Pre-feasibility Report

Mirsarai 2 Economic Zone

Submitted to

Bangladesh Economic Zones Authority

IIFC BETS

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Contents

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Executive Summary

One of the most attractive destinations for business and investment. Bangladesh is now considered as one of the most attractive destinations for business and investment opportunities due to presence of abundant and low-cost labour, investor-friendly environment, diversified natural resources and strong macro-economic fundamentals. In 2015-16, GDP growth registered at a staggering 7.05 percent[1], driven by the boost in the private sector investment, influx of remittance and strong expansion in export.

A new dimension to Bangladesh's economic outlook. The positive sovereign rating by the world's two top credit rating agencies, Standard & Poor's (S&P) and Moody's brought a new dimension to Bangladesh's economic outlook. S&P assigned BB$^-$ and Moody's Investors Service assigned Ba3 rating to Bangladesh and termed the country's macroeconomic outlook stable, putting Bangladesh at par with the Philippines, Vietnam and Turkey. Going forward, Government's objective is to develop a growth trajectory that will support a GDP growth to 8 percent per annum and reduce poverty from 40 percent to 15 percent by 2021. Creating productive employment will largely depend on creating an environment conducive to private sector investment, particularly for labour-intensive manufacturing and services.

New economic zone regime. The Government has, therefore, launched an effort to develop a new economic zone (EZ) paradigm for Bangladesh; drawing from successful examples from around the world as well as Bangladesh's own positive experience of EPZ model. The new economic zone regime provides for a new approach in both management and investment. The Economic Zones Act was passed in the Bangladesh Parliament in August 2010, providing the overall framework for establishing economic zones throughout Bangladesh. Under this Act, the Bangladesh Economic Zone Authority (BEZA) was established under the Prime Minister's Office (PMO).

Industry's Strong Contribution. Industry had a decisive influence on the pace of economic growth due to its increasing share to GDP. In financial year (FY) 2014-15, share of agriculture, industry and service sectors stood at 15.96, 30.42 and 53.62 percent respectively. The corresponding shares of these sectors in the previous FY (2013-14) were 16.50 t, 29.55 and 53.95 percent respectively (Bangladesh Economic Review, 2015). Data shows that the share of service sector slightly slowed in 2014-15 and its contribution to GDP declined from 54.61 percent to 53.62 percent in 2014-15[2].

Sustainable growth of Foreign Trade. Foreign trade of Bangladesh has registered sustainable growth since 2008-09 due to initiation of economic reforms and adoption of an export-biased liberal foreign trade policy. Bangladesh economy has benefited from its growing share of the global RMG market. Government has been pursuing an export led economic development strategy to stimulate export earnings and create employments. Promotional campaign and industry assistance (incentives) are given under export diversification programme. Recently, a new law has been enacted creating special economic zones to give further impetus to export growth. In 2005-06, export accounted for only 14 percent of GDP whereas its share steadily increased to 17 percent[3] of country's GDP by 2015. On the other hand, the contribution of import to GDP is higher than export, revealing that the country had prolong trade deficits. Export has been experiencing a shift from the agricultural products to manufactured goods. The main export items are RMG, leather and leather products, paper, furnace oil, urea, ceramic products, raw jute and jute products. Manufacturing dominated over 92 percent of total export of the country since 2003-04 (against 65.2% in 1983-84) to till date[4]. Bangladesh economy depends on the import of both consumer items and industrial raw materials.

[1] Ibid
[2] Bangladesh Economic Review, 2015
[3] Bangladesh Economic Review, 2015
[4] Ibid

Also requires certain critical enablers. While Bangladesh has done well in some sectors and acquired global recognition in RMG sector, attracting industries for accelerating domestic growth also requires certain critical enablers including access to market, presence of supporting infrastructure (power, water supply, connectivity etc.) and supportive policies and enabling environment. Bangladesh today ranks 174th in the Doing Business 2016 Report of the World Bank Group, which brings about a comparison of business environment in 189 economies of the world. The private sector plays driving role in the development process. In 1983-84, private sector investment constituted only 11.4 percent of GDP, and reached to 22.10 percent in 2014-15. According to the World Investment Report 2015, private investment in Bangladesh will increase substantially due to corridors linking South Asia and East and South-East Asia are being established: Bangladesh-China-India-Myanmar Economic Corridor and China-Pakistan Economic Corridor. World Bank has recently proposed that the government would facilitate the development of 40,000 acres[5] of land for creation of new industrial zones across the country to attract both foreign and local investment.

Mirsarai economic zone. Mirsarai economic zone consists of a total project area of 1,300 acres (Mirsarai 2A 882 and Mirsarai 2B 428 acres) of land. It is situated in Mirsarai upazilla, about 13 km to the west from upazilla headquarter and about 66 Km from Chittagong District Headquarters. BWDB embankment is aligned almost parallel to the Dhaka-Chittagong National highway - running about 10 km to the east of the project site. There exist two access roads: one is from Dhaka-Chittagong old highway with intersection at Borotakia bazar (about 9.30 Km away) and another is from Zorarganj intersection to Muhuri project embankment (about 7 Km away). The existing Dhaka-Chittagong railway line is about 3 km from the Zorargonj intersection. Thus the project site is strategically located closer to the key transportation nodes of Chittagong for export and import. The primary source of water will be the Feni river through Ichhakhali canal. However, ground water will also be used.

Strong potential for success of economic zone program. Success of an economic zone is mainly driven by investment climate, domestic market and attractiveness of the region, feasibility of individual projects, regulatory /policy setup and incentives. Bangladesh Economic Zone program is expected to be successful for a variety of reasons: BEPZA's amazing success to attract investments of $3,021 million from 37 countries by 2014 since inception, 93 percent utilization of plots in all 8 EPZs, establishment of BEZA under the PMO, and conducive policy environment including enactment of Economic Zones Act of 2010, provision of legal coverage for attracting/leveraging private investment, provision of tailored infrastructure services on PPP basis, flexibility of export and local sales with fiscal incentives, one stop shop services and readily available infrastructure are expected to help attract investments in economic zones.

RMG and its suitability for Mirsarai. The RMG industry is the Bangladesh's biggest export earner with value of over $24.49 billion of exports in 2013-14, contributing more than four-fifth of total export earning of the country. Chittagong city has a moderate level of presence of RMG industries - around 0.24 million RMG workers working and 70 percent of whom consists of female workers[6]. In terms of suitability in Mirsarai economic zone, RMG ranks highest compared to other industries, because of the easy availability of low cost workers, least space requirement compared to value addition, proximity to Dhaka- Chittagong highway and Chittagong port makes it even more attractive for the industry as textile and apparel.

Other potential industries suitable for Mirsarai. The next potential industry at Mirsarai would be pharmaceuticals, contributing 1 percent[7] of the GDP. With 194 operating companies in the country, the pharmaceutical industry caters 97 percent of the total medicinal needs of the local market. The industry also exports medicines to global markets, including Europe and USA. Nearly 80 percent cumulative growth in the last three years means that the Bangladesh pharmaceutical market has doubled[8]. The domestic retail market

[5] http://www.thefinancialexpress-bd.com/2014/10/12/60505
[6] http://database.dife.gov.bd/reports/number-of-rmg-workers-by-district
[7] Growth of Pharmaceutical Sector of Bangladesh: www.bangladesh-corporate-world.blogspot.com
[8] BOI, 2015

is growing at 25 percent per year[9]. Bangladesh is also going to establish an API park where 40 API industries are expected to operate[10]. In 2014-15, Bangladesh exported medicines of $72.64 million, which was 4.9 percent higher, compared to $69.24 million in 2013-14[11]. Approximately 80 percent[12] of the APIs are imported and 75–80 percent[13] of the imported APIs are generic. At present, there are 15 companies in Bangladesh manufacturing 40 APIs[14].The proximity to sea and airport is a significant factor, for consideration of setting up pharmaceutical industries in Bangladesh. Mirsarai economic zone is ideal for that.

Leather and leather products sector is one of the growing industries of Bangladesh. Government has identified it as a thrust sector. It is a high value added export industry. The leather footwear sector has been growing over the last 5 years with exports increasing by 25 percent[15] in 2013 followed by 27 percent[16] growth in 2015. Leather of Bangladesh are marketed abroad, mostly in the form of crushed leather, finished leather, leather garments, and footwear.

According to the Association of Ship Building Industries of Bangladesh, Bangladesh has the potential to earn $2.0 billion by exporting ships and vessels in the next five years[17]. Ship building industry of Bangladesh has developed the capacity and technical expertise to manufacture inland and coastal ships in Bangladeshi shipyards. According to a 2013 report, more than 250,000 skilled and semi-skilled workers are employed in the ship building industry and the average growth of the industry is 8 percent[18]. Being adjacent to sea, Mirsarai is a technically suitable place for establishing shipbuilding and ship repairing facility.

Growth and import substitution prospect is high in the light engineering industry. This sector contributes to growth in various related sectors and generates a wide range of economic activities. Most of the industries are located around old Dhaka with heavily concentrated inadequate facilities. Chittagong also houses significant number of light engineering industries, especially due to availability of steel from ship breaking and also to cater the spare parts needs of local industries and automobiles.

Most of Bangladesh's cement requirements are met through imports of clinker and related raw materials such as slag, fly ash, gypsum etc. Currently, around 93 percent of the import in this category is handled at Chittagong Port leaving only 7 percent for Mongla. The key reason for this is that most of the cement manufacturing firms are in Dhaka and Chittagong and demand from Central and South Western Bangladesh is much higher as compared to South Eastern and Northern Bangladesh.

Mirsarai can be one of the top sites compared to other economic zones in the region.. It is evident that Mirsarai 2A and 2B are one of the top sites among the compared economic zones. The closest competitor is Myanmar's Thilawa Special Economic Zone. Business enterprises currently operating in Chittagong are under pressure to relocate away from the congested old city. Land in Chittagong is scarce, and small workshops are scattered throughout residential areas without proper planning. Consolidation could save time and technical pressures, and lower the average cost of doing business as well as the per-unit cost of business enterprise products.

A Data and Counselling Centre for each economic zone project is strongly recommended. We strongly recommend setting up a Data and Counselling Centre for each economic zone project. This centre is required to promote investment for information gathering and dissemination, inter-government communication and create and update database of the target marketing industries. During the initial period of seeking zone developers, BEZA should offer investment counselling services from the Data and Counselling Centre through providing information on (a) securing raw materials; (b) market access (national or regional); (c) seeking

[9] Ibid
[10] Ibid
[11] Export Promotion Bureau
[12] The World Bank, 2012
[13] Ibid
[14] http://www.pharmajogot.com/api-in-open-market-behind-drug-manufacturers/
[15] Export Promotion Bureau
[16] Ibid
[17] Association of Export Oriented Ship Building Industries of Bangladesh, 2013
[18] Same as above

efficiency; and (d) gaining strategic elements for investors. The investor services should start at the BEZA headquarters from Data and Counselling Centre. This would provide a single window of information provision and facilitation to the investors on each economic zone. An economic zone is typically an inter-government responsibility at least during implementation stage, as it involves several connectivity with outside utilities like road, power, water supply, optic fiber etc. BEZA's role to resolve inter-government problems effectively, in communication with other government agencies, is therefore extremely important.

A high profile economic zone with excellent business environment. The planning for the proposed economic zone has been based on the broad objective of establishing an excellent business environment targeted essentially at high growth manufacturing and processing industrial and related infrastructure sectors. Presence of state of the art infrastructure and other services in the zone is planned to be developed to attract investors, both local and foreign. Each zone within the BEZA shall be dedicated to specific sub-sectors and would be self-sufficient units in terms of facilities, ability to attract investors and revenue generation. From planning point of view, the economic zone is a package of number of land uses. The processing activities are prime activities and the efficiency of production is enhanced by a number of other activity zones. These include post- harvest activities, linking infrastructures, marketing infrastructure, R & D services, community facilities and green spaces.

Master Planning Considerations. The master plan was developed to accommodate both the industries area requirements and requirements of the various infrastrucuture facilities. The broad objective was an excellent business environment targeted essentially at high growth manufacturing and processing industrial & related infrastructure sectors.

The zone shall be dedicated to specific sub-sectors and would be self-sufficient units in terms of facilities, ability to attract investors and revenue generation. From the planning point of view, the economic zone is a package of number of land uses. The processing activities are prime activities and the efficiency of production is enhanced by a number of other activity zones. These includes linking infrastructures, marketing infrastructure, R & D services, community facilities and green spaces.

Land use pattern. The land use pattern of the zone is determined considering the land requirement for various processing units, logistics requirements, research, capacity development, skill development, residential facilities, schools and various social amenities etc. A concrete surface road is suggested for the internal road in the economic zone in terms of resistance against heavy rain and heavy truckload that is very common in economic zones. The main road is planned from the entrance crossing through factory plots in the industrial zone. Water distribution network inside the zone will deliver water to each factory along the roads, coming through the tower and tank at several places built inside the zone. A gravity feed system will be used to supply water to the water supply pipeline located along the footpath of the road inside the project.

Institutional Arrangement. Based on the available institutional options and consultations with the officials of BEZA, Mirsarai economic zone will be developed in following manner. Mirsarai Economic Zones Management Committee (MEZMC) will be responsible for the overall operation, management and maintenance of the economic zones in that region. It will also run the One Stop Service Centre. Economic zone management will also be responsible for monitoring and evaluating legal, environmental, social compliances along with investment promotion and investment appraisals.

Enormous economic opportunities. Development of Mirsarai 2 economic zone would lead enormous economic opportunities in the region. These include:

- New livelihood opportunities will be available to the people during the construction and commissioning phases of the Mirsarai 2 economic zone;

- Direct employment opportunities for the local people (especially construction workers and unskilled labours) are expected to increase;
- Local inhabitants expect that the development of Mirsarai 2 economic zone would provide various indirect employment opportunities (such as small shops, restaurants etc. around the Mirsarai 2 economic zone area).
- The residents want that opportunities be given to the local workforce in the Mirsarai 2 economic zone during the construction and commissioning phases;
- Local inhabitants expect that the development of Mirsarai 2 economic zone would lead the area to become more secure in terms of criminal activities such as theft, loot etc.;
- Women empowerment through employment generation since gender inequality is deep rooted in the area;
- Stable employment opportunities throughout the year for communities dependent on seasonal income opportunities.
- The upcoming Mirsarai 2 economic zone will help in the economic upliftment of the local people, Ichhakhali union, and
- The majority of the workforce is unskilled; therefore, in order to provide employment opportunities in the skilled sector, there is a need to establish a "Vocational Training Institute" for the skill enhancement of the local people, especially the youth and women in the area. This may be done in coordination with the UNO office, as they are the nodal agency for the implementation of government programmes on social welfare and livelihood for the people in that area.

An economically and financially viable economic zone.

Mirsarai 2A		*Mirsarai 2B*	
EIRR	38%	EIRR	34%
Benefit-Cost Ratio	1.82	Benefit Cost Ratio	3.89
Total Employment	130,000	Total Employment	92,000
Equity IRR	27%	Equity IRR (after tax)	34%
Project IRR	27%	Project IRR (after tax)	22%

As a whole, the Mirsarai 2 economic zone will have modern infrastructure such as an efficient drainage system, a reliable power supply plant, a water supply treatment plant replenished by river water and rainwater as source, a CETP and communication systems equipped to international standards. These strategically designed infrastructure elements are ready for receiving foreign investment and will hopefully provoke new industrial chains in Bangladesh. "A New Gateway to Bangladesh" is the development concept recommended for recognition as a future industrial development for Bangladesh. Mirsarai has the potential of becoming the largest Economic Zone of Bangladesh.

Abbreviations

ADB	Asian Development Bank
BEZA	Bangladesh Economic Zones Authority
BIDA	Bangladesh Investment Development Authority
DC	Deputy Commissioner
DCCI	Dhaka Chamber of Commerce and Industries
DOE	Department of Environment
DSCR	Debt Service Coverage Ratio
DTA	Domestic Tariff Area
EIA	Environment Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environment Management Plan
EPA	Export Processing Area
EPZ	Export Processing Zone
EU	European Union
EZ	Economic Zone
FBCCI	Federation of Bangladesh Chambers of Commerce and Industries
FDI	Foreign Direct Investment
FICCI	Foreign Investors Chamber of Commerce and Industries
FY	Financial Year
GAAP	Generally Accepted Accounting Principles
GDP	Gross Domestic Product
GOB	Government of Bangladesh
ICT	Inland container terminal
IEE	Initial Environmental Examination
IRR	Internal Rate of Returns
IPP	Independent Power Producers
LAO	Land Acquisition Officer
LDC	Least Developed Countries
LPG	Liquefied Petroleum Gas
O&M	Operations and Maintenance
OECD	Organization for Economic Co-operation and Development
PBS	Palli Bidyut Samity
PGCB	Power Grid Company of Bangladesh
PPP	Public Private Partnership
REB	Rural Electrification Board
RMG	Readymade Garments
RMS	Regulatory and Metering Station
SEZ	Special Economic Zone
SIA	Social Impact Assessment
SMEs	Small and Medium Enterprises
UK	United Kingdom
UP	Union Parishad
US	United States
USA	United States of America
$	United States Dollar
VAT	Value Added Tax
WB	World Bank

1 Introduction

1.1 Background

Bangladesh economy was ranked as the 35th[19] largest economy in the world in 2015 based on Purchasing Power Parity (PPP) terms and 47th[20] largest in nominal terms with a GDP of $537 billion[21] in PPP terms and $172.8 billion[22] in nominal terms. Average GDP growth is 6.2 percent[23] from 1909-10 to 2014-15. Bangladesh is now considered as one of the most attractive destinations for business and investment opportunities due to huge work force base, investor-friendly environment, diversified natural resources and strong macro-economic fundamentals. In 2015-16, GDP growth stands at a staggering 7.05 percent[24], driven by the boost in the private sector investment and strong expansion in export.

The positive sovereign rating by the world's two top credit rating agencies, Standard & Poor's (S&P) and Moody's brought a new dimension to Bangladesh's economic outlook. S&P assigned BB- and Moody's Investors Service assigned Ba3 rating to Bangladesh and termed the country's macroeconomic outlook stable, putting Bangladesh at par with the Philippines, Vietnam and Turkey. US investment Bank, Goldman Sachs, has included Bangladesh in "The Next-11" as one of the most promising economies.

Going forward, Government's objective is to develop a growth trajectory that will support a GDP growth to 8 percent per annum and reduce poverty from 40 percent to 15 percent by 2021. Bangladesh's labour force has been augmenting at the rate of nearly 2 million a year. Creating productive employment will largely depend on creating an environment conducive to private sector investment, particularly for labour-intensive manufacturing and services.

As exporting enclaves, EPZs provided little linkages with the domestic economy, up-stream or down-stream, resulting in low technology and efficiency spill over. Government's objective is therefore to maximize the potential direct and indirect impacts through a more modern, generalized regime of Economic Zones (economic zones).

The Government has, therefore, launched an effort to develop a new economic zone paradigm for Bangladesh; drawing from successful examples from around the world as well as Bangladesh's own positive experience of EPZ model. It would create spill over harnessed by local firms from direct investment, additional investments will be encouraged within value chains, local produce will be procured and better linkages will be established.

The new economic zone regime provides for a new approach in both management and investment. The policy allows the government to develop and pilot an approach that is less reliant on government fiscal subsidies, while leveraging comparative advantages and private sector capabilities, where possible. The Economic Zone Act was passed in the Bangladesh Parliament in August 2010, providing the overall framework for establishing economic zones throughout Bangladesh. Under this Act, the Bangladesh Economic Zone Authority (BEZA) was established under the Prime Minister's Office (PMO). It is governed by a Board chaired by the Prime Minister.

The law provides the legal coverage for attracting and leveraging private investment in the development of zones as zone developers or operators, and in the provision of tailored infrastructure services, such as power, effluent treatment, etc. In the background of the above, the government is implementing the Private Sector Development Support Project (PSDSP) with support from the World Bank and DfID, to support pilot

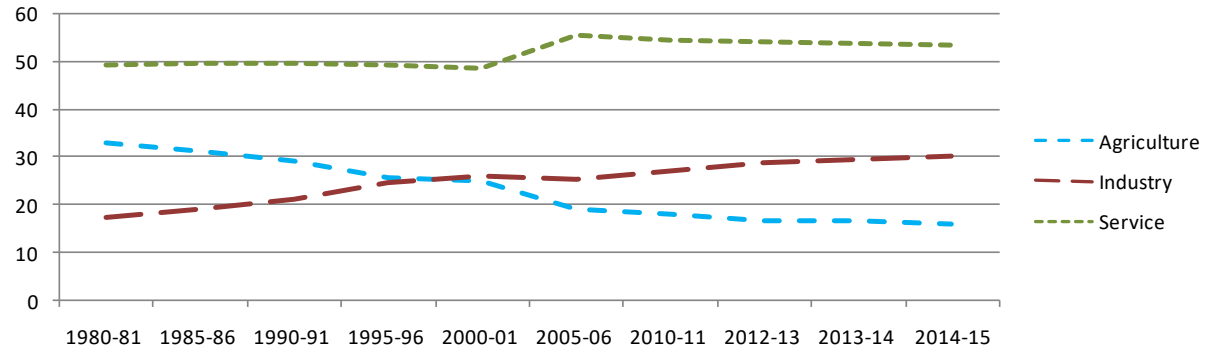
[19] World Bank Data
[20] Same as above
[21] Same as above
[22] Same as above
[23] Bangladesh Economic Review, 2016
[24] Same as above

projects under the new economic zone model. The objective is to demonstrate the viability and efficacy of new models in removing key constraints facing the private sector in business investment.

Bangladesh's economy remained predominately agrarian during the period of 1980-81 with agriculture accounting for almost 33 percent of GDP. During the period 1980-2001, the significant decline in the share of agriculture was made up by growth in the industrial sector and service sector. The structural transformation of the economy since early 1990s indicated a transition from agriculture to industry. The growth of industrial sector started with stable political environment and influx of foreign direct investment.

Industry had a decisive influence on the pace of economic growth due to its increasing share to GDP. In 2014-15, share of agriculture, industry and service sectors stood at 15.96 percent, 30.42 percent and 53.62 percent respectively which were 16.50 percent, 29.55 percent and 53.95 percent respectively in the previous FY (Bangladesh Economic Review, 2016).

Figure 1: Sector wise Contribution to GDP over Years



Source: Bangladesh Economic Review, 2016

In 1980-1981, service sector had 50 percent contribution to GDP. The share of this sector, however, grew gradually and reached 54.61 percent in 2010-11, making it the largest of all in GDP contribution. The data shows that the share of service sector slightly slowed in 2014-15 and its contribution to GDP declined from 54.61 percent to 53.62 percent in 2014-15[25].

[25] Bangladesh Economic Review, 2016

1.2 Description of the Project

Bangladesh Export Processing Zone Authority (BEPZA) one of the most important Governmental organization, successfully provided tailored infrastructure services and business environment from its establishment at 1980 by the EPZ (Export Processing Zone) model. 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, because of limitations of 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 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. The Government has launched an effort to establish a new economic zone paradigm for Bangladesh drawing tenaciously from successful examples of economic zones around the world, as well as Bangladesh's positive experience with the EPZ model. The expectation is that more spill-over benefits 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 economic zone policy. The new economic zone 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 economic zones all over Bangladesh.

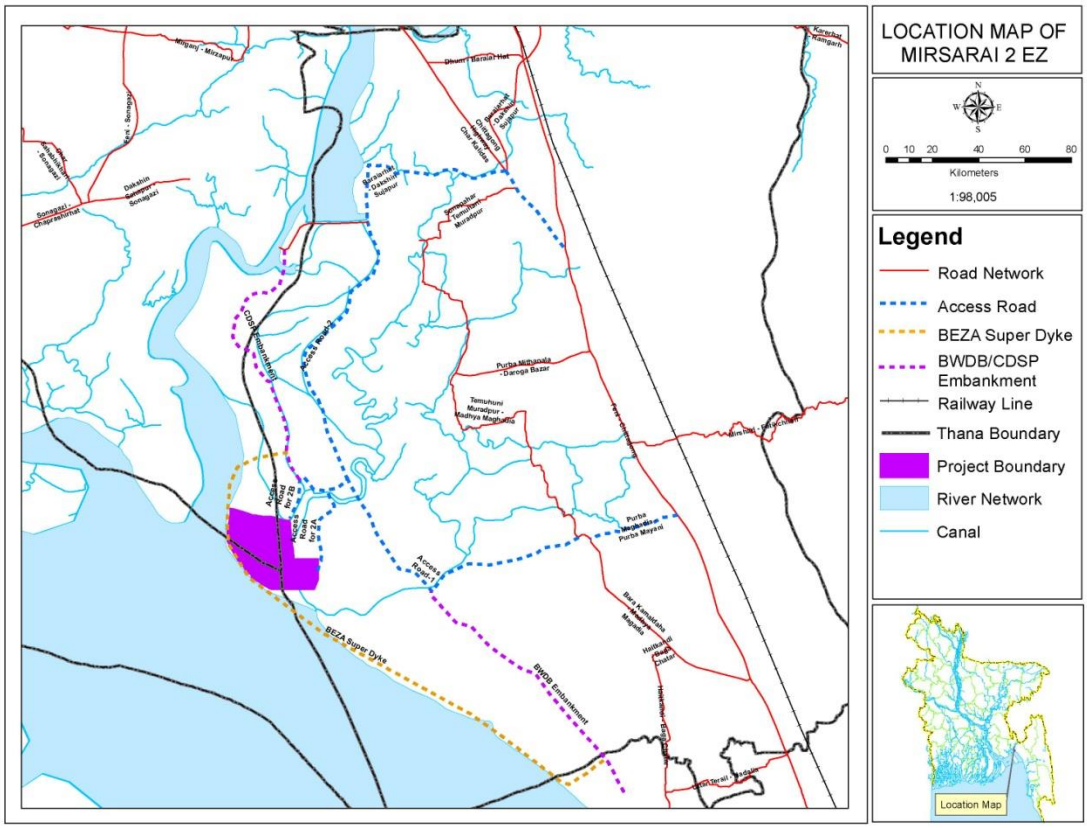
The Mirsarai economic zone site is situated in Mirsarai upazilla (Chittagong District) about 13 Km to the west from upazilla Headquarter and about 66 Km from Chittagong District Headquarters. Dhaka- Chittagong National highway is about 10 Km east of the project site at BWDB embankment which is aligned almost parallel to the Dhaka-Chittagong National highway. The nearest township from the proposed site is about 5 Km away while the nearest two rail stations namely Chinki Astana and Borotakia are both at about 12 Km from the project site.

The Project site is 1300 acres. It is bounded by to the North Mirsarai Economic Zone 1 and Forest Area to the west by the Bay of Bengal and to the south by Bamonsundar Channel and green buffer zone and in the wast by green buffer zone of mangrove forest. Furthermore, the area may be divided into 2 (two) parts named as Mirsarai 2A (800 Acres) and Mirsarai 2B (432 Acres).

The consultant team visited the site and investigated off/on-site infrastructure and available facilities, land acquisition and resettlement issues, environmental and social/gender aspects, sources of water and power, etc. from their own point of assessment. The detail of the site visit report is prepared based on existing conditions/facilities. During the visit, the Team collected information from interviews with local people**,** hydrological data at the site like Highest Flood Level (HFL), Normal Flood Level (NFL), water level (WL) at low tide and high tide (Full moon), tidal system (tidal oscillations) at and near the site, information regarding cyclonic surges etc. Information on the existing embankments, at and near the site, on the Bamonsundar and Ichhakhali khal flowing across the BWDB embankment and through the proposed site was also collected. The Team visited the Bamonsundar Forest and up to the *'Char'* (acreated land) on the Bay of Bengal by boat along this khal; observed Muhuri/Feni river coming from upstream and flowing across the Muhuri Project embankment at the extreme north of the economic zone site and falling to the Bay of Bengal near the project site to the west. The flow and water level of the river, controlled by a regulator at the intersection of the river and Muhuri Project embankment, were also observed.

During the site visit importance was given to the investigation of road connectivity of the proposed site to the highway. Regarding this, there was discussion with the LGED engineers and the Consultant Team was informed that they (LGED) had investigated several access roads from the highway to the project site. However, the Consultants investigated the existing two approach/access roads from the site to the highway and the railway. The possibilities and constraints of the existing two access roads are tabulated for better understanding.

Figure 2: Location Map



1.3 Chittagong District

Chittagong had been a seaport since the ancient time. The Arab traders had business transactions with this port since 9th century AD. Chittagong region was under the kingdom of Arakan during sixth and seventh centuries. Before the Muslim rule, Chittagong had been either under the control of the Arakans or under the kings of Burma. Sultan Fakruddin Mubarak Shah of Sonargaon conquered Chittagong in 1340. After the defeat of Sultan Giasuddin Mahmud Shah in the hands of Sher Shah in 1538, the Arakanese again captured Chittagong. From this time onward until its conquest by the Mughals, this region was under the control of the Portuguese and the Magh pirates. The Mughal Commandar Bujurg Umed Khan expelled the Portuguese from Chittagong in 1666 and established Mughal rule there. The Mughals renamed Chittagong as Islamabad.

Area. 5,282.98 sq. Km of which 1,700 sq. km are coastal area[26].

Location. Chittagong district is bounded by Feni district and Tripura (Indian state) on the north, Cox's bazar district on the south, Bandarban, Rangamati and Khagrachhari districts on the east and Noakhali district and the Bay of Bengal on the west. The district lies between 21°54' and 22°59' north latitude and between 91°17' and 92°13' east longitude.

[2]District Statistics 2011, Chittagong District, BBS 2013.

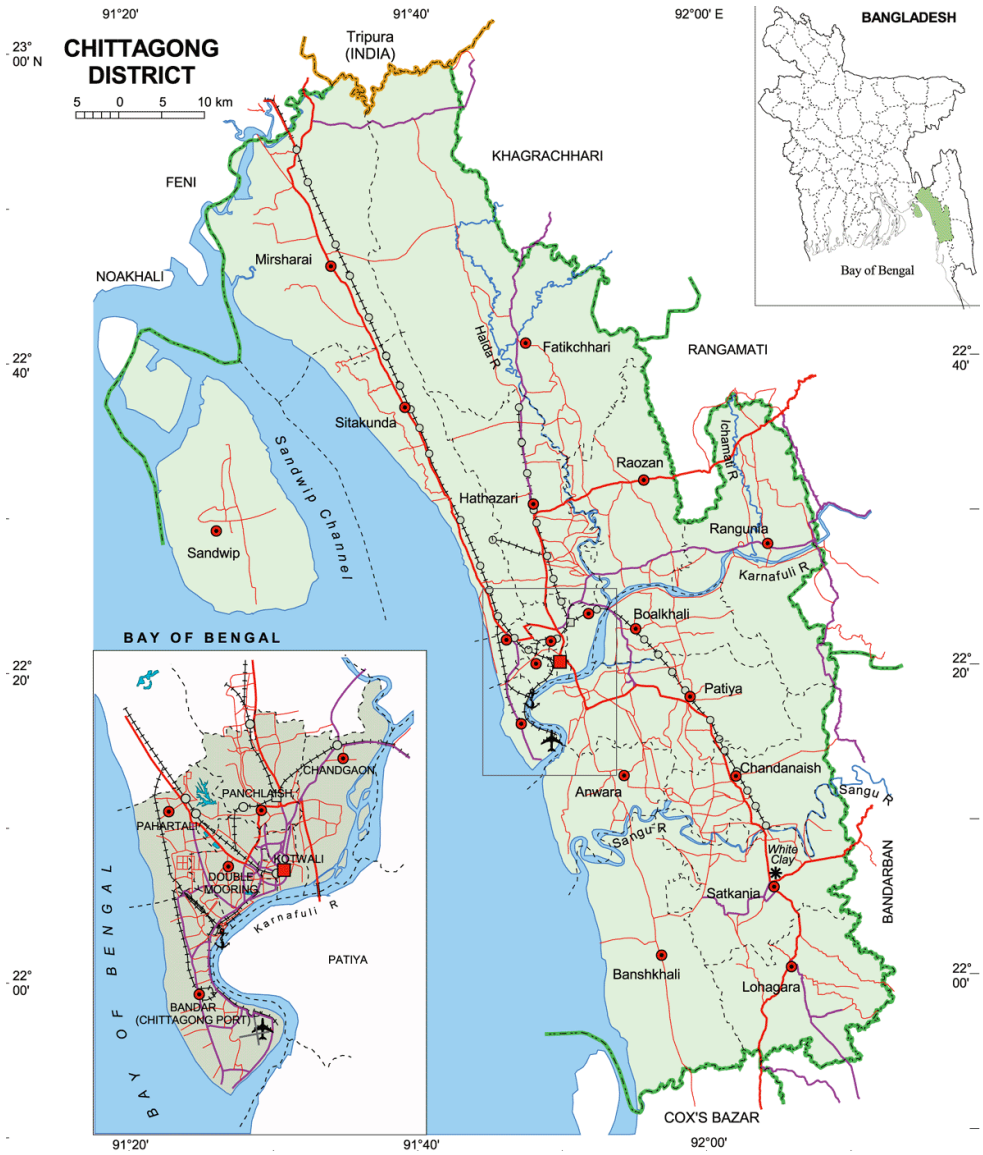
Physiography. The plain along the coast extends from the Feni river to the mouth of the Matamuhuri delta, a distance of 121 km. It comprises gently sloping piedmont plains near the hills, river floodplains alongside the Feni, Karnafuly, Halda and other rivers, tidal floodplains along the lower courses of these rivers, a small area of a young estuarine floodplain in the north, adjoining sub-regional young Meghna estuarine floodplain, and sandy beach ridges adjoining the coast in the south. Sediments near the hills are mainly silty, locally sandy, with clays more extensive in floodplain basins. The whole of the mainland area is subjected to flash floods. Flooding is mainly shallow and fluctuates in depth with the tide (except where this is prevented by river or coastal embankments). The average daily rise in the tide is about two meters. Some soils on tidal and estuarine floodplains become saline in the dry season.

Comparatively low hill ranges occur between and outside the high hill ranges. They are mainly formed over unconsolidated sandstone and shale. Their summits generally are <30m above MSL. Most areas are strongly dissected, with short steep slopes, but there are some areas with rolling to early-level relief. The topography is deeply eroded and rounded; the valleys are curved and almost isolated hillocks are common.

Profile. Chittagong district was established in 1666 including three hill districts. The district of Chittagong Hill Tracts was established in 1860 with the hill region of the district. Later, Chittagong district was further divided into Chittagong and Cox's bazar districts. The district consists of one City Corporation, seven municipalities, six thanas (Police stations within City Corporation), 20 upazillas, 197 union parishads and 1,319 villages.

Municipalities in Chittagong District. Patia, Sitakunda, Sandwip, Rangonia, Raojan, Baryerhat, Mirsarai, Chandanaish and Baskhali.

Figure 3: Chittagong District



Upazillas/ Thanas. Anwara, Banshkhali, Boalkhali, Chandanaish, Fatikchhari, Hathazari, Lohagara, Mirsarai, Patiya, Rangunia, Raozan, Sandwip, Satkania, Sitakunda.

Six Thana under Chittagong City Corporation are Bandar (Chittagong Port), Chandgaon, Double Mooring, Kotwali, Pahartali, and Panchlaish.

Archaeological heritages and relics. Bronze statues (8th and 9th centuries in Anwara upazilla), Fakira Mosque (Hathazari), Musa Khan Mosque (1658), Kura Katni Mosque (1806), Kala Mosque (16th century), Chhuti Khan Mosque (Mirsarai), Kadam Mobarak Mosque (1719), Andar Killah Mosque, Wali Khan Mosque (1790), Badar Awlia Dargah, Bakshi Hamid Mosque of Banshkhali (1568), Chittagong Court Building (1893), Chittagong Collegiate School, Ethnological Museum (1974) are notable places of the district.

Tourist Places. Foy's lake, Potenga sea beach, Chittagong zoo, Chittagong University, Graveyard of Bayajid Bostami, Graveyard of Shah Amanat, War Cemetery, Zia memorial museum, muhuri project, Batali Hill, Chandranath Hill of Shitakunda, Hot water fall, Bashkhali Eco Park, Parky sea beach in Anowara, Bangladesh Military Academy, Marine Academy, Chittagong Ethnological Museum etc. are important tourist places of the district.

Rivers. Karnafuli, Halda and Sangu.

Climate. The weather of Chittagong is characterized by tropical monsoon climate. The dry and cool season is from November to March; pre-monsoon season is from April to May that is very hot. The sunny and the monsoon season are from June to October, which is warm, cloudy and wet.

1.4 Mirsarai upazilla

Mirsarai upazilla is approximately 60 km from the Chittagong city. Main river Feni; Sandwip channel is notable; number of canal is 30, most noted of which are Feni river, Ichhakhali, Mahamaya, Domkhali, Hinguli, Moliaish, Koila Govania and Mayani khal. The hills range on the northern and eastern side of this upazilla along the bank of the Feni river extended up to Chittagong and the Chittagong Hill Tracts. The upazilla (sub-district) is bounded by Tripura state of India, Chhagalnaiya and Feni Sadar on the north, Sitakunda on the south, Fatikchhari on the east, Sonagazi and Companigonj on the west. It has an area of 10.12 km2. The town has two dak bungalows.

Administration

Mirsarai thana was turned into an upazilla in 1983. The upazilla consists of 16 union parishads, 100 mauzas and 207 villages.

Archaeological Heritage and Relics

Hinguli Court Parr built by Arakanese Moghs, Valukia Dighi, Chuti Khan Mosque, Poragol Khan Dighi, Nai Duari Mosque, Daulat Bibi Mosque, Moghadia Mosque and Muhuri Project Jame Mosque.

Historical Events

Fakruddin Mobarak Shah established the muslim rule in Chittagong in 1340. During the reign of Hossain Shah and Nasrat Shah, Paragal Khan and Chhuti Khan were the rulers of this region. Later on Nizam Shah, brother of Sher Shah, became its ruler. Nizampur Pargana was named after him and the total area of Mirsarai came under the jurisdiction of Nizampur Pargana. From the beginning of 16th century this area was one of the centers for practicing Bangla literature; most noted poets and writers include Sayed Sultan, Kabindra Poromessor, Srikor Nandi, Daulat Uzir Bahram Khan. Most of the time from 1580 to 1666, this region was under the control of the Arakans. The place at Mirsarai Thana, where Bujurgo Umed Khan landed after crossing the Feni river, was named as Bujurgo Umed Nagar.

After the conquest of Chittagong, this region came permanently under the Mughals rule. Towards the end of the British rule, Durgapur and Karerhat of Mirsarai upazilla were the main centers of the revolutionaries of Chittagong. During the War of Liberation many direct encounters between the Pak army and the freedom fighters were held at Shuvopur Bridge, Higuli Bridge, Auchi Miah Bridge and Mostannagar.

Figure 4: Mirsarai upazilla

Marks of the War of Liberation

Mass grave 1, memorial monument 1, mass killing site 2.

Religious Institutions

Mosque 640, tomb 50, temple 128 and Buddhist temple 9, most noted of which are Chhuti Khan Mosque, Daulat Bibi Mosque, Mahadia Mosque, Dhan Meah jamia mosque, Nai Duari Mosque, Hamidullah Khan Mosque, Mazars of Shah Zayed, Awal Kazi Moakkel, Shah Badal, Chinki Mostan, Mia Noor Ali Shah, Sufi Noor Mohammad Nizampuri, Mir Gaffar Khan and Moulana Hafez Mohammed Hossain; Jagannath Mandir, Kali Mandir, Hazisharai Mandir Sri Jagannath Dam and Newanpur Mandir.

Educational Institutions

Educational institutions: college 6, high school 50, junior school 4, madrasa 39, government primary school 145, non-government primary school 55, madrasa 1, satellite school 8 and kindergarten school 8[27].

Communication Facilities Roads

Pucca 193 km, semi pucca 119 km and mud road 1500 km; railways 16 km; waterways 11-nautical-mile.

[27] Mirsarai upazilla 2014, Banglapedia, National Encylcopedia of Bangladesh.

Traditional Transport

Palanquin, Shampan boat and bullock cart. These means of transport are either extinct or nearly extinct.

Hats, Bazaars and Fairs

Hats and bazaars are 30, most noted of which are Mohajan Hat, Abu Torab bazar, Kamar Ali bazar, Boro Daroga Hat, Karer Hat, Baroiar Hat, Shantir Hat, Jorarganj, sadurbazar, Mithachara, Fakir Hat, Abur Hat and Bamonsundar Daroga Hat, Golker Hat,Bhuiyan Hat, Annondar Hat etc.

Main Exports

Bamboo, wood, fish, paddy, potato, banana and vegetables.

NGO Activities

Operationally important NGOs are Proshika, BRAC, ASA, Sheba, Grameen Bank, ICDDR B, CARE, Hunger Project, DORP, Bais Opka, IPSA, Fatema Palli, Swasthya Shikkha Centre and Eva.

Health Centers

upazilla health complex 1, family planning centre 16, sub health centre Mirsarai is an upazilla of Chittagong District in the Division of Chittagong, Bangladesh.

Drinking Water

A review of the project area highlights the fact that scarcity of safe drinking water is an acute problem faced in the region. Tap water is available to only 1.6 percent of population. The majority 93.9 % of the population use tube well and 4.5% relies on other sources for drinking water such as ponds. The scarcity of water intensifies during the summer season when the salinity of water increases and during cyclones when the water sources get damaged and, contaminated with saline water. In this situation people are forced to drink unsafe water or spend their limited financial resources on collecting or purchasing water from other sources. Women and the vulnerable population are the most affected during this situation.

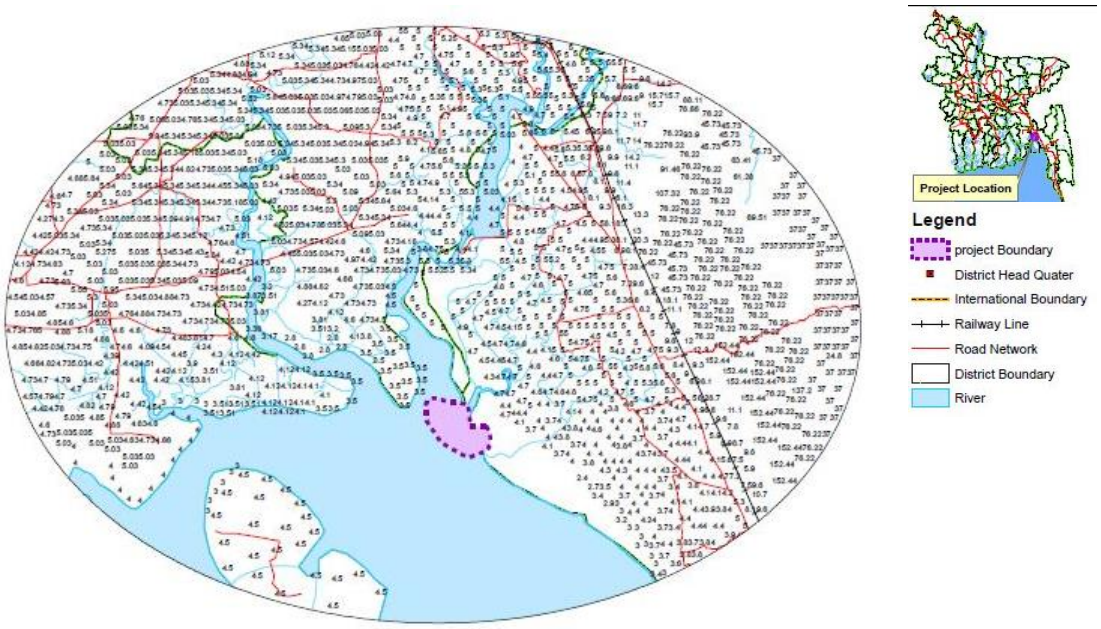
Figure 5: Physiography

Figure 6: Demographics

Topography

In order to understand the topography of the area with respect to the constraints and opportunities presented by the site, a map has been prepared and presented below:

Figure 7: Topography



It is a fact that the site is vulnerable to cyclones and tidal surges. Given this situation, the dike system is planned along the sea shore in order to increase the safety level.

