05	3,250,000	162,500	2,031
5825	0.07	Household	0.07	3,250,000	227,500	2,844
5826	0.11	Household	0.11	3,250,000	357,500	4,469
5827	0.03	Household	0.03	3,250,000	97,500	1,219
5828	0.24	Nal	0.24	2,164,700	519,528	6,494
5829	0.03	Khai	0.03		-	-
5830	0.03	Household	0.03	3,250,000	97,500	1,219
5831	0.03	Nal	0.03	2,164,700	64,941	812
5832	0.11	Nal	0.11	2,164,700	238,117	2,976
5833	0.06	Path	0.06		-	-
5834	0.04	Household	0.04	3,250,000	130,000	1,625
5835	0.04	Khai	0.04		-	-
5836	0.06	Household	0.06	3,250,000	195,000	2,438
5837	0.09	Khai	0.09		-	-
5838	0.1	Path	0.1		-	-
5839	0.07	Nal	0.07	2,164,700	151,529	1,894
5840	0.03	Garden	0.03		-	-
5841	0.09	Nal	0.09	2,164,700	194,823	2,435
5842	0.12	Household	0.12	3,250,000	390,000	4,875
5843	0.07	Household	0.07	3,250,000	227,500	2,844
5844	0.04	Khila	0.04	3,087,063	123,483	1,544
5845	0.09	Household	0.09	3,250,000	292,500	3,656
5846	0.03	Household	0.03	3,250,000	97,500	1,219
5847	0.02	Nal	0.02	2,164,700	43,294	541
5848	0.04	Garden	0.04		-	-
5849	0.05	Nal	0.05	2,164,700	108,235	1,353
5850	0.07	Household	0.07	3,250,000	227,500	2,844
5851	0.05	Nal	0.05	2,164,700	108,235	1,353
5852	0.05	Khai	0.05		-	-
5853	0.08	Nal	0.08	2,164,700	173,176	2,165
5854	0.04	Nal	0.04	2,164,700	86,588	1,082
5855	0.17	Household	0.17	3,250,000	552,500	6,906
5856	0.02	Khai	0.02		-	-
5857	0.41	Nal	0.41	2,164,700	887,527	11,094
5858	2.32	Nal	2.8	2,164,700	6,061,160	75,765
5859	0.29	Nal	0.29	2,164,700	627,763	7,847
5860	0.58	Nal	0.58	2,164,700	1,255,526	15,694
5861	0.45	Nal	0.45	2,164,700	974,115	12,176
5862	0.25	Nal	0.25	2,164,700	541,175	6,765
5863	0.14	Nal	0.14	2,164,700	303,058	3,788
5864	0.11	Nal	0.11	2,164,700	238,117	2,976

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5865	0.12	Nal	0.12	2,164,700	259,764	3,247
5866	0.12	Nal	0.12	2,164,700	259,764	3,247
5867	0.23	Nal	0.23	2,164,700	497,881	6,224
5868	0.07	Nal	0.07	2,164,700	151,529	1,894
5869	0.05	Nal	0.05	2,164,700	108,235	1,353
5870	0.08	Nal	0.08	2,164,700	173,176	2,165
5871	0.09	Nal	0.09	2,164,700	194,823	2,435
5872	0.1	Nal	0.1	2,164,700	216,470	2,706
5873	0.09	Nal	0.09	2,164,700	194,823	2,435
5874	0.1	Nal	0.1	2,164,700	216,470	2,706
5875	0.1	Nal	0.1	2,164,700	216,470	2,706
5876	0.1	Nal	0.1	2,164,700	216,470	2,706
5877	0.5	Nal	0.5	2,164,700	1,082,350	13,529
5878	0.21	Nal	0.21	2,164,700	454,587	5,682
5879	0.19	Nal	0.19	2,164,700	411,293	5,141
5880	0.18	Nal	0.18	2,164,700	389,646	4,871
5881	0.07	Nal	0.07	2,164,700	151,529	1,894
5882	0.26	Nal	0.26	2,164,700	562,822	7,035
5883	0.11	Nal	0.11	2,164,700	238,117	2,976
5884	0.09	Nal	0.09	2,164,700	194,823	2,435
5885	0.07	Nal	0.07	2,164,700	151,529	1,894
5886	0.06	Nal	0.06	2,164,700	129,882	1,624
5887	0.12	Nal	0.12	2,164,700	259,764	3,247
5888	0.1	Nal	0.1	2,164,700	216,470	2,706
5889	0.1	Nal	0.1	2,164,700	216,470	2,706
5890	0.16	Nal	0.16	2,164,700	346,352	4,329
5891	1.34	Nal	1.34	2,164,700	2,900,698	36,259
5892	0.17	Nal	0.17	2,164,700	367,999	4,600
5893	0.14	Nal	0.14	2,164,700	303,058	3,788
5894	0.74	Nal	0.74	2,164,700	1,601,878	20,023
5895	0.09	Nal	0.09	2,164,700	194,823	2,435
5896	0.34	Nal	0.34	2,164,700	735,998	9,200
5897	0.31	Nal	0.31	2,164,700	671,057	8,388
5898	0.38	Nal	0.38	2,164,700	822,586	10,282
5899	0.06	Nal	0.06	2,164,700	129,882	1,624
5900	0.04	Nal	0.04	2,164,700	86,588	1,082
5901	0.12	Nal	0.12	2,164,700	259,764	3,247
5902	0.09	Nal	0.09	2,164,700	194,823	2,435
5903	0.09	Nal	0.09	2,164,700	194,823	2,435
5904	0.03	Nal	0.03	2,164,700	64,941	812
5905	0.03	Nal	0.03	2,164,700	64,941	812
5906	0.05	Nal	0.05	2,164,700	108,235	1,353
5907	0.09	Nal	0.09	2,164,700	194,823	2,435
5908	0.07	Nal	0.07	2,164,700	151,529	1,894
5909	0.11	Nal	0.11	2,164,700	238,117	2,976
5910	0.02	Nal	0.02	2,164,700	43,294	541
5911	0.03	Nal	0.03	2,164,700	64,941	812
5912	0.11	Nal	0.11	2,164,700	238,117	2,976
5913	0.08	Nal	0.08	2,164,700	173,176	2,165
5914	0.04	Nal	0.04	2,164,700	86,588	1,082
5915	0.15	Nal	0.15	2,164,700	324,705	4,059
5916	0.36	Nal	0.36	2,164,700	779,292	9,741
5917	0.03	Nal	0.03	2,164,700	64,941	812
5918	0.15	Nal	0.15	2,164,700	324,705	4,059
5919	0.03	Nal	0.03	2,164,700	64,941	812
5920	0.26	Nal	0.26	2,164,700	562,822	7,035
5921	0.14	Nal	0.14	2,164,700	303,058	3,788
5922	0.35	Nal	0.35	2,164,700	757,645	9,471
5923	0.04	Nal	0.04	2,164,700	86,588	1,082
5924	0.16	Nal	0.16	2,164,700	346,352	4,329