Wages

The scenario for wages, analysed at the upazilla level reveals that the daily average wage rate of male agriculture labourer at the upazilla level is Taka 500 and that for female labourers is Taka 300, as against the Taka 658 daily average wage rate of labour in the manufacturing sector[28].

1.5 Project Site and Off-site Infrastructure

1.5.1 Project Site

The Mirsarai economic zone site is situated in Mirsarai upazilla about 13 km to the west from upazilla headquarter and about 66 Km from Chittagong District Headquarters. Dhaka- Chittagong National highway is about 10 Km to the east of the project site. BWDB embankment is aligned almost parallel to the Dhaka-Chittagong National highway. The nearest township from the proposed site is about 5 Km away while the nearest two rail stations namely Chinki Astana and Borotakia are both at about 12 Km from the project site.

The project site is 1,310 acres. It is bounded by Mirsarai Economic Zone 1 and forest area in the north, by the Bay of Bengal in the west and by Bamonsundar Channel and green buffer zone in the south and by green buffer zone of mangrove forest in the west.

The area is divided into 2 (two) parts:

- *Mirsarai 2A (882 Acres) and*
- *Mirsarai 2B (428 Acres)*

The team visited the site and investigated off/on-site infrastructure and available facilities, land acquisition and resettlement issues, environmental and social/gender aspects, sources of water and power, etc. from their own point of assessment. The detail of the site visit report is prepared based on existing conditions/facilities.

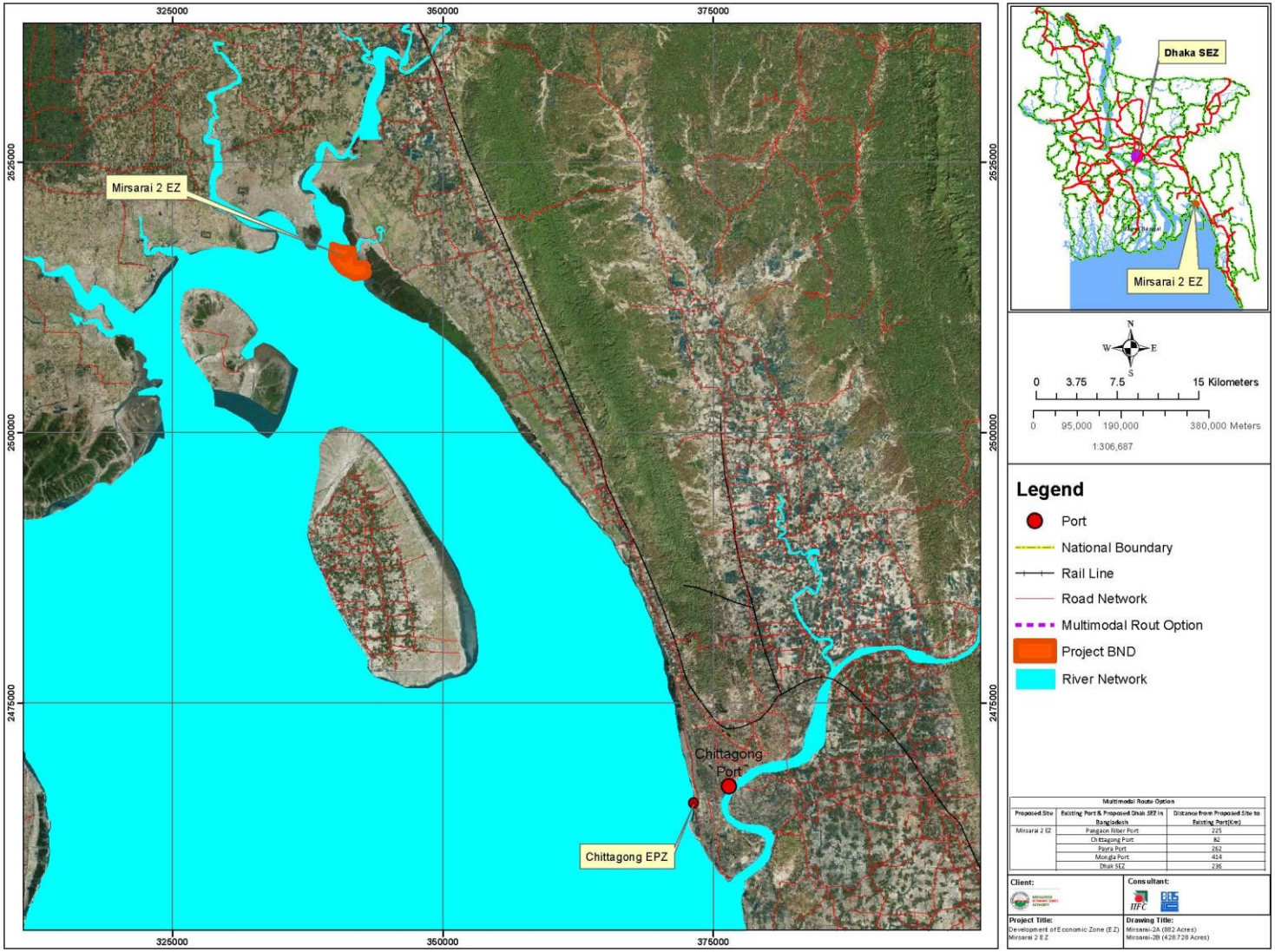
During the visit, the team collected information from interviews with local people**,** hydrological data at the site like Highest Flood Level (HFL), Normal Flood Level (NFL), water level (WL) at low tide and high tide (Full moon), tidal system (tidal oscillations) at and near the site, information regarding cyclonic surges etc. Information on the existing embankments, at and near the site, on the Bamonsundar and Ichhakhali khal flowing across the BWDB embankment and through the proposed site was also collected.

The team also visited the Bamonsundar Forest and up to the *'Char'* on the Bay of Bengal by boat along this khal; observed Muhuri/Feni river coming from upstream and flowing across the Muhuri Project embankment at the extreme north of the economic zone site and falling to the Bay of Bengal near the project site to the west. The flow and water level of the river, controlled by a regulator at the intersection of the river and Muhuri Project embankment, were also observed.

During the site visit, importance was given to the investigation of road connectivity of the proposed site to the highway. Regarding this, there was discussion with the LGED engineers, consultant team was informed that they (LGED) had investigated several access roads from the highway to the project site. However, the consultants investigated the existing two approach/access roads from the site to the highway and the railway.

[28] Social Impact Assessment of Mirsharai Economic Zone, PwC, July 2015

Figure 8: Site Condition between the Mirsarai economic zone and the Chittagong EPZ



1.5.2 Off-site Infrastructure

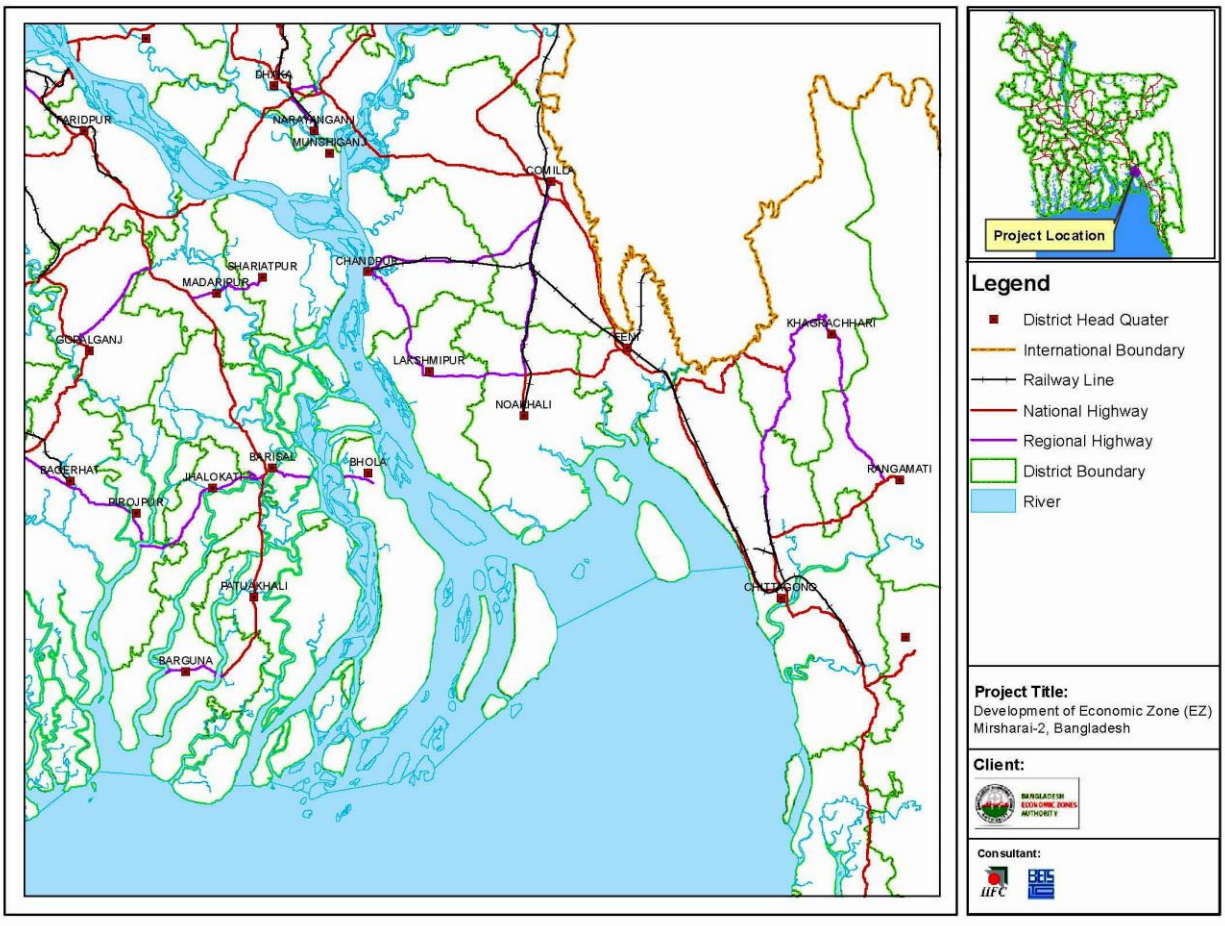
Transportation Network

The site is strategically located closer to the key transportation nodes of Chittagong for export and import. The following figure shows the current geographical condition between the project site and Chittagong. Relatively flat land exists between them and at the same time, the Dhaka – Chittagong highway and railway are running parallel to the seashore. The land between these lines (railway, highway, and seashore) is able to form large sized economic zones at several places between the Feni river and Chittagong.

The seashore along this line is relatively shallow in nature therefore possessing great potential to create a new land area by simple reclamation. In this sense, the entire area exhibits a definite potential to form an economic zone corridor between the Feni river and Chittagong, in the future. If the Mirsarai 1 economic zone is completed, the first economic zone link will be created between Mirsarai 1 and the existing Chittagong Export Processing Zone and this link will be merged into the future economic zone network in Bangladesh shown in the following figure.

Based on the GIS data, transport pattern was studied to identify national highway, major and minor roads traversing the proposed economic zone area. This Information on existing railway lines, airport, major settlements, and infrastructure linkages is also provided. Further the data was utilized as a guiding tool for proposing the transportation network to support the proposed development.

Figure 9: Transportation Network



Power[29]

Presently there are no feeder lines available near by the proposed site. In near future PGCB will provide 132cKV transmission line. This will ensure its connectivity to the national grid system of Bangladesh. Internal networking will be done within the economic zone (EZ) to provide electricity to the customers. Each economic zone will have its own power plant to address shortage of power from national grid.

Water

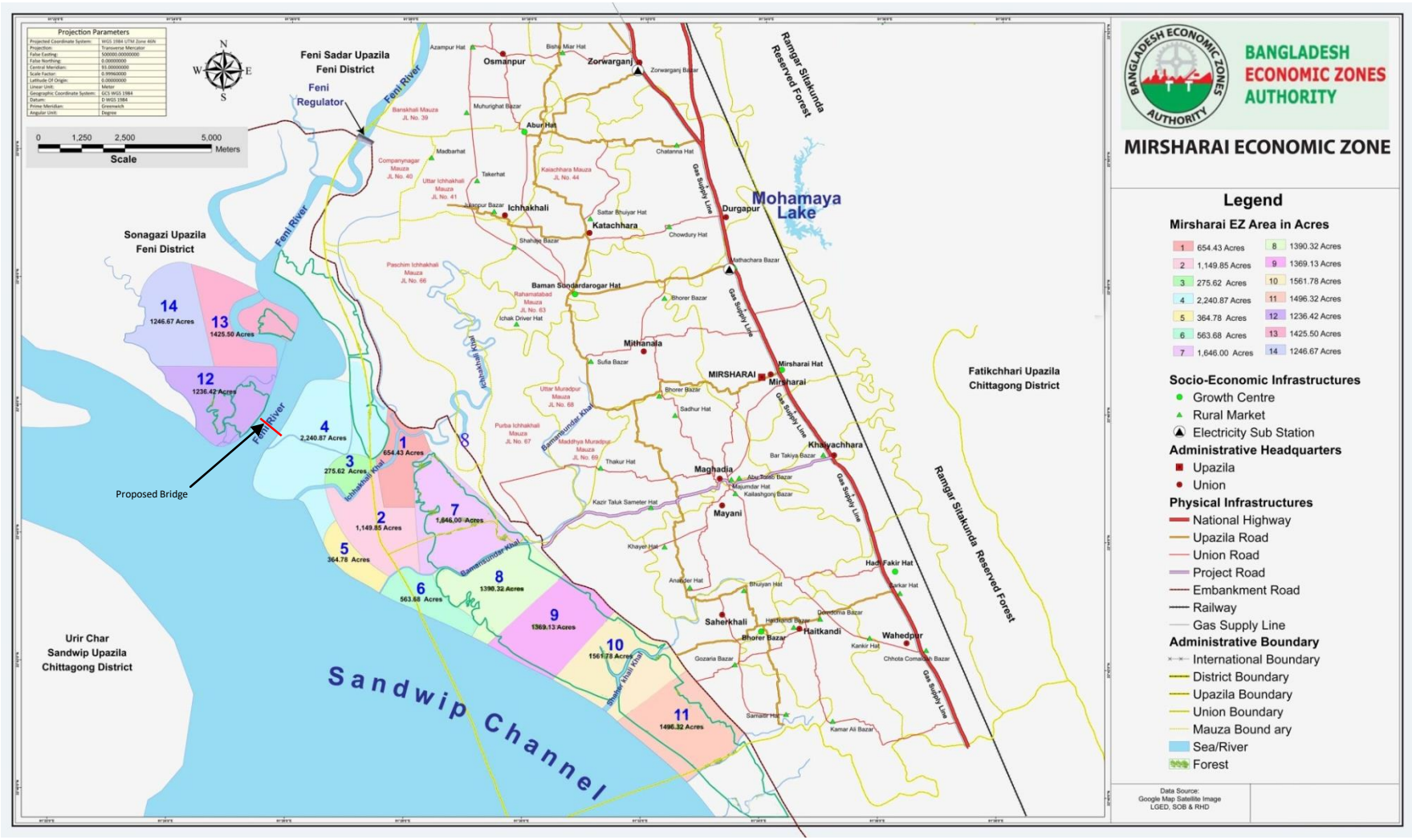
Water from the Feni river will be used as the main water supply source for the project. The place of water intake is at about 16 km upstream of the river where it is free from salinity. Recently Department of Public Health Engineering (DPHE) sunk 5 deep tube wells at different points near the project site and carried out tests. The results of the test revealed saline free water with good industrial quality.

Data Connectivity

In the last three years BTCL built about 1375 Km optical fiber network in the country under Dhaka – Chittagong high capacity optical fiber project. The most modern SDH technology was adopted in all these optical fiber links. The total length of optical cable laid under this project is about 450 Km. 18 core optical cables were used in backbone link whereas spur links were built with 12 core O.F cables. The transmission capacity of the backbone is 2.5 GB/s (STM-16) (BTCL, 2015). There are existing OFC backbones of private corporations such as Summit Communications Ltd, Fiber@Home Ltd, Bangla Phone Ltd etc. The connectivity for Mirsarai economic zone can be provided from these OFC backbones.

[29] Bangladesh has small reserves of oil and coal, but potentially very large natural gas resources. Commercial energy consumption is around 75% natural gas, with the remainder almost entirely oil (plus limited amounts of hydropower and coal). Presently about 70% of the total population has access to electricity including renewable energy . As of January 2015, per capita power generation was 348 292 Kwh through 11,265 MW installed capacity.
Power Grid Company of Bangladesh Ltd. (PGCB) is responsible for operation, maintenance and development of transmission system all over the country. Presently power generated in various power plants in Bangladesh is transmitted to the national grid through 230 kV and 132 kV transmission lines.
Electricity distribution system is controlled by national grid. Total electric power, generated from the power plants is first supplied to the national grid then to the whole country through national grid.
The Padma-Jamuna-Meghna river divides power distribution system into two zones, East and West. The East contains nearly all of the country's electric generating capacity, while the West, with almost no natural resources, must import power from the East.

Figure 10: Outline of Future Mirsarai Industrial City[30]



[30] Source: Bangladesh Economic Zone Authority

1.6 Outline of Future Mirsarai Industrial City

The government has a larger long term plan to develop Mirsarai as an industrial city of around 30,000 acres. However, the developments will take shape in phases in the form of separate economic zones like Mirsarai 1, 2, 3 etc. However, at the same time separate developments need to be harmonised so that once they together emerges as an industrial city, the city itself can cater for the common needs generated by all the economic zones.

The proposed future city indicates about 16,621 acres of land[31]. The remaining 50% land expected to be included from the vacant char land of Sonagaji upazilla under Feni District.

1.6.1 Constitution of a legal authority

In addition to the economic zones being separately managed, it is envisaged there will be a separate legal authority to manage and maintain the city linking the economic zones and coordinating the common concerns of all the economic zones.

1.6.2 Water Supply to the city

it is understood the city will require large amount of water for industrial use, which individual economic zones cannot cater with own water sources like deep tube-wells or sweet surface water. Therefore, sea water might cater for the additional needs of individual economic zones. Therefore, a central sea water desalination plant would be required in future.

1.6.3 Central Power Supply

Similarly, there might power be shortage in the individual economic zones in future or individually generating electricity may turn to be expensive, for which a central power plant can be useful. The plant may draw LNG from LNG terminal being planned and may have 50 MW capacity to cater the additional demand for power in the city.

1.6.4 Township and Communication within city

It is also planned that individual economic zones will have accommodation facilities for mid level or higher midlevel employees. However, some of them may not have sufficient accommodation especially for workers. Therefore, there is a need for city authority to take up the facilities for workers' accommodation in different places within the city.

The city authority may also run internal bus service linking different economic zones from residential facilities, large hospitals, colleges and universities. These would complement the shortage of the facilities in the individual economic zones.

1.6.5 Embankment

BEZA requested BWDB to create an embankment of 25 km around Mirsarai enclaving the existing embankment to protect the industrial city. BWDB has prepared a report for the embankment and asked for government fund and the project has been approved in the ECNEC. It is under process of tendering. The

[31] Map received from BEZA

embankment will cover from Domkhali sluice gate, then covering Mirsarai 2 upto CDSP embankment. It will be a lunar shape alignment. The alignment of the proposed embankment is shown in Figure 2.

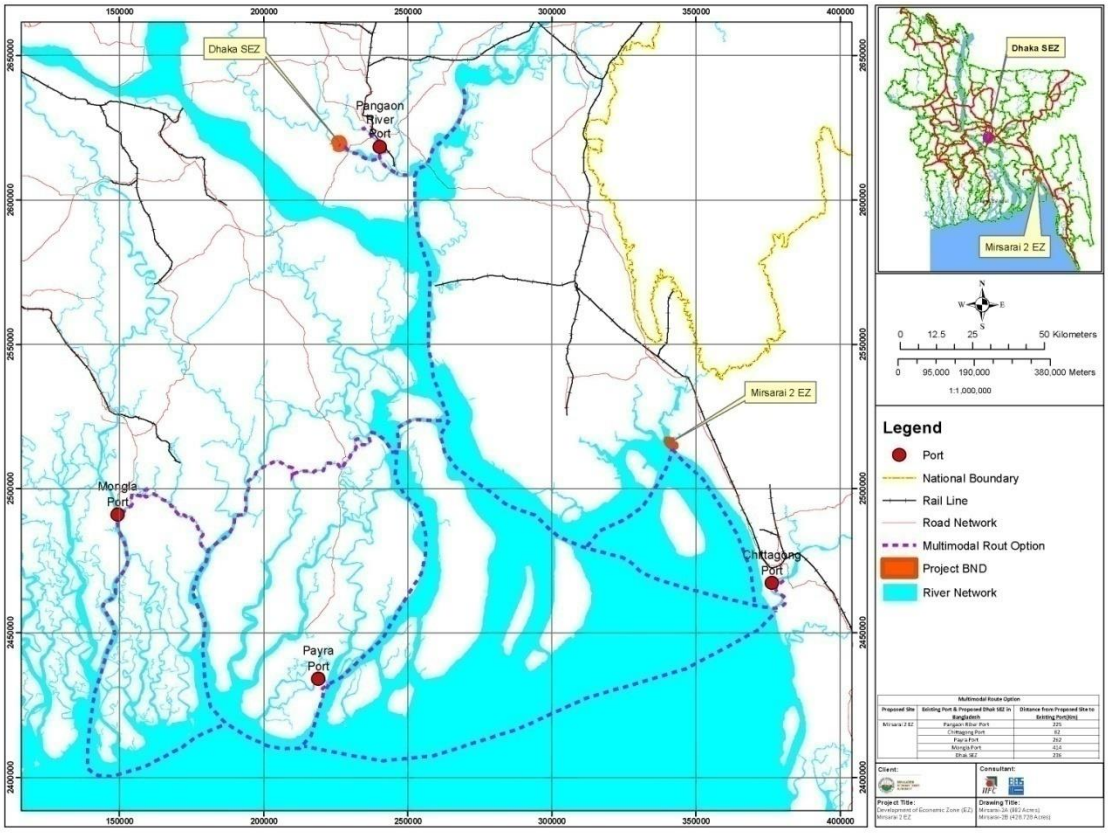
1.6.6 Multimodal Transport Terminal

Port and Waterway Connectivity to the city

The city is expected to be connected with the Chittagong Port through bay crossing vessels. In future, a dedicated port may also be planned depending upon the volume of cargo generated in the economic zones within the city. The jetty may be located outside the proposed embankment to be built by BWDB. The exact location of the jetty is subject to discussion and further study. It may be potentially located on the Sonagaji side of the city.

The city is also envisaged to be connected through waterway with other river and sea ports like Payra, Mongla, Pangaon, Jhalokathi etc. The following figure shows an indicative water route connecting the proposed city:

Figure 11: Indicative Water Way Connectivity to the Proposed Industrial City



Railway

There is an existing railway line and station connecting Mirsarai with Chittagong and Dhaka. The railway may be branched out to a separate station preferably upto the proposed jetty of the city. Depending upon the traffic, Bangladesh railway may take up a separate project for connecting the city. It will facilitate commuting the workers from Chittagong to the industrial city.

Roads

The city is adjacent to Dhaka – Chittagong highway. The highway is undergoing significant widening to 6 lanes. Side by side a 6 lane PPP road is also under process. In future there is a thought to build a direct road

connecting Chittagong port with the proposed city. There is an existing embankment from Chittagong port through Sitakundu upazilla upto Mirsarai. This can be a potential alignment of the direct road connecting Chittagong Port.

1.7 Transport Connectivity Assessment

1.7.1 Approach Roads for the Mirsarai-2 EZ Site

During the site visit on June 20 and 21, 2016, the team investigated the two approach/access roads. One is from Dhaka-Chittagong old highway, with the intersection to the highway at Borotakia bazar. The distance from Borotakia bazar to the site is about 9.30 Km and another approach/access road is from Zorarganj intersection to Muhuri Project embankment. The distance from Zorarganj to Muhuri Project embankment is about 7 Km and from the Dhaka- Chittagong highway through Old Trunk Road is about 10 Km.

Following photographs show the views of access roads and surroundings:

Figure 12: Views of Access Roads and Surroundings

View of Access Road I from Boro Takia bazar (near Dhaka Chittagong highway) to Abu Torab bazar. As On the way to Mirsarai-2 EZ site

At Abu Torab bazar, as seen on the way to Mirsarai-2 EZ site

View of access road from CP morh to Mirsarai-2 EZ site Sluice gate over Bamonsundor Channel.

Access Road for Mirsarai - 2A EZ at main access road for both Mirsarai 1 and Mirsarai 2 with view of Mirsarai 1 to the right

Dhaka-Chittagong highway to Muhuri Project embankment access road-Azampur bazar

Muhuri Dam (Sluice Gate) on Feni river

View of Access road for Mirsarai-2B. This is also north side embankment of Mirsarai 1 EZ.

View of Mirsarai 2B portion to main access road

View of access road for Mirsarai 2B portion to main access road

Figure 13: Access Roads

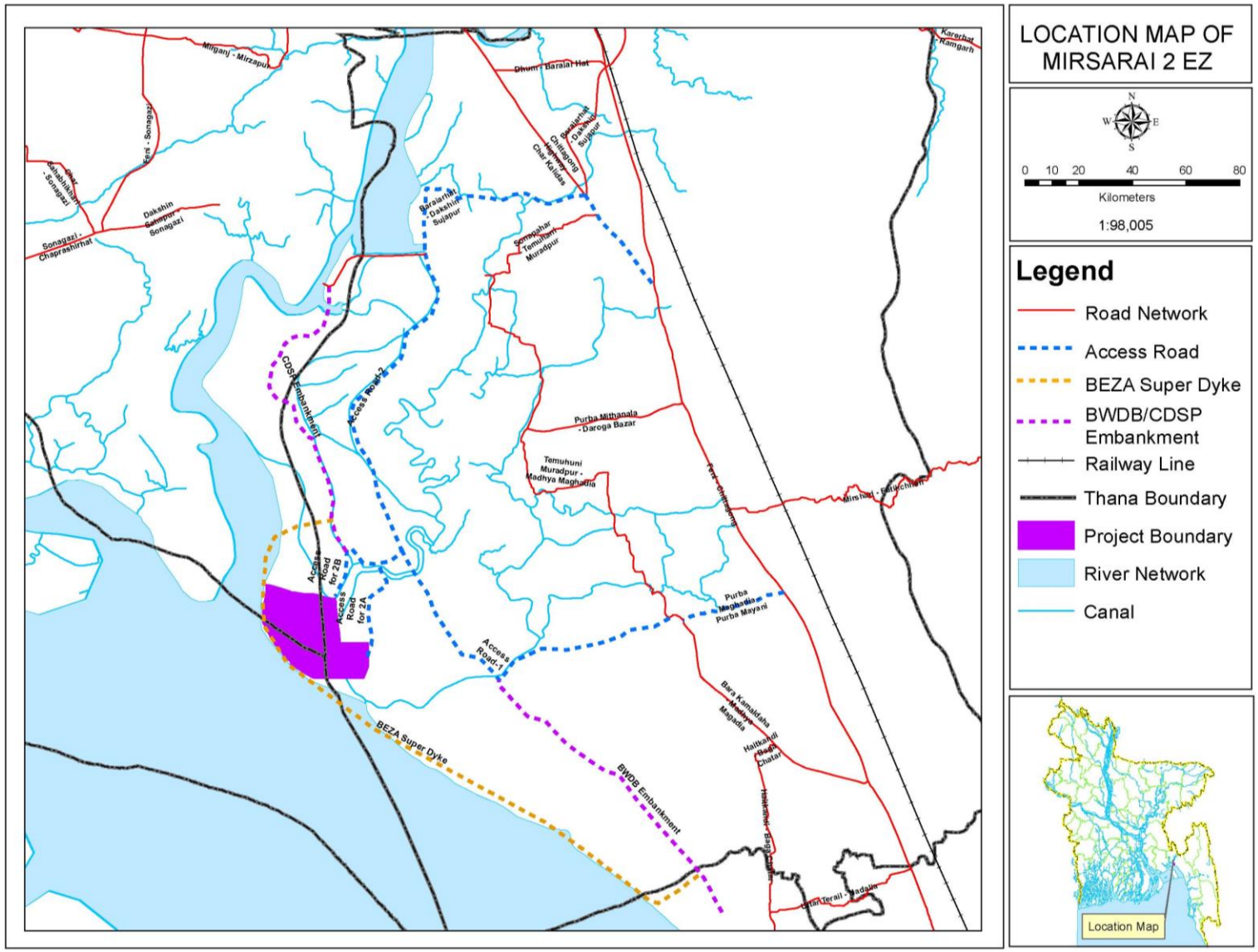
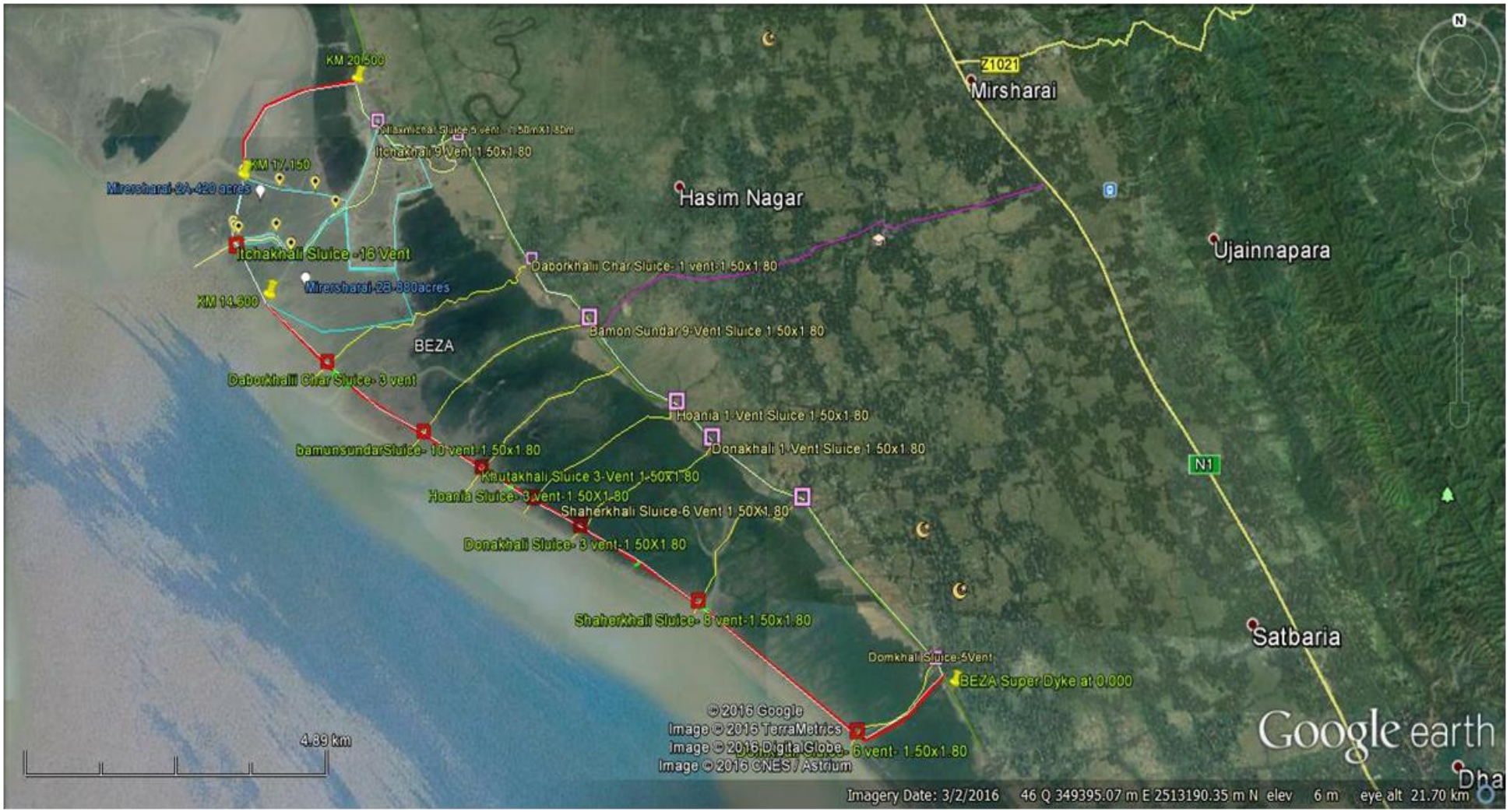


Figure 14: Proposed BEZA Super Dyke[32]



[32] Source: BWDB Chittagong Office

Access Road 1

Approaching from Barotakia bazar, the existing road meets the project site at the southern end, the local name of the junction being Noapara under Roypur union. The width of the road is 5.50 m, some with RCC (rigid pavement) surface and some with bituminous carpeting (BC). There are two tidal water canals along the road. This road can be upgraded to 18.30 m with 4-lanes.

There are two markets along the roads, Abu Torab and Moghadia bazaar. One bypass will be required at Abu Torab bazar on the DC Obaidullah road. Most of the settlements along this road are residential. The road was reconstructed in May 2008 under the Eastern Bangladesh Rural Infrastructure Development Project (EBRIDP) of LGED with financial support (at a cost of Taka 22 million) from JBIC.

The following table shows the possibilities and constraints of the existing access road from Borotakia bazar to Noapara, Roypur union (Access Road 1).

Table 1: Possibilities and Constraints of Access Road 1

Possibilities	Constraints
1. The present road width is 5.5 m with some RCC rigid pavement and some bituminous carpet (BC).	1. The borrow pit is used as canal for flow of the tidal water.
2. Widening the road is possible up to 60 ft (18.30 m) to make 4-lanes with widening of existing embankment.	2. The provision for canal to be made for flowing tidal water.
3. Alongside the road, there are (arable lands (paddy land) covering about 1/3 area. Thus the resettlement cost would be minimum.	3. A by-pass would be required at Abu Torab bazar.
4. Borotakia railway station is about 1 km apart from the Borotakia bazar intersection.	4. The road is not straight, but with its up gradation to 2-way 4-lanes, it will have to be straightened.
	5. The roadway and railway cannot be proposed at the same alignment due to non-availability of land along the existing road.
	6. The intersection point of the old Dhaka Chittagong highway and Borotakia bazar is not wide. The intersection point will have to be widened at the cost of demolishment of some shops and houses.

Access Road 2

Approaching from Zorargonj, the junction is at Muhuri Project embankment on the northern side of the project site. The existing road width is 5.5 m with bituminous carpeting. [33]There is a possibility of increasing the approach/access road up to 4-lanes from the highway-Zorargonj to Muhuri Project embankment, without any need for a bypass. Most of the settlements alongside are residential with two markets: Zorargonj bazar and Azampur bazar.

It was initially constructed by Bangladesh Water Development Board (BWDB) as an approach/access road to Muhuri Project embankment. Now LGED has taken responsibility for the road including maintenance. The existing Dhaka-Chittagong railway line is about 3 km from the Zorargonj intersection.

[33] There are some ponds, ditches (water bodies), a graveyard, a mosque and a temple along the road.

The following table shows the possibilities and constraints of Access Road 2.

Table 2: Possibilities and Constraints of an Access Road 2

Possibilities	Constraints
1. Widening the road is possible up to 60 ft. (18.30 m) to make a two-way 4-lane road.	1. Not possible to widen to accommodate rail connectivity.
2. Most of the road is straight with minimal curve.	2. The land filling cost would be more due to ponds or ditches (water body) along the road.
3. No by-pass is required.	
4. The cost for acquisition of land for road widening would be cheaper due to pond, ditches (water body).	
5. The resettlement cost would be minimum.	
6. The Muhuri Project embankment and BWDB embankment would be used for road network in an extended way.	
7. The CDSP embankment constructed in 2005 is very close to this approach/access road.	

The transport expert with the help/support of team suggests that both Access Road I & II with newly constructed embankment to the site should be developed as access roads. The existing road with embankment road should be upgraded to a 2-way 4 lane highway.

2 Approach and Methodology

2.1 Basic Philosophy Adopted for the Assignment

The methodology reflects the specific requirements of the project's scope and terms of reference as set out in the agreement. The team have given our best effort is to satisfy these requirements and achieve project objectives. Our approach has been based on the following elements:

- an approach and work plan based on careful allocation and scheduling of tasks to ensure an efficient and seamless delivery of outputs in the desired timeframe;
- a focus on producing practical and useable deliverables, rather than a more traditional focus on production of substantial reports on theory and recommendations. Whilst reports will be provided at key milestones, the emphasis of the project will be very much on practical approaches, workshops and inter-working between the consultants and the counterpart team

To accommodate within the timeframe of our engagement, the team needed to prioritize in order to get the project off the ground. The team considered that the economic zone could not be a stand-alone initiative; rather it has to be integrated with other developments in the region. Especially it has to take care of the existing power operations and connectivity with the existing network of roads, power, telecommunication and ICT networks. In addition, the team looked at the area development plan of local authorities and national authorities, so that the Economic Zone project can be harmonized with the development plan of the government.

2.2 Inception

The team submitted an inception report to BEZA. The following activities were carried out as part of inception.

2.2.1 Kick-off meeting with BEZA

At the kick-off meeting, the team covered the following issues:

- discussed the project approach and update the deliverables and timeframes. The purpose of this step will be to discuss BEZA's priorities and to ensure that the deliverables of this project meet BEZA's objectives;
- established the day-to-day working processes between the IIFC consortium team and the BEZA counterpart team, including communication, consultation, reporting and obtaining of documents and data needed for the project;
- discussed and obtained direction from BEZA on the Government's policy objectives for the sector; and
- obtained input from BEZA on key issues impacting the project objectives, tasks and deliverables.

2.2.2 Initial meetings

The team undertook a series of initial meetings with BEZA, local authorities, and key industry stakeholders. As the project team already had an understanding of the economic zones and key problems and constraints, through our team members' previous involvement with BEZA, it has benefitted to revisit the issues raised and obtain first hand input and feedback from the industry players.

2.2.3 Data collection specification

The team provided BEZA with a list of the data required from BEZA.BEZA provided support to source the data needed to complete the project tasks.

2.2.4 Site Visits

The team had intermittent site visits as required to collect technical data, conduct surveys, and hold consultations.

2.3 Component 1: Competitive Advantage and Industry Assessment

2.3.1 Activity 1: Stakeholder Meetings and a Review of Existing Studies/Information

Key BEZA staff, relevant government agencies, and utility providers, as well as, interested stakeholders (private/public sectors and civil society) were met to discuss the site and their development and investment parameters, issues and opportunities. The team have mapped out and engaged stakeholders during the assignment and conducted stakeholder consultation.

2.3.2 Activity 2: Competitiveness Analysis

The sites' potential competitiveness was benchmarked in different industrial sub-sectors vis-à-vis in other countries of the region such as India, China and other similar countries on the following key issues:

- *Connectivity infrastructure and utilities – availability, reliability and cost*
- *Availability of labour, existing industrial base, social infrastructure – especially education*
- *Industrial policy and business environment in state/country, fiscal levies and taxation*
- *Financial markets, trends of investments and exports*

2.3.3 Activity 3: Transport Assessment

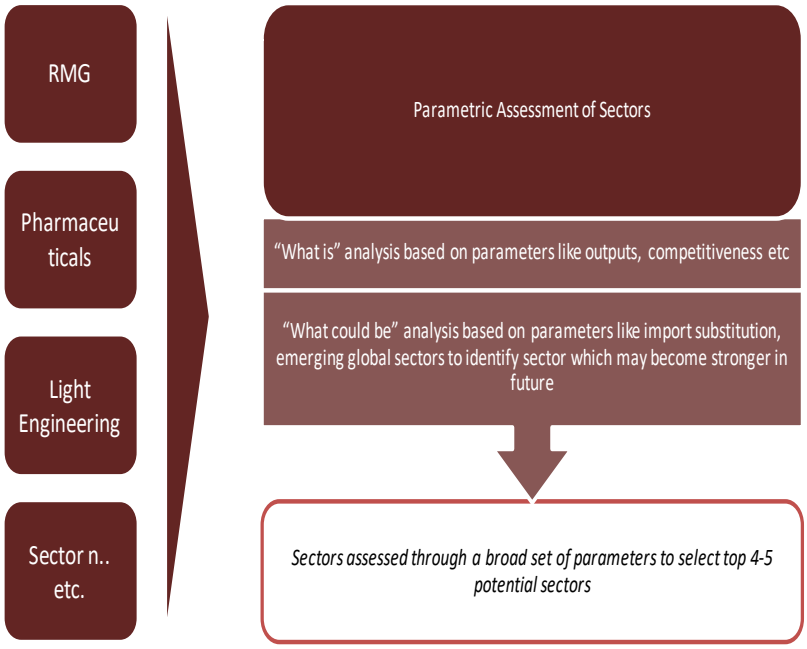
The team reviewed the transport modes and networks that would support each EZ development. A critical assessment of existing conditions, potential opportunities and constraints was identified, and a list of recommended transport infrastructure and networks was highlighted in order to make each location a viable multi-modal transport platform. The transport options supported the individual types of industry sectors being proposed for the site.

2.3.4 Activity 4: Industry/Market Assessment

Demand Analysis. The study of the macroeconomic scenario in Bangladesh with s*pecial focus on the investment scenario* received importance in our approach towards the execution of the assignment. This was followed by sector specific studies. This demand assessment was conducted through the following two methods viz. top-down approach and the bottom-up approach to validate the top-down approach. An important part of this activity is to identify the *chief sources of raw materials/other key inputs* for the industry and assess the existing and proposed linkages. Based on secondary research, the team carried out

profiling of the existing key players in the industry and identified their chief areas of competence. The team also analysed the past trend of investment in the relevant sectors in Chittagong and Dhaka and tried to assess the potential investment in the future that was required in estimating the *demand for the land* for an industry.

Figure 15: Broad Framework for Short-listing of Suitable Sectors



2.3.5 Activity 5: Demand Forecasts

In next stage, the team estimated demand and revenue potential as part of Financial Analysis of the Economic Zone.

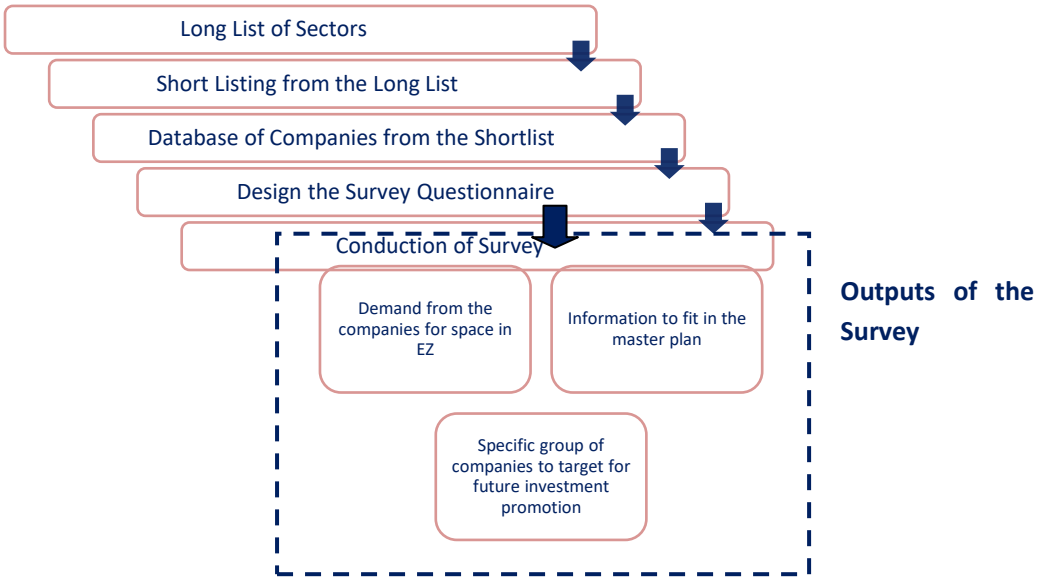
For demand forecast the team first went by manufacturing sectors and then short-listing the sectors by parametric analysis. Subsequently, a database of companies was prepared to be surveyed and a questionnaire was administered to receive the data from the relevant companies to determine if there is sufficient demand from the companies for space in the two economic zones and also to gather information to fit in the master plan and the pre-feasibility study; e.g.:

- projected size of plots
- requirements for electric power, waste water treatment, potable water, and other infrastructure and services
- desired incentives including duty-free and other typical EZ incentives, etc.

And to identify, among the companies surveyed, a specific group of companies to target for future investment promotion purposes.

The following figure illustrates the overall methodology:

Figure 16: Overall Methodology of Demand Survey



The following paragraphs discuss the above process step-by-step.

Short listing of suitable sectors

The team first created a long list of industrial sectors, which exists as 'manufacturing" under Bangladesh government economic sector classification. These are:

Long list of sectors:

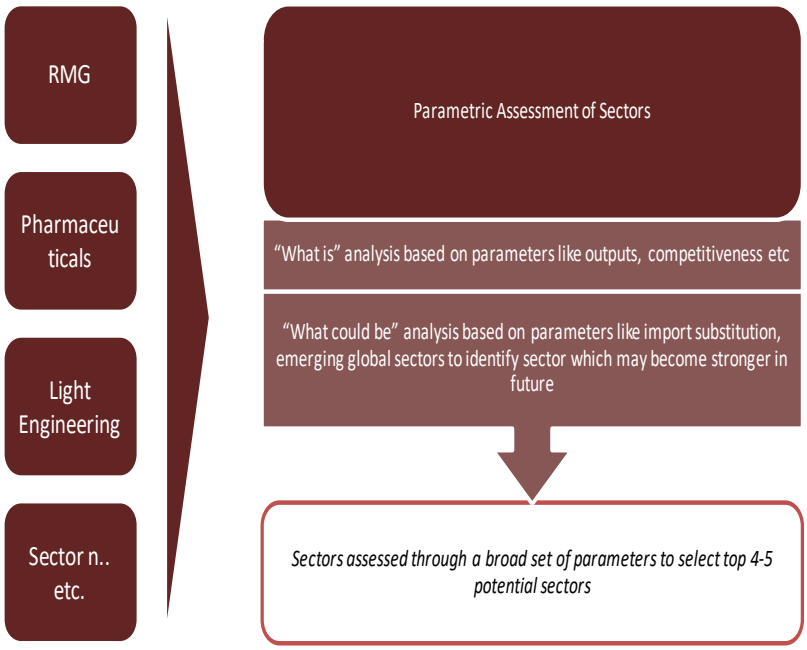
1. Textile and RMG Industry
2. Pharmaceutical
3. Leather Footwear
4. Shipbuilding and Repair
5. ICT Industry (computer, electronic and optical products and software)
6. Light Engineering
7. Frozen Fish
8. Food Processing
9. Cement
10. Wood and products of wood and cork
11. Paper and paper products
12. Printing and reproduction of recorded media
13. Refined petroleum products
14. Chemicals and chemical products
15. Rubber and plastics products
16. Non-metallic mineral products

17. Basic metals
18. Fabricated metal products
19. Electrical equipment
20. Machinery and equipment
21. Motor vehicles, trailers and semitrailers
22. Furniture

From the above long list, the team shortlisted them on a priority based on the following parameters:

1. Suitability with respect to land per unit of value addition;
2. Suitability for proximity to port facility or sea;
3. Environmental suitability;
4. Labor availability in the region (Dhaka or Chittagong);
5. Presence of raw materials/ backward linkage industries in the region (Dhaka or Chittagong);
6. Presence of forward linkage industries as well;
7. Growth prospect/export competitiveness;
8. Import substitution prospect; and
9. Suitability with respect to existing local demand for the products.

Figure 17: Broad Framework for Short-listing of Suitable Sectors



The relevant portion of ToR provides as follows:

"In close coordination and consultation with the BEZA, the World Bank Project team and other key stakeholders, the consultants will create a long list of 6 potential sectors, both industry and services, for the economic zone program. The consultants will be expected to suggest sectors as well as how the chosen sectors should be broken into sub-sectors."

"The final list of sectors must be approved in writing by BEZA, ...".

The team created a short-list of the sectors, based on the above criteria, to fit them in the master plan for the two economic zones and were presented for approval.

Short list of sectors:

Mirsari 2A

- Textile and RMG Industry
- Pharmaceutical
- Leather Footwear
- Shipbuilding and Repair
- ICT Industry (computer, electronic and optical products and software)
- Light Engineering
- Frozen Fish
- Food Processing
- Petrochemical
- Cement

Mirsarai 2B

- Textile and RMG Industry
- ICT Industry (computer, electronic and optical products and software)
- Light Engineering
- Food Processing

Dhaka EZ

- Textile and RMG
- Pharmaceuticals
- Light Engineering
- Plastics

Space Allocation in the economic zone for Shortlisted Sectors

The team carried out a scoring excercise of the short-listed sectors to prioritise the space allocation for each sector in the economic zone based on suitability of the sector for the economic zone. The scoring system with respective weights for different parameters are as follows:

Table 3: Scoring Table of Each Sector

	Parameter	Weightage	Suitability (High/Low/Medium)	Score	Weighted Score
1.	Suitability with respect to Land per unit of Value Addition	25%			
2.	Suitability for proximity to Port Facility or Sea	15%			
3.	Environmental Suitability	15%			
4.	Labor availability in Chittagong region	10%			
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%			
6.	Growth Prospect/Export Competitiveness	10%			
7.	Import substitution Prospect	10%			
8.	Suitability with respect to existing Local Demand of the Products	5%			
	Total Score				

Scores: High 10, Low 0, Medium 5

The above box was filled up for each sector to find the total score and then they were be ranked by total scores. Space will be allocated on the basis of total scores so that the viable sectors receive highest consideration for potential investment.

Demand Survey

Apart from the above theoretical exercise, the team conducted a survey to ascertain the demand for industrial spaces/plots in the economic zones. More specifically the purpose of the demand survey is to:

(a) determine if there exists satisfactory demand for the services of an economic zone;

(b) determine the sectors for which there is demand in these sites;

(c) gather information to feed directly into the master plan and pre-feasibility study (e.g., projected size of plots, requirements for electric power, waste water treatment, potable water, and other infrastructure and services, desired incentives including duty-free and other typical EZ incentives); and

(d) identify, among the companies surveyed, a specific group of companies to target for future investment promotion purposes.

Activity 1: Create a Database of Companies to be surveyed

The team created a database of 50 companies in the priority sectors with the following characteristics:

- Target companies that are potential zone end-users (i.e., the companies that will locate inside the zones), and not companies that are exclusively zone developers or operators.
- Both local and foreign (distribution of local vs. foreign) companies
- Relatively even distribution by industry

- Full information on the name and nature of the company, identify the focal persons with their full contact details, base country and structure of capital (by country), website, etc.
- Prepare a list of companies that are currently located in one of the country's industrial zones/EPZs and expressed interest to set up another industry/unit in the new economic zone.

The ToR suggests to survey *"at least 300 companies total in the priority sectors."* Several surveys have been carried out during investment promotion stage of Mirsarai 1 and Dhaka EZ; and IIFC has carried out a separate survey for setting up a SME industrial park in Keraniganj, Dhaka. On both occasions, higher demand for land has been confirmed by a large number of investors. *the team proposed the number of companies to be 50.*

The same survey was carried put for both Mirsarai 2 and Dhaka EZ. The team submitted the list of the companies surveyed.

***Deliverable:* Database of Companies.**

Activity 2: Create the Survey Instrument

The team drafted the survey questionnaire to bring together the following information:

- Country of global headquarter
- Name and contact details of the respondent
- Size and annual revenue of the company
- Exact products or services, sales value, sales destinations (in-country sales vs. exports and which exact country destinations)
- Expansion plans, potential interest in investing in Bangladesh (for foreign companies), and at which site (both foreign and local companies), and which of Bangladesh sites would be the preferred choice (ranked), given the current location, available infrastructure, and conditions of investment; destination markets for the expansion.
- Requirements for additional conditions (industrial zone with no special law vs. economic zone with special incentives, privately-operated zone vs. government-operated zone, specific incentives which would be important – ranked – etc.)
- Reasons for expansion, criteria for choosing a site, etc.
- Given a positive response for the previous question, projected timeframes for the expansion, and projected needed size and configuration of land, electric power, water including wastewater treatment, solid waste removal, telecommunications, and any other physical and infrastructure needs.
- Given a positive response to the expansion plans, projected needs for personnel, sub-categories of personnel, infrastructure and service needs, and requirements for labor pool size, proximity to urban area, universities, etc.
- Preferences for purchasing land, renting land and constructing their own building, or renting space in a standard factory building (ranked)

A draft of the Questionnaire, which was a test run exercise with five Chittagong and Dhaka-based companies is attached for comments of BEZA and the WB.

***Deliverable:* Final Survey Instrument i.e. Questionnaire**

Activity 3: Conduct the Demand Survey

The team conducted the demand survey, preferably one-on-one in the physical presence of the company representatives as follows: at least 80% of companies to be physically surveyed.

The ToR provides that:

"The consultants will be required to survey the majority of local companies in person. At least 20% of the international surveys should be administered in person[34]."

The team documented the companies and contacts interviewed as well as the findings from each individual interview.

Deliverable: 50 completed responses with each of the sectors and sub-sectors sufficiently represented.

Activity 4: Analysis of the Demand Survey - Industry Assessment, Demand Projection, and Market Strategy

A summary report has been written consisting primarily of (i) an analysis of the raw data, (ii) recommended priority site(s) for an economic zone plot, and (iii) for that (those) site(s), an industry assessment and a demand forecast sufficient to serve as the industry/demand section.

Industry / Site Analysis:

The analysis of the data from the demand survey pulled in information from the studies and reports reviewed under Activity 1 as well as available country trade and investment data to indicate:

- The sectors and sub-sectors that have the greatest demand, and therefore should be targeted
- Which sectors and sub-sectors demonstrate little demand and should be eliminated or receive low priority
- Whether the respondents to the survey from the priority sectors have expressed a preference for locating in an economic zone (vs. in an industrial zone or outside of any zone at all) and are willing to pay additional charges/fees, if the zone is "special"
- In an economic zone, which incentives and services are most important (ranked)
- Which sites are coming out the strongest for which sectors
- A ranking of sites should be developed, if the respondents have expressed a preference for an EZ between Mirsarai or Dhaka EZ.
- For the top-ranked site, some basic recommendations on specific facilities for development (such as, projections on plot requirement amount, plot/factory sizes, industry-wise yearly water consumption, electricity requirements, training facilities, and working strength, etc. for each industry/sector over a 20-year period) would be included.

Demand Forecast

The analysis proceeded to the next step by preparing a 20-year demand forecast for the site(s) selected. The demand projections were developed in three scenarios: *(i) a conservative case, (ii) a base case, and (iii) an aggressive case*. A separate demand projection would be prepared for each site. The findings of the demand forecasts highlighted, in each year interval, the amount of land required and the number of investors projected for each location by sector.

The following are the assumptions for each case:

[34] There is no scope for international survey in our assignment

Table 4: Assumptions for Different Cases

Conservative Case	Base Case	Aggressive Case
• There are delays in preparing necessary offsite infrastructure for the economic zone. • Business enterprises remain in city as pressures to relocate lessen. • Business enterprise industry associations are not able to effect en masse relocation, and are not able to arrange for the necessary financing options for business enterprises.	• Interest from business enterprises located in Chittagong remains strong, being actually interested and capable of relocating to the economic zone. • The government of Bangladesh takes action or incentives to encourage industrial enterprises to establish new industries in the economic zone and relocate/expand away from city. BEZA promises to provide relocation and facilitation services such as training, one-stop bureaucratic services, and other amenities inside the economic zone. • The economic zone contains a dedicated source of power generation, water, effluent treatment, and solid waste disposal. • New economic zones may be built or expanded during the next 20 years.	• The proposed economic zone will contain more newly formed firms than in the Base Case Scenario. This will arise due to the greater ease to start and operate a company. • All regulatory approvals, especially those for establishing the business enterprises in the economic zone, will be provided and regulated within the zone itself. This differs from the Base Case, whereby all consents must be obtained from the central authorities. • The political conditions will remain peaceful, for at least first five years of operation. • The linked projects for offsite infrastructure needed for the zone, will be completed on a fast track basis by the government, while the Base Case assumes that the operation of the zone will continue in parallel with the period while all the required off-site infrastructure may not be complete. The zone can start operation, with a slim access road first, then widening works may go on while the operation of the zone is continued. However, it assumes that the power plant will be built on an urgent basis. • The proposed economic zones will be aggressive in marketing and promotion of the zone to business enterprises. • Raw material and services suppliers will be allowed to locate inside the two economic zones on a first-come, first served basis.

2.3.6 Activity 6: Market Strategy

Market strategy is regarded as "a method or plan to attain and maintain a position of competitive advantage and to be seen to the investors as having competitive advantage through effective use of resources, which maintains attraction of investors". The team prepared a market strategy for the economic zone. The purpose of the market strategy is to provide an overview of how the site would be packaged, promoted, and what type of materials would be needed for each zone's start up.

Under this activity, the team prepared a market strategy for each site. The purpose of the market strategy is to provide BEZA with an overview of how each of the priority sites should be packaged, promoted, and what type of materials would be needed for each zone's start up.

1. The market strategy included, but not be limited to:
    - Identify overall strategy, timing, and implementation framework and responsibilities
    - Identify target markets, countries and investor profiles
    - Identify type of promotional tools and materials required
    - Identify opportunities and ways to coordinate with BEZA.
2. The annexes included the following:
    - A list of the respondents to the survey with country of origin and sector
    - questionnaire template used
    - the raw data of responses for each question (preferably in graph form with exact percentages indicated of responses and all important anecdotal information)

2.1 Component 2: Master Planning, Infrastructure, and E&S Footprint

2.1.1 Activity 1: Site Assessment

The team had undertaken a detailed site visit to understand and collect the following data.

- Profile of the land, access
- Water source – quality & quantity
- Existing structures like pump houses, wells, transmission lines, trees, bushes
- General soil profile
- Constraints from construction point of view
- General cutting & filling area
- Boundary demarcation
- Infrastructure availability road connection, sub-station
- Neighbourhood study
- Topographic survey
- Geo technical investigation reports

2.1.2 Activity 2: Best Practice Master Plan

Basic Planning Study. The team reviewed and confirmed the work already conducted by project sponsors and conducted complementary planning surveys. Based on consultations with BEZA and stakeholders as well as objectives of the zone, the Master Plan has been developed for Mirsarai 2A and 2B.

Preliminary Design. It has been done at a broad level and in doing so; the team looked into the following aspects:

- *Boundary shape*
- *Physical site features*
- *Area availability*
- *Environmental considerations*
- *Social issues*
- *Micro climatic conditions*
- *Compatibility issues*
- *Surrounding areas*
- *Buffer requirements*
- *Accessibility*
- *Security*
- *Logistic requirements*
- *Transportation issues*
- *Functional requirements*
- *Visibility*

Final Design. The team made the final design based on the planning and design studies to propose the overall architecture for the site, based on preliminary design.

2.1.3 Activity 3: On and Off Site Infrastructure Requirements and Associated Costs

Starting with an estimation of the saleable land, the team first obtained relevant inputs on infrastructure requirements (based on inputs from the Industry Analysis) and the area they would take up:

a. *Industrial Infrastructure* requirement

b. *Social and commercial* infrastructure requirement

Infrastructure for industrial purpose. The team analyzed the infrastructure requirements of the proposed number of units. These infrastructure requirements included infrastructure such as:

- Water requirements
- Connectivity requirements
- Power requirements
- Social Infrastructure requirements

Based on the direct and indirect job creation, the team estimated the requirement for social infrastructure at the economic zone site.

Non-industrial infrastructure. Having determined the broad configuration of the "industrial area land", the team analysed the possible composition of the "non-industrial area land" such as hotels, logistics parks, convention & exhibition centre, specialty healthcare and education centres, corporate parks, hyper malls, housing (other than for the captive requirements of the economic zone.

2.1.4 Activity 4: Environmental and Social Footprint

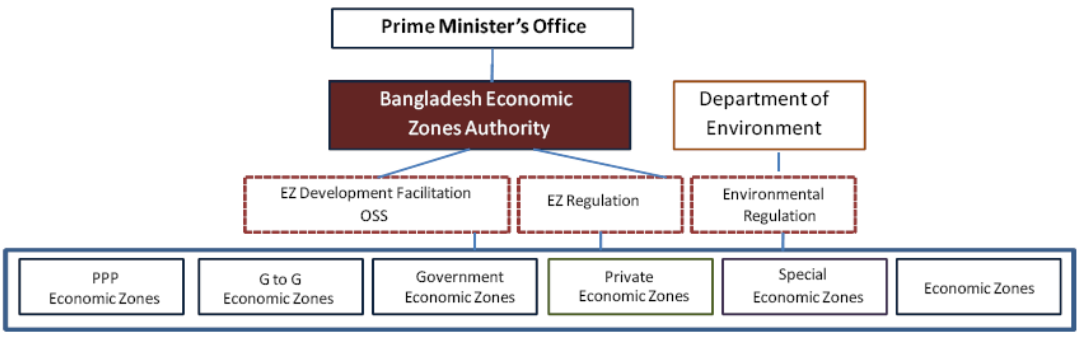
For environmental and social footprint, the team have analysed the following:

- *Physical Environment*
- *Biological Environment*
- *Social and Cultural Resources*

2.2 Component 3: Institutional Framework

The institutional framework as below indicates that there need to be an interfacing between BEZA, Prime Minister's Office and Department of Environment for regulating the Economic Zone.

Figure 18: Institutional Framework of Economic Zones



The team have detailed out the interrelationship in Section 9.

2.3 Component 4: Economic and Financial Modeling

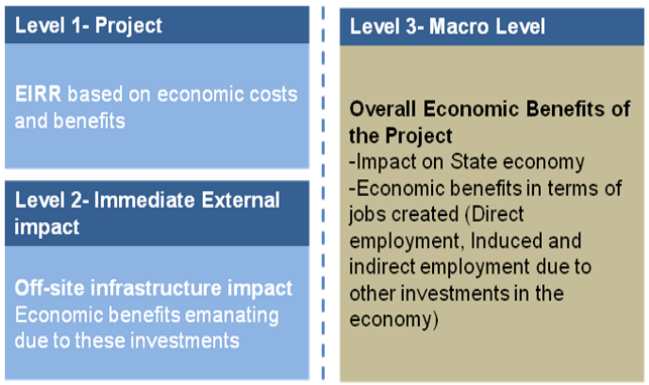
The team analysed the project from both *economic and financial point of view* as well as funding requirements with sources:

- ***Economic analysis*** – estimate economic costs and benefits for the project in terms of rates of return on investment and net present value, with sensitivity analysis for various key variables.

- ***Financial analysis*** – estimate financial costs and benefits and evaluate financial viability using net present value and internal rates of return in constant prices with sensitivity analysis for at various key variables.

2.3.1 Activity 1: Economic Model

The purpose of the economic analysis is to quantify the economic and social benefits of the project with its costs of implementation and operations. In conducting the economic impact analysis of the economic zone, an economic model will be built to identify and quantify costs and benefits associated with the zone development business. The outputs of the model are the Economic Rate of Return (ERR), Benefit Cost ratio (BCR) and Net Present Value (NPV) of the project. The team identified the unquantifiable benefits linked with the project to evaluate the overall economic and social impact of the project.



The approach and methodology of the economic analysis of the Economic Zone is shown below:

a) Comparison between scenarios where Project is implemented and where Project is not implemented: To identify the benefits and costs of the Economic Zone, a matrix will be designed to portray the economic and social impacts of implementing the project. The matrix will help to identify the service and facilities gap as well as to assess the needs of the project.

b) Compare Benefits with Costs: Project investment decisions involve large up-front costs, with benefits that are achieved over time. The team will identify the costs and benefits of the proposed Economic Zone and classify the relevant benefits and costs into two subcategories: (a) Quantifiable and (b) Unquantifiable. Then a framework will be developed to define the value and to measure the quantifiable benefits and costs associated with the Economic Zone. It is envisaged that the industries which will be set up in the Economic Zone will be able to achieve higher efficiencies and hence better productivity.

c) Prepare Economic Model incorporating Results of Financial Model: The team will convert the financial profit/(loss) (considering capital expenditure, operational expenditure, revenue) into economic equivalent terms in designing the economic model. Economic benefits of the Economic Zone will be estimated and added to the financial profit. Costs, including economic costs and taxes, will be subtracted to attain the net economic benefit of the project.

d) Discounting Benefits and Costs to Present Values: The team will design the economic model to calculate the Economic Rate of Return (ERR) and Cost Benefit ratio. In this context, the team will quantify the corresponding costs and benefits which would be generated during the development of the Economic Zone. Thereafter, all pertaining quantifiable future costs and benefits will be converted into present value terms by applying Net Present Value (NPV) principle.

Deliverable: An economic model for each Economic Zone site that illustrates the economic/social benefits (ERR) of each project.

2.3.2 Activity 2: Financial Model

The key objectives of preparing a financial model for financial analysis were:

- to demonstrate the financial viability of development of the Economic Zone based upon demand forecast, expected lease rates, cost estimates, planning parameters and other information.
- to illustrate the sensitivity of the financial and commercial viability to key parameters and to identify the areas which could be adjusted (lease rates or other parameters) to influence the profitability of the project.
- to determine the requirement of initial support and later on to implement project on a commercial footing.

The main approach was to determine the financial viability of the project on the basis of an assessment of demand forecast for industrial plots, revenue collection from commercial areas, capital cost estimate for the project, revenue projection and financing structure.

Financial analysis of the project took into consideration, such factors as:

- Short and long-term financial obligations;
- projected revenue stream, projected costs (fixed and variable), depreciation schedule and asset construction schedule;
- Demand forecast for leasable area of the Economic Zone;
- Lease rate structure and the impact of amendments in that structure;
- Sources and cost of capital

The financial model covered the following:

a) Determination of the revenue projection, projection income statements and cash flow statements over the life of the project.
b) Calculate various matrices such as IRR, payback periods and debt-service coverage ratio for assessment of project viability.
c) Sensitivity analysis on the major parameters including capital cost, O&M cost, lease rate etc. in order to explore its sustainability under different changing situations.
d) Financial analysis on options for cost recovery of capital investments and recurrent costs under different demand forecast scenarios.

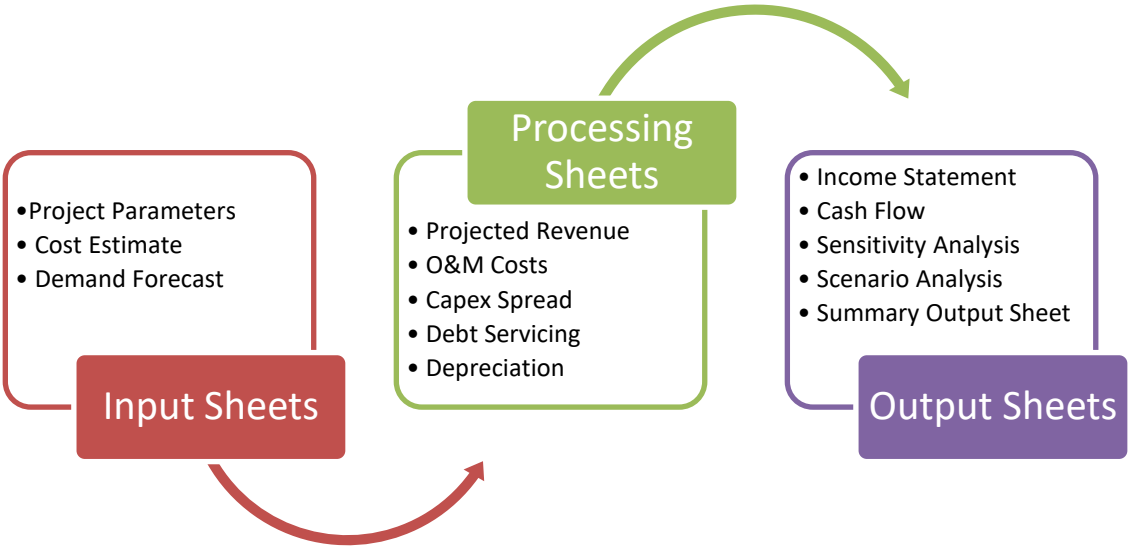
2.4 Structure of the Financial Model

The financial analysis for the project was conducted using a spread sheet based model providing:

1) a projection of each component of cost and expenses on the basis of a consistent set of background financial/economic assumptions; and
2) the revenue generated by a given structure of revenue sources. The results of combining cost and

revenue projection are presented as output indicators as shown in the following figure.

Figure 19: Flow Chart of the Financial Model



The model contains interlinked sheets keeping in view of the available data and information. The sheets of the model are as follows:

Input Sheets	
	1) Project Parameters 2) Cost Estimate 3) Demand Forecast
Processing Sheets	
	4) Debt Servicing 5) Projected Revenue 6) Depreciation 7) Projected O&M Costs
Result Sheets	
	8) Income Statement 9) Cash Flow 10) Sensitivity Analysis 11) Scenario Analysis 12) Summary Output Sheet

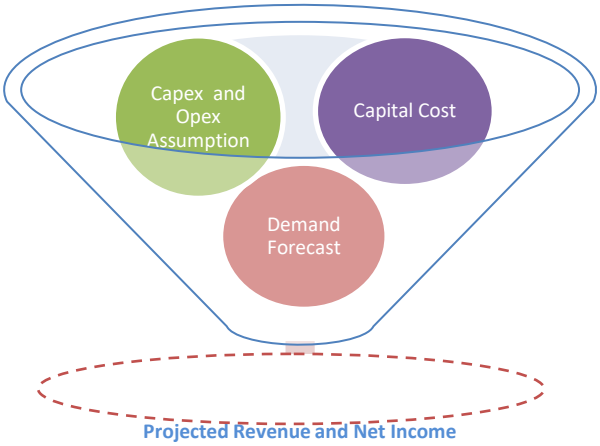
The input and input support sheets accommodate all the basic inputs of the project required for the financial model. These inputs have connection with other sheets (processing/intermediate calculation) where specific calculations are made. Then the outcomes of the individual sheets were connected to the result sheets to obtain the final results. Sensitivity analysis is also included in the model to test its sensitiveness on change of different important parameters.

The interlinked sheets as used in the financial model are briefly described below.

2.4.1 Input and Input Support Sheets

The input sheets include (1) Capex Assumption sheet (2) capital cost summary sheet, and (3) demand forecast sheet (**Error! Reference source not found.**).

Figure 3: Input Sheets in the Model



Capex and Opex Assumption

This two sheets contain all the major parameters of the project which will act as inputs to the model. The parameters include: (1) leasable commercial area, and (2) cost escalation factors, etc.

Capital Cost Summary

Capital cost summary sheet includes land development, off-site infrastructure, on-site infrastructure, project management costs of the project.

This worksheet provides a summary of the project costs for the development of the economic zone. This worksheet has an onward relationship with depreciation sheet, Capex year sheet and cash flow sheet.

Demand Forecast

The sheet provides different demand projections based on different space take up scenarios. The projected demand is used for determining the projected revenue and projected variable costs for the project.

This sheet has an onward relationship with the revenue and O&M sheets.

2.4.2 Processing Sheets

The processing sheets compute and process data as provided in the Capex assumption and capital cost sheets. The processing sheets are follows:

(1) sources of finance (2) revenue, (3) depreciation, (5) O&M Costs and (6) Capex month.

Sources of Finance

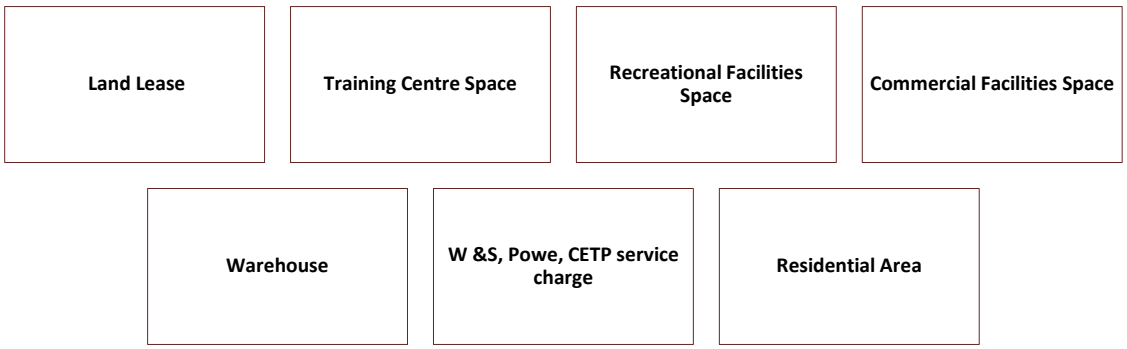
This worksheet sets out a consolidated summary of finance stating separately the yearly amount of equity and loan in Bangladeshi Taka. The computation of yearly equity is derived from capital cost, and debt equity ratio. It is linked with the cash flow sheet.

Revenue Sheet

This worksheet calculates the projected revenue of the Economic Zone from sources such as:

a. Rent from Land Lease
b. Rent from Training Centre Space
c. Rent from Recreational Facilities Space
d. Rent from Commercial Facilities Space
e. Rent from Warehouse
f. W &S service charge from tenants
g. Power service charge from tenants
h. CETP service charge from tenants
i. Rent from Residential Area

Figure 20: Sources of Revenue



Revenue is calculated based on the demand forecast and the lease rates. The output of the revenue sheet is processed in the income statement sheet to calculate the projected net income of the operator.

Depreciation

Depreciation sheet calculates the depreciated value of the assets annually. The sheet takes data from Capex assumption sheet and after computation, the depreciation expense from this sheet goes to the income statement.

O&M Costs

This sheet receives data from the input sheet and input support sheets regarding operation cost, maintenance cost and fixed costs of the project. The output of the O&M costs sheet is used in the income statement sheet to calculate the projected net profit of the business.

Capex Year Sheet

The Capex year sheet is used for incorporating capital cost staggering year by year.

2.5 Financial Statements

Results of operating performance and financial position at periodic intervals are the essence of financial statements. The financial model provides projected financial statements such as, income statements and cash flow statements depicting profitability, liquidity and overall financial health of the entity. The result sheets include (1) Income Statement and (2) Cash Flow Analysis.

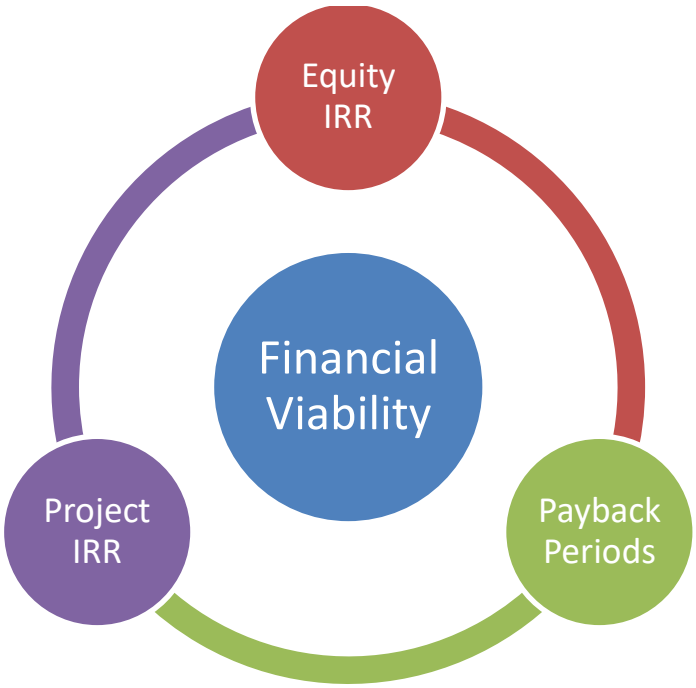
2.5.1 Income Statement

The financial model provides income statements for each year for 20 years. The revenue stream over the years from commercial operations date is shown in the income statement. The statement also shows the operating expenses (fixed and variable), financing expenses and depreciation expenses as deductions from the revenues to obtain net income before tax. After deducting applicable tax, the net income for the equity holder is derived.

2.5.2 Cash Flow Analysis

Cash flow statement is an important financial output in the model, especially to work out the appropriate cash requirements of the project. The financial model incorporates the cash flow analysis for the project and determines the Project and Equity IRR.

Figure 21: Key Financial Indicators



2.5.3 Result (Financial Indicator) Sheets

Summary Output Sheet

The key requirement for financial viability is that the business is able to earn profit and keep up cash flow sufficient to finance all necessary future investments.

This sheet gives the results of the model run in summarized form. The key results indicators are:

1) Internal Rate of Return (IRR) on capital employed in the total project and on equity. This is the ultimate parameter to determine the viability of the project.
2) Total Capital Payback Period
3) Equity Payback Period

Sensitivity Analysis Sheet

Sensitivity analysis is used to test the robustness of the results to variation in key inputs and project parameters. Cash flow as well as financial indicators depend on the interplay of several factors including capital cost, O&M cost and revenue and charges it earns from different category of services. It can be used to identify the values, if any, at which, preference for one option is switched to preference for another. Considering these variations of parameters, change of output /results is found through this analysis.

Scenario Analysis Sheet

The model incorporates different demand forecast scenarios. This sheet analyses the results of these scenarios in different combinations.

Deliverable: A financial model and sensitivity tests for the site.

3 Economic Scenario of Bangladesh

3.1 Growth

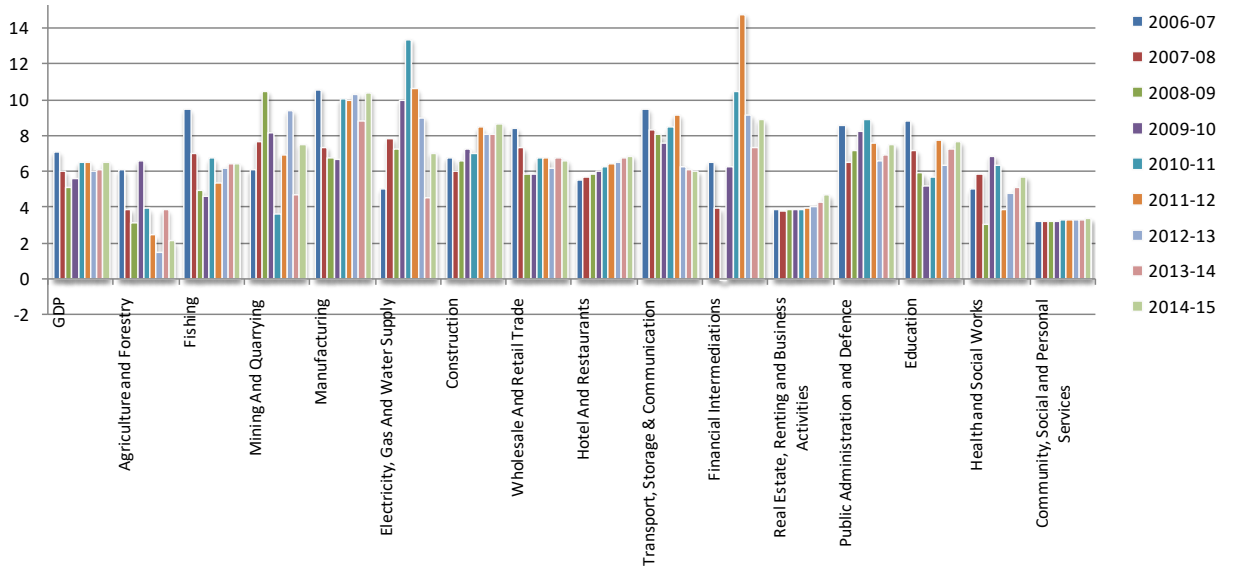
As already mentioned, the Bangladesh economy has been experiencing steady growth over the last decade and prospects are looking better for the coming years, with a booming industrial sector, flourishing remittance flow, record high foreign currency reserve and growing interest of international investors' in Bangladesh.

Bangladesh achieved more than 6 percent[35] economic growth on average in the last five years. Most of the global economies including the Asian economies were affected by the global economic crisis and their growth rates significantly declined in 2009. After the five years of financial crisis, the global economics are struggling to revive the growth of economy. In spite of global economic downturn, the economy of Bangladesh has been maintaining high and sustainable growth rate.

GDP growth during 2014-2015 was based on 7.48 percent growth in industry sector followed by 6.59 percent growth in service sector and 2.7 percent growth in agriculture sector. The growth of industries in 2015 was largely driven by higher manufacturing activities and growth in export earnings[36].

The growth of the industrial sector is dominated by exports earning in RMG, which has been growing at an average of 20 percent[37] over the last 5 years.

Figure 22: Sector wise Growth Rate (at constant price)



Source: Bangladesh Economic Review, 2016[38]

The growth that had occurred in the service sector of the economy was fuelled by growing importance of education, health and social activities. Income growth had been dominated by wages and salaries in incorporated firms. The life span of the population continued to increase with more urbanization and more apt to live in a modern life. The later trend is particularly helping to reduce poverty level.

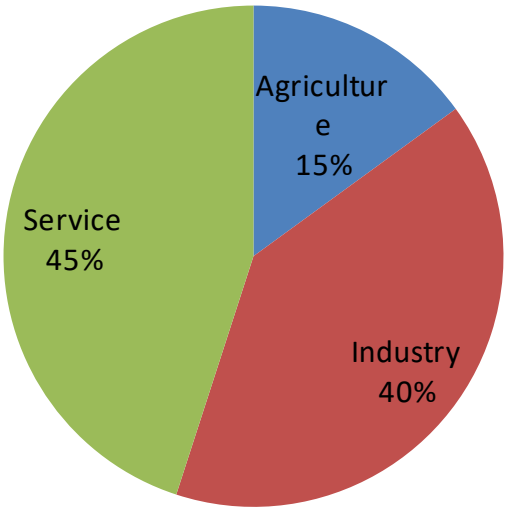
In the past decade, the economy has apparently become more stable. Living standards, as measured by per capita GDP, had improved at a higher rate. Internal and external balances were in good shape. Unemployment rate remained at a reasonable level. The economic stability and business prospects that prevailed in this particular period have generated significant confidence that may be a cause for good economic development in the near future.

[35] Ministry of Finance
[36] Bangladesh Economic Review, 2016
[37] Bangladesh Bank
[38] Growth statistics after 2004-05 calculated following base year 2005-06

3.2 Vision 2021

In reorganization of the long-term development challenges, the government adopted Bangladesh Vision 2021. The vision and the associated Perspective Plan 2011-2021 have set solid development targets for Bangladesh by the end of 2021. Bangladesh plans to achieve lower-middle income status by 2021, which requires the economy to grow by 8 percent to 10 percent[39] per annum. Bangladesh economy has sustained modestly high growth in the last 10 years. Achieving the targeted robust growth will require a major spur in the rate of investment.

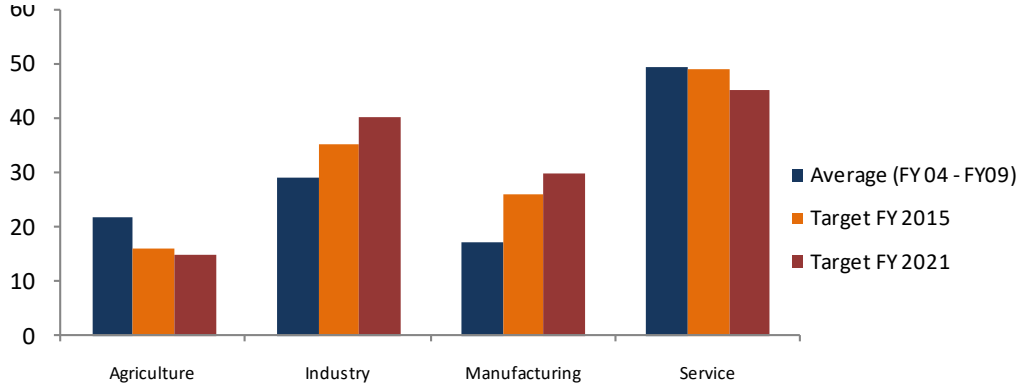
Figure 23: Target Share of GDP (percent) by 2021



Source: Perspective Plan of Bangladesh 2010-2021

Promotion of structural transformation in the economy has been cited as one of the important strategic goals of the Perspective Plan. In the structural transformation process, within the time of Perspective Plan 2011-21, agriculture's share will decline from 22 percent[40] in 2009 to 15 percent[41] by the end of Seventh Five Year Plan and share of industry will increase from 29 percent[42] to 40 percent[43] by the end of Seventh Five Year Plan. Share of manufacturing will grow from 17 percent in 2009 to 30 percent in 2021.

Figure 24 : Strategic Structural Change: Share of GDP (percent)



[39] Perspective Plan 2010-2021
[40] Same as above
[41] Same as above
[42] Same as above
[43] Same as above

Source: Perspective Plan of Bangladesh 2010-2021

As a strategic option, Seventh Five Year Plan explicitly has chosen the path of boosting manufacturing for creating productive high-income jobs and development. It is found that decline in share of agriculture is projected to be compensated by increased share of industry and manufacturing while share of services remains steady.