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5925	0.1	Nal	0.1	2,164,700	216,470	2,706
5926	0.1	Nal	0.1	2,164,700	216,470	2,706
5927	0.2	Nal	0.2	2,164,700	432,940	5,412
5928	0.1	Nal	0.1	2,164,700	216,470	2,706
5929	0.46	Nal	0.46	2,164,700	995,762	12,447
5930	0.07	Nal	0.07	2,164,700	151,529	1,894
5931	0.13	Pond	0.13	2,680,000	348,400	4,355
5932	0.19	Nal	0.19	2,164,700	411,293	5,141
5933	0.1	Nal	0.1	2,164,700	216,470	2,706
5934	0.07	Nal	0.07	2,164,700	151,529	1,894
5935	0.68	Nal	0.68	2,164,700	1,471,996	18,400
5936	0.17	Nal	0.17	2,164,700	367,999	4,600
5937	0.25	Nal	0.25	2,164,700	541,175	6,765
5938	0.09	Nal	0.09	2,164,700	194,823	2,435
5939	0.05	Nal	0.05	2,164,700	108,235	1,353
5940	0.48	Nal	0.48	2,164,700	1,039,056	12,988
5941	0.54	Nal	0.54	2,164,700	1,168,938	14,612
5942	0.62	Nal	0.62	2,164,700	1,342,114	16,776
5943	0.06	Nal	0.06	2,164,700	129,882	1,624
5944	0.03	Nal	0.03	2,164,700	64,941	812
5945	0.04	Nal	0.04	2,164,700	86,588	1,082
5946	0.06	Nal	0.06	2,164,700	129,882	1,624
5947	0.06	Nal	0.06	2,164,700	129,882	1,624
5948	0.28	Nal	0.28	2,164,700	606,116	7,576
5949	0.22	Nal	0.22	2,164,700	476,234	5,953
5950	0.21	Nal	0.21	2,164,700	454,587	5,682
5951	0.21	Nal	0.21	2,164,700	454,587	5,682
5952	0.11	Nal	0.11	2,164,700	238,117	2,976
5953	0.52	Nal	0.52	2,164,700	1,125,644	14,071
5954	0.014	Nal	0.014	2,164,700	30,306	379
5955	0.04	Nal	0.04	2,164,700	86,588	1,082
5956	0.08	Nal	0.08	2,164,700	173,176	2,165
5957	1.2	Nal	1.2	2,164,700	2,597,640	32,471
5958	0.21	Nal	0.21	2,164,700	454,587	5,682
5959	0.2	Nal	0.2	2,164,700	432,940	5,412
5960	0.27	Nal	0.27	2,164,700	584,469	7,306
5961	0.11	Nal	0.11	2,164,700	238,117	2,976
5962	0.15	Nal	0.15	2,164,700	324,705	4,059
5963	0.13	Nal	0.13	2,164,700	281,411	3,518
5964	0.42	Nal	0.42	2,164,700	909,174	11,365
5965	0.17	Nal	0.17	2,164,700	367,999	4,600
5966	0.12	Nal	0.12	2,164,700	259,764	3,247
5967	0.08	Nal	0.08	2,164,700	173,176	2,165
5968	0.03	Nal	0.03	2,164,700	64,941	812
5969	0.13	Nal	0.13	2,164,700	281,411	3,518
5970	0.27	Nal	0.27	2,164,700	584,469	7,306
5971	0.14	Nal	0.14	2,164,700	303,058	3,788
5972	0.2	Nal	0.2	2,164,700	432,940	5,412
5973	0.28	Nal	0.28	2,164,700	606,116	7,576
5974	0.16	Nal	0.16	2,164,700	346,352	4,329
5975	0.25	Nal	0.25	2,164,700	541,175	6,765
5976	0.23	Nal	0.23	2,164,700	497,881	6,224
5977	0.07	Nal	0.07	2,164,700	151,529	1,894
5978	0.08	Nal	0.08	2,164,700	173,176	2,165
5979	0.34	Nal	0.34	2,164,700	735,998	9,200
5980	0.1	Nal	0.1	2,164,700	216,470	2,706
5981	0.04	Nal	0.04	2,164,700	86,588	1,082
5982	0.04	Nal	0.04	2,164,700	86,588	1,082
5893	0.01	Nal	0.01	2,164,700	21,647	271
5984	0.15	Nal	0.15	2,164,700	324,705	4,059

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
5985	0.1	Nal	0.1	2,164,700	216,470	2,706
5986	0.12	Nal	0.12	2,164,700	259,764	3,247
5987	0.14	Nal	0.14	2,164,700	303,058	3,788
5988	0.36	Nal	0.36	2,164,700	779,292	9,741
5989	0.01	Nal	0.01	2,164,700	21,647	271
5990	0.06	Nal	0.06	2,164,700	129,882	1,624
5991	0.07	Nal	0.07	2,164,700	151,529	1,894
5992	0.43	Nal	0.43	2,164,700	930,821	11,635
5993	0.13	Nal	0.13	2,164,700	281,411	3,518
5994	0.33	Nal	0.33	2,164,700	714,351	8,929
5995	0.18	Nal	0.18	2,164,700	389,646	4,871
5996	0.2	Nal	0.2	2,164,700	432,940	5,412
5997	0.05	Nal	0.05	2,164,700	108,235	1,353
5998	0.15	Nal	0.15	2,164,700	324,705	4,059
5999	0.24	Nal	0.24	2,164,700	519,528	6,494
6000	0.11	Nal	0.11	2,164,700	238,117	2,976
6001	0.12	Nal	0.12	2,164,700	259,764	3,247
6002	0.09	Nal	0.09	2,164,700	194,823	2,435
6003	0.06	Nal	0.06	2,164,700	129,882	1,624
6004	0.06	Nal	0.06	2,164,700	129,882	1,624
6005	0.16	Nal	0.16	2,164,700	346,352	4,329
6006	0.16	Nal	0.16	2,164,700	346,352	4,329
6007	0.07	Nal	0.07	2,164,700	151,529	1,894
6008	0.07	Nal	0.07	2,164,700	151,529	1,894
6009	0.86	Nal	0.86	2,164,700	1,861,642	23,271
6010	0.06	Nal	0.06	2,164,700	129,882	1,624
6011	0.06	Nal	0.06	2,164,700	129,882	1,624
6012	0.06	Nal	0.06	2,164,700	129,882	1,624
6013	0.14	Nal	0.14	2,164,700	303,058	3,788
6014	0.03	Nal	0.03	2,164,700	64,941	812
6015	0.05	Nal	0.05	2,164,700	108,235	1,353
6016	0.18	Nal	0.18	2,164,700	389,646	4,871
6018	0.08	Nal	0.08	2,164,700	173,176	2,165
6019	0.22	Nal	0.22	2,164,700	476,234	5,953
6020	0.42	Nal	0.42	2,164,700	909,174	11,365
1621	1.54	Nal	1.54	2,164,700	3,333,638	41,670
6022	0.16	Nal	0.16	2,164,700	346,352	4,329
6023	0.9	Nal	0.9	2,164,700	1,948,230	24,353
6024	0.12	Nal	0.12	2,164,700	259,764	3,247
6025	0.11	Nal	0.11	2,164,700	238,117	2,976
6026	0.14	Nal	0.14	2,164,700	303,058	3,788
6027	0.04	Nal	0.04	2,164,700	86,588	1,082
6028	0.1	Nal	0.1	2,164,700	216,470	2,706
6029	0.11	Nal	0.11	2,164,700	238,117	2,976
6030	0.16	Nal	0.16	2,164,700	346,352	4,329
6031	0.42	Nal	0.42	2,164,700	909,174	11,365
6032	0.26	Nal	0.26	2,164,700	562,822	7,035
6033	0.42	Nal	0.42	2,164,700	909,174	11,365
6034	0.38	Nal	0.38	2,164,700	822,586	10,282
6035	0.28	Nal	0.28	2,164,700	606,116	7,576
6039	0.27	Khila	0.27	3,087,063	833,507	10,419
6040	0.68	Khila	0.68	3,087,063	2,099,203	26,240
6043	0.64	Nodi	0.64		-	-
6044	0.56	Nal	0.56	2,164,700	1,212,232	15,153
6045	0.23	Nal	0.23	2,164,700	497,881	6,224
6046	0.22	Nal	0.22	2,164,700	476,234	5,953
6047	0.09	Nal	0.09	2,164,700	194,823	2,435
6048	0.42	Nal	0.42	2,164,700	909,174	11,365
6049	0.31	Nal	0.31	2,164,700	671,057	8,388
6053	0.08	Nal	0.08	2,164,700	173,176	2,165

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
6054	0.06	Nal	0.06	2,164,700	129,882	1,624
6057	0.21	Nal	0.21	2,164,700	454,587	5,682
6058	0.5	Nal	0.5	2,164,700	1,082,350	13,529
6059	0.12	Nal	0.12	2,164,700	259,764	3,247
6060	0.16	Nal	0.16	2,164,700	346,352	4,329
6061	0.09	Nal	0.09	2,164,700	194,823	2,435
6062	0.08	Nal	0.08	2,164,700	173,176	2,165
6063	0.04	Nal	0.04	2,164,700	86,588	1,082
6064	0.15	Nal	0.15	2,164,700	324,705	4,059
6065	0.12	Nal	0.12	2,164,700	259,764	3,247
6066	0.2	Nal	0.2	2,164,700	432,940	5,412
6067	0.28	Nal	0.28	2,164,700	606,116	7,576
6068	0.17	Nal	0.17	2,164,700	367,999	4,600
6069	0.42	Nal	0.42	2,164,700	909,174	11,365
6070	0.56	Nal	0.56	2,164,700	1,212,232	15,153
6071	0.04	Nal	0.04	2,164,700	86,588	1,082
6072	0.24	Nal	0.24	2,164,700	519,528	6,494
6073	0.02	Nal	0.02	2,164,700	43,294	541
6074	0.06	Nal	0.06	2,164,700	129,882	1,624
6075	0.06	Nal	0.06	2,164,700	129,882	1,624
6076	0.12	Nal	0.12	2,164,700	259,764	3,247
6077	0.97	Khila	0.97	3,087,063	2,994,451	37,431
6078	0.58	Nal	0.58		-	-
6079	0.69	Baluchor	0.69	2,699,200	1,862,448	23,281
6080	0.74	Baluchor	0.74	2,699,200	1,997,408	24,968
6081	0.39	Nal	0.39	2,164,700	844,233	10,553
6082	0.05	Nal	0.05	2,164,700	108,235	1,353
6083	0.04	Nal	0.04	2,164,700	86,588	1,082
6084	0.05	Nal	0.05	2,164,700	108,235	1,353
6085	0.39	Nal	0.39	2,164,700	844,233	10,553
6086	0.06	Nal	0.06	2,164,700	129,882	1,624
6087	0.58	Nal	0.58	2,164,700	1,255,526	15,694
6088	0.14	Nal	0.14	2,164,700	303,058	3,788
6089	0.11	Nal	0.11	2,164,700	238,117	2,976
6090	0.18	Nal	0.18	2,164,700	389,646	4,871
6091	0.45	Nal	0.45	2,164,700	974,115	12,176
6092	0.08	Nal	0.08	2,164,700	173,176	2,165
6093	0.22	Nal	0.22	2,164,700	476,234	5,953
6094	0.11	Nal	0.11	2,164,700	238,117	2,976
6095	0.12	Nal	0.12	2,164,700	259,764	3,247
6096	0.13	Nal	0.13	2,164,700	281,411	3,518
6097	0.1	Nal	0.1	2,164,700	216,470	2,706
6098	0.1	Nal	0.1	2,164,700	216,470	2,706
6099	0.25	Nal	0.25	2,164,700	541,175	6,765
6100	0.45	Nal	0.45	2,164,700	974,115	12,176
6101	0.11	Nal	0.11	2,164,700	238,117	2,976
6102	0.06	Nal	0.06	2,164,700	129,882	1,624
6103	0.03	Nal	0.03	2,164,700	64,941	812
6104	0.05	Nal	0.05	2,164,700	108,235	1,353
6105	0.09	Nal	0.09	2,164,700	194,823	2,435
6106	0.08	Nal	0.08	2,164,700	173,176	2,165
6107	0.04	Nal	0.04	2,164,700	86,588	1,082
6108	0.6	Nal	0.6	2,164,700	1,298,820	16,235
6109	0.1	Nal	0.1	2,164,700	216,470	2,706
6110	0.05	Nal	0.05	2,164,700	108,235	1,353
6111	0.03	Nal	0.03	2,164,700	64,941	812
6112	0.03	Nal	0.03	2,164,700	64,941	812
6113	0.07	Nal	0.07	2,164,700	151,529	1,894
6114	0.1	Nal	0.1	2,164,700	216,470	2,706
6115	0.06	Nal	0.06	2,164,700	129,882	1,624

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
6116	0.06	Nal	0.06	2,164,700	129,882	1,624
6117	0.03	Nal	0.03	2,164,700	64,941	812
6118	0.03	Nal	0.03	2,164,700	64,941	812
6119	0.07	Nal	0.07	2,164,700	151,529	1,894
6120	0.13	Nal	0.13	2,164,700	281,411	3,518
6121	0.06	Nal	0.06	2,164,700	129,882	1,624
6122	0.07	Nal	0.07	2,164,700	151,529	1,894
6123	0.05	Nal	0.05	2,164,700	108,235	1,353
6124	0.01	Nal	0.01	2,164,700	21,647	271
6125	0.02	Nal	0.02	2,164,700	43,294	541
6126	0.07	Nal	0.07	2,164,700	151,529	1,894
6127	0.52	Nal	0.52	2,164,700	1,125,644	14,071
6128	0.04	Nal	0.04	2,164,700	86,588	1,082
6129	0.09	Nal	0.09	2,164,700	194,823	2,435
6130	0.16	Nal	0.16	2,164,700	346,352	4,329
6131	0.06	Nal	0.06	2,164,700	129,882	1,624
6132	0.32	Nal	0.32	2,164,700	692,704	8,659
6133	0.04	Nal	0.04	2,164,700	86,588	1,082
6134	0.34	Nal	0.34	2,164,700	735,998	9,200
6135	0.09	Nal	0.09	2,164,700	194,823	2,435
6136	0.03	Nal	0.03	2,164,700	64,941	812
6137	0.42	Nal	0.42	2,164,700	909,174	11,365
6138	1.05	Nal	1.05	2,164,700	2,272,935	28,412
6139	0.42	Nal	0.42	2,164,700	909,174	11,365
6140	0.13	Nal	0.13	2,164,700	281,411	3,518
6141	0.11	Nal	0.11	2,164,700	238,117	2,976
6142	0.05	Nal	0.05	2,164,700	108,235	1,353
6143	0.21	Nal	0.21	2,164,700	454,587	5,682
6144	0.25	Nal	0.25	2,164,700	541,175	6,765
6145	0.34	Nal	0.34	2,164,700	735,998	9,200
6146	0.14	Nal	0.14	2,164,700	303,058	3,788
6147	0.12	Nal	0.12	2,164,700	259,764	3,247
6148	0.23	Nal	0.23	2,164,700	497,881	6,224
6149	0.04	Nal	0.04	2,164,700	86,588	1,082
6150	0.04	Nal	0.04	2,164,700	86,588	1,082
6151	0.03	Nal	0.03	2,164,700	64,941	812
6152	0.02	Nal	0.02	2,164,700	43,294	541
6153	0.1	Nal	0.1	2,164,700	216,470	2,706
6154	0.02	Nal	0.02	2,164,700	43,294	541
6155	0.07	Nal	0.07	2,164,700	151,529	1,894
6156	0.02	Nal	0.02	2,164,700	43,294	541
6157	0.05	Nal	0.05	2,164,700	108,235	1,353
6158	0.16	Nal	0.16	2,164,700	346,352	4,329
6159	0.38	Nal	0.38	2,164,700	822,586	10,282
6160	0.43	Nal	0.43	2,164,700	930,821	11,635
6161	0.36	Household	0.36	3,250,000	1,170,000	14,625
6162	0.44	Nal	0.44	2,164,700	952,468	11,906
6163	0.2	Nal	0.2	2,164,700	432,940	5,412
6164	0.17	Nal	0.17	2,164,700	367,999	4,600
6165	0.49	Nal	0.49	2,164,700	1,060,703	13,259
6166	0.22	Nal	0.22	2,164,700	476,234	5,953
6205	0.02	Nal	0.02	2,164,700	43,294	541
6206	0.02	Nal	0.02	2,164,700	43,294	541
6207	0.02	Nal	0.02	2,164,700	43,294	541
6208	0.02	Nal	0.02	2,164,700	43,294	541
6209	0.03	Nal	0.03	2,164,700	64,941	812
6210	0.04	Nal	0.04	2,164,700	86,588	1,082
6211	0.08	Nal	0.08	2,164,700	173,176	2,165
6212	0.05	Nal	0.05	2,164,700	108,235	1,353
6213	0.14	Nal	0.14	2,164,700	303,058	3,788