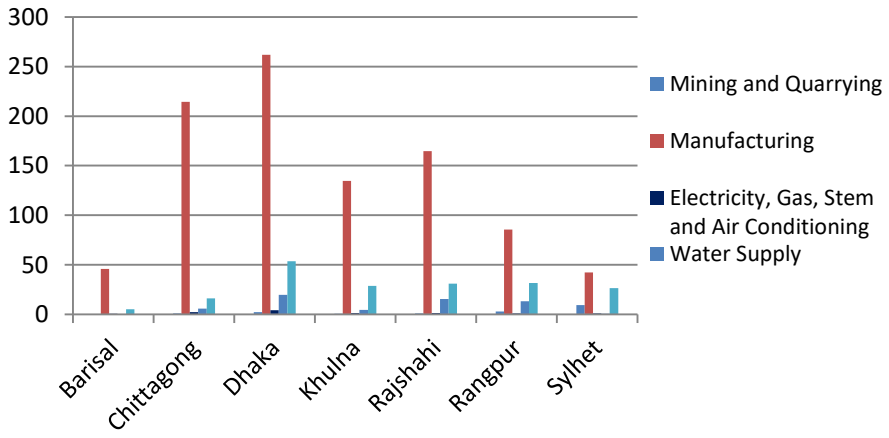
3.3 Bangladesh's Industrial Performance and Trends

Vision 2021 of the GoB stipulates that Bangladesh will attain middle-income status by 2021. In order to achieve this goal, the government has set its economic growth target at 8 percent in 2016 and 10 percent in 2021 with an average 7.3 percent[44]. To fulfil this vision it is envisaged that the manufacturing sector will play a central role. The strategy of the government has been to facilitate a dynamic, vibrant, pro-export and competitive manufacturing sector that would eventually contribute some 30 percent to national income and be able to absorb 20 percent of the work force. Since 1990s, government has been pursuing a market-oriented industrial strategy. The policy regime for manufacturing improved significantly in the 1990s, based on investment deregulation, trade liberalization, better exchange rate management and improved financial sector performance. The result is evident from the higher share of industry in GDP as agriculture continues to decline.

3.3.1 Distribution of Economic Units by Broad Industrial Classification

The geographical distribution of economic units in 2013 by division and economic sector following two digits Bangladesh Standard Industrial Classification (BSIC) 2009 in shown in the following figure:

Figure 25: Geographical Distribution of Broad Industrial Units



Source: Economic Census 2013, Bangladesh Bureau of Statistics

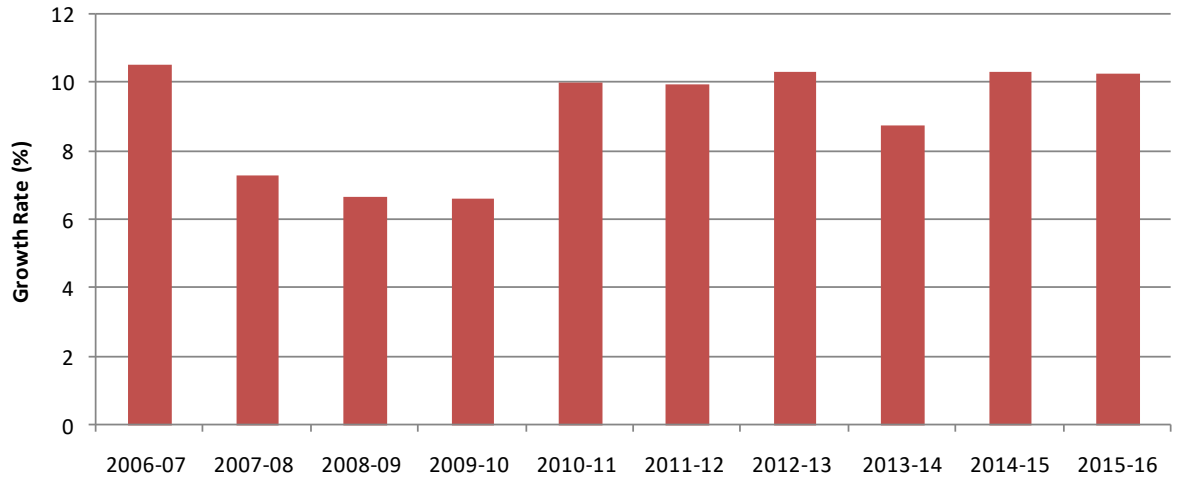
As depicted, manufacturing is the predominant and leading sector within broad industry accounting for 77.0 percent[45] of all industrial units located across the country followed by construction (15 percent). Out of total 9,49,590, 27.6 percent[46] manufacturing units located in Dhaka division, 22.6 percent in Chittagong division and 14.2 percent[47] in Khulna division.

[44] Seventh Five Year Perspective Plan
[45] Preliminary Report on Economic Census 2013
[46] Same as above
[47] Same as above

3.3.2 Manufacturing Sector

Manufacturing has been a major driver of industrial growth in Bangladesh. However, it is narrow-based to only few industries: readymade garments and textiles, fish and seafood, leather, fertilizer and pharmaceuticals.

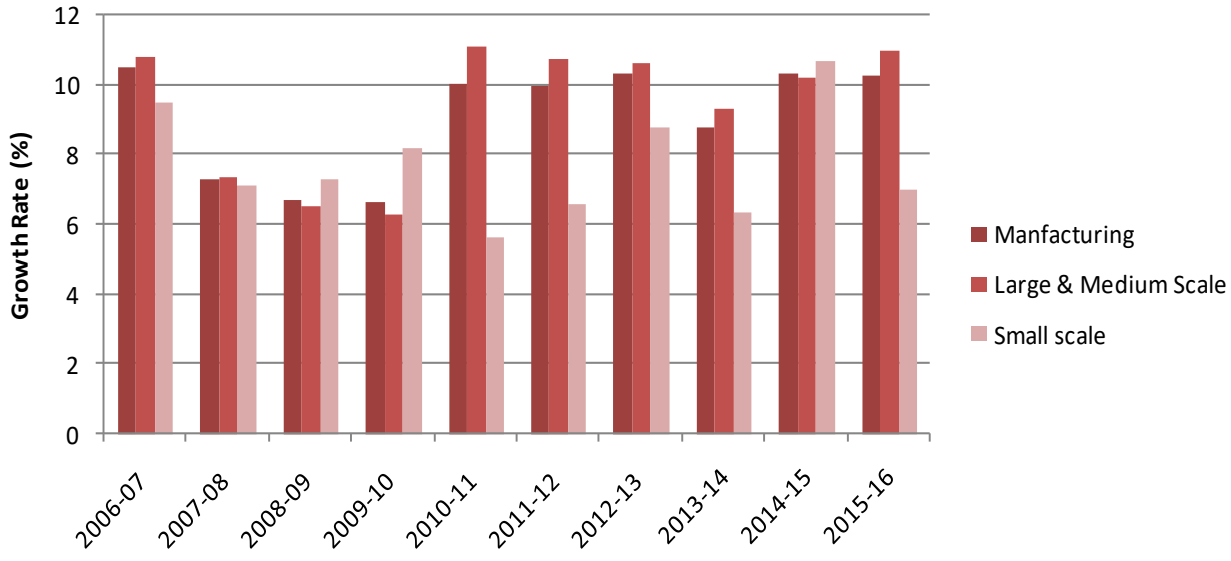
Figure 26: Growth of Manufacturing Sector



Source: *Bangladesh Economic Review 2016*

The sector recorded 8.5 percent annual growth rate during FY2006-2016. Since 2008-09, it the growth was exponential. In FY2008-09, it grew 6.6 percent fuelled by 8.1 percent growth in small and cottage industry and 6.2 percent growth in medium and large industry. Rapid growth in medium and large-scale industry units mainly propelled by readymade garment and knitwear uplift. The growth increased to 10.3 percent in FY2015-16.

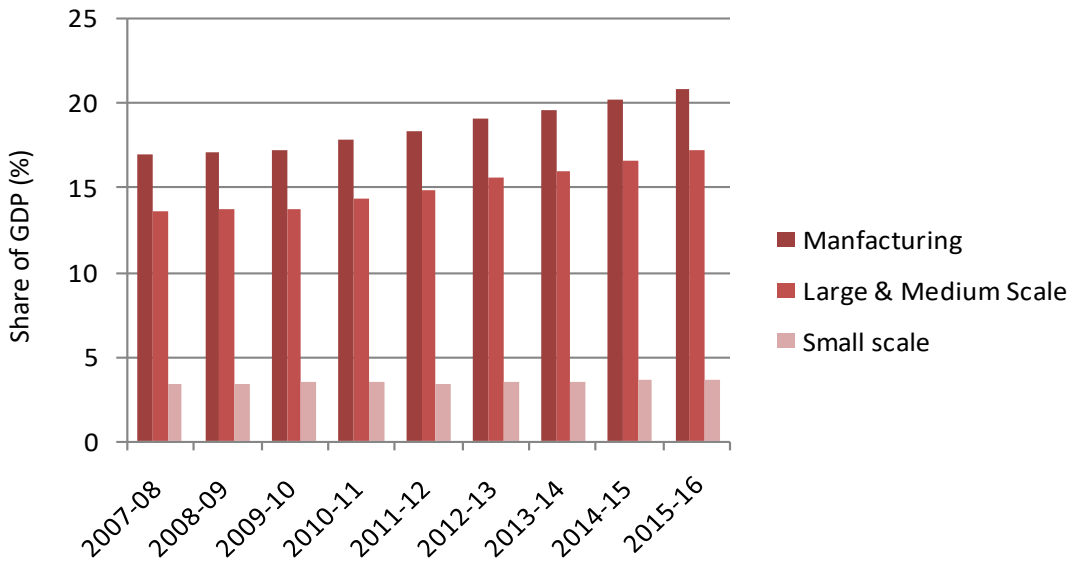
Figure 27: Growth of Manufacturing Sector by Size



Source: Bangladesh Economic Review, 2016

As per Bangladesh Economic Review 2016, the contribution of manufacturing industries to national GDP was 20.17 percent in 2015-16, of which medium and large-scale industries contributed 16.52 percent to GDP and small-scale industries contributed only 3.65 percent to GDP. The share of manufactured goods to GDP has been increasing over the years.

Figure 28: Share of Manufacturing in GDP



Source: Bangladesh Economic Review, 2016

3.3.3 Raw Materials of Manufacturing Industries

The following table illustrates the sources of raw materials of the industries:

Table 5: Sources of Raw Materials[48]

Sectors/Industries	Raw Materials
Textile and Apparel Sector	• The backward-linkage industry supplies around 90 percent raw materials to the knitwear subsector and 40 percent to the woven sub-sector. • 60 percent woven raw fabrics are imported, mainly from China and India to meet the demand of woven sub sector.
Leather Goods and Footwear Sector	• The basic raw materials for footwear manufacturing units are hide and skin of animals. Footwear sector dependent on local raw materials. Around 40 percent of skin and hide come from the animals sacrificed during annual Muslim festival of Eid-Ul-Azha
Pharmaceutical Sector	• Bangladesh pharmaceutical production is very import-intensive as raw materials like API, packaging, and materials are imported from abroad. Around 50 percent of the total pharmaceutical import comes from China, 30 percent from India, and the rest from other countries.
Food Industry	• The industry is local raw material dependent
Plastic Industry	• Polymers use as main raw material. Industry uses imported raw

[48] Ministry of Industries, 2015

Sectors/Industries	Raw Materials
	materials of polymer granules
Agro Processing Industry	• Local raw material intensive
Ceramic Industry	• Local clay used as main raw material
Cement Industry	• Imported clinker used as key raw material
Furniture	• The main varieties of furniture are produced from wood, processed wood, melamine board, Medium Density Fiber Board (MDF), particleboard, steel etc. On average 60 percent of raw materials of furniture sector are imported from different countries.
Light Engineering	• Ship scraps as raw materials are used for this sector without testing its composition, at the same time competing finished products are also imported.
Shipbuilding	• Imported raw materials dependant

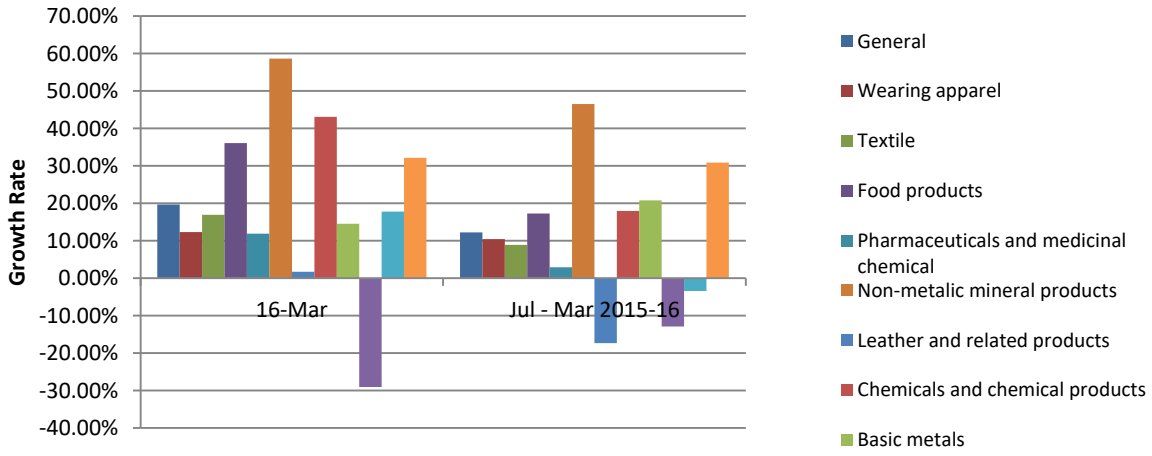
3.3.4 *Medium and Large Manufacturing Industries*

The medium and large scale industries comprises a wide range of sectors such as textile and apparel industry, pharmaceutical industry, Food products, chemical products, lather industry, tobacco industry etc. The general index of medium and large industrial production stands higher at 272.24 in March 2015 recording an increase of 19.69 percent over the same period of the preceding year[49].

Indices that recorded increase and decrease in July-March, 2015-16 compared to the same period of the preceding year are as follows:

Pharmaceuticals and Medicinal Chemical	↑ 2.90 percent	Wearing Apparel	↑ 10.39 percent
Non-Metallic Mineral Products	↑ 46.50 percent	Food Products	↑ 7.23 percent
Fabricated Metal Products Except Machinery	↓ 3.39 percent	Tobacco Products	↓ 2.90 percent
Leather and Related Products	↓ 17.36 percent	Basic Metal	↑ 9.78 percent
Chemical Products	↑ 17.98 percent	Textile	↑ 3 percent

Figure 29: Quantum Index of Medium and Large-Scale Manufacturing Industry



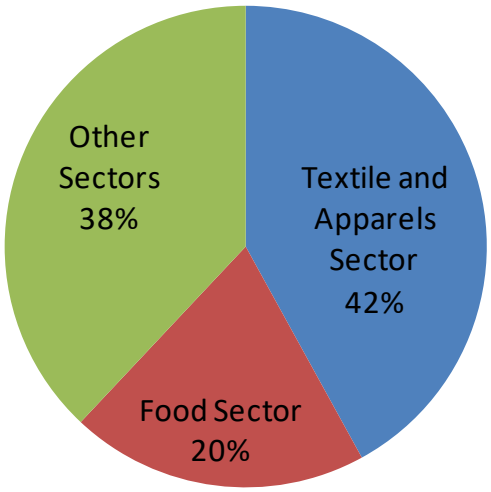
Source: Major Economic Indicators, Monthly Update: July 2016, Volume 7/2016, Monetary Policy Department, Bangladesh Bank

[49] Bangladesh Bureau of Statistics, July 2016

3.3.5 Geographical Concentration

In Bangladesh, there are around 50,000 units of major industries mainly located at Dhaka, Chittagong and different industrial zones. Of the total industrial units, 98.68 percent units are under private sector and rests of the 1.32 percent units are run by Government.

Figure 30: Key Industrial Units Distribution



Textile and apparels units account for 42 percent[50] and food sector accounts for 19.81 percent[51] of manufacturing units of the country.

Table 6: Data on Major Industrial Units

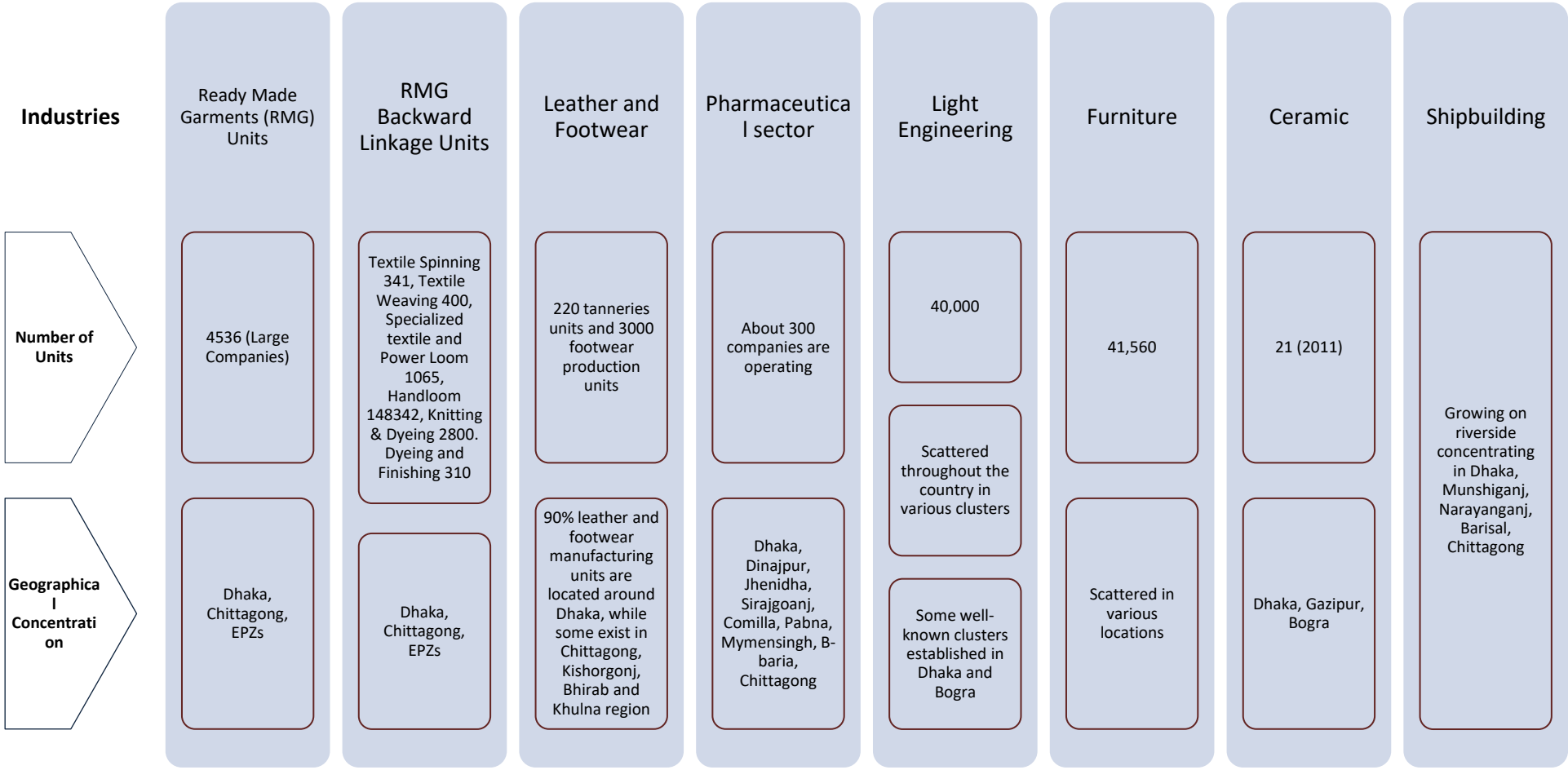
	Number of Total Key Industries	42,592
1.	Textile and apparels	17,967
2.	Food	8,441
3.	Private Ownership	98.68 percent
4.	Government Ownership	1.32 percent
5.	Number of Fully Government Owned Companies	103
6.	Foreign Ownership	263
7.	Joint Venture (Local and Foreign)	263
8.	Government and Private Ownership	35

Source: Bangladesh Bureau of Statistics Economic Census 2013

The following figure depicts the geographical concentration of major medium and large industries in Bangladesh:

[50] Bangladesh Bureau of Statistics Economic Census 2013
[51] Same as above

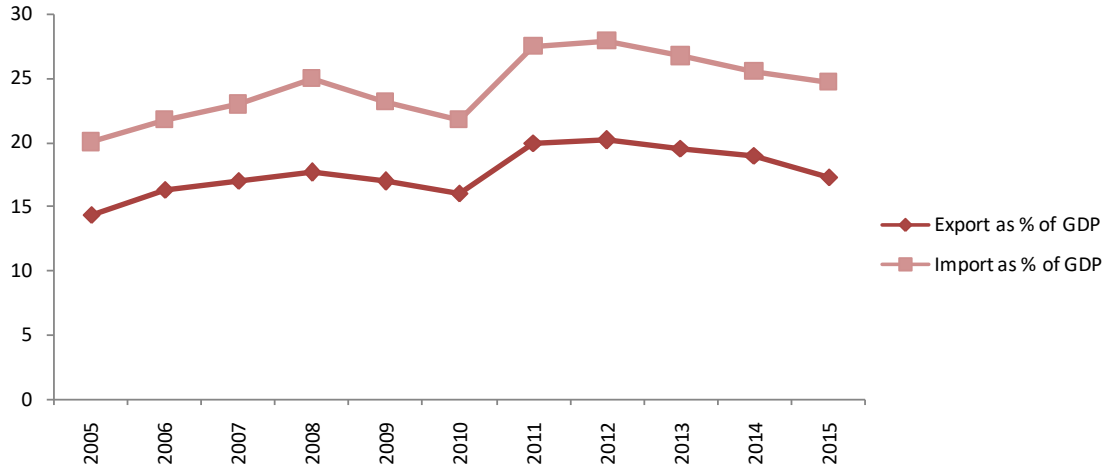
Figure 31: Geographical Concentration of Major Small, Medium and Large Industries



3.4 Foreign Trade

In 2005-06, export accounted for only 14 percent of GDP where as its share steadily increased to 17 percent[52] of country's GDP by 2015. On the other hand the contribution of Import to GDP is higher than export that revealed that Bangladesh experienced trade deficit, imports exceeded exports. However, the trade deficit, as a share of GDP gradually decreased due to strong surge in export volume of the country.

Figure 32: Share of Foreign Trade to GDP

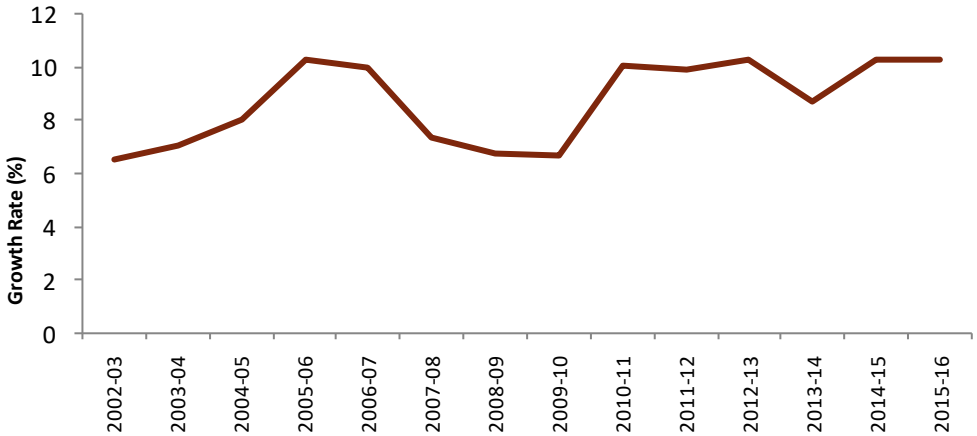


Source: The World Bank, http://data.worldbank.org/indicator

3.4.1 Export Trend

Bangladesh export's has been experiencing a shift from the agricultural products to manufactured goods. The main export items are RMG, leather and leather products, paper, furnace oil, urea, ceramic products, raw jute and jute products. In FY1983-84, manufactured goods accounted for 65.2 percent of total export volume of the country. Manufacturing dominated over 92 percent of total export of the country since FY2003-04 to till date[53].

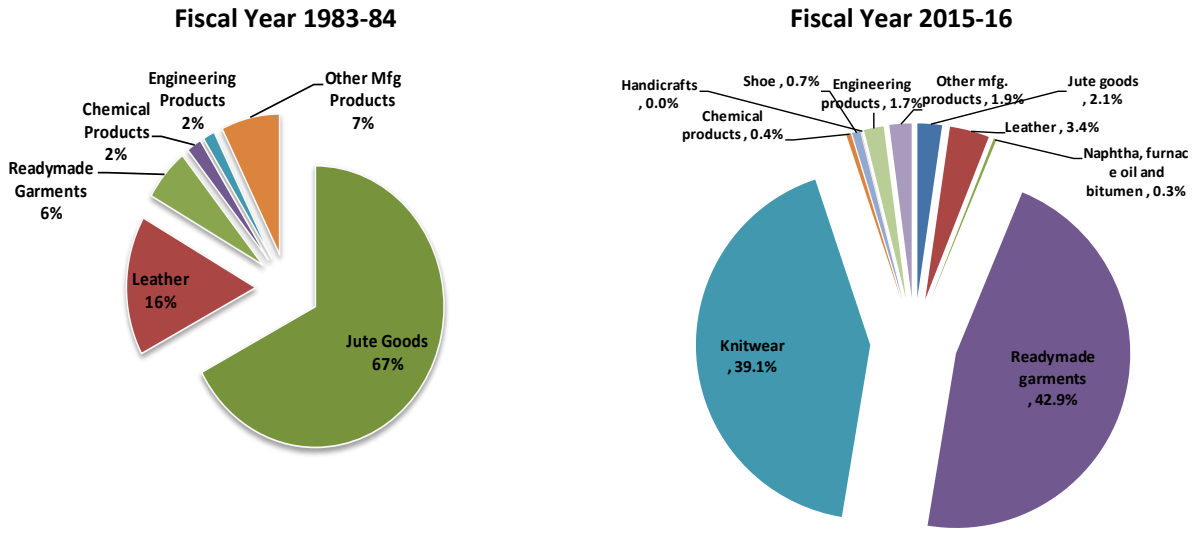
Figure 33 : Growth of Manufacturing Sector



[52]Bangladesh Economic Review, 2016
[53] Same as above

In 1983-84, export of manufactured commodities dominated by jute goods that were accounted for 67.48 percent and in FY2015-16, its share downed to only 2.1 percent[54].

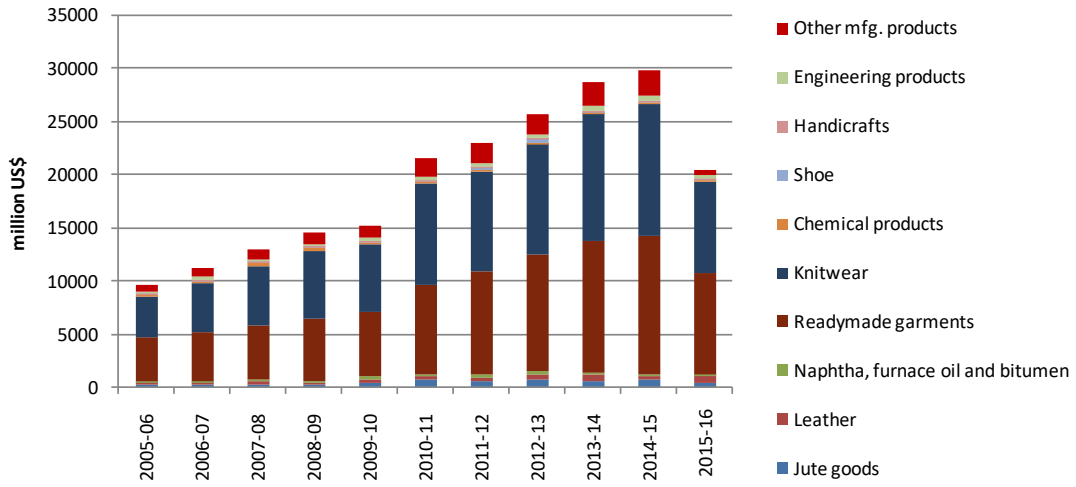
Figure 34: Share of Manufacturing to Export



Source: EPB; Bangladesh Economic Review 2016

On the other hand, export of textile and apparel items continued to rise. Over the periods, Bangladesh has achieved robust growth in this sector. The sector contributed more than 82 percent[55] of the total export earnings. To reduce the excessive dependence of single basket export government has taken initiative to diversify the export focusing on leather and footwear, engineering products, shipbuilding and pharmaceutical products.

Figure 35: Export of Major Commodities[56]

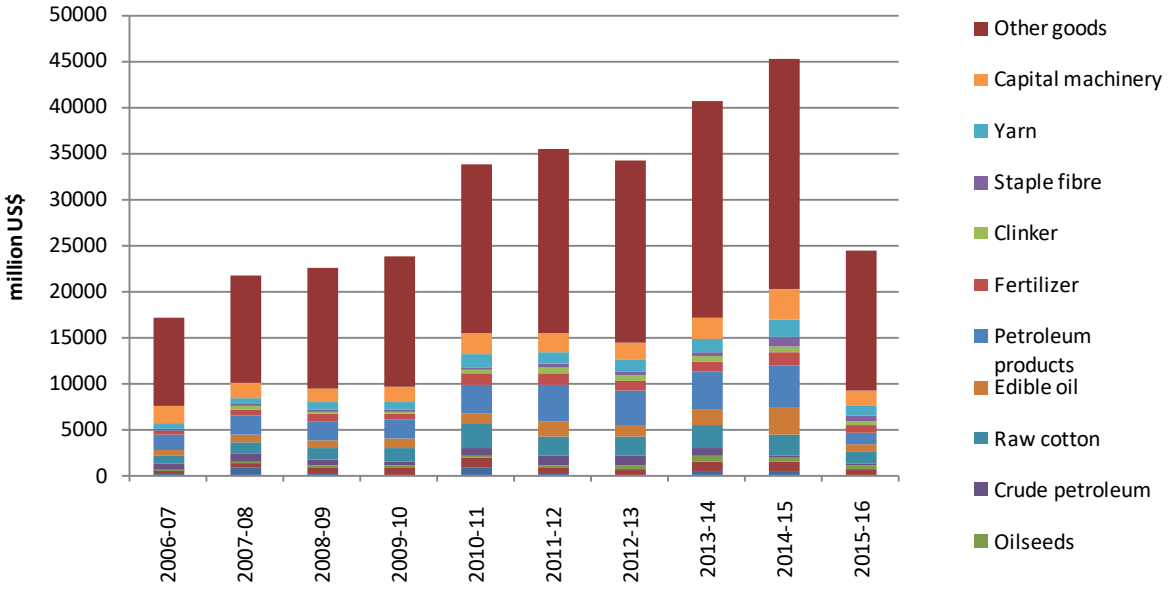


[54] Bangladesh Economic Review, 2016
[55] Bangladesh Garment Manufacturers and Export Association (BGMEA)
[56] Bangladesh Economic Review 2016 (2016 data up to February 2016)

3.4.2 Import Trend

Bangladesh's economy depends on the import of both consumer items and industrial raw materials. Major import products are raw cotton, crude petroleum, wheat, oil, seeds, edible oil, petroleum products, fertilizer, yarn, capital goods, staple fibres, iron and steel.

Figure 36: Import by Major Commodities[57]



Source: *Bangladesh Economic Review 2016*

[57] Bangladesh Economic Review 2016 (2016 data up to February 2016)

4 Bangladesh Competitiveness Analysis -Prospects of Investment in Bangladesh Economic Zones

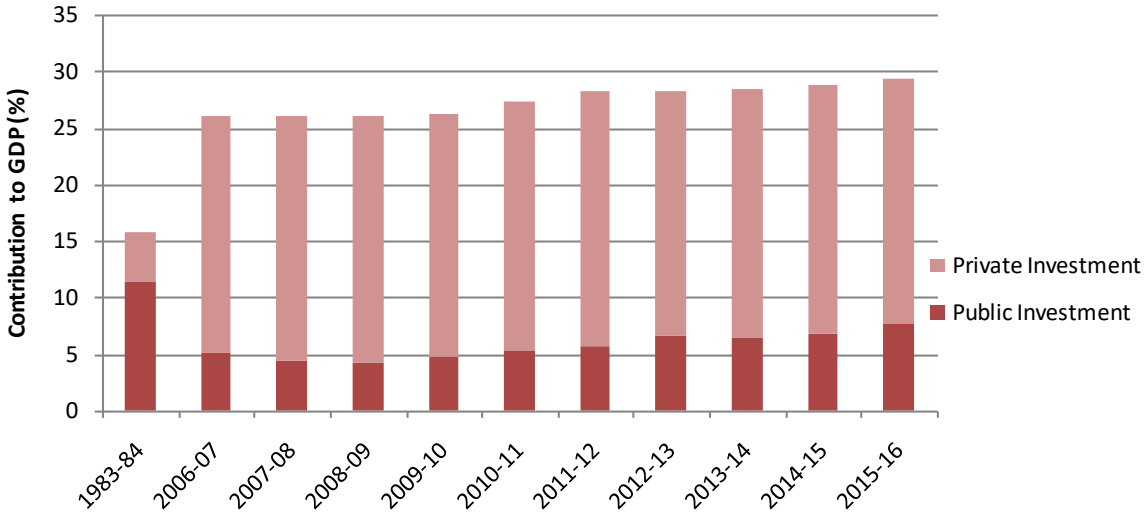
While Bangladesh has done well in some sectors and acquired global recognition in RMG sector, attracting industries for accelerating domestic growth also requires certain critical enablers including access to market, presence of supporting infrastructure (power, water supply, connectivity etc.) and supportive policies and enabling environment. Collectively, these decide the ease of doing business in a country.

Bangladesh today ranks 174th in the Doing Business 2016 Report of the World Bank Group, which brings about a comparison of business environment in 189 economies of the world. Although the Economic Zone development would be incentivized and facilitated by BEZA, it is important to understand the parameters that define the "Doing Business" ranking, and the underlying issues that affect these parameters. Inside manufacturing sector, the demand of private investment is growing. Government has taken number of prudent steps to create a facilitating environment so that it can play its due role and makes substantial contribution to the overall economic development.

4.1 Private Sector Investment

The private sector plays the lead role. In 1983-84, private sector investment constituted only 11.4 percent of GDP. It reached to 21.78 percent in 2015-16.

Figure 37: Investment Contribution to GDP



Source: *Bangladesh Economic Review 2016*

World Investment Report 2016 indicated that private investment in Bangladesh will increase substantially due to corridors linking South Asia and East and South-East Asia are being established: the Bangladesh-China-India-Myanmar Economic Corridor and the China-Pakistan Economic Corridor. This will help enhance connectivity between Asian sub regions and provide opportunities for greater access of business and regional economic connectivity.

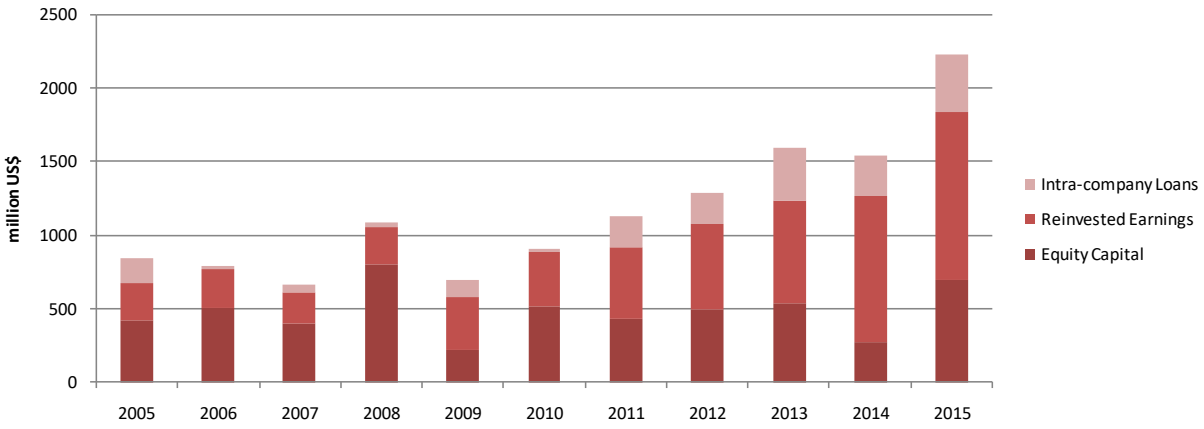
4.2 Foreign Direct Investment

Since the last decade, there has been a considerable change in global flows of trade and finance including a surge in FDI. Despite being a recent phenomenon, several underlying factors have contributed to increasing the FDI inflow in Bangladesh, such as trade and exchange liberalization, current account convertibility, emphasis on private sector led development, liberalization of the investment regime, opening up of

infrastructure and services to the private sector-both domestic and foreign, and above all the interest of foreign investors in energy and telecommunication sector.

FDI in Bangladesh consists of three components: Equity capital, reinvested earnings and intra-company loans. Bangladesh has attracted $2.23billion FDI in 2015 which is 71 percent higher than 2013.

Figure 38: FDI Inflows by Components

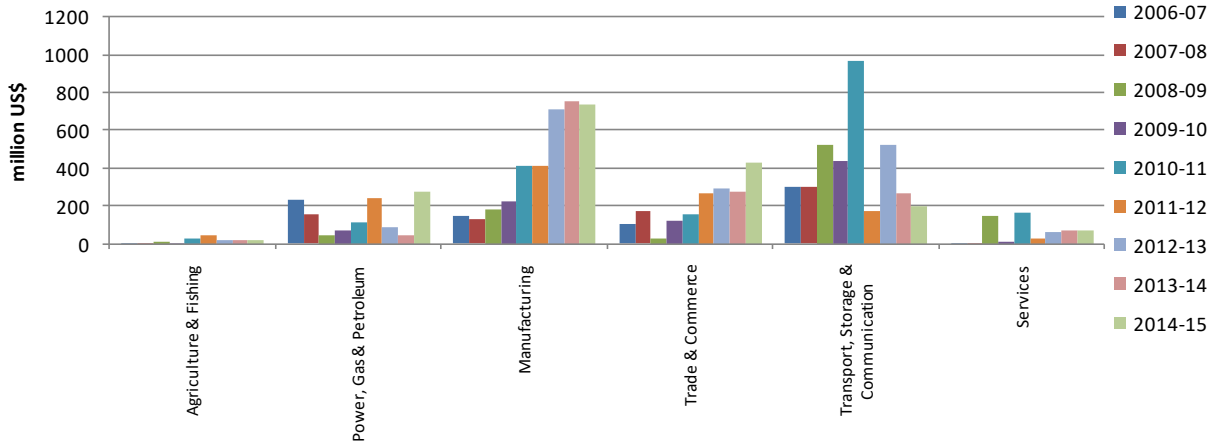


Source: Survey Report on Foreign Direct Investment in Bangladesh 2015, Statistics Department, Bangladesh Bank

4.2.1 Sector Wise Distribution of FDI

The sectors that attracted maximum FDI during FY2014-15 include manufacturing sector ($737.54 million), telecommunication ($254.57 million. However, food and allied, chemical, pharmaceutical and leather industries have been experiencing strong surge in attracting FDI, indicating growth potential of these sectors.

Figure 39: Sector wise Distribution of FDI Inflows



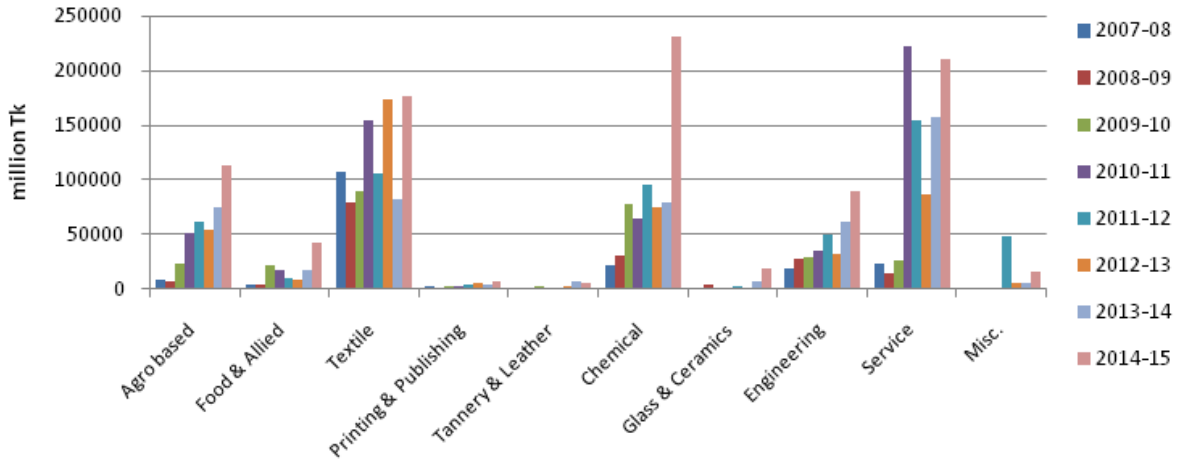
Source: Survey Report on Foreign Direct Investment in Bangladesh 2015, Statistics Department, Bangladesh Bank

4.3 Domestic Investment

The key behind the country's economic success is the upsurge in its local business entrepreneurship and the government has set up priority to the domestic investors to lead the industrial upsurge. Domestic investment showed steadily upward trend in the past years. During FY2007-08, projects registered with the

BOI[58] were amounting to Taka 1,93,530 million which raised to Taka 9,12,730 million in 2014-15.Sector wise distribution of domestic investment is shown below:

Figure 40: Sector wise Distribution of Local Investment Projects



Source: Survey Monthly Report (2014-15), Policy & Planning, Board of Investment (BOI)

4.4 Emerging Prospects

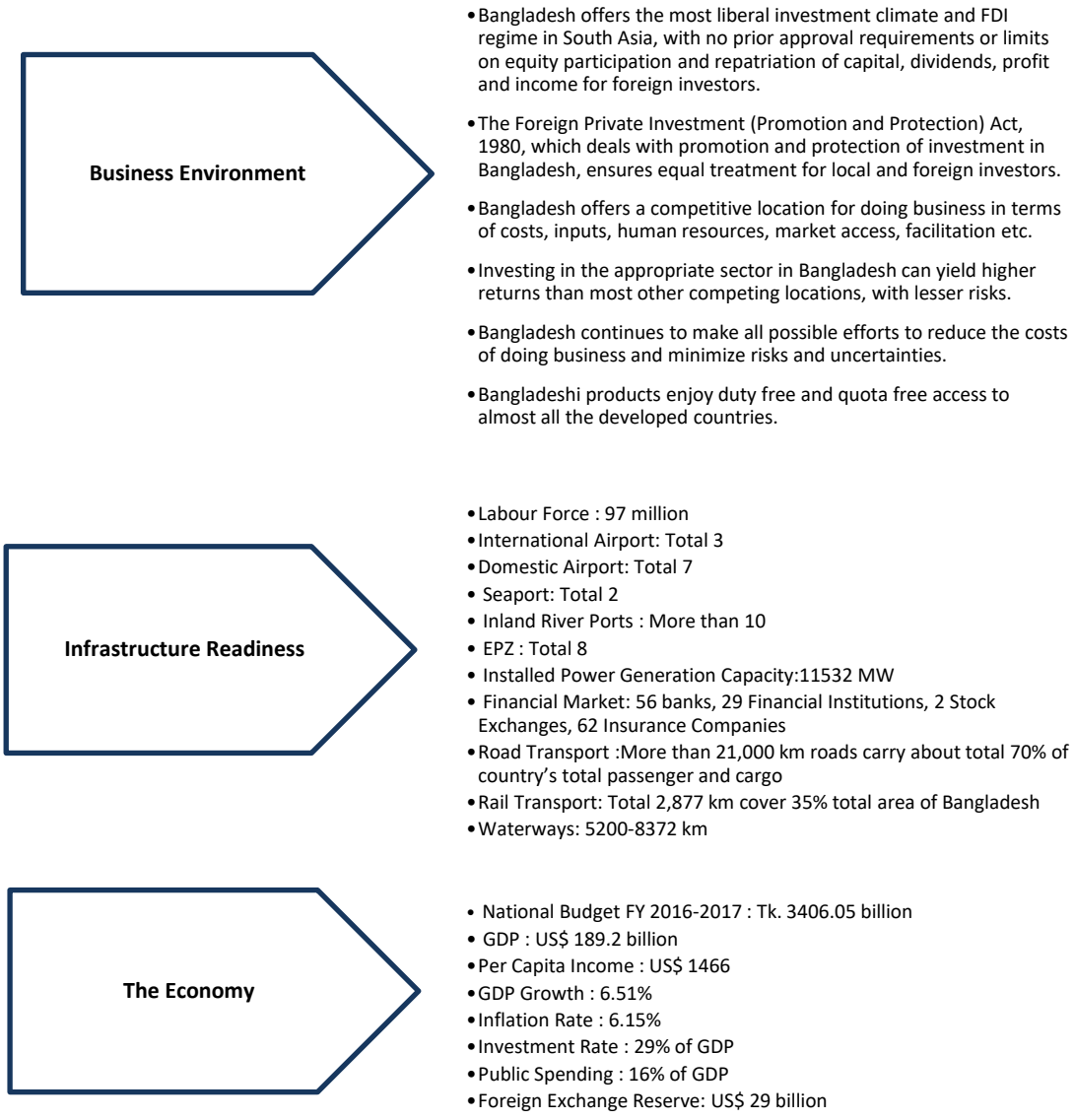
Economic development and attracting industries for accelerating domestic growth requires certain critical enablers including access to market, presence of supporting infrastructure (power, water supply, connectivity etc.) and supportive policies and enabling environment. Collectively, these factors decide the ease of doing business in a country. This section presents an overview of business environment in Bangladesh and emerging prospects for future investment.