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
6214	0.03	Nal	0.03	2,164,700	64,941	812
6215	0.03	Nal	0.03	2,164,700	64,941	812
6216	0.03	Nal	0.03	2,164,700	64,941	812
6217	0.04	Nal	0.04	2,164,700	86,588	1,082
6218	0.04	Nal	0.04	2,164,700	86,588	1,082
6219	0.04	Nal	0.04	2,164,700	86,588	1,082
6220	0.04	Nal	0.04	2,164,700	86,588	1,082
6221	0.61	Nal	0.61	2,164,700	1,320,467	16,506
6222	0.07	Nal	0.07	2,164,700	151,529	1,894
6223	0.09	Nal	0.09	2,164,700	194,823	2,435
6224	0.09	Household	0.09	2,164,700	194,823	2,435
6225	0.06	Nal	0.06	2,164,700	129,882	1,624
6226	0.07	Path	0.07		-	-
6227	0.08	Nal	0.08	2,164,700	173,176	2,165
6228	0.24	Nal	0.24	2,164,700	519,528	6,494
6229	0.2	Nal	0.2	2,164,700	432,940	5,412
6230	0.2	Nal	0.2	2,164,700	432,940	5,412
6231	0.2	Nal	0.2	2,164,700	432,940	5,412
6233	0.18	Nal	0.18	2,164,700	389,646	4,871
6234	0.05	Nal	0.05	2,164,700	108,235	1,353
6236	0.67	Nal	0.67	2,164,700	1,450,349	18,129
6237	0.1	Nal	0.1	2,164,700	216,470	2,706
6238	0.11	Nal	0.11	2,164,700	238,117	2,976
6239	0.12	Household	0.12	3,250,000	390,000	4,875
6240	0.36	Nal	0.36	2,164,700	779,292	9,741
6241	0.03	Nal	0.03	2,164,700	64,941	812
6242	0.06	Nal	0.06	2,164,700	129,882	1,624
6243	0.07	Nal	0.07	2,164,700	151,529	1,894
6244	0.19	Nal	0.19	2,164,700	411,293	5,141
6245	0.01	Nal	0.01	2,164,700	21,647	271
6246	0.01	Nal	0.01	2,164,700	21,647	271
6247	0.01	Nal	0.01	2,164,700	21,647	271
6248	0.42	Nal	0.42	2,164,700	909,174	11,365
6249	0.06	Nal	0.06	2,164,700	129,882	1,624
6250	0.08	Nal	0.08	2,164,700	173,176	2,165
6251	0.07	Nal	0.07	2,164,700	151,529	1,894
6252	0.08	Nal	0.08	2,164,700	173,176	2,165
6257	0.04		0.04	2,164,700	86,588	1,082
6261	0.06	Nal	0.06	2,164,700	129,882	1,624
6263	1.05	Khila	1.05	3,087,063	3,241,416	40,518
6264	0.74		0.74	3,087,063	2,284,427	28,555
6265	0.17		0.17	3,087,063	524,801	6,560
6266	5.35		5.35	3,087,063	16,515,787	206,447
6267	9.06		9.06	3,087,063	27,968,791	349,610
6269	0.54	Baluchor	0.54	2,699,200	1,457,568	18,220
6270	8.56		8.56	2,699,200	23,105,152	288,814
6271	3.38		3.38	2,699,200	9,123,296	114,041
6272	5		5	2,699,200	13,496,000	168,700
6273	8.3		8.3	2,699,200	22,403,360	280,042
6274	184.86	River	60		-	-
6276	0.16		0.16	2,699,200	431,872	5,398
6282	0.28		0.28	2,699,200	755,776	9,447
6283	0.09		0.09	2,699,200	242,928	3,037
6284	0.35		0.35	2,699,200	944,720	11,809
6285	0.2		0.2	2,699,200	539,840	6,748
6286	0.09		0.09	2,699,200	242,928	3,037
6287	0.05		0.05	2,699,200	134,960	1,687
6288	0.2		0.2	2,699,200	539,840	6,748
6297					-	-
8042	0.46	Nal	0.46	2,164,700	995,762	12,447

B.S. Plot Id.	Amount of land in plot (Acres)	Types of land as per B.S. record	Proposed amount of land acquisition	Rate per Acre	Value in Taka	Value in US$
8043	0.28	Nal	0.28	2,164,700	606,116	7,576
8046	0.34	Nal	0.04	2,164,700	86,588	1,082
8047	1.17	Nal	1.17	2,164,700	2,532,699	31,659
8048	1.18	Nal	1.18	2,164,700	2,554,346	31,929
8049	1.33	Nal	1.33	2,164,700	2,879,051	35,988
8050	2.12	Nal	2.12	2,164,700	4,589,164	57,365
8051	6.72	Nal	6.72	2,164,700	14,546,784	181,835
8052	0.62	Nal	0.62	2,164,700	1,342,114	16,776
8053	1.2	Nal	1.2	2,164,700	2,597,640	32,471
8054	0.37	Nal	0.37	2,164,700	800,939	10,012
8055	5.14	Nal	5.14	2,164,700	11,126,558	139,082
8056	17.78	Khila	17.78	3,087,063	54,887,980	686,100
8057	11.58	Nal	9.4	2,164,700	20,348,180	254,352
8058	1	Nal	0.17	2,164,700	367,999	4,600
8059	1.65	Nal	0.03	2,164,700	64,941	812
8060	0.97	Nal	0.53	2,164,700	1,147,291	14,341
8061	0.36	Nal	0.36	2,164,700	779,292	9,741
8062	2.5	Nal	2.5	2,164,700	5,411,750	67,647
8063	1.85	Nal	1.43	2,164,700	3,095,521	38,694
8064	0.2	Nal	0.2	2,164,700	432,940	5,412
8065	2.14	Nal	2.14	2,164,700	4,632,458	57,906
8066	0.32	Nal	0.32	2,164,700	692,704	8,659
8067	0.97	Nal	0.35	2,164,700	757,645	9,471
8083	81.28	Khila	27.28	3,087,063	84,215,079	1,052,688
8084	107.98	River	69.93		-	-
6277	0.22		0.22	2,680,000	589,600	7,370
6278	0.12		0.12	2,680,000	321,600	4,020
6279	0.12		0.12	2,680,000	321,600	4,020
6280	0.12		0.12	2,680,000	321,600	4,020
6281	0.53		0.53	2,680,000	1,420,400	17,755
6289	0.2		0.2	2,680,000	536,000	6,700
6290	0.09		0.09	2,680,000	241,200	3,015
6291	0.2		0.2	2,680,000	536,000	6,700
6292	0.26		0.26	2,680,000	696,800	8,710
Total	**612.224**		**378.864**		**609,749,810**	**7,621,873**

ANNEX 5

CHAPTER 6: FINANCIAL AND ECONOMIC MODELLING

(COMPONENT 4)