4.4.1 Business Climate

Although Bangladesh currently does not compare positively with most Asian economies, several reforms have been undertaken at various levels to transform the business environment of the country. The reform push combined with government's vision has helped in creating some positive business sentiments in the country although the potential for further enhancement remains immense. Aspects that create the overall business climate and the key challenges facing them are as follows.

[58] Presently Bangladesh Investment Development Authority (BIDA)

Figure 41: Business Climate in Bangladesh



Source: Bangladesh Bank, BBS (2016)

It may thus be inferred from the above that in addition to the existing and unexplored potential for industrial development, the nation is taking conscious efforts in improving the business environment in the country. This is essential given that poverty and unemployment continue to be the major problems facing Bangladesh's economy. Identification and development of sustainable means of livelihood for its masses and making use of the abundant labour is the nation's natural priority. Organised industrial development being a sustainable source of job opportunities and income for all strata of society provides strong avenues for growth.

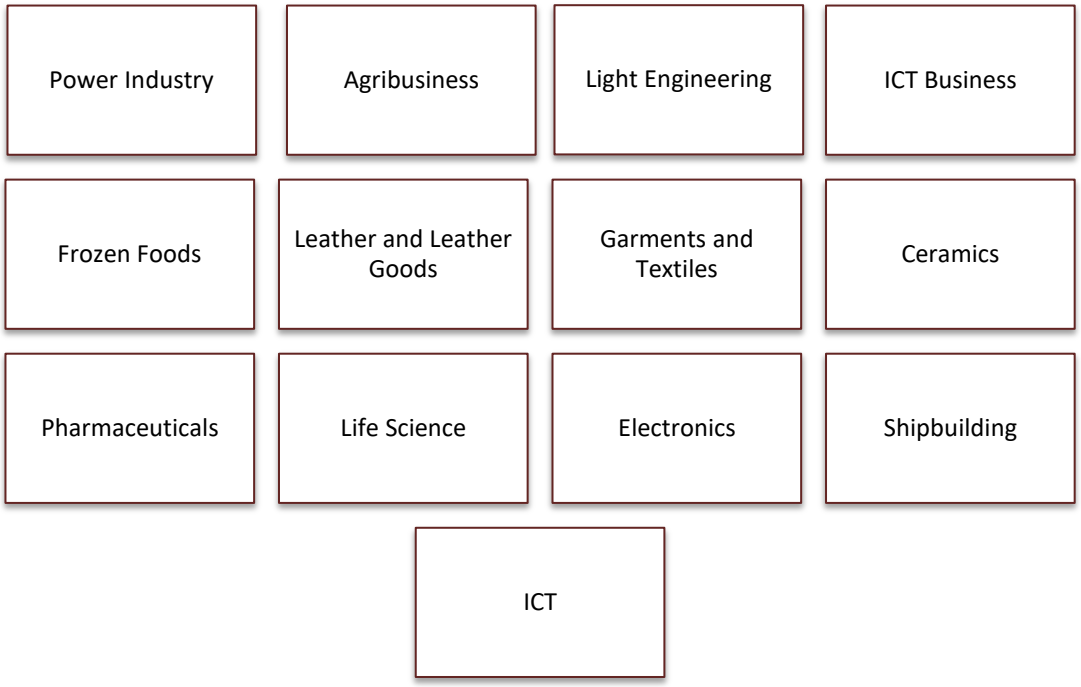
Accordingly, development of economic zones to drive industrial development is a logical course of action to meet the above objectives. It may be noted that other Asian countries like Thailand and Indonesia have taken the economic zone route to come out of poverty in last 25 years and it is the right time for Bangladesh to adapt some of the learning. Success will be determined by how soon the country is able to overcome some of the key challenges facing industrial growth in Bangladesh.

4.4.2 Emerging Sectors

As envisaged in Vision 2021, Bangladesh will have, by 2021, a dominant industrial sector where industrial sector will account for at least 40 percent of the GDP, with a capacity to absorb 25 percent of the workforce. To achieve this estimated growth the manufacturing sector will play an important role.

Bangladesh is a new emerging market with a young population of close to 165 million and a fast increasing middle class. As a consequence, this growing internal market offers ample opportunities for trade and investment in consumer goods and luxury items. In addition, Bangladesh is developing as a key export hub in the heart of Asia.

Government aims at diversifying the economic base of the country by facilitating investments in an identified series of priority areas. By analyzing the growth trend of manufacturing sector, BIDA has identified the following key emerging and prospective sectors that are growing:



Bangladesh is set to emerge as the next manufacturing hub in Asia as the cheap labor and location advantage are prompting top manufacturers to relocate their RMG factories and footwear manufacturing units, electronics companies in the country.

4.4.3 Industrial Land Demand

The demand for industrial land is growing. At present, only around 5,000 industrial units are housed in EPZs, and different Industrial Parks. Due to inadequate planned industrial parks, Industrial units are mushrooming here and there disrupting farmland and environment. Government has taken initiative to develop industrial parks, economic zones and special economic zones in planned way to attract both local and foreign investment. In this context, government has taken initiative to conduct surveys in every district to select potential industrial sites.

Industrial Land Demand from Private Investors

The manufacturing sector is growing on an average 8.5 percent for past decade and it has immense potential to steady economic growth in years to come. To capitalize investment friendly environment, local and foreign investors are expanding their business in Bangladesh. In addition, new manufacturing units are being set-up by private investors.

In order to accommodate the present trend of manufacturing growth and to attract private investment in full-scale it is required to develop economic zones in different strategic locations across the country. Different international business communities have already been shown their comprehensive interest of partnership and to relocate/expand their business in Bangladesh. Crowding-in private sector investment would be strengthened by establishing more economic zones with infrastructure facilities.

The World Bank has recently proposed that the government would enable the development of 40,000 acres[59] of land for creation of new industrial zones across the country to facilitate both foreign and local investment. The growing interest from different international business communities to invest in Bangladesh is shown in the below noted table:

Table 7: Growing Interest of International Entrepreneurs in Bangladesh[60]

Japan	• Japan considered Bangladesh as BIG-B (Bay of Bengal Industrial Growth Belt) and next invest hub to expand business.
	• Japanese foreign direct investment in Bangladesh has tripled from $31.36 million in 2012 to $99.04 million in FY2013.
	• Japan is interested in setting up economic zones in and around Dhaka and Chittagong cities. Japan's business community identified the following locations as potential sites:
	  ○ Dhaka-Chittagong highway
	  ○ Dhaka-Sylhet highway
	  ○ Dhaka-Mymensingh highway
	  ○ Dhaka-Aricha highway.
	• In a survey conducted by Jetro (Japan External Trade Organization) revealed that 80 percent of Japanese companies are planning to expand their business activities in Bangladesh by 2016.
	• Government is planning to provide 8,000 acres of land in Chittagong to Japanese investors for setting up a special economic zone (SEZ)

Malaysia	• Malaysian Chinese business leaders are interested to set up joint ventures and relocate their small and medium industries in Bangladesh. • Malaysian car manufacturer keen to invest in Bangladesh • It is estimated that 100 to 300 hectares of land will be needed for Malaysian Chinese investors
India	• Indian investors are keen to invest and set up new manufacturing units concentrating on paints, automobile, pharmaceutical, telecom etc in Bangladesh • Indian investors floated desire for special economic zone to set up labour-intensive industries • At present, 150 Indian companies are operating in Bangladesh with a cumulative investment of $3 to $4 billion investment • Bangladesh may receive Indian investment worth $2.0-3.0 billion by setting Special Economic Zone for Indian Investors

[59] http://www.thefinancialexpress-bd.com/2014/10/12/60505
[60] http://www.theindependentbd.com/printversion/details/38535

China	• China has received a pre qualification license for an economic zone at Anwara • Providing land to Chinese investors for setting up economic zone (EZ) is also under active consideration • Bangladesh invites China to invest in pharmaceuticals, petrochemicals, shipbuilding, agro-based industries, textiles, ceramics, leather, tourism, manufacturing, ICT, design and planning in high valued added sectors
Singapore	• Singapore investors community has expressed intention of building a special economic zone in Bangladesh • Interested invest in the power, shipping and ports

4.5 Factors inspiring confidence for the success of economic zone development in Bangladesh

A development like economic zone is mainly driven by investment climate of the country, domestic market and attractiveness of the region, feasibility of individual projects, regulatory /policy setup & incentives. With specific reference to Bangladesh, Economic Zone development is expected to be successful for a variety of reasons:

The BEPZA Experience: The successful experience of BEPZA - from its inception up to Feb 2014, BEPZA was successful in attracting investments of $ 3,021 million from 37 countries. The vast experience of the Bangladesh Export Processing Zone Authority (BEPZA) can help a great deal in advancing the economic zones.

Existing high demand for fully serviced EPZ plots: Around 93 percent of the plots under the existing eight export processing zones have already been sold out. This demonstrates a high industrial/export potential of hinterland, necessitating provision of additional land for industrial activity.

Conducive policy environment: The economic zones Act of 2010 and resultant framework for economic zones, the establishment of BEZA under the PMO, provision of legal coverage for attracting/leveraging private investment and provision of tailored infrastructure services on PPP basis is expected to help drive investments in economic zones

Flexibility of export and local sales with fiscal incentives and readily available infrastructure: The economic zones are offering a flexibility of export and local sales which EPZ regime did not allow. Also in addition to the fiscal incentives that EPZ regime was providing, economic zones will provide facilities of one stop shop services, fiscal incentives more than the EPZs are providing and readily available infrastructure.

5 Competitive Analysis and Industry Assessment

5.1 Industry Assessment

5.1.1 Textile and RMG Industry

The textile and apparel industries provide the single source of economic growth in Bangladesh's economy. The export oriented industry started in 1980s. Since then it has been acting as the backbone of our economy and as a catalyst for the development of the country. The "Made in Bangladesh" tag has also brought glory for Bangladesh, making it a prestigious brand across the globe. The apparel industry is Bangladesh's biggest export earner with value of over $24.49 billion of exports in 2013-14, contributing 81 percent of total export earning of the country.

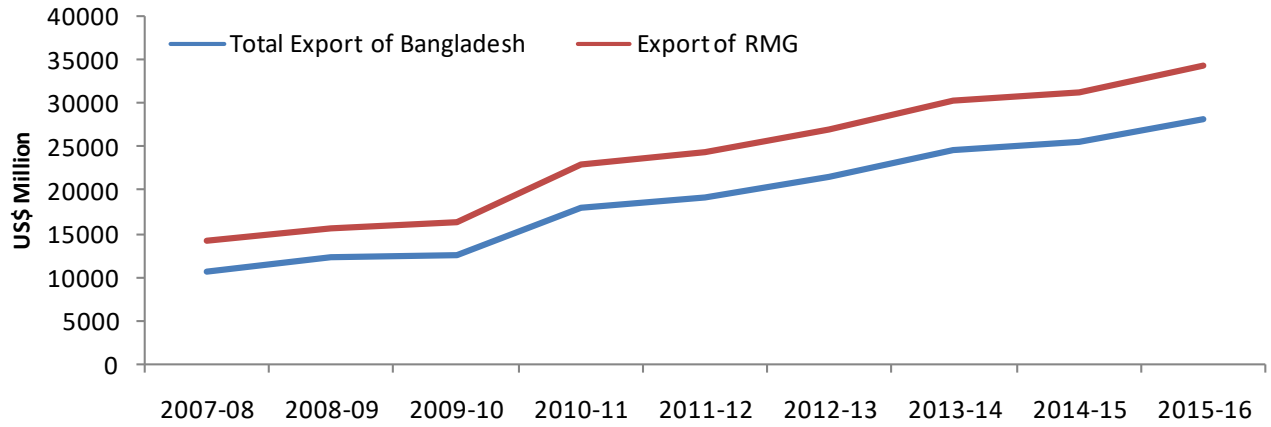
Currently the industry has around 5,000 companies[61], employing around 4 million, mostly women, which have made it $19 billion-a-year industry[62]. Bangladesh is second to China, the world's second-largest apparel exporter of western brands. Sixty percent of the export contracts of western brands are with European buyers and about forty percent with American buyers. Only 5 percent of textile factories are owned by foreign investors, with most of the production being controlled by local investors[63].

The textile and apparel industry encompasses textile processes from spinning; weaving; knitting including hosiery and knit dyeing; dyeing and finishing; yarn dyeing; and sewing thread; up to the final outputs, including ready-made garments and nonwovens such as technical textiles.

- *The sector consists of 17,967[64] small, medium and large manufacturing units;*
- *There is a concentration of manufacturing activity in and around the capital city of Dhaka, Narayangonj, and Chittagong and a growing garment manufacturing presence in the country's export processing zone;*
- *EU is Bangladesh's highest RMG export destination constituting 58 percent[65] of total export followed by US market with export of 23 percent[66]*
- *Bangladesh has recently diversified into emerging export markets including Australia, Brazil, China, Japan, and South Africa accounting for 14 percent[67] of total export*
- *The HSBC Trade Forecast report expects Bangladesh's share of textiles and garment exports to rise from 2.8 percent in 2010 to 3.8 percent in 2020*
- *Bangladesh is the second largest exporter of readymade garment products trailing China according to the McKinsey report (2011).McKinsey report sees Bangladesh as the next hot spot in apparel sourcing[68];*
- *The 4.0 million garment workers in the county have created an annual local market of Taka.226.5 billion for different services and commodities[69]*

[61] BGMEA
[62] Wikipedia
[63] BGMEA
[64] The Daily Prothom-alo Dated 25 September 2014
[65] Light Castle Investment Study Bangladesh
[66] Same as above
[67] Same as above
[69] The Financial Express dated 04 October 2014 and BGMEA
[69] The Financial Express dated 04 October 2014 and BGMEA

Figure 42: Export Growth of Textile and Apparel Industry



Source: Bangladesh Garment Manufacturers and Export Association (BGMEA)

As per data of Export Promotion Bureau, The readymade garments industry accounts for 82 percent of total exports of FY15-16[70]*. Bangladesh is now second largest ready-made garments (RMG) manufacturer after China*. 80 percent of American and European clothing companies planned to move their outsourcing from China, where wages had risen, and were considering Bangladesh as the "next hot spot" making it the "next China."

Chittagong Port accounts for almost all of the garment industry cargo both for import of textiles and raw materials and export of finished products. Out of total export through Chittagong port Garments account for around 44 percent by volume, most of these Garments (around 80-90 percent) are generated in Dhaka and surrounding region and remaining in Chittagong region.

The industry being mostly Dhaka based and heavily concentrated due to land constraints indicates a high prospect to grow in Chittagong region. According to Department of Inspection for Factories and Establishments, Ministry of Labour and Employment, there are 674 garments and textile factories situated at Chittagong district[71]. There are around 0.24 million RMG workers working in Chittagong district, and 70 percent consists of female workers[72]. Despite proximity to port, that is the driving factor of the export-oriented industry; RMG and Textile have not been as much of a flourishing industry in Chittagong as it has been in Dhaka. The reason may be attributed to high-margin trading activity compared to manufacturing, generated from the Chittagong port and religious and social perspective of the city, where female labours are less preferred in family environment.

However, due to its cost effectiveness in terms of exporting cost from Chittagong compared to exporting cost from Dhaka through Chittagong, the industry is likely to have a significant tendency to grow in future; based upon Chittagong's investment friendly trading culture and access to the port facility.

In terms of suitability to be set up in Mirsarai, the industry ranked highest compared to other industries. From a national perspective, the industry takes the least space compared to value addition, which is ideal for setting up an industry in the economic zones. Proximity to the Dhaka Chittagong highway and the Chittagong port makes it even more attractive for the industry as textile.

The Chittagong city, being the commercial hub of the country, has a large availability of labour force, which the Mirsarai economic zone can borrow for its operation especially for its RMG industries, as the city has already a moderate level of presence of RMG industries. All the above indications show that the RMG industry has a high prospect in Mirsarai economic zone.

[70] Statistics Department, Bangladesh Bank
[71] http://database.dife.gov.bd/reports/number-of-rmg-factories-by-district
[72] http://database.dife.gov.bd/reports/number-of-rmg-workers-by-district

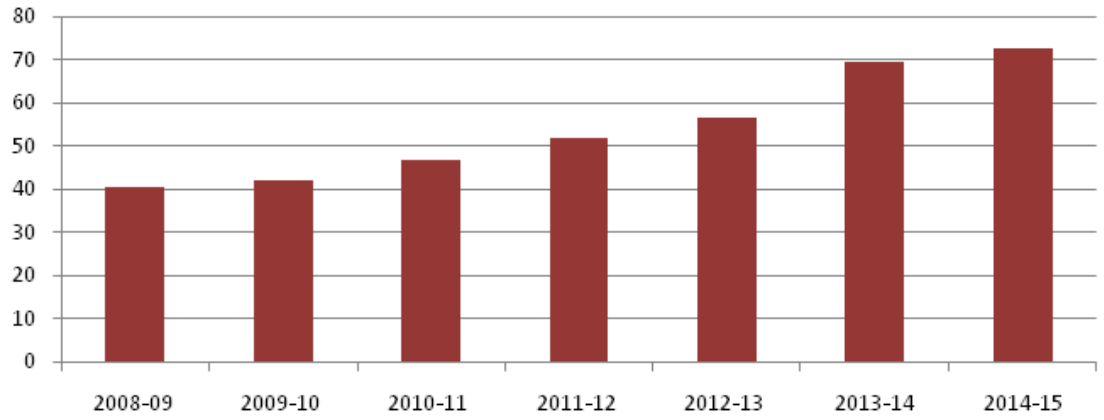
5.1.2 Pharmaceuticals

With 194 operating companies, the pharmaceutical industry provides 97 percent of the total medicinal requirement of the local market. The industry also exports medicines to global markets, including Europe.

The industry started flourishing with the promulgation of Drug Control Ordinance (1982). Nearly 80 percent cumulative growth in the last three years means that the Bangladesh pharmaceutical market has doubled[73]. About 5,600 brands of medicines are manufactured in different dosage forms in Bangladesh. The domestic retail market is growing at 25 percent per year[74]. Bangladesh is also going to establish an API park where 40 API industries are expected to operate[75].

Current market size is approximately Taka. 76,500 million[76] per year. The industry contributes 1 percent[77] of the GDP.

Figure 43: Export of Medicine from Bangladesh ($millions)



In 2014-15, Bangladesh exported medicines of $72.64 million, which was 4.9 percent higher, compared to $69.24 million in FY2013-14[78]. According to the EPB, Bangladesh currently exports pharmaceutical products to 107 countries, of which Myanmar imports the highest quantity of medicines worth $11.5 million followed by Sri Lanka with $8.3 million, the Philippines with $6.4 million, Vietnam $5.3 million, Kenya $3.7 million, Afghanistan $3.3 million, Slovenia $3.4 million and Nepal $1.3 million[79]. The pharmaceutical industry also set a target of exploring 30 new destinations for their products during the current financial year. BEXIMCO Pharmaceuticals has become the first Bangladeshi pharmaceutical company to be approved by the US Food and Drug Administration (US FDA) following the successful inspection of its oral solid dosage facility at Tongi, during 19-22 January 2015. The Company received the establishment inspection report (EIR) from the US FDA on 22 June, 2015 stating the audit was formally concluded[80].

APIs consist a significant part of the manufacturing cost of a drug. Approximately 80 percent[81] of the APIs are imported and 75–80 percent[82] of the imported APIs are generic. At present, there are 15 companies in Bangladesh manufacturing 40 APIs[83]. Companies are still dependent on import from India and China. The government has taken initiative to set-up a park for Active Pharmaceutical Ingredients (API) with a focus on developing synthetic chemistry skills.

[73] BOI, 2015
[74] Same as above
[75] Same as above
[76] Eskayef Bangladesh Ltd
[77] Growth of Pharmaceutical Sector of Bangladesh: www.bangladesh-corporate-world.blogspot.com
[78] Export Promotion Bureau
[79] Same as above
[80] http://www.biospace.com/News/beximco-pharmaceuticals-receives-u-s-fda-approval/382497
[81] The World Bank, 2012
[82] Same as above
[83] http://www.pharmajogot.com/api-in-open-market-behind-drug-manufacturers/

The industry imports APIs mostly through sea and air. Therefore, proximity to sea and airport is a significant factor, for consideration of setting up pharmaceutical industries in Bangladesh. It also depends upon consumer concentration in the proximity. All these have resulted that the majority of the pharmaceutical industries are located in Dhaka region. *However, next to Dhaka, Chittagong accommodates the second highest concentration of medicine users and it has an international port, which is emerging as a busy international port. This indicates a high degree of suitability of the pharmaceutical industries for setting up in Mirsarai.*

5.1.3 Steel Mills

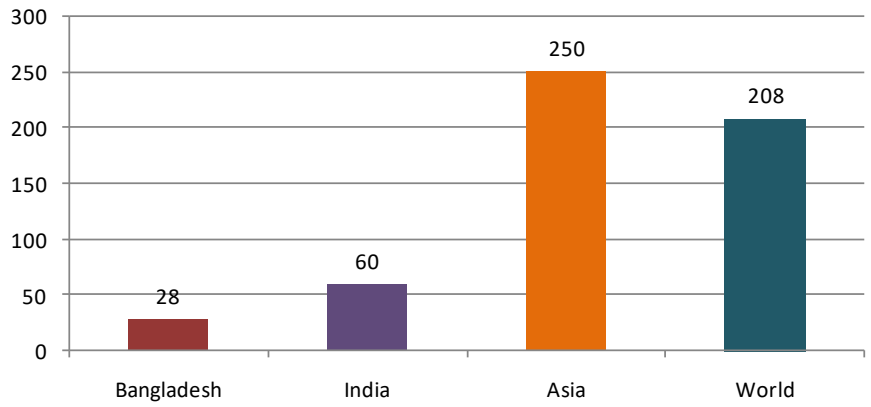
The steel industry plays a fundamental role in driving economic growth and complementary industries such as transportation, energy, heavy engineering and construction. The global steel industry, second in size only to oil and gas, produced 1,598 million tonnes of steel and had in 2015[84]. Despite dynamic shifts in the global scenario, the steel industry continues to be a source of employment for over 50 million people.

World Steel forecasts that global steel demand will decrease by -0.8% to 1,488 Mt in 2016 following a contraction of -3.0% in 2015[85]. In 2017, it is forecasted that world steel demand will return to growth of 0.4% and will reach 1,494 Mt[86].

The global steel industry is going through a slowdown, ***but the picture in Bangladesh is the opposite***, with the sector registering 15 percent growth last year riding on large infrastructure projects. ***With an estimated market size of 300 Billion Taka, the steel industry in Bangladesh is currently experiencing an upsurge in demand[87].*** This growth is driven mostly by government spending on infrastructure projects, which accounts for 40% of steel consumption in Bangladesh.

The steel industry in Bangladesh produces mainly two classes of products: flat steel (mainly CI sheet and CR coil) and long steel (MS rod/TMT bar). Although there are currently over 400 active firms in the industry, the ***top 20 companies service more than half of the demand***. Of the over 400 steel re-rolling mills operating in Bangladesh, around 350 mills primarily source their raw materials from ship breaking. Production capacity of the Bangladesh steel industry has more than tripled during FY14-15, actual production is expected to double by 2022[88].3

Figure 44: Per Capita Consumption, 2015 (in kg)



Bangladesh steel industry is largely dependent on domestic growth drivers such as government infrastructure projects and the real estate industry. At the moment, per capita steel rebar consumption in Bangladesh is only 28 kg, compared to 60 kg in India, Asia average of 250, and the world average of 208 kg in 2015. This is expected to grow to 50 kg by 2022.

[84] World Steel Association, 2016
[85] Same as above
[86] Sane as above
[87] Bangladesh Steel and Engineering Corporation (BSEC)
[88] Steelmint Group

Figure 45: Top Export Destinations of Steel 2015-16

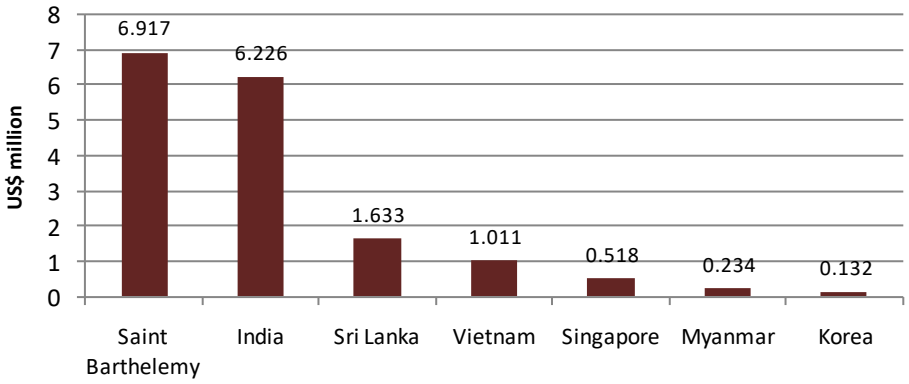
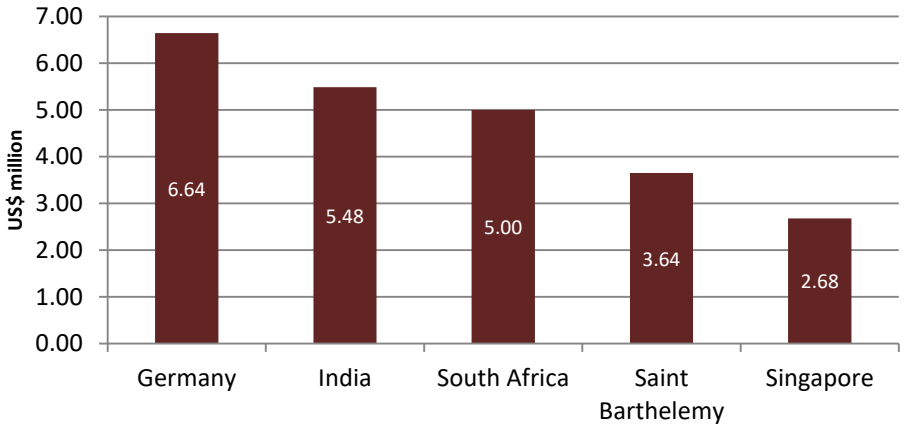


Figure 46: Top Export Destinations of Steel Products 2015-16



As per EPB, Bangladesh exported 48.56 Million $ worth of iron and steel products and raw materials in 2016-15. ***Although big markets such as India currently feature among Bangladesh's top export destinations for steel products, focusing more on other growing Asian markets as well may be key to future exports growth.*** As the global steel industry continues to transition to a new phase, the local sector has the prime opportunity to not only grow to satisfy the domestic demand but also secure position in the emerging export markets of tomorrow.

BSRM, the market leader, located in Mirsarai, currently produces around 0.8 million tonnes of steel per year[89]. As BSRM and other top firms such as AKS, GPH, RSRM, KSRM have their plants situated in and around Mirsarai, the suitability of the economic zone for steel industries requires no further explanation. The primary raw materials are sourced from the ship breaking industries in Chittagong, which indicates a strong correlation of forward and backward linkages in the area. Availability of labor and improved connectivity with the port and the rest of the domestic market propelled the growth of steel industries in this region.

[89] Annual Report 2016, BSRM

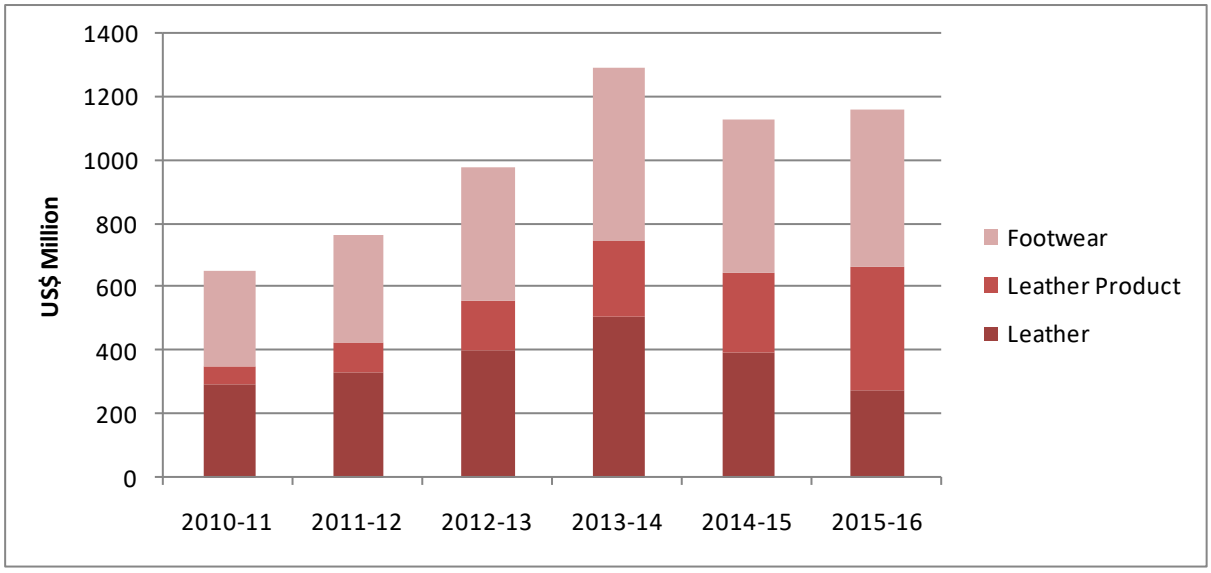
5.1.4 Leather Footwear

Leather is one of the growing industries of Bangladesh. Government has identified it as a thrust sector for export. Hides & skins of Bangladesh have good demand in the international market for its fine fiber structure and good grains. There are three broad components of the leather industry (a) Leather tanning (BSIC Code 1911), (b) Leather footwear (BSIC Code 1921) and (c) Other leather products such as handbags, carry bags, wallets, cases etc (BSIC Code 1912).

Currently Bangladesh produces and exports quality bovine and ovine, caprine (buffalo and cow; sheep and goat) leathers that have a good international reputation for fine textured skins. However, the entire leather sector meets only 0.5 percent of the world's leather trade. About 113 tanneries in Bangladesh produce 180 million sft hides and skins per year. In addition, there are about 30 modern shoe-manufacturing industries engaged in the production of high-quality footwear, with over 2500 smaller footwear manufacturers also present. Most of the tanneries do not have proper effluent plants and generate 20,000m^3 tannery effluent and 232 tons solid waste per day[90]. Sustainable and cleaner production of shoes will be a key issue for the development of the industry.

- *The leather footwear sector has been growing over the last 5 years with exports increasing by 25 percent[91] in 2013 followed by 27 percent[92] growth in 2015*
- *Leather and leather products of Bangladesh are marketed abroad, mostly in the form of crushed leather, finished leather, leather garments, and footwear.*
- *Nearly 90 percent of all leather footwear making units is located in and around Dhaka city with some units existing in Chittagong and Khulna and in Bhairab of Kishoreganj district*
- *This concentration occurred in an unplanned manner posing threat to the environment. Hence, the government has taken a move to shift the industry to a leather estate at Savar outside the city.*
- *Some international investors have already carved a niche by setting up factories in local EPZs.*

Figure 47: Export of Leather and Leather Goods



Source: Export Promotion Bureau

Despite environmental concerns, leather footwear produced in Bangladesh has a high reputation in the international market. Setting aside the effluent consideration in leather tanning, leather footwear

[90] A Report on Leather and Leather Goods Industry of Bangladesh, Mansur Ahamed (Ph.D), JB Group Research Department,, JBBC Corporation
[91] Export Promotion Bureau
[92] Same as above

manufacturing itself is not of that much of environmental hazard, and still considered by Bangladesh government as a prospective industry for Bangladesh.

The new leather park at Savar is expected to bring a clear transformation to the leather industry with marked increase in production, product diversification, and new product lines with increased sustainability of the sector.

Chittagong is a major source of rawhides and is likely to be a major footwear manufacturing growth centre next to Dhaka. According to the Chittagong Rawhide Traders Association, 112 rawhide warehouses – big and medium – are located on a 4-km stretch between Muradpur and Oxygen area in Chittagong[93].

[93] http://www.theindependentbd.com/printversion/details/14041

5.1.5 Shipbuilding and Ship Repairing

With escalating cost of energy and human resources, the existing major ship building countries like South Korea, China, and Japan are finding it less attractive to build smaller ships, especially of 25,000 DWT or less. Therefore, the international ship owners, who are interested in building small ships of less than 25,000 DWT, are looking for alternative markets.

This is allowing nations like Bangladesh to break through the ship building industry as a cost effective shipbuilding production hub for global buyers. However, Bangladesh, a gainer from this ship building industry transformation, faces a tough challenge as the demand for new ships is being affected by the global economic slowdown leading to less merchandise movement. A volatile new ship building demand scenario is evident from the significant rise and fall of world new orders over the last few years.

Bangladesh has the potential to earn $2.0 billion by exporting ships and vessels in the next five years[94]. New ships exported to European market, especially to Denmark, Finland and Germany. It is now set to deliver a number of ships under orders received from Germany, the Netherlands, and Denmark.

Ship building industry of Bangladesh has developed the capacity and technical expertise to manufacture all inland and coastal ships in Bangladeshi shipyards. *According to a 2013 report, more than 250,000 skilled and semi-skilled workers are employed in the ship building industry and the average growth of the industry is 8 percent*[95].

EPB reported export receipts of $15.92 million in FY2014-15 from shipbuilding, which can be considered a boost compared with previous year's exports of only $0.44 million. Bangladesh has the potential to earn $2 billion[96] by exporting ships and vessels in the next five years.

Table 8: World New Ship Orders

	Number of Vessels			
	2011	**2012**	**2013**	**2014**
Japan	332	387	571	596
South Korea	359	232	551	337
China	731	704	1417	1102
Europe	109	101	113	123
Others	721	728	880	536
Total	**2252**	**2152**	**3532**	**2694**

Source: IHS (Former Lloyd's Register) "World Fleet Statistics"

The ship building industry has strong correlation with worldwide merchandise movement. If we look at the container industry outlook, the global container shipping industry faces a tough recovery in 2011 after the decline in global trade volumes. Currently, instead of containers, global shipping lines are focusing on high profit margin LPG carriers and tankers, where it is difficult for our local entrepreneurs to enter. However, with global environmental concern and tougher international shipping regulation, the life span of most of the existing ships is coming towards an end along with extensive repair and inspection requirements that provides significant opportunities for next 10-12 years.

Being adjacent to sea, Mirsarai is a technically suitable place for establishing shipbuilding and ship repairing facility. Bangladesh after experiencing a high demand as a shipbuilding destination until, the sector is now undergoing major downturn due to fluctuating nature of the industry with the global business trend.

Ship repairing has been a consistently sustainable business worldwide. Local ship repairing industry also offer maintenance services to international sea going vessels. The main demand for ship repair work stems from pre-planned, scheduled routine maintenance for the vessels. These scheduled calls at shipyards for routine

[94] Association of Export Oriented Ship Building Industries of Bangladesh, 2013
[95] Same as above
[96] Association of Export-oriented Shipbuilding Industries of Bangladesh

repair/maintenance (which require dry dock within 2.5 years) are also driven by the need for regular class inspections by classification societies.

Ship repair work is by nature labour intensive, as virtually every job will be unique in some respect (*e.g.* the amount, nature, and location of steel replacement). This provides an immediate advantage to countries like Bangladesh with an abundance of cheap labour.

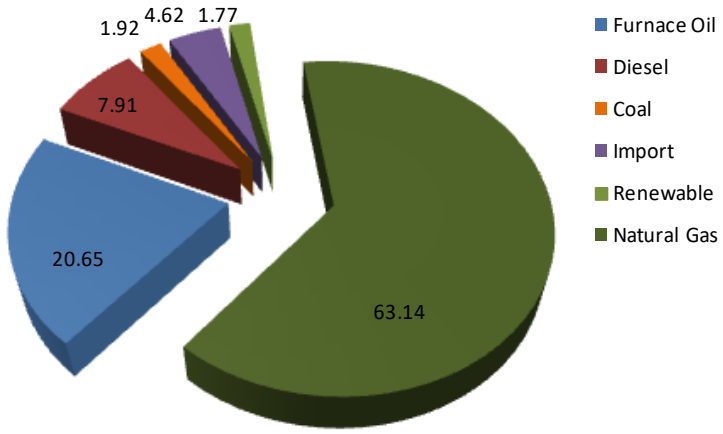
Despite the labour intensive nature, the technologies employed in ship repair have undergone major changes to ensure high safety and environmental standards when carrying out maintenance and repairs, such as the replacement of steel plates, the cleaning of tanks and so on. In addition, modern vessels are increasingly becoming complex, with automated systems that require constant attention as well as regular maintenance and rectification and this has also increased the need for greater sophistication and skills on the part of the service providers.

Chittagong Dry-dock is the only ship repairing facility for Chittagong bound ships. Therefore, a ship repairing facility in Mirsarai will be a suitable proposition. Mirsarai has traditionally been the ship-breaking destination*. Although this has been criticized for safety concerns, the area will be a good source of trained labour of ship repairing facility.*

5.1.6 Power

Energy is the one of 17 goals of Sustainable Development Goals (SDGs) declared by the United Nations in September 2015. Goal 7 of SDGs depicted 'ensure access to affordable, reliable and sustainable modern energy to all'. To provide affordable and reliable electricity to all, power sector of Bangladesh need substantial capacity addition with optimum fuel mix, sustained primary fuel supply for power generation, transmission and distribution network expansion to provide reliable electricity to all.

Figure 48: Installed Capacity by Fuel Type as on October 2016[97]

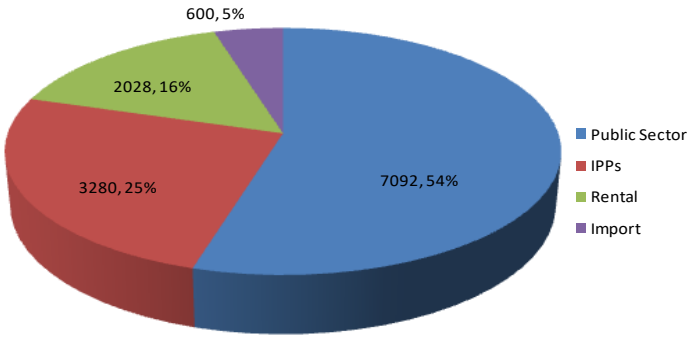


Power sector development of Bangladesh in recent years is quite remarkable. Installed power generation capacity was doubled and number of consumers increased to 34 millions in the last five years. By this time, distribution utilities have expanded their services to more than 60,000 villages.

As the power sector is a capital-intensive industry, huge investments are required in order to generate addition to the capacity. Competing demands on the government resources and declining levels of external assistance from multilateral and bilateral donor agencies constrained the potential for public investment in the power sector. Recognizing these trends, the government of Bangladesh amended its industrial policies to enable private investment in the power sector. Till now, private sector provided 5908 MW, 46% of the installed capacity through IPPs, SIPPs etc. There are about 2900 IPPs are installed all around the country.

Figure 49: Installed Generation Capacity by Ownership[98]

Electricity demand is related to economic growth. According to PSMP 2010 forecast, grid system demand would be 33,708 MW with Demand Side Management (DSM) by 2030. Without DSM measures, demand of grid electricity would be 40,177 MW. Government has taken investor friendly Private Sector Power Generation Policy which provides special incentive facilities for investing in power generation.



Total Installed Capacity 13,000 MW

Mirsarai economic zone, envisaged to be a part of the future Mirsarai Industrial City, can provide array of opportunities for local and foreign investors interested to invest in power sector.

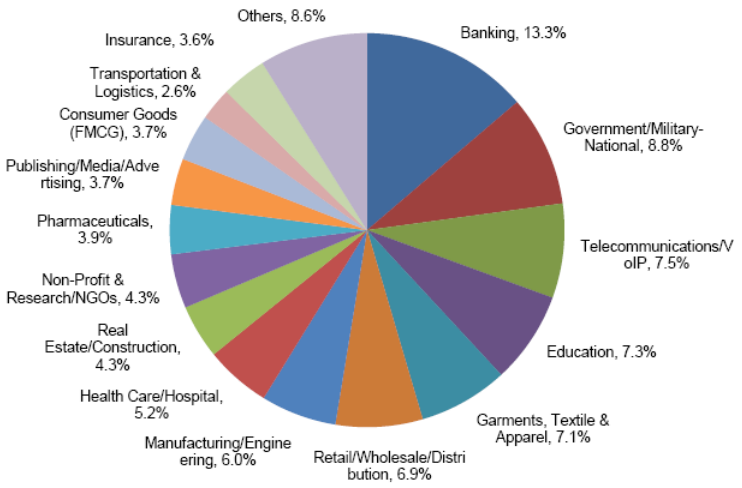
[97] BPDB
[98] Same as above

5.1.7 ICT Industry

The ICT industry is growing and is playing an increasingly prominent role in Bangladesh's economy. This industry serves both domestic and international markets. It counts more than 1,500 registered ICT service providers employing over 250,000 ICT professionals. Total ICT revenue reached $600 million for the period 2013-2014, with export accounting for $250 million, including freelance outsourcing[99]. Recently, there has been strong growth in freelancing, where young professionals directly serve overseas clients. These professionals mainly work from home and do not own registered companies. According to BASIS, there are about 40,000 freelance professionals in Bangladesh, earning on average revenue of about $ 15.0 million per year (BASIS).

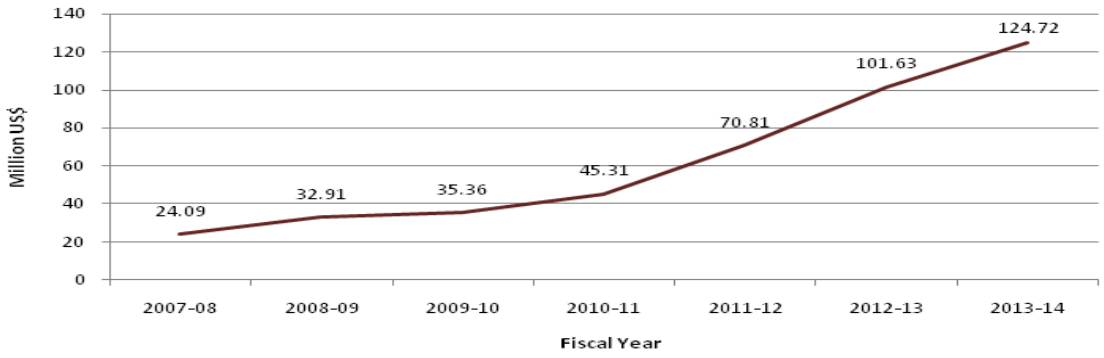
As derived from BASIS membership data, the majority of ITO service providers in the country specialize in the Customized Software Development and IT Enabled Services, comprising 56 percent and 17 percent of BASIS members, respectively. As of 2015 – BASIS counts 986 member companies under its fold. A number of these companies also engaged in providing different IT enabled services (data/form processing, graphic/web design, content management etc.) to their clients.

Figure 50: BASIS Member Companies 2014 – Vertical Specialization



Major export destinations for software companies include the US, Japan, UK, Denmark, Sweden, Norway, Netherlands, Germany, Australia, Saudi Arabia, and the UAE. Most software exporting companies are primarily involved in development and maintenance of small and midsized web applications, games or mobile applications etc. The global growth rate in the ICT industries is 16 percent over last five years, reaching a size of 1.06 trillion dollars in 2010 (NASSCOM Review 2010). In comparison, the overall IT industries in Bangladesh have enjoyed a growth rate of 40 percent over the last five years (BASIS) and this trend is expected to continue. The export trend in recent years is shown below:

Figure 51: Export Trends in Recent Years



Source: *EPB & BASIS Report, 2015*

[99] BASIS, 2014

The global ICT market continues to grow and due to its large market size, there is a huge potential for Bangladesh to grab additional market share. Several Bangladeshi companies have been successful in penetrating the global ICT market. The main attraction for the tech companies including Intel, Samsung and Nokia is the low labour wages. Large corporations will go to those places that offer them the best business scope. Two companies, one Sri Lankan and one Indian, have already signed an agreement to set up their hardware manufacturing plant in the planned Hi-Tech Parks of BHTPA. Considering the proximity of the location to airport and seaport, the Mirsarai economic zone offers attractive package for the tech giants to set up their hardware manufacturing plants.

5.1.8 Light Engineering

Growth prospect and import substitution prospect is high in the light engineering industry. This sector contributes to growth in various related sectors and a wide range of economic activities. *It is estimated that there are more than 40,000 units of Light Engineering Industries (LEIs) in the country employing some 800,000 persons and generating annual revenue of about Taka 9,500 crores ($1,600 Million)100. According to EPB data, the LEIs posted export earnings of $447.04 million in FY2014-15, which indicates 22 percent increase from export earnings of $366 million during FY2013-14.*The sector produces mainly spare parts of machineries of transport, agriculture, power, automobiles and pharmaceutical sector, and electrical switches and accessories. The sector is attributed to manufacturing spare parts "from aircraft to bicycles." Most of the industries are located around old Dhaka with heavily concentrated facilities. These industries are classified as SMEs. Despite the pressures to relocate away from old Dhaka, there are also valid reasons that keep SMEs in their current place of business. These are discussed below:

Old Dhaka is attractive because SMEs' customer base is there, including both retail outlets and industrial intermediaries. The Dholai khal area of Old Dhaka is a 'naturally developed' industrial area in which businesses have access to raw material supplies as well as services trade—repair, accounting, and the like. This naturally developed value chain cannot be easily replicated elsewhere. Businesses in Old Dhaka have developed strong bonds, and have developed a cooperative style of doing business that allows them to survive, often in the informal or gray market sector.

The bicycle and bicycle parts export industry has emerged relatively recently in the industrial landscape of Bangladesh. Foreign direct investment was critical to the emergence of the bicycle export sector. Malaysian investors were the first to seize the EU market opportunity by establishing the first bicycle-exporting firm in Bangladesh in 1995. A domestic trading group, Meghna, was the next firm to enter the bicycle export manufacturing industry. Bicycle exports are the single largest product export within Bangladesh's light engineering sector, contributing to about 7.5 percent[101] of engineering exports.

Meghna Group is the largest bicycle manufacturer and exporter (90 percent). It has nine factories, including two for handling exports, 2 for meeting local demand and 5 to produce bicycle components. They currently produce six types of bicycles. Alita Bangladesh is a Taiwan based company but one of our largest bicycle exporters. Pran – RFL Group is the latest entry with a manufacturing capacity of 500,000 bicycles annually. Side by side with the export-oriented bicycle industry, Bangladesh also has a cottage industry of small-scale bicycle assemblers, parts manufacturers and retailers, which had its beginning during the 1970s (World Bank, 2013). The Bongshal market of Dhaka is the hub of this bicycle cottage industry in the country, employing about 2,000 people in businesses related to bicycle assembling, component manufacturing and retailing.

Bangladesh exported bicycles worth $126.06 million during FY2014-15 and $112.89 million during FY2013-14, thereby earning for itself the tenth position in the global ranking of bicycle exporters.

Chittagong also houses significant number of SMEs/light engineering industries, especially due to availability of steel from ship breaking and due to need of spare parts of local industries and automobiles. The major light engineering clusters in and around Chittagong are: Pathantuli – Badamtoli, Pathantuli-Kalabagan, Muradpur-Panchlaish, Pahartoli Shoraipara-Colonel Hat, Sitakund, Anderson Road, Cox's bazar, Station Road, Comilla, Old Sunagaji Bus Stand, Feni, Lalpul, Feni Sadar etc. Data on the number of industries is scarce. However, due to location advantage with respect to availability of steel such industries are suitable to be set up in Mirsarai.

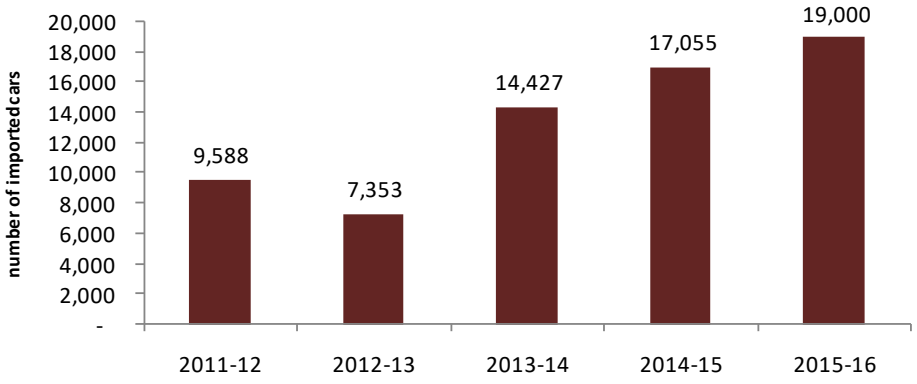
[100] Study on Identifying Regulatory Impediments of the Light Engineering Sector and Improving Transparency, International Business Forum of Bangladesh (IBFB)
[101] The World Bank

5.1.9 Automobile

The growth in urban population as well as the increase in economic activities has created a huge demand for different types of motorized vehicles. The demand ranges from luxury inter-district buses to small sedans. As our country is not manufacturing any type of motorized vehicles, it is totally dependent on imported ones. Bangladesh vehicle market is being dominated by imports from Japan, Korea and India. *Every year Bangladesh is importing a large number of vehicles*, including used cars known as reconditioned cars. This import demand requires a huge amount of foreign currency.

Since there is no official automotive industry in the country, Bangladesh has to import cars from abroad by paying high amount of taxes. *Car sales will grow significantly only when the tax rate will be in a tolerable state.* Sales of reconditioned cars rose in fiscal 2015-16 amid increasing demand from the middle income segment. While no official annual sales data is available, the import data compiled by Barvida shows an 11 percent spike to 19,000 units in fiscal 2015-16 from a year earlier. As per BIDA, *Bangladesh has a huge demand for automobiles for the increasing population, with a sales forecast of as much as $2.5 billion a year*.

Figure 52: Number of Imported Reconditioned Vehicles[102]



Despite the lack of any local car manufacturers, *Bangladesh has one state-owned factory for car assembly of Pragoti near Chittagong*. It assembles around 1,000 units of Mitsubishi Pajero, minibuses of Tata and Eicher. There are no automobile parts manufacturers in Bangladesh and thus all parts and components required for the repair and maintenance of automobiles are imported. *PHP, a Chittagong-based industrial enterprise, is set to assemble Malaysian Proton cars in Bangladesh*, with plans to make parts and components as well in future. This will be the second such initiative in Bangladesh after state-run Pragoti. *Mitsubishi announced a plan to manufacture 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 manufacturing clusters as those found in Thailand. International automobile companies would have to come to Bangladesh in great force. Also worth noting is the budding motorbike manufacturing industry that's taking shape in Bangladesh. Since two-stroke engine vehicles were banned in the country, the demand for motorbikes has seen a sizeable spike.

Mirsarai economic zone can become future destinations for the automobile companies to set up assembling or manufacturing plants inside the zone. Chittagong and Dhaka has the most demand of automobiles.

[102] Bangladesh Reconditioned Vehicle Importers and Dealers Association (BARVIDA)

5.1.10 Frozen Fish

Bangladesh has huge fisheries resources having high potential to increase fisheries production and export. Bangladesh exports frozen shrimp and other fish and fisheries products to EU, USA, Japan, Russia, Hong Kong, Singapore, Saudi Arabia, Sudan and many other developed countries. Total frozen food (covering shrimps, white fish, fish dry etc.) accounts for about 2 percent of total export of Bangladesh. Year wise export of shrimp and other fish products are shown in the exhibit below.

Figure 53: Export Trend of Shrimps/Fish (in million $)

Source: EPB, 2014

Export Growth Potential: Shrimp production per hectare in Bangladesh is very low as compared to other countries because industry in Bangladesh still follows traditional method of farming while other countries have shifted to more scientific and innovative methods of production. The traditional methods of production resulted into low production and yield per hectare. Bangladesh's typical yields are less than one tenth of Thailand and one fifth of India as presented in the diagram.

In 2014-15, export earnings from the frozen foods sector was $568 million. According to Export Promotion Bureau, frozen fish had a 6 percent decline to $49 million in FY2014-15, compared to previous year's $52 million[103]. Although export in terms of volume is increasing but value is declining because of decrease in demand due to lower consumption in the world market and other countries such as Vietnam, Thailand etc. are offering the same type of fish/shrimp at a much lower price. The export of frozen food has grown at a rate of 8 percent per annum in the last 10 years. However, as per Bangladesh Frozen Food Exporters Association, the growth rate is expected to come down due to effect of recession and impose of ban by some countries because of quality issues. Accordingly, it has been assumed that, the export growth will remain in the range of 6-7 percent in the short to medium term.[104]

Government has taken a number of policy initiatives to intensify the cultivation and increase per hectare yield. These policy initiatives are expected to be implemented over next 5-10 years. It is expected that with the introduction of scientific method of shrimp culture, the present production of shrimp will be increased substantially. In the long term, export is expected to grow at the rate of 8-10 percent per annum[105] and continue to grow at the same rate until the projection period.

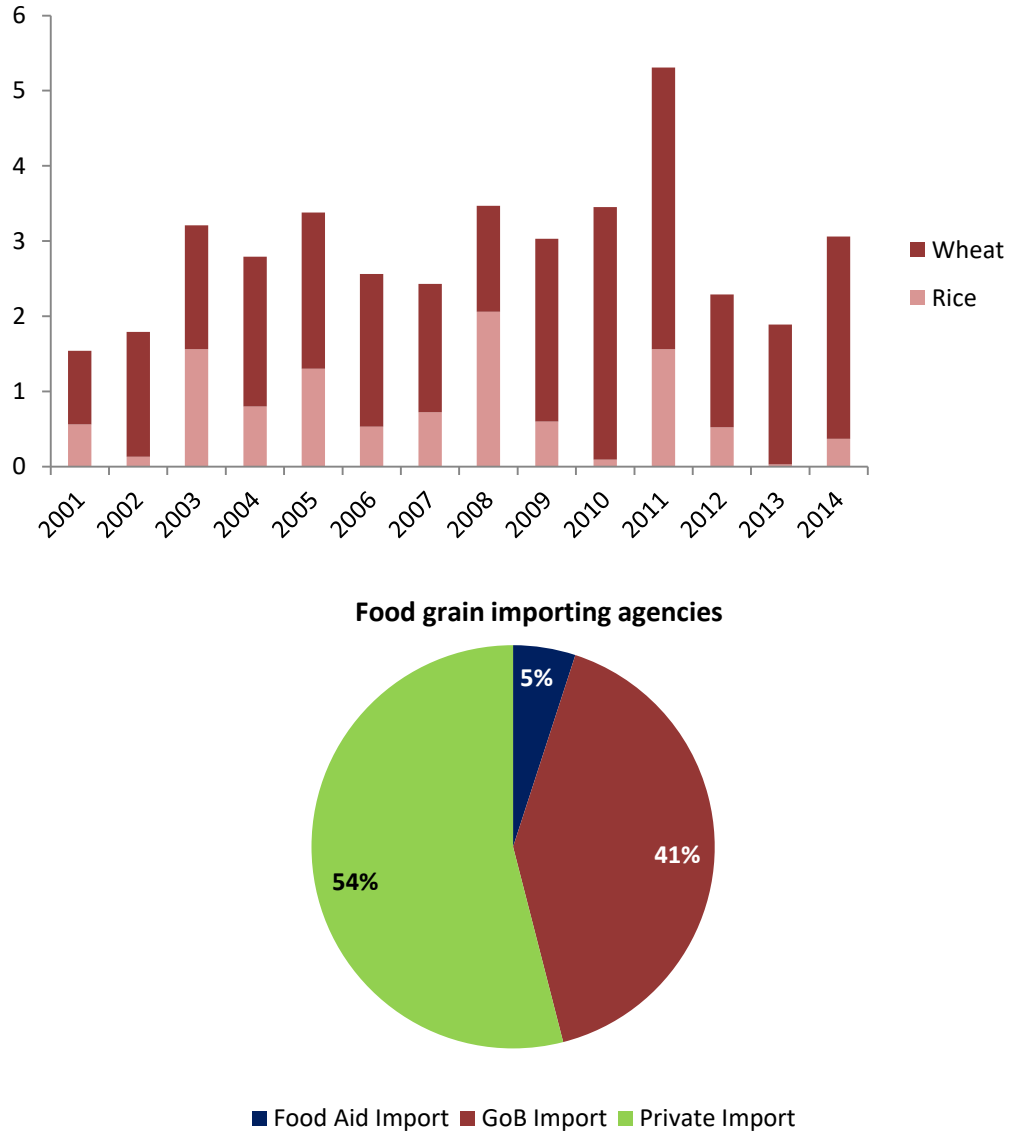
[103] Export Promotion Bureau, Website Data\2014-2015\12.July-June\Monthly Summary Sheet 2014-2015 for the month of July-June (Revised).doc
[104] 3-5 years
[105] Deloitte estimate

5.1.11 Food Processing

Bangladesh has been importing around 2.29 million tons of food grain per annum in recent years. The majority consists of wheat along with moderate volumes of rice in years of poor harvests. Wheat accounts for over 70 percent of the total food grains import while the remaining is rice. The key importers of food grains include GoB, private importer and food aid agencies. Imports were controlled by government bodies in the past, but private sector imports have increased significantly in recent years. Majority of the import is done by private importers and it accounts for around 54 percent, followed by GoB.

The import accounts for about 7-8 percent of Bangladesh's food grain requirements. Bangladesh has been almost self-sufficient in rice for many years, producing about 19 million tonnes in a good year. However, it produces only about half its wheat requirements. Annual production is about 1.5 million tonnes with another 1.5 million tonnes being imported. The trend of food grain import for past decade and key agencies importing food grains are presented in exhibit below.

Figure 54: Import of food grains by Bangladesh



Source: FPMU, Ministry of Food, Bangladesh

Around 87 percent of the total seaport import is through Chittagong and remaining through Mongla. Food grain imported serves as the raw material of food processing industries mainly biscuit and cookies. The fact that the food grains are imported signifies that there is a strong local demand for processed foods in

Bangladesh. Chittagong being the concentrated commercial hub of the country is also a major consumption centre for processed foods. The types of food processing industries are as follows:

Primary Processing:

- Meat Processing
- Grain Milling
- Fruit and vegetable processing

Secondary Processing:

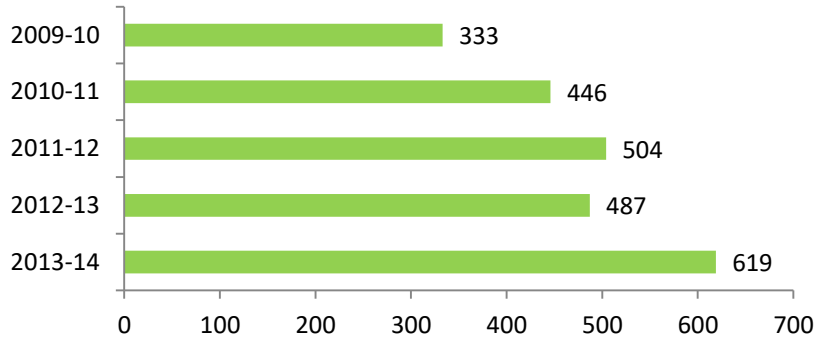
- Food Canning from pulp
- Biscuit making
- Distilling and manufacture of other beverages
- Processing of oils and fats

It is understood that secondary processing will be more suitable for Mirsarai.

5.1.12 Cement

Most of Bangladesh's cement requirements are met through imports of clinker and related raw materials such as slag, fly ash, gypsum etc. Currently, around 93 percent of the import in this category is handled at Chittagong Port leaving only 7 percent for Mongla. The key reason for this is that most of the cement-manufacturing firms are in Dhaka and Chittagong and demand from Central and South Western Bangladesh is much higher as compared to South Eastern and Northern Bangladesh. Import of clinker and other cement manufacturing raw materials are given in the exhibit below.

Figure 55: Import of Clinker in Bangladesh ($ million)



Source: IDLC Monthly Business Review, 2015

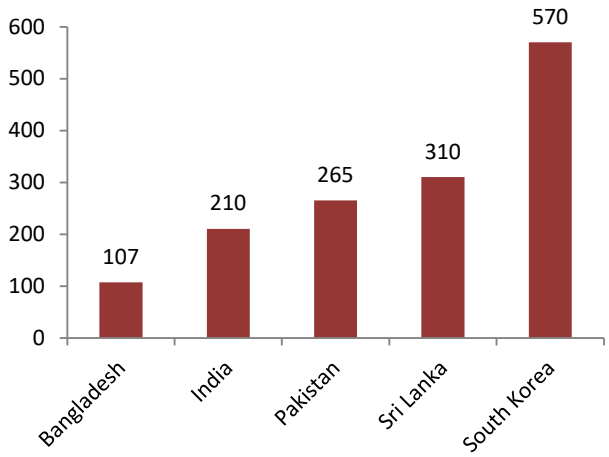
Demand for Cement/Clinker: Bangladesh has a high need for basic infrastructure, housing and services, and therefore a robust growth in the demand for cement. Cement consumption has steadily been rising and more than doubled in the last 10 years. Per capita consumption remains poor when compared with the other Asian countries and world average, which underlines tremendous scope for growth in the Bangladesh cement demand in the long term.

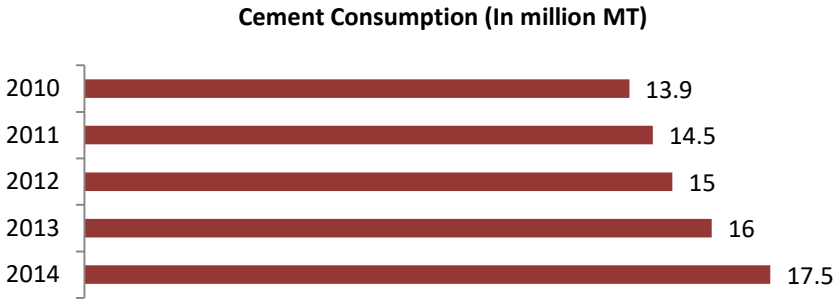
It is believed that in Bangladesh currently there is a gap in the required and available Infrastructure facilities. The situation is almost similar to what prevailed in India in the past decades. As can be seen from the graph shown below, per capita consumption of cement in Bangladesh is one of the lowest in the world. However, India fares slightly better than Bangladesh, the same figure for India is also very low and was even lower in the past few years.

Under such scenario, there exists huge growth potential for cement industry in Bangladesh. Actually, the Indian cement industry has shown impressive growth with production in 2010 being almost 1.6 times than production in the year 2005. In India, the demand in this sector has grown at a rate of 8.3 percent over a 15 year period (from 1997-2011). Comparing this to situation in Bangladesh, it can be seen that cement production in Bangladesh has almost doubled in the past five years (from 7.6 m tones to 13.93 m tonnes). It can hence be reasonably believed that, Bangladesh cement sector will grow in similar fashion with the possibility of growth rates being even higher than those of India.

The outlook for the cement demand in Bangladesh seems positive for a number of reasons. First, the government seems to be on an aggressive footing to increase the amount of spending in social and physical infrastructure. Second, the private sector is also energized because of certain tax advantages, on real estate investment. Third, a number of large infrastructure construction projects (such as the Padma Bridge) are under implementation. Both the government and the private sector are soliciting funds for such projects. If implemented, these projects would significantly improve demand for construction materials including cement.

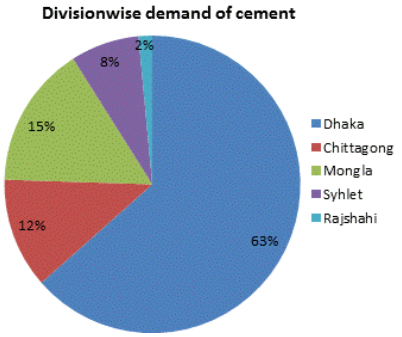
Figure 56: Per Capita Cement Consumption (Kg)





Source: IDLC Monthly Business Review, 2015

Currently, Bangladesh cement industry is at the beginning of growth stage and growing at average growth rate of around 7 percent per annum. It has been assumed that, the growth of demand for cement will be linked to the growth of construction industry that is currently growing at the rate of 8 percent per annum. Accordingly, it has been estimated that in short to medium term (3-5 years) overall cement demand in Bangladesh will grow at around 7-8 percent while growth is expected to be over 10 percent after five years owing to overall development in construction activities including development of big infrastructure projects (Padma Bridge, Flyovers, highways, power plants), growth in real estate sector (construction of houses, apartment blocks, public utilities etc.) due to growth in urbanization etc.



It is understood that, in the past most of the Bangladesh's cement requirements have been met by imports in the form of finished cement but since last 5-6 years only raw materials used for manufacturing of cement such as Clinker, Fly ash, Gypsum and Slag etc. are imported. Currently, majority of cement used in the country is Ordinary Portland Cement (OPC), with a 95 percent to 5 percent mix of clinker and gypsum hence among the total import of raw materials for cement, clinker accounts for around 93 percent and rest is Slag, Fly ash & Gypsum etc. However, worldwide Portland Composite Cement (PCC) has become popular which requires less clinker (around 65-80 percent). In addition, since overall price of cement is driven by price of clinker so in order to minimize the effect of price sensitivity of cement due to price of clinker, industry will shift slowly towards manufacturing of PCC. Using these above assumptions, total demand for each of the raw materials for cement has been projected for 30 years.

5.2 Competitiveness Analysis of Mirsarai Site

5.2.1 SWOT Analysis

The proposed Mirsarai 2 economic zone as a site has both strengths and weaknesses, as well as opportunities and threats. However, compared to weaknesses and threats, its strengths and opportunities are great, and as such, this zone has been proposed for implementation.

Strengths

- A substantial amount of land is available.
- It has the potential to become the largest seafront EZ of Bangladesh.
- Land is low and flat.
- Land reclamation from sea is possible by dredging.
- Not much agrarian activities with very little production.
- Most part of this site is protected by embankments.
- Elevating the land using dredged sand from the sea is possible.
- Direct access to sea and Feni river may ensure quick transportation of construction material
- Sweet water is available at 1000-1200 ft depth.
- Condition of Muhuri Project: embankment at site is very good and can be used to protect the site on the northern part.
- People living at site are impoverished and willing to give their land for acquisition.
- Total needed resettlement is comparatively low.
- Less number of structures and trees will make the land clearing task easier and less costly.
- Wind, solar and hydropower may be used for electricity production. Detail study will be needed.
- Mobile phone network is available at site.

Weaknesses

- A complex dike system will be needed for protecting the bigger Mirersharai site.
- Use of dredged sand may increase the time for land compaction and thus increase construction time.
- Deep piling will be required for construction; which will increase the construction cost.
- No existing water and gas supply facility.
- Very low voltage electric connection adjacent to site.
- Surface water is saline. Need to collect sweet water from 16 Km upstream of the Feni River.
- No local and regional facilities regarding product and market.
- No urban living and recreational facilities.
- A small mangrove forest is present at the boundary of the site.
- Soil quality.
- Tidal effect of the canals at site may hamper the drainage system.

Opportunities

- Site is located along the strategic Dhaka-Chittagong industrial corridor and at the end of the eastern side of the Bay of Bengal.
- Opportunity to become the largest EZ of Bangladesh.
- Setting up of all infrastructures will create a township.
- Creation of flood protection infrastructure and EZ will protect the whole Mirsarai 2 EZ.
- Road transportation of cargo to Chittagong Port is only 67 Km.
- Nearest ODF (Optical Distribution Frame) is located about 12 Km from the site.
- Chittagong port is only 85 Km by sea.
- A 230/132KV substation is located within 10 Km from the site; which can be used to connect the site with the national grid.
- Access roads connect the site directly to the Dhaka-Chittagong highway; the most important highway of Bangladesh.
- Dhaka-Chittagong highway is being upgraded to a 4-lane highway.
- The BWDB embankment protecting this site continues up to Sitakunda. Constructing a road on top of it may directly connect this site with the Chittagong port.

Threats

- The site is exposed to natural calamities, hence needs better protection.
- Busy Dhaka-Chittagong Highway will increase time to bring construction materials to the site and hence increase the construction time.
- Construction of access roads may prove to be difficult, as land acquisition and resettlement will be needed.
- The site is 182 km from Dhaka City.
- Lack of proper infrastructure in the region.
- Absence of urban living and recreational facilities in nearby areas.
- Minimal possibility of obtaining gas connection as the national production is very low.
- Suitable soil for construction is not available at or near the site. This fact will increase the construction time.

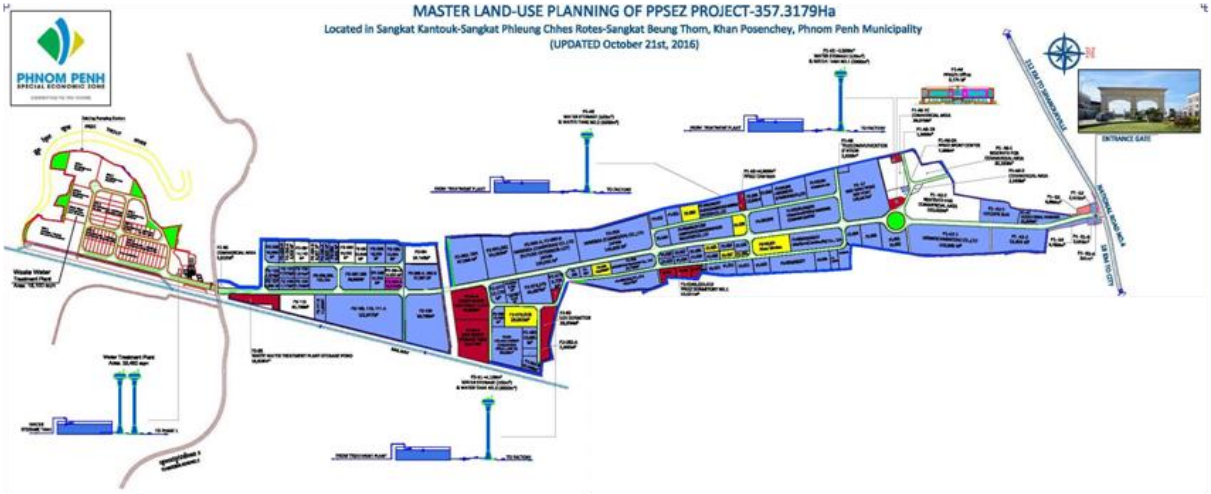
5.2.2 Benchmarking Assessment

The team have carried out comparative assessment, which assembled a large number of quantitative investment or locational factors, and a scheme has been developed for aggregation across such variables. The Economic Zones/Industrial Parks selected for the assessment are as follows:

Name of the Economic Zone/Industrial Park	Country
1. Phnom Penh Special Economic Zone	Cambodia
2. Dahej Multi-product Special Economic Zone	India
3. Bitung Special Economic Zones	Indonesia
4. Thilawa Special Economic Zone	Myanmar
5. Tien Son Industrial Zone	Vietnam
6. Amata Industrial Estate	Thailand

Phnom Penh Special Economic Zone:

Figure 57: Layout of Phnom Penh SEZ



Phnom Penh is the capital city of Cambodia and the most populated city as well. Phnom Penh Special Economic Zone was established in 2006 on the outskirts of the capital Phnom Penh. There are around 100 companies located in Phnom Penh SEZ (10/2016) within a land area of about 357 hectares, accommodating around 21000 workers. It operates under the authority of the Cambodia Special Economic Zone Board under the umbrella of the Council for the Development of Cambodia (CDC). It was was converted into a Public Limited Company (PLC) on July 7th, 2015. Key manufacturers and investors in Phnom Penh SEZ include Betagro, Coca Cola, Denso, Laurelton Diamonds, Minebea and Toyota amongst many others. Key Infrastructures includes flood-safe dyke and drainage system, electricity and telecommunication network, dry port, power station, independent water supplies etc. (Phnom Penh SEZ Website).

Dahej Multi-product Special Economic Zone:

Figure 58: Layout of Dahej SEZ

Dahej SEZ is located in Vagra Talulka of western part of Bharuch District, Gujarat, India. It is a part of Dahej Petroleum, Chemicals and Petrochemicals Investment Region (PCPIR) and is within Delhi-Mumbai Investment Corridor (DMIC). It has an area of 1682 hectare, of which 1573 hectare is processing area and 34 hectare is non processing area. There are 96 units operating inside the SEZ, employing around 45000 workers. It is developed by Dahej SEZ Ltd (DSL). DSL is promoted jointly by Gujarat Industrial Development

Corporation (GIDC) and Oil & Natural Gas Corporation (ONGC) for development of Special Economic Zone (SEZ). GIDC is co-developer for water supply, collection of treated effluent and disposal, Torrent Energy Ltd. is co-developer for power distribution, Gujarat State Petronet Ltd. (GSPL) is co-developer for gas distribution, Bharat Sanchar Nigam Limited (BSNL) is Co-developer for Telecommunication and data transmitting Network in this SEZ (Dahej SEZ Website).

Bitung Special Economic Zones:

Figure 59: Layout of Bitung SEZ

Bitung Special Economic Zone (SEZ) is newly launched by the Government of Indonesia in 2014. Bitung SEZ is managed by the provincial government of North Sulawesi and is designated by the Government as the centre of fishery, distribution, and logistic in Sulawesi Economic Corridor. It sits on an area of 534 Ha at Tanjung Merah Bitung village, North Sulawesi Province. Priority sectors in the area are logistics, herbal pharmacy, fish processing and coconut processing, creating more than 30,000 jobs in the area. It is governed by the The National Council for Special Economic Zone of Indonesia (KEK Website).

Thilawa Special Economic Zone:

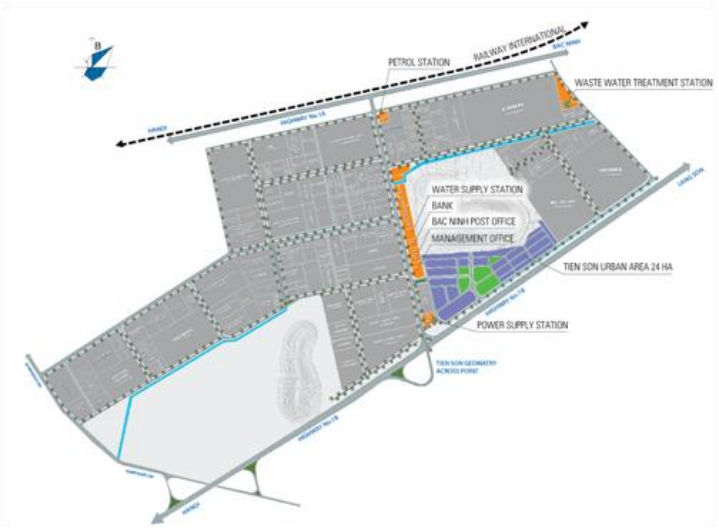
Figure 60: Layout of Thilawa SEZ

Thilawa Special Economic is the first operational SEZ in Myanmar, encompassing around 2,500 hectares in Kyauktan and Thanlyin Townships. Thilawa SEZ was developed by a joint venture, initially between the Japan External Trade Organization and the Union of Myanmar Federation of Chambers of Commerce and Industry. The Burmese and Japanese governments established a consortium including Japan Thilawa SEZ Company (backed by Mitsubishi, Marubeni and Sumitomo corporations), Myanmar Thilawa SEZ Holdings, Thilawa SEZ

management committee and the Japan International Cooperation Agency (JICA) on 29 October 2013 to proceed with development. It is located at around 20 km South-East of Yangon, which is the biggest commercial city of Myanmar (Thilawa SEZ Website).

Tien Son Industrial Zone:

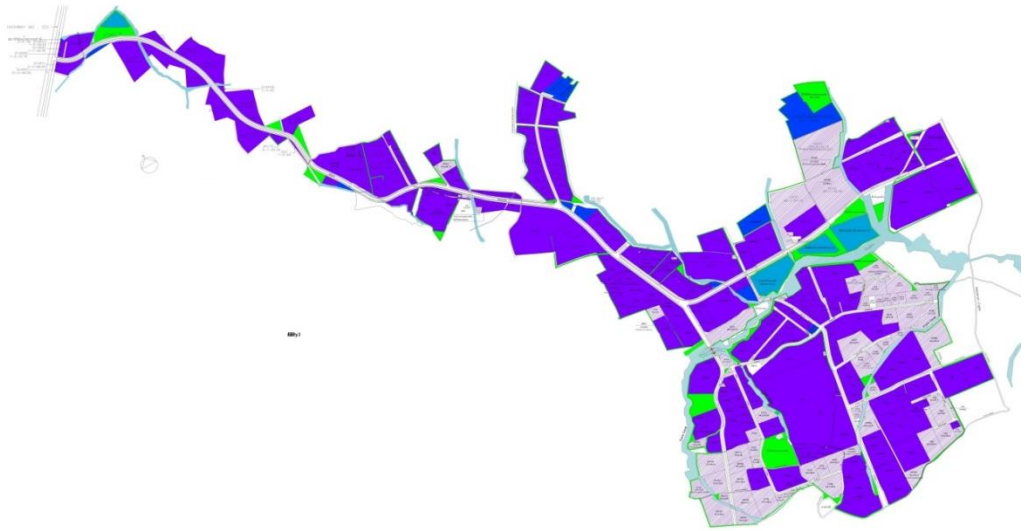
Figure 61: Tien Son Industrial Zone



Tien Son Industrial Park is located in the area of Bac Ninh Province, Vietnam with the total area of 350ha. This is the first industrial park project in Bac Ninh Province. It is about 22 km away from Hanoi capital. With facilitated investment conditions and attractive preference policies, Bac Ninh has recently ranked the second in the North in terms of provincial competitiveness index, and reached top 10 in FDI attraction nationwide for years. The zone has adequate infrastructure support including power supply, water supply and drainage system, waste and waste water treatment etc. It was developed in two phases starting from 1999, first phase 134.76 ha, second phase 214.24 ha. Primary sectors in this IP include electrical and electronic, steel, consumer goods and garment production, agricultural processing and foodstuff etc. (Viglacera Website).

Amata Industrial Estate:

Figure 62: Layout of Amata Industrial Estate



Amata City Industrial Estate is located on highway No. 331 in Rayong province, in the heart of the Eastern Seaboard of Thailand. The estate is located close to a deep-sea port and all major infrastructure of the area. It is home to over 70 international clients. The estate is strategically located just 27 kilometres from Laem Chabang Deep Sea Port and 1.5 hours drive from Bangkok. Amata works in partnership with the Industrial Estate Authority of Thailand. Amata serves companies from around the world with industrial land for sale in various sizes to suit the individual requirements of each investor. Quality development, maintenances, and the dedication to keep Amata estate “green & clean” contribute to the company’s success.

The above sites will be assessed based on following criteria against Mirsarai 2(a) and Mirsarai 2(b).

Benchmarking Criteria

A total of eighteen criteria were chosen as being particularly relevant for this assignment at this prefeasibility stage. The criteria are outlined below. Each criterion was given a mark ranging from 1-4 with four being least cost/best advantage and one being greatest cost/most disadvantageous. The marks allocated to each criterion for each of the sites is shown below Table 4.The overall score from the comparative analysis are then detailed in Table 7. The sites with the highest overall marks were then ranked.

Figure 63: Benchmarking Criteria

Size	No. of plots	Employment	Lease Tenure	Water treatment unit	Wastewater TP
Lease rate	Maintenance charge	Distance from nearest sea-port	Distance from commercial metropolis	Distance from nearest air-port	Corporate tax rate
VAT	OSS	Tax holiday	Min. wage	Cost to Export	Cost to Import

Table 9: Benchmarking Criteria – Allocated Marks

1. Size (ha)	
Adequate with Expansion	4
Adequate no Expansion	3
Less than 500 ha possible expansion	2
Less than 500 ha no expansion	1

2. No. of plots	
> 500	4
300 > 500	3
100 > 300	2
> 100	1

3. Employment	
> 50,000	4
35,000 - 50,000	3
20,000 - 35,000	2
< 20,000	1

4. Lease tenure (yrs)	
> 90	4
70 – 90	3
50 – 70	2
< 50	1

5. Water treatment unit (m^3)	
< 5000	4
5000 – 10000	3
10000 – 20000	2
> 20000	1

6. Wastewater TP (m^3)	
> 20000	4
15000 – 20000	3
10000 – 20000	2
< 10000	1

7. Lease rate	

10. Distance from commercial metropolis	
10 km or less	4
10 – 30 km	3
30 - 60 km	2
> 60 km	1

11. Distance from nearest air-port	
10 km or less	4
10 – 30 km	3
30 - 60 km	2
> 60 km	1

12. Corporate tax rate (percent)	
< 20 percent	4
20 percent - 25 percent	3
25 percent - 30 percent	2
> 30 percent	1

13. VAT (percent)	
< 10 percent	4
10 percent - 15 percent	3
15 percent - 20 percent	2
> 20 percent	1

14. OSS	
Available	4
Not Available	1

15. Tax holiday (yrs)	
> 15	4
10 – 15	3
5 – 10	2
< 5	1

16. Min. wage

Cheapest	4
Normal	3
Expensive	2
Most expensive	1

Cheapest	4
Normal	3
Expensive	2
Most expensive	1

8. Maintenance charge/m2/month	
Cheapest	4
Normal	3
Expensive	2
Most expensive	1

17. Cost to Export	
Cheapest	4
Normal	3
Expensive	2
Most expensive	1

9. Distance from nearest sea-port	
25 km or less	4
25 – 50 km	3
50 – 75 km	2
> 75 km	1

18. Cost to Import	
Cheapest	4
Normal	3
Expensive	2
Most expensive	1

The above competitive indicators come in two categories. There are the charges that need to be paid, like the land lease charges. The lower they are, the more attractive is the zone in question. In contrast, there are indicators, such as average capacity of the water treatment plant per hectare of land in the economic zone. The higher they are, the more attractive is the zone in question.

Data

The team have made a diligent effort to collect information from the following sources:

a) web-sites, including those hosted by the authorities that run these comparator industrial parks or special economic zones (SEZ) as the case may be;
b) research papers brought out by bilateral and multilateral agencies as JETRO, JICA, UNESCAP etc;

Weighting

As part of the benchmarking assessment a weighting, or rating, were applied to each criteria. This would enable those criteria considered more important to have a greater effect on the overall score. For instance, size of the zone and lease tenure is highly attributed as these are considered for growth of industries at the zones. Consequently Criteria 1, “Size” and Criteria 4 “Lease Tenure”, were given a higher weighting than the others. The weighting was then adjusted to a percentage of 100 percent and this percentage was multiplied by the mark previously given. One of the key advantages of the method adopted is that different weightings can be applied to each of the criteria and the matrix marks and ranking updated automatically using a spreadsheet. It makes easier to assess and review the results of the evaluation process, as there is a greater difference between the marks applied to each site.

The data collected for each site is provided in following Table 18. The markings applied to each criterion, weighting and overall marks for each site are included in the overall results of the benchmarking process included in Tables 19 and 20.

Limitations

- The assessment is based on numerical data from available sources. It does not take into account the micro and macro factors related with the success or failure of an economic zone.
- The operational efficiencies of the economic zones have not been taken into account.
- The assessment is based on attributes of site, not the performance of the zone.