Annex 5 (b): Economic Modelling

Revenue Stream

Capital Cost

		4.498	4.498					
Cost of Public lands		4.498	4.498					$ in million
Year/Item	2014	2015	2016	2017	2018	2019	2020	2021
Land Acquisition Costs/Compensation costs		7.647	7.647					
Relocation Costs:			2.501					
On-Site Inf. Costs:								
Land Development - Preparation & Dredging				34.567	14.820			
Road (minor) Ind. Zone						11.600	2.503	
Road (main) Ind. Zone					1.431	0.075		
Sheet Piling (Ship Building Yard)				2.796				
Deck Wall and Stock Yard				2.011	0.056	15.610		
Dyke System				21.222	12.668			
Drainage System				1.352	1.109	0.650		
Plantation							0.091	
Water Supply System				3.865	8.222	0.135		
Waste Water System (Sanitary Sewer)				4.373	5.849	0.496		
Electrical System (On-Site)				2.883	2.492	0.382	0.083	
Communication System (On-Site)							0.411	
Buildings				3.474	2.038			
Fencing					0.489			
Access Road on the Dyke					0.780	0.885		
Power Plant (IPP)					48.06	121.53	80.41	
Offsite inf. Costs								
Dyke System (Super Dyke)								
Electrical Connection								
Water Connection								
Access Road on the Dyke								
Communication								
Total Capital Costs		**12.15**	**14.65**	**76.54**	**98.01**	**151.37**	**83.50**	-
				76.541	**98.012**	**29.833**	**3.088**	
				0.355	0.454	0.138	0.014	215.71
				16.050	15.928	13.792		
				1.875				
				16.066				
					1.180	1.790		
				0.461				

Financial IRR

	Year	Capital Costs	O&M Cost	Total Costs	Total Benefits	Net Benefits (Costs)	NPV @ 12%	NPV @ 15%	NPV @ 20%
0	2015	12.15		12.1450		-12.1450	($12.15)	($12.15)	($12.15)
1	2016	14.65	0.2035	14.8495		-14.8495	($13.26)	($12.91)	($12.37)
2	2017	76.54	1.4034	77.9446		-77.9446	($62.14)	($58.94)	($54.13)
3	2018	98.01	2.8211	100.8335	153.116	52.2828	$37.21	$34.38	$30.26
4	2019	151.37	10.8368	162.2042	86.747	-75.4574	($47.95)	($43.14)	($36.39)
5	2020	83.50	12.5351	96.0302	61.808	-34.2222	($19.42)	($17.01)	($13.75)
6	2021		12.5050	12.5050	66.584	54.0786	$27.40	$23.38	$18.11
7	2022		12.5050	12.5050	70.789	58.2844	$26.36	$21.91	$16.27
8	2023		12.5050	12.5050	71.495	58.9899	$23.83	$19.28	$13.72
9	2024		12.5050	12.5050	71.495	58.9899	$21.27	$16.77	$11.43
10	2025		12.5050	12.5050	71.495	58.9899	$18.99	$14.58	$9.53
11	2026		12.5050	12.5050	71.495	58.9899	$16.96	$12.68	$7.94
12	2027		12.5050	12.5050	71.495	58.9899	$15.14	$11.03	$6.62
13	2028		12.5050	12.5050	71.495	58.9899	$13.52	$9.59	$5.51
14	2029		12.5050	12.5050	71.495	58.9899	$12.07	$8.34	$4.59
15	2030		12.5050	12.5050	71.495	58.9899	$10.78	$7.25	$3.83
16	2031		12.5050	12.5050	71.495	58.9899	$9.62	$6.30	$3.19
17	2032		12.5050	12.5050	71.495	58.9899	$8.59	$5.48	$2.66
18	2033		12.5050	12.5050	71.495	58.9899	$7.67	$4.77	$2.22
19	2034		12.5050	12.5050	71.495	58.9899	$6.85	$4.14	$1.85
20	2035		12.5050	12.5050	71.495	58.9899	$6.12	$3.60	$1.54
							$107.47	**$59.33**	**$10.46**
						IRR =		**21.63%**	

Income Statement of SPV Co. ($ in million) (Base Case)

Income Statement of SPV Co. ($ in million) (Base Case)																					
	Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Total Revenue		0	0	0	153.116	86.747	61.808	66.584	70.789	71.495	71.495	71.495	71.495	71.495	71.495	71.495	71.495	71.495	71.495	71.495	71.495	71.495
Operating Costs/Expenses		0	0.204	1.403	2.821	10.837	12.535	12.505	12.505	12.505	12.505	12.505	12.505	12.505	12.505	12.505	12.505	12.505	12.505	12.505	12.505	12.505
Commercial LT Debt Expenses				6.85	9.48	15.89	18.01	14.55	10.39	6.38	3.12	0.82	0	0	0	0	0	0	0	0	0	0
Commercial ST Debt Expenses				0.026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Depreciation				-	2.47	7.23	13.35	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68
Total Expenses		0	0.204	8.282	14.775	33.955	43.887	43.736	39.581	35.568	32.306	30.004	29.186	29.186	29.186	29.186	29.186	29.186	29.186	29.186	29.186	29.186
Net Profit		0.00	-0.204	-8.282	138.341	52.792	17.921	22.847	31.209	35.927	39.189	41.490	42.309	42.309	42.309	42.309	42.309	42.309	42.309	42.309	42.309	42.309
Depreciation (From Above)			0	0	2.47	7.23	13.35	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68	16.68
EBDA		0.00	-0.20	-8.28	140.81	60.02	31.27	39.53	47.89	52.61	55.87	58.17	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99
Interest from Above)		0	0	6.88	9.48	15.89	18.01	14.55	10.39	6.38	3.12	0.82	0	0	0	0	0	0	0	0	0	0
EBITDA			-0.20	-1.40	150.30	75.91	49.27	54.08	58.28	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99

Cash Flow of SPV Co. ($ in million) Base Case (Scenario 1)

Cash Flow of SPV Co. ($ In million) Base Case (Scenario 1)																					
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Revenue	0	0	0	153.12	86.75	61.81	66.58	70.79	71.49	71.49	71.49	71.49	71.49	71.49	71.49	71.49	71.49	71.49	71.49	71.49	71.49
Operating Costs	0	-0.20	-1.40	-2.82	-10.84	-12.54	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51	-12.51
Capital Expenditures	(12.15)	(14.65)	(76.54)	(98.01)	(151.37)	(83.50)	0	0	0	0	0	0	0	0							
Net Project Cash Flow	***-12.15***	***-14.85***	***-77.94***	***52.28***	***-75.46***	***-34.22***	***54.08***	***58.28***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***
LT Loans	10.5	10.3	53.6	68.6	105.96	58.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LT Loan Arrangement Fee	-2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST Loans		0.204	0																		
LT Debt Service	0	0	(8.55)	(13.24)	(30.36)	(46.19)	(63.93)	(69.76)	(63.70)	(49.72)	(33.70)	(11.69)	0	0	0	0	0	0	0	0	0
ST Debt Service	0	0.0	-0.230	0	0	0	0														
Equity Drawn for Capex	3.64	4.39	22.96	29.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual cash Surplus/Shortage	***0.00***	***0.00***	***-10.19***	***137.06***	***0.14***	***-21.97***	***-9.85***	***-11.48***	***-4.71***	***9.27***	***25.29***	***47.30***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***	***58.99***
Retained Cash Used for Capex	0	0	0.0	0.0	45.41	25.05	0	0	0	0	0	0									
Equity Drawn to clear deficit	0	0	10.19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Retained Cash Used to Clear Deficits	0	0	0	0	0	0	9.85	11.48	4.71	-9.27											
Cumulative Cash Balance	***0***	***0.00***	***0.00***	***137.06***	***137.20***	***115.23***	***105.38***	***93.90***	***89.19***	***98.46***	***123.75***	***171.05***	***230.04***	***289.03***	***348.02***	***407.01***	***466.00***	***524.99***	***583.98***	***642.97***	***701.96***

Free Cash Flow to Equity holder of SPV Co. ($ in million)