Table 10: Benchmarking Assessment – Collected Data[106]

Items Compared	Bangladesh		Cambodia	India	Indonesia	Myanmar	Vietnam	Thailand
	Mirsarai 2A	Mirsarai 2B	Phnom Penh	Dahej	Bitung	Thilawa	Tien Son	Amata
1. Size (ha)	357	173	360	1682	534	400	350	2,700
2. No. of plots	200	120	103	96	48	52	90	695
3. Employment	40,000	25,000	21,000	46,270	34,710	55,000	26,000	28,866
4. Lease tenure (yrs)	50	50	50	30	30	25	50	50
5. Water treatment unit (m^3/day)	0	0	5,300	336,000	72,000	6,000	6,500	30,000
6. Wastewater TP (m^3/day)	84,906	22,286	4,500	40,000	64,800	4,800	4,000	5,000
7. Lease rate ($/m2/year)	3	3	55	2.5	175	75	60	65
8. Maintenance charge ($/m2/month)	0.16	0.16	0.06	0.27	0.06	0.07	0.4	0.28
9. Distance from nearest sea-port	67	67	209	7.9	6	50	110	27
10. Distance from commercial metropolis	66	66	18	50	43	23	25	114
11. Distance from nearest air-port	79	79	8	120	37	25	50	99
12. Corporate tax rate (percent)	27.5	27.5	20	34.61	25	25	25	20
13. VAT (percent)	15	15	10	12.5	10	-	10	0
14. OSS	1	1	1	0	1	1	0	1
15. Tax holiday (yrs)	10	10	9	5	15	7	2	8
16. Min. wage	68	68	140	143	237	68	100	230
17. Cost to Export (/container (20 feet)	1281	1281	795	1,332	571	620	610	595
18. Cost to Import (/container (20 feet)	1515	1515	930	1,462	646	610	600	760

[106] The sources of the data are provided in Annexure 1

Table 11: Benchmarking Assessment – Comparative Analysis

Items Compared	Bangladesh		Cambodia	India	Indonesia	Myanmar	Vietnam	Thailand
	Mirsarai 2A	Mirsarai 2B	Phnom Penh	Dahej	Bitung	Thilawa	Tien Son	Amata
1. Size (ha)	2	2	1	3	3	1	1	4
2. No. of plots	2	2	2	1	1	1	1	4
3. Employment	3	2	1	3	2	4	2	2
4. Lease tenure (yrs)	2	2	2	1	1	1	2	2
5. Water treatment unit (m^3/day)	4	4	3	1	1	3	3	1
6. Wastewater TP (m^3/day)	4	3	1	4	4	1	1	1
7. Lease rate (/m2/year)	4	4	3	4	1	3	3	3
8. Maintenance charge/m2/month	3	3	4	2	4	4	1	2
9. Distance from nearest sea-port	2	2	1	4	4	3	1	3
10. Distance from commercial metropolis	1	1	3	2	2	3	3	1
11. Distance from nearest air-port	1	1	4	1	2	3	2	1
12. Corporate tax rate (percent)	2	2	3	1	2	2	2	3
13. VAT (percent)	3	3	3	3	3	4	3	4
14. OSS	4	4	4	4	4	4	1	4
15. Tax holiday (yrs)	3	3	2	2	3	2	2	2
16. Min. wage	4	4	2	2	1	4	3	1
17. Cost to Export (/container (20 feet)	1	1	2	1	4	3	3	4
18. Cost to Import (/container (20 feet)	1	1	2	1	4	4	4	3

Table 12: Benchmarking Assessment – Overall Score

Items Compared	Weights Applied	Bangladesh		Cambodia	India	Indonesia	Myanmar	Vietnam	Thailand
		Mirsarai 2A	Mirsarai 2B	Phnom Penh	Dahej	Bitung	Thilawa	Tien Son	Amata
1. Size (ha)	15	20	20	10	30	30	10	10	40
2. No. of plots	10	13	13	13	7	7	7	7	27
3. Employment	10	20	13	7	20	13	27	13	13
4. Lease tenure (yrs)	10	13	13	13	7	7	7	13	13
5. Water treatment unit (m^3/day)	5	13	13	10	3	3	10	10	3
6. Wastewater TP (m^3/day)	5	13	10	3	13	13	3	3	3
7. Lease rate (/m2/year)	10	27	27	20	27	7	20	20	20
8. Maintenance charge/m2/month	5	10	10	13	7	13	13	3	7
9. Distance from nearest sea-port	10	13	13	7	27	27	20	7	20
10. Distance from commercial metropolis	10	7	7	20	13	13	20	20	7
11. Distance from nearest air-port	10	7	7	27	7	13	20	13	7
12. Corporate tax rate (percent)	5	7	7	10	3	7	7	7	10
13. VAT (percent)	5	10	10	10	10	10	13	10	13
14. OSS	10	27	27	27	27	27	27	7	27
15. Tax holiday (yrs)	10	20	20	13	13	20	13	13	13
16. Min. wage	10	27	27	13	13	7	27	20	7
17. Cost to Export (/container (20 feet)	5	3	3	7	3	13	10	10	13
18. Cost to Import (/container (20 feet)	5	3	3	7	3	13	13	13	10
Total Score		**253**	**243**	**230**	**233**	**243**	**267**	**200**	**253**

5.2.3 Results of Benchmarking Assessment

After applying the benchmarking evaluation criteria, the sites were ranked in the following order:

Name of economic zone	Country	Total Score
Thilawa	Myanmar	267
Mirsarai 2A	**Bangladesh**	**253**
Amata	Thailand	253
Bitung	Indonesia	243
Mirsarai 2B	**Bangladesh**	**243**
Dahej	India	233
Phnom Penh	Cambodia	230
Tien Son	Vietnam	200

From the table, it is evident that the Mirsarai 2A and 2B are both competitive Economic Zones in the region. The best performing site here is Myanmar's Thilawa Special Economic Zone. Myanmar has recently revised its minimum wage and introduced new incentive packages to increase the competitiveness of their zones. However, the scores represent that BEZA offers the an attractive and competitive package for the investors within the region. The attributes, which made Mirsarai 2A and 2B sites competitive, are:

- Lease rate (/m2/year): The lease rate recommended by BEZA, $3 per year, is one of the cheapest rate offered between the above zones. The only closest rate is offered by India, $2.5/year. This attribute lower the operation cost of the investment and increases the attractiveness of the zone.

- Tax holiday (yrs): After Indonesia (15 years), BEZA offers the most attractive incentive for the investors, tax holiday of 10 years. In fact, there is a clause of minimum investment of $37 million[107] to avail the incentive in Indonesia, whereas BEZA is offering 10 years of tax holiday to all investment irrespective of size. Overall, BEZA's incentive package is the most attractive and competitive in the region.
- Employment and minimum wage: The availability of labour and the minimum wage are attractive attributes for the investors. BEZA scored the highest in both attributes. Myanmar has recently revised their minimum wage at par with Bangladesh to stay competitive in the region.

Other important attributes include the size of the economic zone, lease tenure, availability of One Stop Service etc. The following table summarises the competitive advantages of each benchmarked site:

Table 11: Competitive Advantages of the Sites

Name of economic zone	Competitive Advantage
Mirsarai economic zone	• Planned future expansion as Mirsarai Industrial City • Land is low and flat, land reclamation from sea is possible by dredging • Well protected by embankments • Very Well connected with the nearby airport, rail station and commercial hub • Attractive incentive package • Streamlined one stop service • Lowest labour rate in the region • Ease of establishing industries • Investor friendly rules and regulations
Phnom Penh SEZ	• Located centrally in the heart of the region's east-west corridor • Comprehensive and high-standard infrastructure • One-stop services in partnership with relevant government authorities

[107] http://www.indonesia-investments.com/

Name of economic zone	Competitive Advantage
	• Competitive investment incentives • Investment protection agreements with key markets • Efficient infrastructure and strategic location • A young and motivated workforce
Dahej SEZ	• Scope of future expansion • Infrastructure is built on international standards • Competitive incentive package • Competent and experienced management team • Inclusion of the utility providers as co-developers • Listed as the world's top-50 'free zones' by FDI magazine • Easy availability of finance
Bitung SEZ	• Strategic location as the the centre of fishery, distribution, and logistic in Sulawesi Economic Corridor • Attractive fiscal exemptions and incentives • Top priority program in the national development planning • Connected with all major regional infrastructures • One Stop Service System (OSS) to accelerate permit process for businesses • Streamlined and hassle free procedure of setting up business
Thilawa SEZ	• Located about 20 kilometers from Yangon, biggest commercial city of Myanmar • Strategic location for investors to have easy access to international markets • Easily expandable distribution network system for the industries • Necessary infrastructures for investors are made available • Competitive tax exemptions along with a favorable investment climate • Simplified and practical approval procedures • Availability of cheap labour
Tien Son IZ	• Synchronized infrastructure construction • Large investments for manufacturing in the electronics sector • Entrepreneurial dynamism allow several small and medium sized enterprises to flourish • Proximity to highly developed Infrastructure • Attractive business environment
Amata IE	• Investors are allowed to own land freehold and enjoy investment incentives • One-stop service centers with customs checkpoints • Maximum incentives benefits to business entities investing in the 13 target business activities • Exclusive rights/ permission to use unskilled foreign labour • International standard infrastructures available

5.3 Demand Forecast

The demand forecast is the most important element of the pre-feasibility study, and draws upon findings from the industry analysis, stakeholder consultation, and open source data and published studies. The demand forecast identifies:

a) the type of industries most likely to locate in the zone,

b) the number of tenants proposed, and

c) the land and infrastructure requirements of units proposed for the economic zone over a 20-year period. Assumptions were made according to three demand scenarios—Base Case, Aggressive Case and Conservative Case.

The result is three demand estimates, one conforming to each of the three sets of forecast assumptions. This will provide public officials, physical planners, and investors with realistic views of interest of the business enterprises in the economic zone, infrastructure requirements, suggested timeframe of the project, and marketing and promotional recommendations to meet anticipated demand.

5.3.1 Purpose of Demand Forecast

The demand forecast has broad and important applications throughout the pre-feasibility study:

- **Forecast Demand.** Estimate the number of companies that will locate in the Mirsarai 2 economic zone over a period of 20 years.
- **Financial Analysis.** Estimate the costs and revenues associated with developing and operating the Mirsarai 2 economic zone, and project the internal rate of return (IRR) of developing and operating the project.
- **Economic Analysis**. Suggest effects the Mirsarai 2 economic zone will have on society, and estimate the economic rate of return (ERR) to the government based on its financial and in-kind contributions to zone development and operation.

5.3.2 Sources of Data

The demand forecast draws upon numerous sources of data and information—both quantitative and qualitative in nature. Specifically, these include:

- **Stakeholder Consultation.** The stakeholder consultation was conducted by consultants. The consultation provides information on the interest of firms in relocating to or establishing new industries in the zone, the operating costs and parameters of these companies, the growth potential of business enterprises, and other data pertinent to the demand forecast.
- **Business Enterprise Association Consultations.** Consultants held consultations with business enterprise industry associations. The information provided by the associations include testimonials on actual and perceived demand for space in the Mirsarai 2 zone, as well as information on operating conditions faced by association members that may influence their proclivity to relocate.
- **Open Source Data and Analysis.** The demand forecast employed data from the Bangladesh Bureau of Statistics (BBS) with respect to the number of firms in each sector, and also drew upon open source analysis from the World Bank, IFC, and previous analysis of industries.[108]

5.3.3 Demand Forecast Methodology

Demand estimations for economic zones provide calculations of the likely intent on new and existing companies to locate—or relocate—operations in a particularly defined zone. The forecast represents an

[108] General analysis of SME industry sectors is included in Section 4 of this report.

approximation based upon several "pillars" that provide evidence to substantiate the demand estimation. This section defines those pillars that constitute the methodology behind the demand forecast, and discusses the evidence each of them provides in detail.

The team utilized types of facts, to build a case for demand in the Mirsarai 2 economic zone. These include:

- **Assumptions.** Demand for space in the Mirsarai 2 economic zone is contingent upon policies and conditions that were assumed at the outset of the study.
- **Investment Trends.** The demand forecast considers new company formation trends and viability of existing business enterprises as a way to establish a baseline upon which the demand estimations are based.
- **Relocation Trends.** The Mirsarai 2 economic zone will be heavily marketed to attract companies wishing to relocate from Chittagong. As such, consultants explored these firms' stated willingness—and actual proclivity—to locate or relocate, external pressures to move, and analyzed the types of firms that would actually move.
- **Uptake Rates in Bangladesh.** The demand forecast reviewed actual land uptake rates of other economic zones in Bangladesh in support of high demand for serviced industrial space.

Utilizing the above facts, the consulting team analyzed trends and estimated likely number of plots that would be populated in the Mirsarai 2 economic zone over the course of 20 years.

General Assumptions

The following broad assumptions define the parameters against which the demand forecast was made. A change in any of these assumptions could affect the demand estimations in a positive or negative manner.

- Business enterprises in the designated sectors the target groups to locate in the Mirsarai 2 economic zone, regardless of their export status. The zone will be open to any in these sectors that desires land and/or building space in the sizes offered by the zone. The business enterprises in the zone will be allowed to have sales to the Bangladeshi domestic market as well as export.
- The zone will offer a streamlined approval process for establishing business enterprise units at a one-stop office within the zone. This will include services such as business registration, licensing, permitting, environmental clearances, work permits, and others.
- Law and order within the Mirsarai 2 economic zone will be maintained at the desired level to maintain a peaceful business environment.
- A power plant will be constructed in the zone. This will provide a dedicated power supply for tenants in the zone.
- Additional utilities such as LNG, water, waste treatment, and telecommunications will be available to zone tenants at market-rate tariffs.
- Business enterprises will have the option to lease serviced land, or the warehouses.

Investment Trends

Much of the demand for space in the proposed Mirsarai 2 economic zone will likely be from companies that will relocate operations from Chittagong. However, it is also necessary to examine the formation of new business enterprises to understand growth and, hence, potential demand from new firms. Consultants looked at multiple indicators, published information about growth trends, and estimated number of business enterprises in operation in Bangladesh.

Growth Trends

The number of new business enterprises created each year ranges between 5 to 8 percent, based on published data. The growth rate of business enterprises changes quite often depending on government policies, particularly with respect to taxation. Overall the consultation found that there was a great potential for growth. The single factor most likely to hamper growth, according to firm, is the shortage of gas and electrical power. An indirect effect has arisen from the lack of gas supply at the national level. Since the government is not giving gas connections to new industries due to gas shortages, no new industries in sectors such as textiles and jute are being set up. These industries form a major customer base for the zone. Therefore, the gas shortage has negative impact on the growth of industries.

Rationale for Relocating from Chittagong City

Congestion. Business enterprises currently operating in Chittagong are under pressure to relocate away from the congested old city. Land in Chittagong is scarce, and small workshops are scattered throughout residential areas without proper planning. According to business enterprise industry associations, businesses are operating from up to five separate locations in Chittagong. Consolidation could save time and technical pressures, and lower the average cost of doing business as well as the per-unit cost of business enterprise products.

Governmental mandate and social pressure. There also exist social and—some may argue—governmental pressures to move business enterprises away from Chittagong. In the summer of 2010, dozens of residents and workers were killed in Dhaka when stored chemicals caught fire. Since then, there has been a backlash against industrialists that operate in the congested old cities, often without proper permits or sanitation. These points, perhaps, to the difficulty associated with relocation of small and medium-sized firms.

Reasons Business Enterprises Remain in Chittagong City

Despite the pressures to relocate away from Chittagong, there are also valid reasons that keep business enterprises in their current place of business. These are discussed below:

Presence of value chain. Chittagong is attractive because business enterprises' customer base is there, including both retail outlets and industrial intermediaries. The Kalurghat area is a 'naturally developed' industrial area in which businesses have access to raw material supplies as well as services trade—repair, accounting, and the like. This naturally developed value chain cannot be easily replicated elsewhere. Businesses in Chittagong have developed strong bonds, and have developed a cooperative style of doing business that allows them to survive, often in the informal or gray market sector.

With regards to the existing value chain, the following problems were raised by business enterprises in the stakeholder consultations for this pre-feasibility study. In some cases, business enterprises indicated they would still be satisfied to source their raw materials from Chittagong presuming that the road communication to the business enterprise is good. On the other hand, it would be more difficult for the light engineering industry to bring raw material supplies into the zone from locations that are more distant. Their raw materials are varied and heavy, and several established markets in Chittagong and neighbouring areas will continue to keep their holds for a substantial time in the future.

Access to workers. Many business enterprise employees trace their home villages to the Mirsarai area. It is also expected over time that accommodations for workers will develop in the villages around the economic zone site, and the difficulty in hiring employees will be lessened.

First Mover Disadvantage. The presence of existing supply chains in Chittagong—raw materials, customers, and workforce—put first movers at a disadvantage, and create a disincentive to relocate operations to the proposed economic zone in Mirsarai. Conversations with business enterprises in Chittagong reveal that many will not move out individually; they are only willing to relocate if others do the same en masse. This first-mover disadvantage may be difficult to overcome. Industry associations will need to play a very large role in the coordination and confidence-building necessary to ensure large-scale relocations by their members.

Willingness to Locate to Proposed Mirsarai Economic zone

This interest is in response to cramped conditions in Dhaka and Chittagong, dangerous working conditions, and social and governmental pressures to move industrial business activities elsewhere. Light engineering industries, for instance have a strong demand to move to an economic zone, as they want to simultaneously upgrade technology, and require the space to do so. They are now finding it difficult to secure financing for capital improvements because of the sub-standard conditions of their current factories. Interviews with industry associations confirm the strong interest in the zone elucidated in the Stakeholder consultation.

The proposed Mirsarai economic zone is not the first attempt, however, to move firms outside Dhaka and Chittagong. There have been several attempts in the past, each met with varying degrees of success.

Electrical Goods Manufacturing village. In the 1990s, electrical manufacturers were given a 10-acre plot of land in Shyampur by the government on which to establish an Industrial Park for companies to locate or relocate operations. The industrial park was constructed with approximately 65 plots of 3,600 and 7,500 square feet, and was managed jointly by BSCIC and BEMMA. Only 60 percent of the plots have been filled by small, medium, and large-sized companies. The reasons are a) Lack of proper utility infrastructure; b) No formal management of the industrial park; c) No support systems for tenants; and d) Lack of training facilities in the industrial park.

Tannery Industrial Area. Tannery businesses were found to be polluting areas within Dhaka, including the main river channel. To ameliorate these problems, the government acquired lands in Savar and constructed a centralized effluent treatment plant and other infrastructure for tanneries. Initially, tannery companies were enthusiastic to relocate to the new site. However, the relocation did not materialize as planned. Their refusal to move stems in part from the high cost of plots in the new area, which the tannery businesses ascribe to corruption.

Relevance to the Demand Forecast

The preceding examination of business enterprise relocation trends provides very useful information regarding the demand forecast, including the numbers of firms that are likely to express serious intent to relocate to the proposed Mirsarai 2 economic zone. In summary, we note the following:

- Cramped conditions, dangerous working environment, and social and political pressures have created a strong demand to relocate business enterprise operations outside Chittagong. Support for relocation is strong among business enterprise industry associations, and there are large numbers of firms that state they are willing to move. The number of firms with *intentions* to relocate can form the basis for the number of firms represented in the Aggressive Scenario of the demand forecast.

- Previous attempts to relocate firms out of Chittagong have not always been met with success. The inability to relocate businesses in the tannery and electronics sectors, for instance, stem from high costs and lack of utilities and services available to firms. It is a telling prediction of the demand for space in the proposed Mirsarai economic zone if the zone does not have fully functioning utilities and land prices at an attractive level for business enterprises.

- A strong cooperative system of doing business exists in Chittagong, particularly among small firms that largely operate in the informal sectors. Firms reliant upon the localized value chain in the old city will not relocate to Mirsarai.

- Two likely scenarios exist with regards to space uptake in the demand forecast. It was noted that there is a distinct first mover disadvantage to relocated to the zone. The first firms to locate in the zone will not enjoy the nearby supplier base nor heavy traffic from potential buyers of their products. Therefore, one demand scenario will likely have the zone initially filling up quite slowly. However, the other scenario will see more firms move en masse. The second scenario is more likely when, and if, the business enterprise industry associations can leverage their members to take a collective relocation decision—and action.

Past Uptake Rates of Other Industrial Parks

The EPZs and industrial estates provided by BSCIC in Dhaka and Chittagong demonstrate a near 100 percent occupancy level. The data presented for this site shows a 95 percent site *allocation*, although observation shows the site in the first stage of development. Older sites in the environs of Dhaka and Chittagong demonstrate a 100 percent occupancy rate, though as with all such developments there is an unavoidable delinquency rate. The Dhaka and Chittagong EPZ also has 100 percent occupancy rates.

Overall rate of occupation within Dhaka and Chittagong, where the industrial zones have been opened, and developed in an orderly and timely fashion seems to indicate that 100 percent take-up appears to be achieved within three to five years.

Industrial parks in and around Dhaka fill up very quickly. We recognized this fact when developing the demand forecast. Below are some particular things to keep in mind in this regard.

- Though the take-up rate is quite fast, we also recognize that much of this take-up is from plot *allocation*, rather than the actual *presence* of a business venture. This effectively lengthens the amount of time it actually takes for a zone to fill up.
- A five-year horizon represents a very aggressive scenario for the proposed Mirsarai 2 economic zone.
- The demand forecast depicted in this pre-feasibility study assumes that firms included in the forecast are actually paying rent or lease, rather than just *allocation.*

5.4 Demand Survey

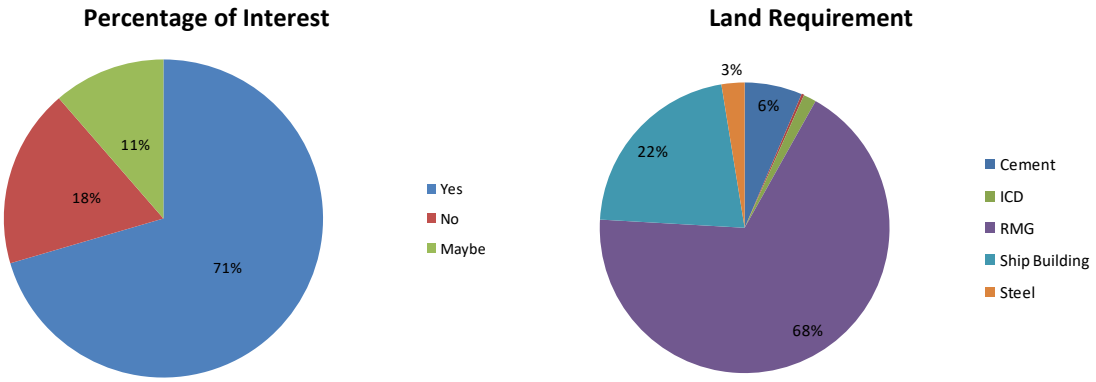
The team carried out survey of enterprises in the designated sectors based in Chittagong and Dhaka. The purpose of the consultation was threefold:

- To have a level of confidence by directly speaking to them
- To understand motivations for desiring a new operating location;
- Gauge interest in existing business enterprises to move to a new location.
- Collect data on the operating parameters—current and desired—of business enterprises, including land, buildings, utilities, and workforce.

The detailed methodology of survey is provided in Section 2.3.5. A questionnaire was filled up by the consulted individuals. 52 responses were received. The filled up forms are provided in Annexure 2. The consulting team identified consultation respondents chosen from business enterprises located at Chittagong and Dhaka through several channels. Executives of the relevant industries were consulted. Consultants also contacted the mid to high level executives of the business enterprises. The survey was conducted in November 2016. It highlighted the general importance of features required by business enterprises in the proposed Mirsarai 2 economic zone. These are discussed below.

5.5 Demand Survey Findings

Low price for industrial land stands out as the most important feature that an economic zone can offer to business enterprises. This is followed by a fully developed connectivity enhancements and availability of labour. Another important point is the availability of energy and access to raw materials. The total land requested for Mirsarai is 697 acre out of 882 acres. Floor spaces requested in standard factory buildings are 290,000 sqft.



5.5.1 Land Requirement

Almost 80% of the respondents conveyed their requirement of land in the economic zones. Out of 52 responses received 48 were positive. In fact most of the respondents expressed that they are pressed for land and gas for expansion and such expansion is ideal if it can be located in such economic zones. Shipbuilding industry and RMG industries expressed interest to take up around 90% of the total land requirements derived from the survey.

5.5.2 Tax Related Issues and Regulatory Regimes

Tax and VAT complexities create considerable difficulty to the business enterprises. Arrangements with the NBR with a bank located within the economic zone will significantly streamline the tax payments. If an understanding can be reached for monitoring the payment of VAT by associations in the economic zone, this could lead to a conducive atmosphere. The same should work well for other regulatory bodies of the government, like the authorities regulating environment and labour. Through education of the entrepreneurs in the economic zone and appropriate campaigning, a conducive environment may be created so that production is not interrupted due to external interventions.

5.5.3 Facilities Needed in the Park

The stakeholder consultation queried business enterprises on the relative importance of various features of a potential economic zone. The following figure illustrates the importance of facilities, according to responses on a scale of 1 to 10 (10 = highest importance; 0 = lowest importance).

Raw Material Sourcing

The survey indicates that the raw materials of the designated sectors mainly come from import and local markets. Since these come through a few hands, the costs are escalated. Therefore, if arrangements are made to import the raw materials needed by all the industries in the economic zone together, it could help lower the costs. Besides, through direct importing, they can have a control over the quality of the raw

materials resulting in improved and sustained product quality. This would also reduce the cost on quality control, since raw materials from a known source will be procured through such procedures. Clustering in the zone would help reduce the cost of transportation of intermediate products besides having a close monitoring of quality by the sub-contractor.

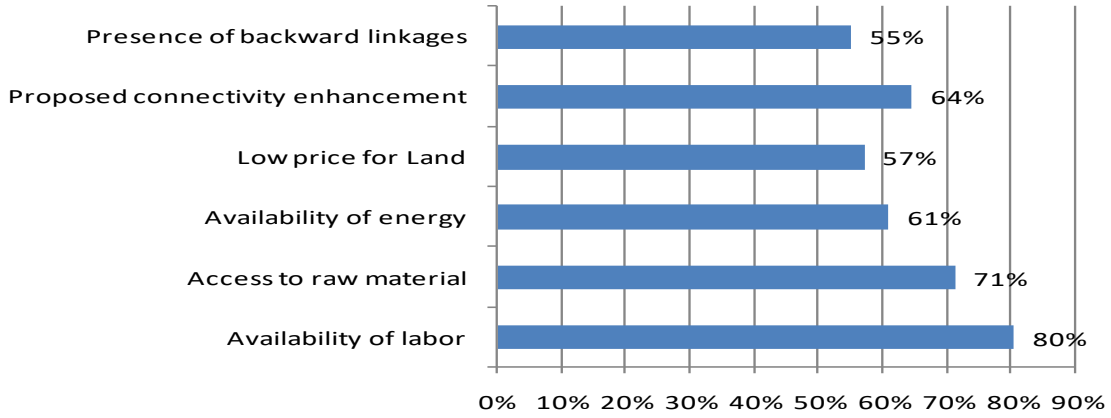
Reliable Power

One of the factors of competitiveness is the continuous availability of adequate electrical power at the correct voltage level. Business enterprises require reliable power supply. Power interruption increases the cost of production due to wastage of time and extra costs. In some industries the whole material in the process gets wasted. Cleaning the machinery and reloading of fresh materials take considerable time and effort.

Availability of cheap Land near Chittagong City

Industrial land at a reduced price and at a short distance from Chittagong was one of the factors that were given high value by the respondents. Since Chittagong has become a hub for businesses, in terms of procurement of raw materials and selling of products, proximity to Chittagong is a priority. Again, since for many enterprises customers come to the industrial units for giving direct orders, a good road communication is important. Therefore, the proposed location in Mirsarai for the zone will be competitive.

Figure 64: Importance of Different Facilities in the Park



5.6 Estimation of Industry wise demand

The study carried out a suitability assessment of each industry to be set up in Mirsarai 2 with respect to different factors and scored with weightage for different factors. Based on suitability of the industry demand for land has been varied for different demand forecast scenarios. The higher the score the more space is allocated for the industry in the zone and then a standard land take up percent of total space allocation for that industry has been assumed.[109]

[109] The higher absolute amount of land take up for more suitable industries is automatically taken care of as the same percentage of land take of a higher space allocated, will result in a higher absolute land take up by the industry.

Table 12: Time Required for Land Take-up

	Scenarios[110]	Base Case	Optimistic Case	Conservative Case
1.	RMG, Food Processing, LE/ Automobile Parts, Textile, Shipbuilding industries/Steel Mills	7 years	5 years	10 years
2.	Petro chemical and Pharmaceutical industries	10 years	7 years	15 years
3.	commercial facilities, residential facilities, warehouse, and training centre	10 years	7 years	15 years

The above land take up rates have been taken in consideration of the following:

- **Investment Trends.** The demand forecast considers new company formation trends and viability of existing business enterprises as a way to establish a baseline upon which the demand estimations are based.
- **Relocation Trends.** The zone will be heavily marketed to attract companies wishing to relocate from city. As such, consultants explored these firms' stated willingness—and actual proclivity—to locate or relocate, external pressures to move, and analyzed the types of firms that would actually move.
- **Uptake Rates in Bangladesh.** The demand forecast reviewed actual land uptake rates of other economic zones in Bangladesh in support of high demand for serviced industrial space.

The following table provides the scores assigned to each industry for suitability of setting up in Mirsarai.

Table 13: Suitability of different industries for setting up at Mirsarai

	Parameter	Weightage	Suitability	Score	Weighted Score
	RMG				
1.	Suitability with respect to Land per unit of Value Addition	25%	High	10	2.5
2.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
3.	Environmental Suitability	15%	Medium	5	0.75
4.	Labour availability in the Chittagong region	10%	High	10	1
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	High	10	1
6.	Growth Prospect/Export Competitiveness	10%	High	10	1
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	Low	0	0
					8.75
	Textiles				
1.	Suitability with respect to Land per unit of Value Addition	25%	Medium	5	1.25
2.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
3.	Environmental Suitability	15%	Low	0	0
4.	Labour availability in the region	10%	High	10	1
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	High	10	1
6.	Growth Prospect/Export Competitiveness	10%	High	10	1
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	Medium	5	0.25
					7
	Pharmaceuticals				
1.	Suitability with respect to Land per unit of Value Addition	25%	High	10	2.5
2.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
3.	Environmental Suitability	15%	Low	0	0
4.	Labour availability in Chittagong region	10%	Medium	5	0.5
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	Low	0	0
6.	Growth Prospect/Export Competitiveness	10%	Medium	5	0.5
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	Medium	5	0.25
					6.25

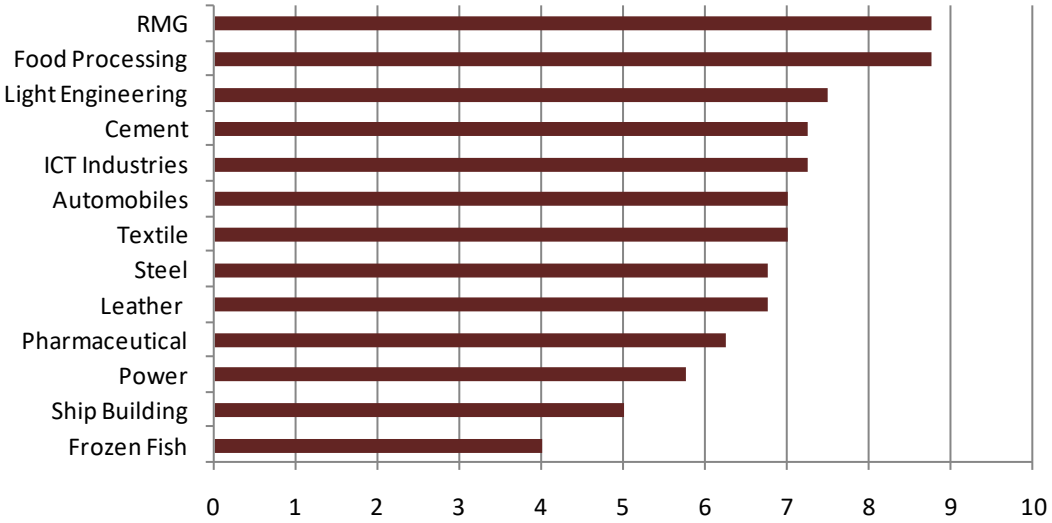
[110] The scenarios have been detailed out in Section 0.

	Parameter	Weightage	Suitability	Score	Weighted Score
	Steel				
1.	Suitability with respect to Land per unit of Value Addition	25%	High	10	2.5
2.	Suitability for proximity to Port Facility or Sea	15%	Medium	5	0.75
3.	Environmental Suitability	15%	Low	0	0
4.	Labour availability in Chittagong region	10%	High	10	1
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	Medium	5	0.5
6.	Growth Prospect/Export Competitiveness	10%	Medium	5	0.5
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	High	10	0.5
					6.75
	Leather Footwear				
9.	Suitability with respect to Land per unit of Value Addition	25%	High	10	2.5
10.	Suitability for proximity to Port Facility or Sea	15%	Medium	5	0.75
11.	Environmental Suitability	15%	Low	0	0
12.	Labour availability in Chittagong region	10%	High	10	1
13.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	Medium	5	0.5
14.	Growth Prospect/Export Competitiveness	10%	Medium	5	0.5
15.	Import substitution Prospect	10%	High	10	1
16.	Suitability with respect to existing Local Demand of the Products	5%	High	10	0.5
					6.75
	Ship Building and Ship Repair				
1.	Suitability with respect to Land per unit of Value Addition	25%	Low	0	0
2.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
3.	Environmental Suitability	15%	Low	0	0
4.	Labour availability in Chittagong region	10%	High	10	1
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	High	10	1
6.	Growth Prospect/Export Competitiveness	10%	Medium	5	0.5
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	Low	0	0
					5
	Power				
9.	Suitability with respect to Land per unit of Value Addition	25%	Medium	5	1.25
10.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
11.	Environmental Suitability	15%	Low	0	0
12.	Labour availability in Chittagong region	10%	High	10	1
13.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	Low	0	0
14.	Growth Prospect/Export Competitiveness	10%	Medium	5	0.5
15.	Import substitution Prospect	10%	High	10	1
16.	Suitability with respect to existing Local Demand of the Products	5%	High	10	0.5
					5.75
	ICT Industries	Weightage	Suitability	Score	Weighted Score
1.	Suitability with respect to Land per unit of Value Addition	25%	High	10	2.5
2.	Suitability for proximity to Port Facility or Sea	15%	Low	0	0
3.	Environmental Suitability	15%	High	10	1.5
4.	Labour availability in Chittagong region	10%	Medium	5	0.5
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	Medium	5	0.5
6.	Growth Prospect/Export Competitiveness	10%	High	10	1
7.	Import substitution Prospect	10%	Low	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	Medium	5	0.25
					7.25
	Light Engineering				
1.	Suitability with respect to Land per unit of Value Addition	25%	High	10	2.5
2.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
3.	Environmental Suitability	15%	Low	0	0

	Parameter	Weightage	Suitability	Score	Weighted Score
4.	Labour availability in Chittagong region	10%	Medium	5	0.5
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	High	10	1
6.	Growth Prospect/Export Competitiveness	10%	Medium	5	0.5
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	High	10	0.5
					7.5
	Automobiles				
9.	Suitability with respect to Land per unit of Value Addition	25%	Medium	10	1.25
10.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
11.	Environmental Suitability	15%	Medium	5	0.75
12.	Labour availability in Chittagong region	10%	Medium	5	0.5
13.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	High	10	1
14.	Growth Prospect/Export Competitiveness	10%	Medium	5	0.5
15.	Import substitution Prospect	10%	High	10	1
16.	Suitability with respect to existing Local Demand of the Products	5%	High	10	0.5
					7
	Frozen Fish				
1.	Suitability with respect to Land per unit of Value Addition	25%	Low	0	0
2.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
3.	Environmental Suitability	15%	Low	0	0
4.	Labour availability in Chittagong region	10%	Medium	5	0.5
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	Low	10	1
6.	Growth Prospect/Export Competitiveness	10%	Low	0	0
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	Low	0	0
					4
	Food Processing				
1.	Suitability with respect to Land per unit of Value Addition	25%	High	10	2.5
2.	Suitability for proximity to Port Facility or Sea	15%	Medium	5	0.75
3.	Environmental Suitability	15%	High	10	1.5
4.	Labour availability in Chittagong region	10%	High	10	1
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	Medium	5	0.5
6.	Growth Prospect/Export Competitiveness	10%	High	10	1
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	High	10	0.5
					8.75
	Cement				
1.	Suitability with respect to Land per unit of Value Addition	25%	Medium	5	1.25
2.	Suitability for proximity to Port Facility or Sea	15%	High	10	1.5
3.	Environmental Suitability	15%	Medium	5	0.75
4.	Labour availability in Chittagong region	10%	High	10	1
5.	Presence of Raw materials/ Backward Linkage Industries in Chittagong Region	10%	Medium	5	0.5
6.	Growth Prospect/Export Competitiveness	10%	High	10	1
7.	Import substitution Prospect	10%	High	10	1
8.	Suitability with respect to existing Local Demand of the Products	5%	Medium	5	0.25
					7.25

The above results are summarised in the following figure:

Figure 65: Suitability of Setting up Different Industries at Mirsarai



Accordingly the spaces have been allocated. RMG and food processing have been given highest space allocation being the highest scoring industry with respect to suitability and subsequently food processing, light engineering etc. In other words, the suitability has been reflected in the space allocation to different industries as provided in the following table:

Table 14: Space Allocation for Different Industries

Mirsarai 2A

		Plot Type	Number of Plots	Area in Acres	Area in sqm	%
Processing Area	1	RMG	29	71.60	289,769	8.1%
	2	Integrated textile	24	56.55	228,870	6.4%
	3	Food Processing	25	60.76	245,860	6.8%
	4	Pharmaceutical	22	54.32	219,833	6.2%
	5	Cement Factory	12	29.35	118,750	3.3%
	6	Light engineering/automobile parts manufacturing	19	46.58	188,521	5.3%
	7	Ship Building/Steel	2	63.36	256,434	7.2%
	8	Petro Chemical	31	79.53	321,866	9.0%
		Total Industrial Area	**164**	**462**	**1,869,903**	**52%**

Mirsarai 2B

Land use Category		Plot Type	Number of Plot	Area in Acres	Area in sqm	%
Processing Area	1	RMG	20	59.04	238,947	13.8%
	2	Integrated textile	10	24.48	99,050	5.7%
	3	Food processing	29	75.16	304,160	17.5%
	4	Light engineering/ automobile parts manufacturing	16	40.10	162,277	9.4%
	5	Electronics	12	29.63	119,905	6.9%
		Total Industrial Area	**87**	**228.41**	**924,339**	**53%**

5.7 Demand Forecast Scenarios

This section of the pre-feasibility study presents the demand forecast calculations under three distinct growth scenarios—Base Case, Conservative, and Aggressive. In addition to calculating the number of tenants likely to locate in the zone, we also include extrapolations of the utility and land requirements, as well as employment generation, and a rationale for the values we used for each.

5.7.1 Base Case

The Base Case Scenario makes the following assumptions with regard to firms actually locating in the proposed Mirsarai 2 economic zone.

- Interest from business enterprises located in Chittagong remains strong, being actually interested and capable of relocating to the economic zone.
- The government of Bangladesh takes action or incentives to encourage industrial enterprises to establish new industries in the economic zone and relocate/expand away from Chittagong city. BEZA promises to provide relocation and facilitation services such as training, one-stop bureaucratic services, and other amenities inside the zone.
- The zone contains a dedicated source of power generation, water, effluent treatment, and solid waste disposal.
- New economic zones may be built or expanded during the next 20 years, particularly along the Dhaka-Chittagong corridor, thus providing competition for the proposed zone.

5.7.2 Aggressive Case

The Aggressive Scenario assumes more positive assumptions about economic and political conditions in the country and streamlined approval process under the new economic zone regime. It differs from the Base Case Scenario with respect to the following aspects:

- **New firms.** In the Aggressive Scenario, the Mirsarai 2 economic zone will contain more newly formed firms than in the Base Case Scenario. This will arise due to the greater ease to start and operate a company.
- **Streamlined approval processes - one-window service.** All regulatory approvals, especially those for establishing the business enterprises in the zone, will be provided and regulated within the zone itself. This differs from the Base Case, whereby all consents must be obtained from the central authorities.
- **Peaceful political condition.** The political conditions will remain peaceful, for at least first five years of operation.
- **Quick completion of off-site infrastructure.** The linked projects for offsite infrastructure needed for the zone, will be completed on a fast track basis by the government, while the Base Case assumes that the operation of the zone will continue in parallel with the period while not all the required off-site infrastructure may be complete. The zone can start operation, with a slim access road first, then widening may go on while the operation of the zone is continued. However, it assumes that the power plant will be built on an urgent basis.
- **Pro-active Marketing and Promotion.** The new zone will be aggressive in marketing and promotion of the zone to business enterprises.
- **Suppliers Allowed.** Raw material and services suppliers will be allowed to locate inside the Mirsarai 2 economic zone on a first-come, first served basis.

5.7.3 Conservative Case

The Conservative Scenario differs from the other two scenarios in the following manner.

- **Offsite Infrastructure.** There are delays in preparing necessary offsite infrastructure for the Mirsarai 2 economic zone.
- **Lessened Relocation Pressures.** Business enterprises remain in Chittagong as pressures to relocate lessen.
- **Little Relocation Assistance or Facilitation.** Business enterprise industry associations are not able to effect en masse relocation, and are not able to arrange for the necessary financing options for business enterprises.

Based on the above assumption, the following rate of space take-up in percent terms by different industries is envisaged:

Table 15: Twenty-Year Demand Forecast for Mirsarai 2A - Space Take-up in percent

	Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
RMG	Base Case	5	15	25	50	75	90	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	50	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	20	30	50	75	80	90	95	95	95	95	95	95	95	95	95	95	95
Food Processing	Base Case	5	15	25	50	75	90	90	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	50	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	20	30	50	75	80	90	95	95	95	95	95	95	95	95	95	95	95
LE/Automobile Parts	Base Case	5	10	25	50	75	90	90	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	50	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	20	30	50	75	80	90	95	95	95	95	95	95	95	95	95	95	95
Petro Chemical	Base Case	5	5	25	25	25	50	50	75	75	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	25	50	75	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	5	15	15	25	40	50	70	70	75	75	85	85	95	95	95	95	95	95
Pharmaceutical	Base Case	5	5	25	25	25	50	50	75	75	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	25	50	75	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	15	15	20	20	25	40	50	60	70	75	80	90	95	95	95	95	95	95
Ship Building/Steel	Base Case	0	0	0	0	0	50	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	0	0	50	50	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	0	0	0	0	0	50	50	50	95	95	95	95	95	95	95	95	95	95	95
Textile	Base Case	5	10	25	50	75	90	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	50	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	20	30	50	75	80	90	95	95	95	95	95	95	95	95	95	95	95

Saturation Point

Based on the above percentages, the number of plots that is forecasted to be leased out is as follows, using the following formula. Number of Plots forecasted to be leased = Space Take-up in percent (Table 15)* Total space allocation for the particular Industry (Table 14).