Free Cash Flow to Equity Holders of SPV Co. ($ in million)																				
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Equity Drawn	-3.64	-4.39	-33.15	-29.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Change in Retained Cash	0.00	0.00	0.00	137.06	0.14	-21.97	-9.85	-11.48	-4.71	9.27	25.29	47.30	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99
Net Cash Flow to E.H.	-3.64	-4.39	-33.15	107.66	0.14	-21.97	-9.85	-11.48	-4.71	9.27	25.29	47.30	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99	58.99
PV of Net CF to E. H. @12%	-3.64	-3.92	-26.43	76.63	0.09	-12.47	-4.99	-5.19	-1.90	3.34	8.14	13.60	15.14	13.52	12.07	10.78	9.62	8.59	7.67	6.85	6.12
PV of Net CF to E. H. @15%	-3.64	-3.82	-25.06	70.79	0.08	-10.92	-4.26	-4.32	-1.54	2.63	6.25	10.17	11.03	9.59	8.34	7.25	6.30	5.48	4.77	4.14	3.60
PV of Net CF to E. H. @20%	-3.64	-3.66	-23.02	62.30	0.07	-8.83	-3.30	-3.20	-1.10	1.80	4.08	6.37	6.62	5.51	4.59	3.83	3.19	2.66	2.22	1.85	1.54
Equity IRR	85.68%		85.68%																		

Economic Modelling

Annex 5 (b) – 1

World Bank's Consultant's comments on the Economic modeling work	JDI/MSL/Sheltech's observation
1.1. Economic Model should be fully linked to Financial Model to integrate all financial model inputs that affect the economic model, and to allow user to compare EIRR and IRR for each scenario. This includes all capital, operating cost, and revenues.	It has been taken care of.
1.2. Several links in the Summary (HR) sheet in Economic Model should be either corrected if this sheet is needed for the analysis, or delete it if the sheet is not used in the analysis (as mentioned in the notes).	
1.3. Economic analysis assumed all capital and operating costs (Adjusted for Conversion factors) whether paid by GoB or by Investor as a cost to the GoB and all project revenues (Adjusted for Conversion factors) as revenues to GoB.	It has been taken account of.
The analysis should have dealt with the economic effect of project revenue and construction cost factors as follows: • Revenue indirect effect on the economy and taxes if any, • Cost paid by the government as direct cost (net of all taxes and duties), • Duties and taxes on cost paid by the developer on the construction of the zone as a benefit.	It has been taken account of. It has been taken account of. Account has been taken of fees charged to businesses, and of liable personal income taxes against staff in zones, with appropriate assumptions. Effects of a 10-year tax-holiday have been correctly accounted for, as has been lost government revenue from local businesses relocation to the zone.
1.4. Studies didn't account for any revenues from government fees charged to businesses and staff in zones. The type of fees and revenues should be added to the government revenues from the zone and would include things like company registration and renewal fees, developer fees (to government), work permits for zone workers, government inspection fees for buildings along with other possible fees.	Added value from new businesses open in the zone has been addressed.
1.5. Lost government revenue from local businesses relocation to the Zone should be addressed, such as the effect of tax holiday (if applicable).	
Added value from new businesses open in the zone should be addressed, such as using inputs from local market or taxes and duties on goods producing in the zone for local use.	

Annex 5 (b) – 2

- This annex leads on to the four spreadsheets, containing the detailed calculations of the Economic Internal Rates of Returns (EIRRs).
- The informational content of the various worksheets in these spreadsheets is now presented.
- The first worksheet presents the on-site capital outlays, following the methods described in the main text, including enforcing the scheme to apportion the capital outlays using, broadly, a five-part decomposition into labor, nontradables, tradables, rentals and other overheads. Rentals are further divided up into energy-sensitive outlays and others.
- The second worksheet presents the off-site capital outlays, all net of taxes, following the methods described in the main text, including enforcing the scheme to apportion the capital outlays using, broadly, a five-part decomposition, like for on-site costs.
- The third worksheet presents the capital costs. These values have been taken from the financial modeler's financial costs at market prices.
- The work-sheet titled 'economic conversion' are where we account for on-site and off-site differently. All off-site costs are net of appropriate taxes---tradable outlays being net of border taxes including 'para-tariffs'. Other outlays, being in the nature of expenditures on domestic, largely non-tradable, resources, are net of value-added taxes, of roughly 4% relative to the gross value of sales. All net-of-tax outlays thus obtained are again multiplied by 0.97, this being the standard conversion factor (SCF), in order to deal with the overvaluation of the currency. As pointed out already, rentals are divvied up into energy-sensitive outlays and other. The distinction is important: outlays on energy-sensitive items draw forth a small subsidy from the public exchequer, while other outlays need to be adjusted downwards relative to market-values. By assumption, one third of 'general overheads' are attributable to repair, maintenance, and other miscellaneous kinds of outlays. Two thirds of general overheads are assumed to be comprised of gross profits of business carrying out the implementation of the on-site and off-site outlays, the latter being on behalf of the government. (Some government revenue is assumed to occur on account of profit taxation from the second part of 'overheads'.
- The next worksheet is about revenues. Revenues include private developer's revenues from selling all manners of land, all other charges from the tenants in the zone. Revenues also include all direct and indirect revenues by the Government from a whole variety of fees, taxes, para-tariffs, trade licenses, signboard fees, work-permit fees, Board of Investment fees from investors who want to buy or lease land on the BEZA, taxes on profits, etc. However, subsidies and revenue losses from enterprises relocating from elsewhere into the zones and availing of the tax-holiday incentive are *deducted* from government revenue, as they ought to be.
- The next worksheet is about the O&M cost and the one thereafter presents the Economic Internal Rates of Return (EIRR).

Note: All the detailed worksheets have been included in the CD attached in this report. For present purposes, we include only the EIRR worksheet here.

Economic Internal Rates of Return (EIRR) – Baserun

	Year	Cost		Benefits	Total Economic Costs	Incremental Wage Benefits	Dynamic Efficiency	Second Order Econ benefit	Total Economic benefits	Net (E-4)	NPV @12%	NPV @15%	NPV @20%
		Capital Cost	O&M				$ 0.020						
0	2015	$ 11.781	$ -	$ -	$ 11.781	$ -	$ -	$ -	$ -	$ (11.781)	$ (11.781)	$ (11.781)	$ (11.781)
1	2016	$ 14.207	$ 0.19	$ -	$ 14.400	$ -	$ -	$ -	$ -	$ (14.400)	$ (12.857)	$ (12.522)	$ (12.000)
2	2017	$ 99.475	$ 1.37	$ 4.135	$ 100.841	$ -	$ 0.080	$ 0.080	$ 4.216	$ (96.625)	$ (77.029)	$ (73.063)	$ (67.101)
3	2018	$ 58.757	$ 1.80	$ 152.082	$ 60.555	$ -	$ 2.950	$ 2.950	$ 155.033	$ 94.478	$ 67.247	$ 62.121	$ 54.675
4	2019	$ 39.259	$ 7.21	$ 87.302	$ 46.469	$ -	$ 1.694	$ 1.694	$ 88.996	$ 42.527	$ 27.027	$ 24.315	$ 20.509
5	2020	$ 2.661	$ 7.30	$ 26.465	$ 9.957	$ 11.351	$ 0.513	$ 11.864	$ 38.329	$ 28.372	$ 16.099	$ 14.106	$ 11.402
6	2021		$ 7.27	$ 12.679	$ 7.265	$ 14.754	$ 0.246	$ 15.000	$ 27.679	$ 20.414	$ 10.342	$ 8.825	$ 6.837
7	2022		$ 7.27	$ 16.881	$ 7.265	$ 20.751	$ 0.327	$ 21.078	$ 37.959	$ 30.694	$ 13.884	$ 11.539	$ 8.566
8	2023		$ 7.27	$ 17.562	$ 7.265	$ 20.751	$ 0.341	$ 21.091	$ 38.653	$ 31.388	$ 12.677	$ 10.261	$ 7.300
9	2024		$ 7.27	$ 17.563	$ 7.265	$ 20.751	$ 0.341	$ 21.091	$ 38.654	$ 31.389	$ 11.319	$ 8.923	$ 6.083
10	2025		$ 7.27	$ 17.562	$ 7.265	$ 20.751	$ 0.341	$ 21.091	$ 38.653	$ 31.388	$ 10.106	$ 7.759	$ 5.069
11	2026		$ 7.27	$ 17.563	$ 7.265	$ 20.751	$ 0.341	$ 21.091	$ 38.654	$ 31.389	$ 9.024	$ 6.747	$ 4.225
12	2027		$ 7.27	$ 17.562	$ 7.265	$ 20.751	$ 0.341	$ 21.091	$ 38.653	$ 31.388	$ 8.057	$ 5.867	$ 3.520
13	2028		$ 7.27	$ 17.563	$ 7.265	$ 20.751	$ 0.341	$ 21.091	$ 38.654	$ 31.389	$ 7.194	$ 5.102	$ 2.934
14	2029		$ 7.27	$ 17.562	$ 7.265	$ 20.751	$ 0.341	$ 21.091	$ 38.653	$ 31.388	$ 6.423	$ 4.436	$ 2.445
15	2030		$ 7.27	$ 18.393	$ 7.265	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 32.235	$ 5.889	$ 3.962	$ 2.092
16	2031		$ 7.27	$ 18.392	$ 7.265	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 32.234	$ 5.258	$ 3.445	$ 1.743
17	2032		$ 7.27	$ 18.393	$ 7.265	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 32.235	$ 4.695	$ 2.995	$ 1.453
18	2033		$ 7.27	$ 18.392	$ 7.265	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 32.234	$ 4.192	$ 2.605	$ 1.211
19	2034		$ 7.27	$ 18.393	$ 7.265	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 32.235	$ 3.743	$ 2.265	$ 1.009
20	2035		$ 7.27	$ 18.392	$ 7.265	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 32.234	$ 3.342	$ 1.970	$ 0.841
											$ 124.850	**$ 89.875**	**$ 51.032**
		$ 226.140	$ 126.841	$ 532.836							**EIRR=**	**34.986%**	

Economic Internal Rates of Return (EIRR): All costs up by 10%

	Year	Cost		Benefits	Total Economic Costs	Incremental Wage Benefits	Dynamic Efficiency	Second Order Econ benefit	Total Economic benefits	Net (E-4)	NPV @12%	NPV @15%	NPV @20%
		Capital Cost	O&M				$ 0.020						
0	2015	$ 12.959	$ -	$ -	$ 12.959	$ -	$ -	$ -	$ -	$ (12.959)	$ (12.959)	$ (12.959)	$ (12.959)
1	2016	$ 15.627	$ 0.21	$ -	$ 15.840	$ -	$ -	$ -	$ -	$ (15.840)	$ (14.143)	$ (13.774)	$ (13.200)
2	2017	$ 109.422	$ 1.50	$ 4.135	$ 110.925	$ -	$ 0.080	$ 0.080	$ 4.216	$ (106.710)	$ (85.068)	$ (80.688)	$ (74.104)
3	2018	$ 64.633	$ 1.98	$ 152.082	$ 66.611	$ -	$ 2.950	$ 2.950	$ 155.033	$ 88.422	$ 62.937	$ 58.139	$ 51.170
4	2019	$ 43.185	$ 7.93	$ 87.302	$ 51.116	$ -	$ 1.694	$ 1.694	$ 88.996	$ 37.880	$ 24.074	$ 21.658	$ 18.268
5	2020	$ 2.927	$ 8.03	$ 26.465	$ 10.953	$ 11.351	$ 0.513	$ 11.864	$ 38.329	$ 27.376	$ 15.534	$ 13.611	$ 11.002
6	2021		$ 7.99	$ 12.679	$ 7.992	$ 14.754	$ 0.246	$ 15.000	$ 27.679	$ 19.687	$ 9.974	$ 8.511	$ 6.593
7	2022		$ 7.99	$ 16.881	$ 7.992	$ 20.751	$ 0.327	$ 21.078	$ 37.959	$ 29.967	$ 13.556	$ 11.266	$ 8.363
8	2023		$ 7.99	$ 17.562	$ 7.992	$ 20.751	$ 0.341	$ 21.091	$ 38.653	$ 30.662	$ 12.384	$ 10.023	$ 7.131
9	2024		$ 7.99	$ 17.563	$ 7.992	$ 20.751	$ 0.341	$ 21.091	$ 38.654	$ 30.663	$ 11.057	$ 8.716	$ 5.943
10	2025		$ 7.99	$ 17.562	$ 7.992	$ 20.751	$ 0.341	$ 21.091	$ 38.653	$ 30.662	$ 9.872	$ 7.579	$ 4.952
11	2026		$ 7.99	$ 17.563	$ 7.992	$ 20.751	$ 0.341	$ 21.091	$ 38.654	$ 30.663	$ 8.815	$ 6.591	$ 4.127
12	2027		$ 7.99	$ 17.562	$ 7.992	$ 20.751	$ 0.341	$ 21.091	$ 38.653	$ 30.662	$ 7.870	$ 5.731	$ 3.439
13	2028		$ 7.99	$ 17.563	$ 7.992	$ 20.751	$ 0.341	$ 21.091	$ 38.654	$ 30.663	$ 7.027	$ 4.984	$ 2.866
14	2029		$ 7.99	$ 17.562	$ 7.992	$ 20.751	$ 0.341	$ 21.091	$ 38.653	$ 30.662	$ 6.274	$ 4.333	$ 2.388
15	2030		$ 7.99	$ 18.393	$ 7.992	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 31.509	$ 5.757	$ 3.872	$ 2.045
16	2031		$ 7.99	$ 18.392	$ 7.992	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 31.508	$ 5.140	$ 3.367	$ 1.704
17	2032		$ 7.99	$ 18.393	$ 7.992	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 31.509	$ 4.589	$ 2.928	$ 1.420
18	2033		$ 7.99	$ 18.392	$ 7.992	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 31.508	$ 4.097	$ 2.546	$ 1.183
19	2034		$ 7.99	$ 18.393	$ 7.992	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 31.509	$ 3.658	$ 2.214	$ 0.986
20	2035		$ 7.99	$ 18.392	$ 7.992	$ 20.751	$ 0.357	$ 21.108	$ 39.500	$ 31.508	$ 3.266	$ 1.925	$ 0.822
											$ 103.711	$ 70.574	$ 34.140
		$ 248.754	$ 139.525	$ 532.836							EIRR=	28.876%	

Economic Internal Rates of Return (EIRR): All benefit down by 10%

	Year	Cost		Benefits	Total Economic Costs	Incremental Wage Benefits	Dynamic Efficiency	Second Order Econ benefit	Total Economic benefits	Net (E-4)	NPV @12%	NPV @15%	NPV @20%
		Capital Cost	O&M				$ 0.020						
0	2015	$ 11.781	$ -	$ -	$ 11.781	$ -	$ -	$ -	$ -	$ (11.781)	$ (11.781)	$ (11.781)	$ (11.781)
1	2016	$ 14.207	$ 0.19	$ -	$ 14.400	$ -	$ -	$ -	$ -	$ (14.400)	$ (12.857)	$ (12.522)	$ (12.000)
2	2017	$ 99.475	$ 1.37	$ 3.722	$ 100.841	$ -	$ 0.072	$ 0.072	$ 3.794	$ (97.047)	$ (77.365)	$ (73.381)	$ (67.394)
3	2018	$ 58.757	$ 1.80	$ 136.874	$ 60.555	$ -	$ 2.655	$ 2.655	$ 139.529	$ 78.974	$ 56.212	$ 51.927	$ 45.703
4	2019	$ 39.259	$ 7.21	$ 78.572	$ 46.469	$ -	$ 1.524	$ 1.524	$ 80.096	$ 33.627	$ 21.371	$ 19.227	$ 16.217
5	2020	$ 2.661	$ 7.30	$ 23.818	$ 9.957	$ 11.351	$ 0.462	$ 11.813	$ 35.631	$ 25.674	$ 14.568	$ 12.765	$ 10.318
6	2021		$ 7.27	$ 11.411	$ 7.265	$ 14.754	$ 0.221	$ 14.975	$ 26.386	$ 19.121	$ 9.687	$ 8.267	$ 6.404
7	2022		$ 7.27	$ 15.193	$ 7.265	$ 20.751	$ 0.295	$ 21.046	$ 36.238	$ 28.973	$ 13.106	$ 10.892	$ 8.086
8	2023		$ 7.27	$ 15.806	$ 7.265	$ 20.751	$ 0.307	$ 21.057	$ 36.863	$ 29.598	$ 11.954	$ 9.676	$ 6.884
9	2024		$ 7.27	$ 15.807	$ 7.265	$ 20.751	$ 0.307	$ 21.057	$ 36.864	$ 29.599	$ 10.674	$ 8.414	$ 5.736
10	2025		$ 7.27	$ 15.806	$ 7.265	$ 20.751	$ 0.307	$ 21.057	$ 36.863	$ 29.598	$ 9.530	$ 7.316	$ 4.780
11	2026		$ 7.27	$ 15.807	$ 7.265	$ 20.751	$ 0.307	$ 21.057	$ 36.864	$ 29.599	$ 8.509	$ 6.362	$ 3.984
12	2027		$ 7.27	$ 15.806	$ 7.265	$ 20.751	$ 0.307	$ 21.057	$ 36.863	$ 29.598	$ 7.597	$ 5.532	$ 3.320
13	2028		$ 7.27	$ 15.807	$ 7.265	$ 20.751	$ 0.307	$ 21.057	$ 36.864	$ 29.599	$ 6.783	$ 4.811	$ 2.766
14	2029		$ 7.27	$ 15.806	$ 7.265	$ 20.751	$ 0.307	$ 21.057	$ 36.863	$ 29.598	$ 6.056	$ 4.183	$ 2.305
15	2030		$ 7.27	$ 16.554	$ 7.265	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 30.360	$ 5.547	$ 3.731	$ 1.971
16	2031		$ 7.27	$ 16.553	$ 7.265	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 30.360	$ 4.952	$ 3.244	$ 1.642
17	2032		$ 7.27	$ 16.554	$ 7.265	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 30.360	$ 4.422	$ 2.821	$ 1.368
18	2033		$ 7.27	$ 16.553	$ 7.265	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 30.360	$ 3.948	$ 2.453	$ 1.140
19	2034		$ 7.27	$ 16.554	$ 7.265	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 30.360	$ 3.525	$ 2.133	$ 0.950
20	2035		$ 7.27	$ 16.553	$ 7.265	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 30.360	$ 3.147	$ 1.855	$ 0.792
											$ 99.586	**$ 67.924**	**$ 33.191**
		$ 226.140	$ 126.841	$ 479.552							**EIRR=**	**29.203%**	

Economic Internal Rates of Return (EIRR): All costs up by 10% and benefit down by 10%

	Year	Cost		Benefits	Total Economic Costs	Incremental Wage Benefits	Dynamic Efficiency	Second Order Econ benefit	Total Economic benefits	Net (E-4)	NPV @12%	NPV @15%	NPV @20%
		Capital Cost	O&M				$ 0.020						
0	2015	$ 12.959	$ -	$ -	$ 12.959	$ -	$ -	$ -	$ -	$ (12.959)	$ (12.959)	$ (12.959)	$ (12.959)
1	2016	$ 15.627	$ 0.21	$ -	$ 15.840	$ -	$ -	$ -	$ -	$ (15.840)	$ (14.143)	$ (13.774)	$ (13.200)
2	2017	$ 109.422	$ 1.50	$ 3.722	$ 110.925	$ -	$ 0.072	$ 0.072	$ 3.794	$ (107.131)	$ (85.404)	$ (81.006)	$ (74.397)
3	2018	$ 64.633	$ 1.98	$ 136.874	$ 66.611	$ -	$ 2.655	$ 2.655	$ 139.529	$ 72.919	$ 51.902	$ 47.945	$ 42.198
4	2019	$ 43.185	$ 7.93	$ 78.572	$ 51.116	$ -	$ 1.524	$ 1.524	$ 80.096	$ 28.981	$ 18.418	$ 16.570	$ 13.976
5	2020	$ 2.927	$ 8.03	$ 23.818	$ 10.953	$ 11.351	$ 0.462	$ 11.813	$ 35.631	$ 24.678	$ 14.003	$ 12.269	$ 9.918
6	2021		$ 7.99	$ 11.411	$ 7.992	$ 14.754	$ 0.221	$ 14.975	$ 26.386	$ 18.395	$ 9.319	$ 7.953	$ 6.160
7	2022		$ 7.99	$ 15.193	$ 7.992	$ 20.751	$ 0.295	$ 21.046	$ 36.238	$ 28.246	$ 12.777	$ 10.619	$ 7.883
8	2023		$ 7.99	$ 15.806	$ 7.992	$ 20.751	$ 0.307	$ 21.057	$ 36.863	$ 28.872	$ 11.661	$ 9.438	$ 6.715
9	2024		$ 7.99	$ 15.807	$ 7.992	$ 20.751	$ 0.307	$ 21.057	$ 36.864	$ 28.872	$ 10.412	$ 8.207	$ 5.596
10	2025		$ 7.99	$ 15.806	$ 7.992	$ 20.751	$ 0.307	$ 21.057	$ 36.863	$ 28.872	$ 9.296	$ 7.137	$ 4.663
11	2026		$ 7.99	$ 15.807	$ 7.992	$ 20.751	$ 0.307	$ 21.057	$ 36.864	$ 28.872	$ 8.300	$ 6.206	$ 3.886
12	2027		$ 7.99	$ 15.806	$ 7.992	$ 20.751	$ 0.307	$ 21.057	$ 36.863	$ 28.872	$ 7.411	$ 5.396	$ 3.238
13	2028		$ 7.99	$ 15.807	$ 7.992	$ 20.751	$ 0.307	$ 21.057	$ 36.864	$ 28.872	$ 6.617	$ 4.693	$ 2.699
14	2029		$ 7.99	$ 15.806	$ 7.992	$ 20.751	$ 0.307	$ 21.057	$ 36.863	$ 28.872	$ 5.908	$ 4.080	$ 2.249
15	2030		$ 7.99	$ 16.554	$ 7.992	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 29.634	$ 5.414	$ 3.642	$ 1.923
16	2031		$ 7.99	$ 16.553	$ 7.992	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 29.633	$ 4.834	$ 3.167	$ 1.603
17	2032		$ 7.99	$ 16.554	$ 7.992	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 29.634	$ 4.316	$ 2.754	$ 1.336
18	2033		$ 7.99	$ 16.553	$ 7.992	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 29.633	$ 3.853	$ 2.395	$ 1.113
19	2034		$ 7.99	$ 16.554	$ 7.992	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 29.634	$ 3.441	$ 2.082	$ 0.928
20	2035		$ 7.99	$ 16.553	$ 7.992	$ 20.751	$ 0.321	$ 21.072	$ 37.625	$ 29.633	$ 3.072	$ 1.811	$ 0.773
											$ 78.447	**$ 48.623**	**$ 16.300**
		$ 248.754	$ 139.525	$ 479.552							**EIRR=**	**24.004%**	

Bibliography

- Hossain, Manzur and M. Ahmed. 2011. "Exchange rate policy amid floating Regime in Bangladesh: an assessment and strategic policy options",
- Madani, 1999. "A Review of the Role and Impact of Export Processing Zones", http://siteresources.worldbank.org/INTRANETTRADE/Resources/MadaniEPZ.pdf (accessed on December 7, 2013, 1 pm).
- MIGA, 2003. "Benchmarking FDI Competitiveness in Asia, 2003", Washington, D.C.: World Bank Group.
- World Bank. 2013. "Bangladesh Diagnostic Trade Integration Study", Vol. 3, Sector Studies.
- Zhang, Xiaobo*et al.* 2013. "Rising Wage in Bangladesh", Washington, D.C.: International Food Policy Research Institute Discussion Paper No. 01249, March.