Table 16: Twenty-Year Demand Forecast for Mirsarai 2A - Space Take-up: Number of Industrial Plots

	Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
RMG	Base Case	1	4	7	15	22	26	28	28	28	28	28	28	28	28	28	28	28	28	28	28
	Aggressive	1	7	15	22	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Food Processing	Base Case	1	3	5	11	16	19	19	20	20	20	20	20	20	20	20	20	20	20	20	20
	Aggressive	1	5	11	16	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	Conservative	0	1	2	4	6	11	16	17	19	20	20	20	20	20	20	20	20	20	20	20
LE/Automobile Parts	Base Case	1	2	5	10	14	17	17	18	18	18	18	18	18	18	18	18	18	18	18	18
	Aggressive	1	5	10	14	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
	Conservative	0	1	2	4	6	10	14	15	17	18	18	18	18	18	18	18	18	18	18	18
Petro Chemical	Base Case	2	2	8	8	8	16	16	23	23	29	29	29	29	29	29	29	29	29	29	29
	Aggressive	2	8	8	16	23	23	29	29	29	29	29	29	29	29	29	29	29	29	29	29
	Conservative	0	2	2	5	5	8	12	16	22	22	23	23	26	26	29	29	29	29	29	29
Pharmaceutical	Base Case	1	1	6	6	6	11	11	17	17	21	21	21	21	21	21	21	21	21	21	21
	Aggressive	1	6	6	11	17	17	21	21	21	21	21	21	21	21	21	21	21	21	21	21
	Conservative	0	1	3	3	4	4	6	9	11	13	15	17	18	20	21	21	21	21	21	21
Ship Building/Steel	Base Case	0	0	0	0	0	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Aggressive	0	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Conservative	0	0	0	0	0	0	1	1	1	2	2	2	2	2	2	2	2	2	2	2
Textile	Base Case	1	2	6	12	18	22	23	23	23	23	23	23	23	23	23	23	23	23	23	23
	Aggressive	1	6	12	18	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
	Conservative	0	1	2	5	7	12	18	19	22	23	23	23	23	23	23	23	23	23	23	23
Total	**Base Case**	**7**	**14**	**37**	**60**	**83**	**111**	**115**	**130**	**130**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**
	Aggressive	**7**	**37**	**61**	**97**	**130**	**130**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**	**141**
	Conservative	**0**	**7**	**14**	**27**	**37**	**59**	**89**	**100**	**117**	**125**	**129**	**130**	**134**	**136**	**141**	**141**	**141**	**141**	**141**	**141**

Table 17: Twenty-Year Demand Forecast for Mirsarai 2B - Space Take-up in percent

	Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
RMG	Base Case	5	15	25	50	75	90	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	50	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	20	30	50	75	80	90	95	95	95	95	95	95	95	95	95	95	95
Textile	Base Case	5	10	25	50	75	90	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	50	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	20	30	50	75	80	90	95	95	95	95	95	95	95	95	95	95	95
Electronics	Base Case	5	10	15	20	30	50	60	75	90	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	10	25	50	75	90	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	15	20	25	30	40	50	60	70	80	85	90	95	95	95	95	95	95
LE/Automobile Parts	Base Case	5	10	20	50	75	90	0	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	50	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	20	30	50	75	80	90	95	95	95	95	95	95	95	95	95	95	95
Food Processing	Base Case	5	15	25	50	75	90	0	95	95	95	95	95	95	95	95	95	95	95	95	95
	Aggressive	5	25	50	75	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Conservative	0	5	10	20	30	50	75	80	90	95	95	95	95	95	95	95	95	95	95	95

Saturation Point

Based on the above percentages, the number of plots that is forecasted to be leased out is as follows:

Table 18: Twenty-Year Demand Forecast for Mirsarai 2B - Space Take-up: Number of Industrial Plots

	Years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
RMG	Base Case	1	3	5	10	15	18	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	Aggressive	1	5	10	15	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	Conservative	0	1	2	4	6	10	15	16	18	19	19	19	19	19	19	19	19	19	19	19
Textile	Base Case	1	1	3	5	8	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Aggressive	1	3	5	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Conservative	0	1	1	2	3	5	8	8	9	10	10	10	10	10	10	10	10	10	10	10
Electronics	Base Case	1	1	2	2	4	6	7	9	11	11	11	11	11	11	11	11	11	11	11	11
	Aggressive	1	1	3	6	9	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	Conservative	0	1	1	2	2	3	4	5	6	7	8	10	10	11	11	11	11	11	11	11
LE/Automobile Parts	Base Case	1	2	3	8	12	14	0	15	15	15	15	15	15	15	15	15	15	15	15	15
	Aggressive	1	4	8	12	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	Conservative	0	1	2	3	5	8	12	13	14	15	15	15	15	15	15	15	15	15	15	15
Food Processing	Base Case	1	4	6	12	18	22	0	23	23	23	23	23	23	23	23	23	23	23	23	23
	Aggressive	1	6	12	18	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
	Conservative	0	1	2	5	7	12	18	19	22	23	23	23	23	23	23	23	23	23	23	23
Total	**Base Case**	**4**	**10**	**19**	**37**	**56**	**69**	**36**	**76**	**77**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**
	Aggressive	**4**	**19**	**38**	**59**	**76**	**77**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**	**78**
	Conservative	**0**	**4**	**8**	**16**	**23**	**38**	**56**	**61**	**69**	**74**	**75**	**76**	**77**	**77**	**78**	**78**	**78**	**78**	**78**	**78**

6 Investment Promotion Strategy

Investment promotion strategy is regarded as "a method or plan to attain and maintain a position of competitive advantage and to be seen to the investors as having competitive advantage through effective use of resources, which maintains attraction of investors".

Market can be seen from demand side and the supply side, and both approach should interplay and respond to each other, for marketing to be successful.

A good demand side management without supply of appropriate infrastructure would not help the zone in the long run and would be a cause of loss of confidence of the investors. On the other side, setting up modern facilities that are not optimum as per the requirement of the investors, would unnecessarily tie up investment without any response from the investors.

Investment promotion strategy will vary depending upon:

- Timeframe provided for campaigning
- The resources available

As far as timeframe is concerned, there are two phases. Phase I involves campaign for developers and Phase II campaign for retail tenants. The target groups for the two campaigns will be different. The Phase I developers will be mostly large civil engineering development companies, with experience of developing economic zones, real estate housing projects, etc.

The Phase II investors will be the process oriented production industries like pharmaceuticals, garments factories and leather industries etc and service oriented industries like banks, hotel operators etc. Given the fact, that economic zone development is a capital-intensive business, it requires iterative interaction and approval requirements of authorities, promoting the economic zones to the potential developers will require one to one interaction with the individual developers, to explain the situation in Bangladesh here and to convey the message how keen Bangladesh is to carry forward the economic zone program.

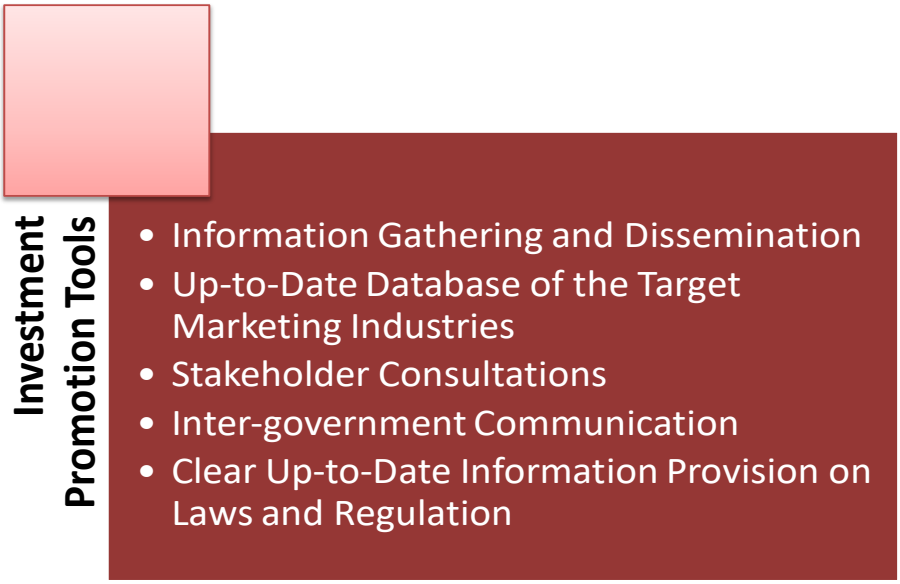
One of the objectives of formulating an investment promotion strategy is to enable BEZA and the potential developers to understand the nature of business and operation of the zones and to demonstrate the findings and trouble-shooting mechanisms involved.

6.1 Tools of Investment Promotion

To promote investment in each economic zone, the following tools will be effective:

- Information gathering and dissemination
- 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

Figure 66: Investment Promotion Tools



6.1.1 Information Gathering and Dissemination

A dedicated Data and Counselling Centre is an essential tool for facilitating investors with required data. We strongly recommend setting up a ***Data and Counselling Centre*** *for each economic zone project. As BEZA is going ahead with setting up a One-Stop-Shop (OSS), it may operate as a Data and Counselling Centre in the interim period. Once the OSS is established, the center may be made a part of OSS.*

Investment promotion agencies sometime tend to present too much information on economic indicators and statistics on FDI, ODA, trade and tourism while providing little on what potential investors really want to know.

Such information can be useful to potential investors, but the investors 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.

Furthermore, investors are very demanding in terms of detailed information of not only the physical infrastructure of the economic zone 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.

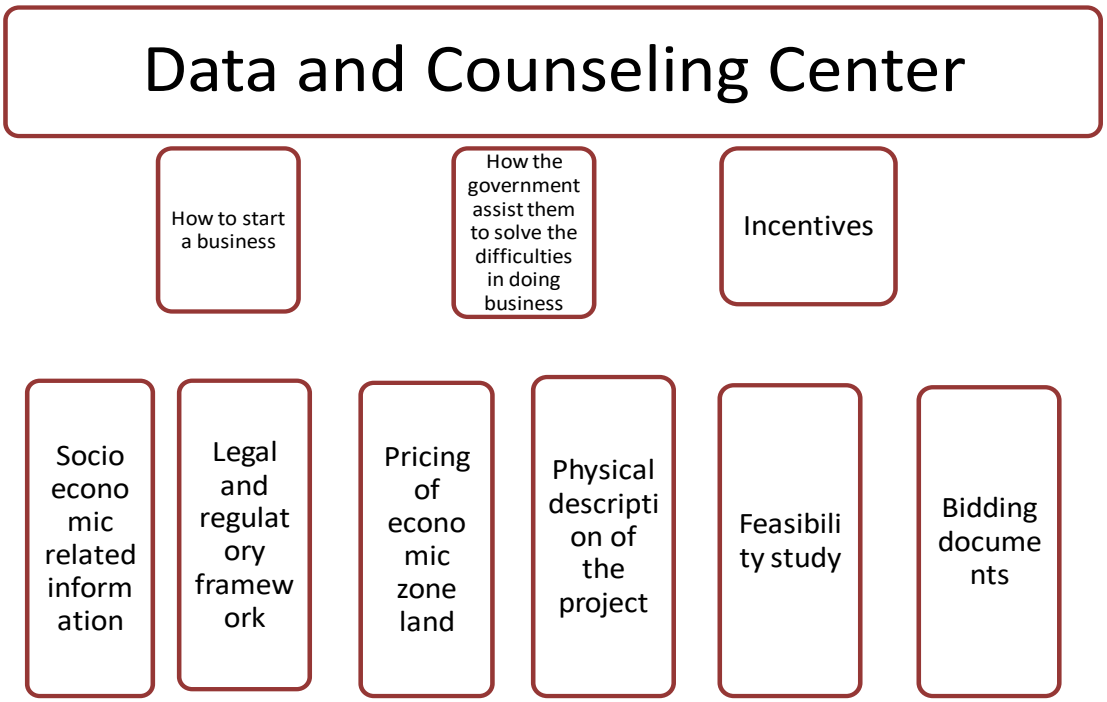
The following additional information needs to be collected and disseminated:

- international comparisons on labour costs, business start-up costs and utility costs between rival countries
- the products the economic zone can market (Product),
- the strength and weakness of the zone in comparison with other economic zones (Positioning),
- the target group of tenants (Target Audience),
- the scope of work and services provision to be involved together with development and marketing of the zone (Scope of services)

- Site Mouza Map
- Lay-out of the site
- Feasibility Study
- Bidding Document (RFP + Draft Developer's Agreement)
- Information Memorandum
- Government Policies, Rules and Laws with respect to economic zones, Foreign Direct Investment, Forex Regulations of Bangladesh
- Standard Investment Guidebook for investing in Bangladesh
- List of potential local partners

The Data and Counselling Centre should also be equipped with reproduction facilities, so that potential investors can take copies of information with a pre-fixed charge. The Data and Counselling Centre may also keep reserve soft copies of various documents in CDs for supply to potential investors with minimum standard charge.

Figure 67: Duties of Data and Counselling Centre with respect to Information Provisions



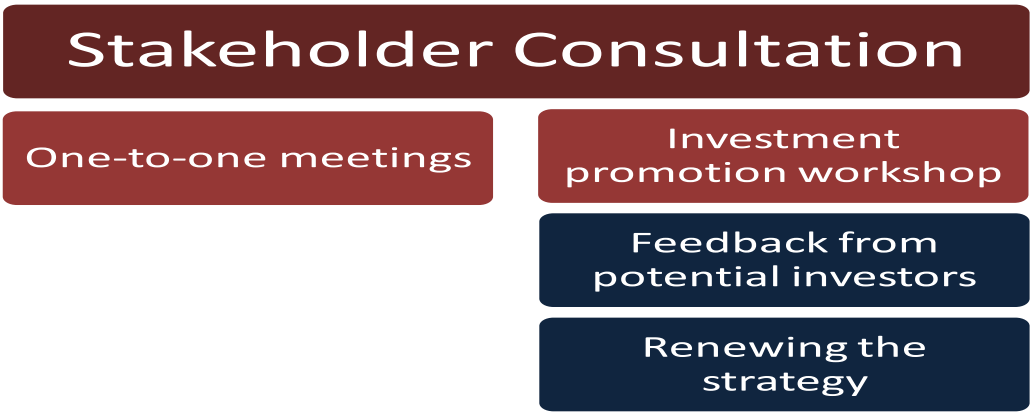
In the Data and Counselling Centre, we also recommend to employ a person (counsellor), to provide necessary counselling with appropriate disclaimer conditions, so that investors feel comfortable about the mode of working in Bangladesh through gathering knowledge informally about authorities of Bangladesh, their broad functions and procedures, the business community in Bangladesh and their nature of business.

6.1.2 Stakeholder Consultations

Stakeholder consultation is extremely important for such large complex investment to define or adapt project configurations. A system of regular contact with business communities would enable to spot business and incentive needs and investment trends early and begin taking necessary action.

Stakeholder consultation can be carried out either through one to one meetings or gathering the stakeholders in an investment promotion workshop. We recommend both one to one meetings and investment promotion workshop/s. The potential investors should be communicated through mail, with brief description of the investment opportunity. On a case-by-case basis, one to one meetings may be held with the ones, who seem to be potential and eager. These meetings may also act as a warming up for preparation to enhance attendance in the investment promotion workshop. A standard questionnaire may be developed to receive feedback from the potential investors. These will help in adding some sweeteners in the economic zone development deal.

Figure 68: Pillars of Stakeholder Consultation



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 and private developers, to respond to new developments received from the feedback from the investors.

6.1.3 Inter-government Communication

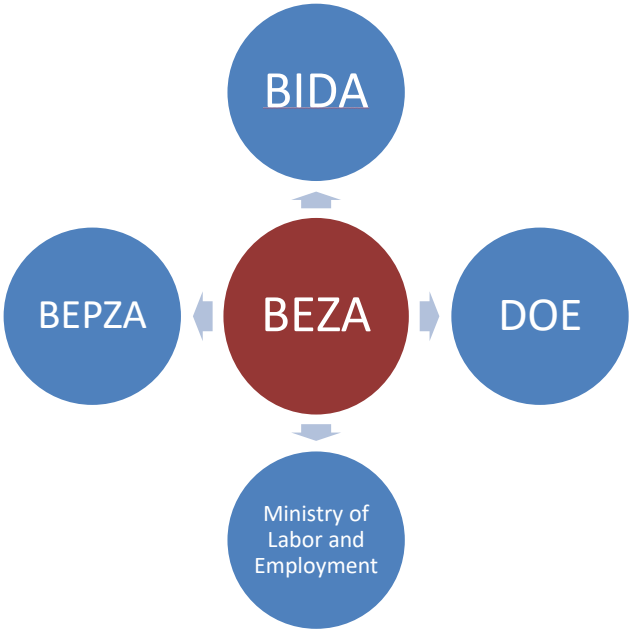
An economic zone is typically an inter-government responsibility at least during implementation stage, as it involves several connectivity with outside utilities like road, power, water supply, optic fiber etc. BEZA's role to resolve inter-government problems effectively, in communication with other government agencies, is therefore extremely important.

In addition, several government institutes are performing marketing activities for investment into Bangladesh before the establishment of BEZA. Those institutes are, namely, Board of Investment (BOI)[111] and Bangladesh Export Processing Zone Authority (BEPZA), Export Promotion Bureau. Their experience in marketing activities and networking among peer investment promotion agencies are now very much advanced.

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 BIDA and BEPZA have been trained in the field of marketing service provision through participating in overseas business missions, training provided by the peer network association and going through actual and practical interactions with prospective and already-settled investors.

[111] Presently Bangladesh Investment Development Authority (BIDA)

Figure 69: Intergovernmental Coordination



The JDI report suggested as follows:

"Cooperative institutional coordination among BEZA, BIDA and BEPZA is required to maximize opportunities for promotion and marketing of economic zones 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 zone management and operation. The role of the BIDA should continue as it is, but should incorporate effective marketing activities for the zone. BEZA should focus on dissemination of information about economic zones among BEPZA and BIDA and then perform as the nodal point of contact for prospective investors."

Political support is critical in overcoming challenges, in the provision of leverage for BEZA to impose Economic Zone Acts and policies 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 inter-ministerial business and administrative affairs. There has to be a clear zone Investors' Manual for zone developers and investors with respect to approvals needed from different agencies of Government of Bangladesh.

The following entities will be closely working with BEZA:

- Board of Investment: Board of Investment is the central agency to register and facilitate investments in Bangladesh. The zone developers and investors will need to be registered with the Board of Investment as well. The zone Investors' Manual will identify the approvals needed from Board of Investment vis-à-vis approvals needed from BEZA and suggest proper sequencing of approvals and how the investment promotion activities of both the agencies can reinforce each other.

- BEPZA: BEPZA as the foremost zone developer in the country has gathered tremendous experience in zone development and operation. The senior officials of BEPZA may be transferred to BEZA as and where appropriate, for setting up the zones of BEZA at the initial stage and to negotiate with the developers

with respect procedural matters, incentives and other infrastructural facilities. This will help BEZA to upstart the activities during the initial periods of zone development. Such steps will provide significant comfort to the potential investors, as they would know that they are not dealing with officials with little experience to deal with investors.

- Department of Environment: Department of Environment has jurisdiction on environmental matters irrespective of zone boundaries. BEZA will also have a responsibility to maintain environmental standards in the zones. Therefore, an understanding between BEZA and the DoE needs to be established on how to achieve environmental compliance in the economic zones and these needs to be clearly laid out in the Investors' Manual, so that the investors are not hassled in going to multiple entities for approvals of the same thing.

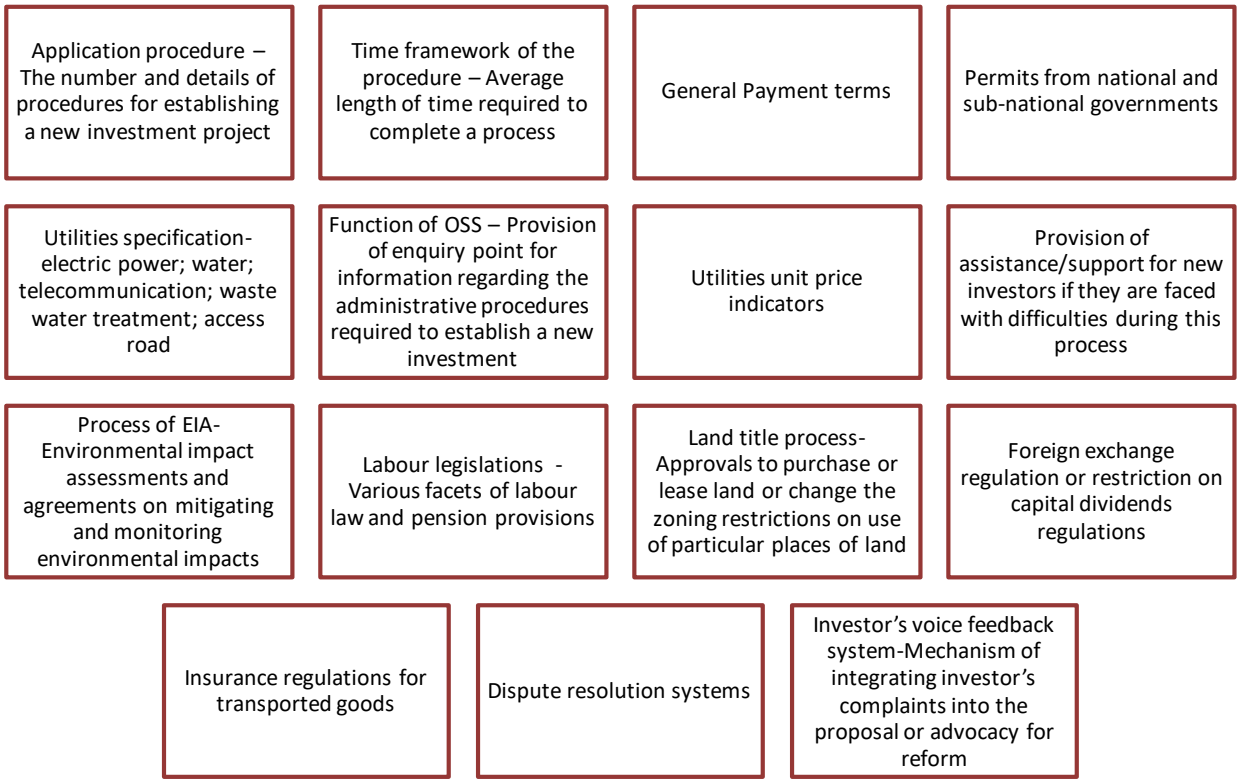
- Ministry of Labour and Manpower: The economic zones has to comply with labour standards and the Ministry of Labour and Employment has a jurisdiction on the matter irrespective of zone boundaries. Maintaining labour standards will enhance acceptability of the products of the economic zones to the outside world. Therefore, BEZA has also a stake in maintaining labour standards within an economic zone. However, for providing comfort to the investors, the Investor's Manual should also clearly lay out the approvals needed and the procedure of getting such approvals avoiding duplication of efforts and double standards.

6.1.4 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 sometime 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.

The following information needs to be provided to the investors:

Figure 70: Information to be provided on Laws and Regulations



6.2 Methodology of Investment Promotion

The following sections provide the methodology 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.

Figure 71: Investment Promotion Methodology

Investor promotion is to be done in different times to different groups of investors:

1) zone Developer
2) Investors or tenants of individual industrial units

Investment promotion to potential zone developers is highly crucial at the initial stage for attracting bids from the developers. Therefore, such investment promotion will continue from the beginning up to landing to sufficient number of investors bidding for each zone development.

The methodology of investment promotion has to be related with the tendering process of selecting the zone developer. It starts from issuing a notice inviting tenders. However, though the tender process itself starts from issuing the notice, the promotional activities should start much before that. The promotional activities need to be carried out in different periods with respect to tendering process:

- Pre-notice Period
- Bidding Period
- Post Bidding Period

The following broad activities are to be carried out as part of the investment promotion. These are borrowed from international best practices provided in OECD investment promotion and facilitation guidance:

- **Streamlining approvals** among government agencies or removal of obstacles to investment. It should be preferably carried out during pre-notice period.
- **Creation of image of the zone**, which will be attractive to investors 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 zone and the country as an investment destination. This should be carried out during pre-notice period and continue onto the bidding period.

The following activities should be done during the bidding period:

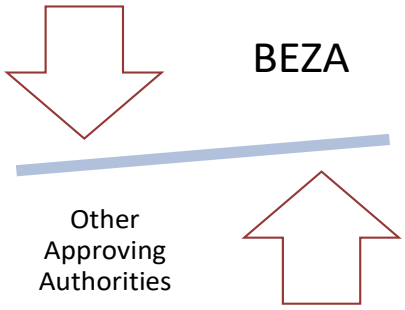
- **Investor facilitation** to help solve problems faced by existing or prospective investors.
- **Targeting investors** by identifying the investors who are capable and willing and who have more likelihood to invest

6.3 Pre-Notice Promotional Activities

6.3.1 Streamlining Approvals

BEZA is pledged to be established to act as a one-stop-shop for approvals and licensing, but investment projects often require approval from many government agencies and sub-national governments for land use, labour practices, safety, taxes and customs and environmental impact etc. BEZA will remain as the central agency concerned with business affairs and regulation surely remains in its hands; will be the focal point of contacts from investors and coordination among many ministries concerned. Different agencies have different mandates and perspectives and hence approach to an investment proposal might vary.

Figure 72: Balancing conflicting perspectives



However, to resolve the inter-agencies conflicting issues, BEZA should act as a driving agency within government, conveying to government the concerns of business of the zone and balancing these conflicting or mismatching perspectives and requirements in different agencies. Clear responsibility and power should be assigned to BEZA to streamline regulatory procedures for dealing with multiple with regulatory and facilitating agencies.

BEZA has the responsibility for the dissemination of new zone developments among different but concerned government ministries and agencies. Different authorities concerned with necessary approvals may at an early stage of implementation hesitate to accord approvals, due to non-clarity of the new economic zone approval regime. In relation to this, political intervention is needed to speed up the new set of registration and regulatory framework, which shall bring advantage in Economic Zones.

Sustaining this political interest should not be a challenge, especially under changing political circumstances, as BEZA reports directly to the Prime Minister's Office. Exchange of experience with other countries to learn about effective advocate reforms and maintaining good relations with government departments, can be made through peer networking of investment promotion agencies.

6.4 Promotion during Bidding Period

6.4.1 Creation of Image of the zone

This is the most important and critical part of investment promotion. While streamlining approvals is an internal affair within the government, creation of positive image of the zone is an external affair addressing business and industrial communities both at home and abroad. BEZA should, with assistance from TAS, should drum up investor relations, which includes one to one meeting with the investors, organizing investment promotion meeting, advertising, producing promotional materials, and attending trade fairs etc. Opportunities should be communicated in Bangladesh and other countries by workshops and seminars in Dhaka, Delhi, Singapore, Bangkok, Taipei and Shanghai etc; advertisements in business newspapers, TV commercials and reportage on international broadcasting channels; investment promotion website linked to

websites of counterpart countries; and brochures distributed. Investors can register their investments online or at the Bangladesh embassies in the respective countries, or at the investment representative office of Bangladesh in these cities.

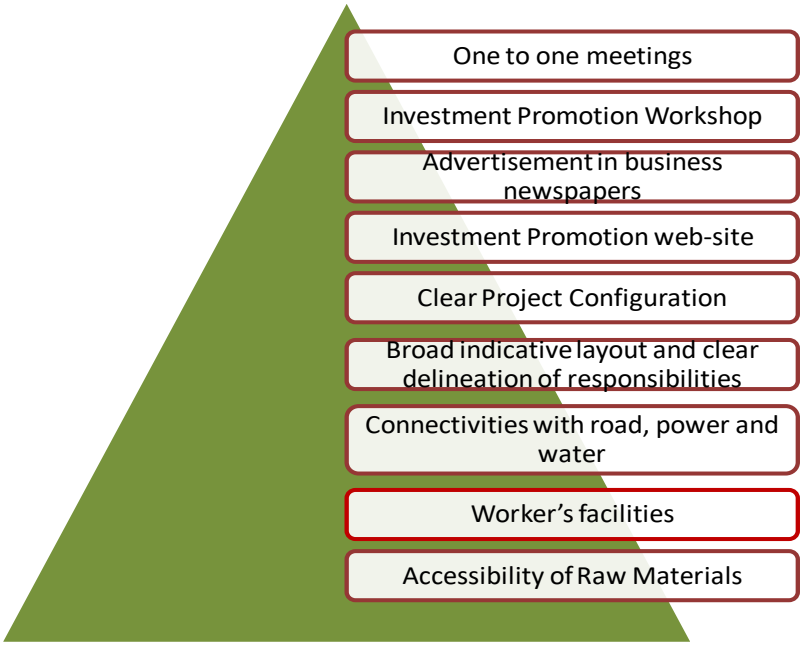
These should be carried out on a continuous basis. TAS should continuously keep communication with the potential investors and conduct one-to-one meetings with selected A1 investors, for keeping their interest alive. However, it is critical that the investor's concern should be mitigated by BEZA with some form of commitment, to provide a comfort to them. Without commitment of mitigating some concerns, the efforts may ultimately portray a negative image to the investors.

BEZA should appear as organised with well defined project configurations and scope of work and with will defined delineation of responsibilities between the public sector funded component and the development component to be carried out by the zone developer.

At least a broad indicative layout of the zone and the functional requirements of the zone should be ready for creation of a good image of the zone. We recommend a wide scale investment promotion meeting, where project configurations can be discussed. Without the ground preparatory works are done, such meeting may instead portray a negative image to the investors.

An approach of pro-activeness, rather than reacting for investors to come to the authority office, should be taken. For promoting Economic Zones and for creating an 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, should be shown clearly in the promotional tools with facts and objective figures.

Figure 73: Creation of an Image of the zone



An illustration of the region gives an understanding of the key characteristics of the zone and its business environment to prospective investors. The site may have comparative advantages, which also are to be highlighted. Connectivities with power, gas and road network and characteristics of existing industries in the region should also be discussed. The possibility of backward and forward linkages should also be highlighted to the investors. The availability of labour force and raw materials should also be discussed. Living standards of the people in the region and their purchasing power also needs to be highlighted, to provide comfort to the investors. The following items needs to be specially highlighted:

- Land/Location
- Utility Service
- Accessibility to raw materials
- Workers facilities
- Business environment

Following is an example of highlighting a hypothetical zone site:

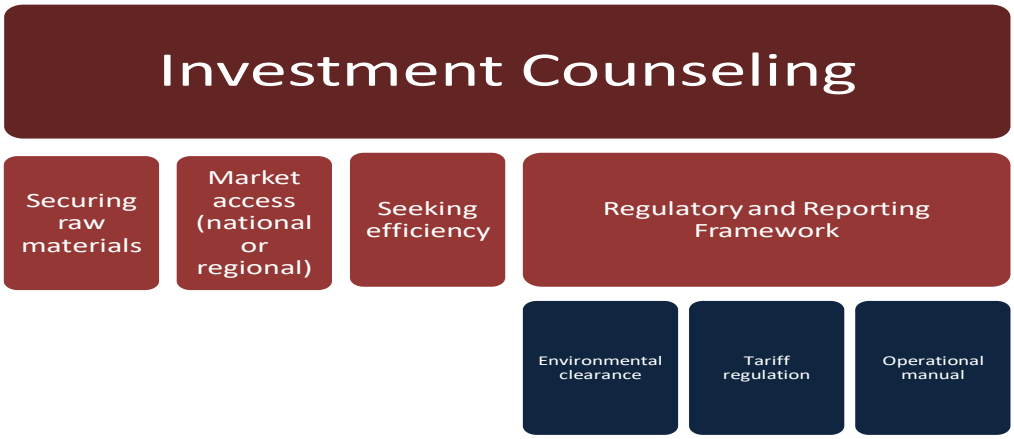
- The Zone aims to be the preferred diversification destination of a number of industries in relation to Dhaka and Chittagong City and the rest of Bangladesh. The woven fabric and spinning industries both domestic and from overseas (Taiwan, China and Thailand) may consider this location for the manufacture of intermediate products for the ready-made garment industry. The dyeing industry may choose it to be its risk diversification destination in those environmentally sound industrial operations will be possible.
- The Zone aims to attract food processing, consumer goods and construction materials manufacturing industries, with provision of smooth and cost effective logistics for accessing markets
- The Zone will provide the most reliable power supply in the region
- The Zone will become the ideal bridge providing easy access between Bangladesh and the markets of India

6.4.2 Investor Facilitation

During the initial period of seeking zone developers, BEZA should offer investment counselling services from the Data and Counselling Centre through providing information on (a) securing raw materials; (b) market access (national or regional);(c) seeking efficiency; and (d) gaining strategic elements for investors. This is an important investment promotion activity for Economic Zones.

The following figure shows the basic elements of investment counselling:

Figure 74: Basic Elements of Investment Counselling



The counsellor at the Data and Counselling Centre will significantly help in investor facilitation. He will be 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.

The following questions are usually asked by the investors:

Whether the land has been acquired by the government and what is the size of the land	How much land filling is required to develop the site	What off-site and on-site infrastructure will government provide. What is the time-line.
What fiscal incentives government will provide	What is the regulatory and reporting framework	What is the broad scope of work of the investor
What studies are already done for the site	Whether environmental clearances have been taken for the site and EZ development	Whether government will control rents or tariffs to be collected from the tenant?
	Has the government prepared any manual that the developers have to follow in running and managing the EZ?	

Once the zone developer is engaged, a One-stop-shop should aim to cater for the needs of both prospective and already-settled tenants 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. The One-stop-shop at the specific zone level should ideally be operated by the zone developer engaged with officials from BEZA also stationed in the One-stop-shop for resolving complex issues with respect to approvals etc. The One-stop-shop is not necessarily a one-stop-clearance shop at the early stage, due to the pending legal jurisdictional set-up among other departments and authorities. Delegation of power to the one-stop-shop is still to be decided. The 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.

The investor services should start at the BEZA headquarters from Data and Counselling Centre. This would provide a single window of information provision and facilitation to the investors on zone related affairs.

6.4.3 Targeting Investors

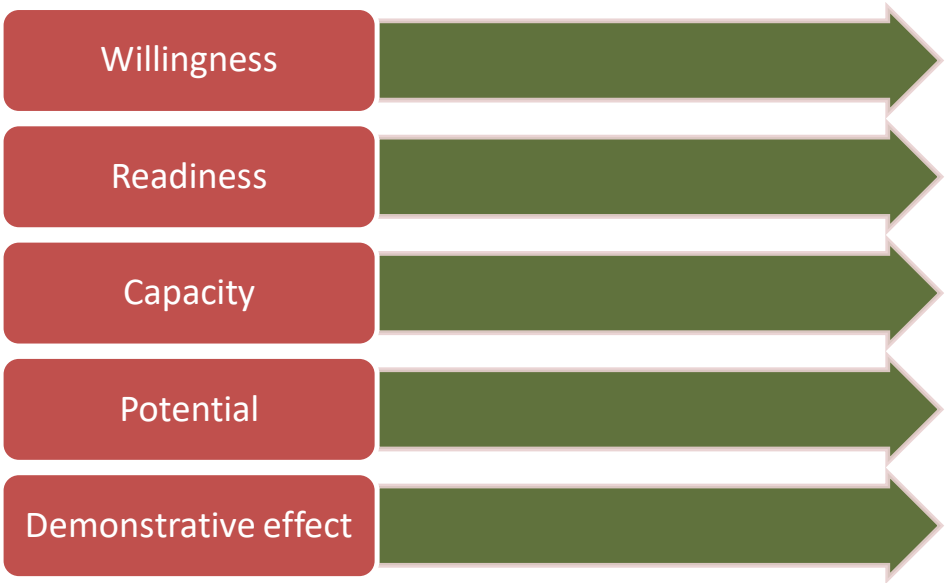
The government cannot satisfy all investors at the same time. The benefits of the investment environment should be addressed to the targeted national and foreign investors. After deciding on the target audience, the government should work out a communication programme that delivers its message regarding the investment environment to the target audience.

Since national and foreign investors are not uniform, they must be categorized into different segments. They can be divided into groups 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)

Arrangement of meetings with each individual potential investor is an important activity, but it may make sense to prioritize such meetings towards those selective investors. After broad level one-to-one meetings and the general investment promotion meeting with a long list of investors (Set A), BEZA has to identify amongst the investors, who are more capable and willing to invest and have more likelihood to invest, which may be called Set A1 investors.

More focused and detailed discussions should be carried out with those investors and their feedback will be considered with more focus and time. As discussed, TAS is in the best position to suggest who the investors to be targeted are. However, effective target marketing depends on a continuous effort of gathering business and industrial needs, trends and information through exchanging views with prospective and existing investors.

Figure 75: Targeting Investors



The criteria for investors who will be ideally targeted are as follows:

- Willingness: whether the investor are willing to consider investment in Economic Zones and to expand their business onto Economic Zones
- Readiness: whether the investor is ready to invest in Economic Zones within time frame of Economic Zones development
- Capacity: whether the investor have enough capacity to expand their business
- Potential: whether the investor have potential to grow
- Demonstrative Effect: whether the investor can be a demonstrative case to other companies in and outside Bangladesh after developing Economic Zones

Special attention would need to be provided to the investors:

- Who has developed or operated at least one economic zone or developed such small cities and responded to the initial correspondence from BEZA side, conveying the notice inviting private developers or shown interest in the investment promotion meeting.
- Who visited BEZA office showing interest to invest for zone development Who participated in earlier similar bids of BEZA
- Who has a strong local partner with understanding of local government processes and procedures
- Who has already a setup or establishment in Bangladesh

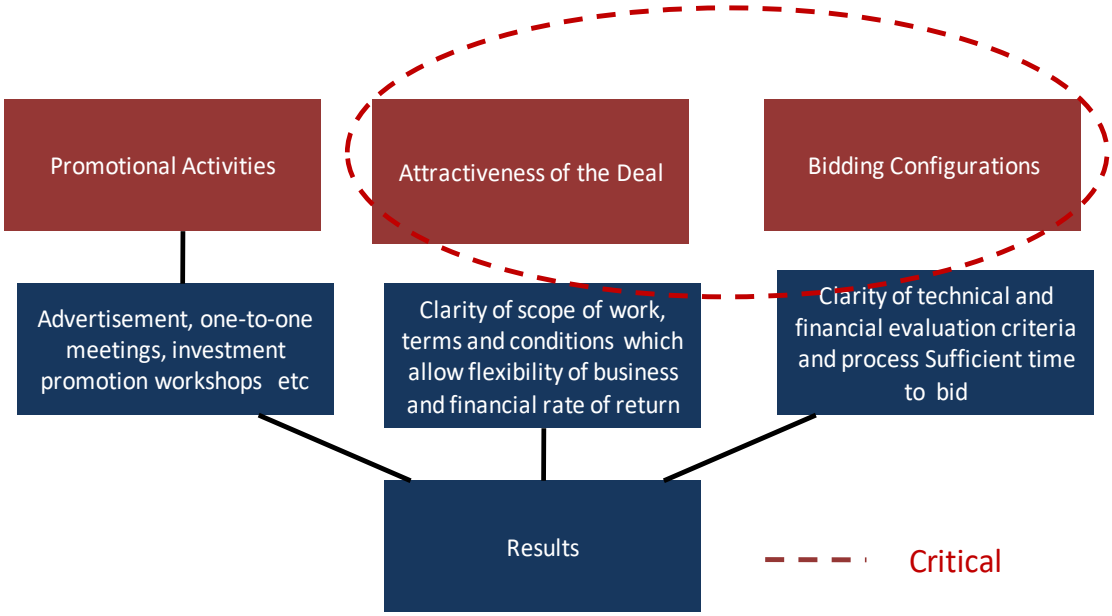
6.4.4 Evaluation during Bidding period and Post bid evaluation

Regular evaluation is needed with respect to attracting real investors in the loop.

However, for attracting the potential zone developers the fact is that they can be pulled in to inspect the site, appraise investment opportunity and to brief and highlight the investment prospects. However, ultimate success in bidding through receipt of good bids depends upon how good the deal is defined in terms of clarity of scope of work, terms, and conditions, which allows flexibility of business and financial rate of return.

The point is that though promotional activities are a critical part of the assignment, the ultimate success of the zone will depend upon a number of inter-linked factors like the capacity of BEZA to deal with investors, the attractiveness of the deal and investments, level of risks and ultimately required financial rate of return. It will also depend upon bidding configurations especially clarity of technical and financial evaluation criteria and process and the time provided for bidding.

Figure 76: Success Factors of Invest Promotion Activities



For attracting the tenants or industrial units in the zone, the progress can be evaluated with the following factors:

- Overall investment flow
- the form of investment
- investment by sector
- job creation
- linkages and additional purchase of inputs and services,
- technology transfer and
- Net tax benefits from corporate taxes, customs duties and employment taxes paid.

This evaluation process should be linked with incentives to the zone developer.

6.5 Coordination with Other Promotional Agencies

For an effective and timely investment promotion, establishment of a national and international network with investment promotion agencies is important. BEZA may join the OECD (Organisation for Economic Co-operation and Development) Investment Promotion Association -World Association of Investment Promotion Agencies (WAIPA).

The following offices may also be contacted:

- 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 establish good partnership 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.

Such network would become a valuable resource for BEZA. As per JDI report, JETRO has already shown a preliminary response to establishing a relationship with BEZA for investment promotion and marketing of economic zones in Bangladesh and Japan.

Bilateral chambers of commerce would also provide an important and unique network for promotion of investment into Economic Zones. The following trade bodies and associations may be communicated:

- Bangladesh German Chamber of Commerce & Industry
- The Nordic Chamber of Commerce and Industry (NCCI)

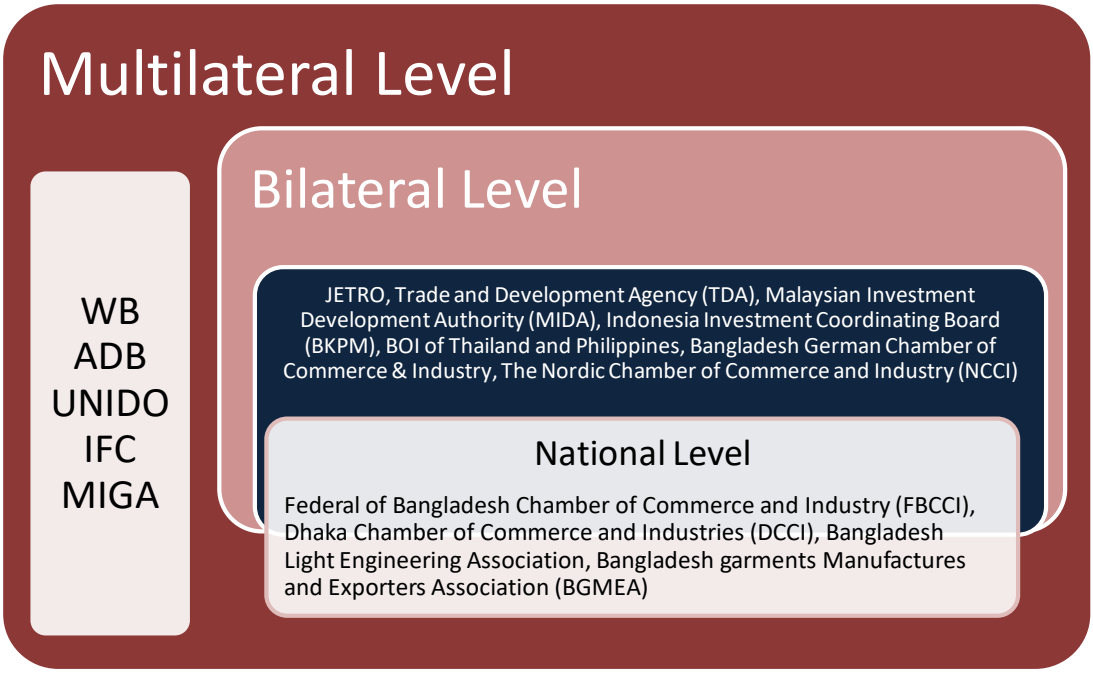
Both chambers have shown interest in cooperating with BEZA on promotion of European investors to Economic Zones, as per JDI report.

In addition to bilateral chambers, network should also be established with local chambers: such as:

- Federation of Bangladesh Chambers of Commerce and Industries (FBCCI)
- Dhaka Chamber of Commerce and Industries (DCCI)
- Foreign Investors Chamber of Commerce and Industries (FICCI)
- Bangladesh Light Engineering Association
- Bangladesh Garments Manufacturers and Exporters Association (BGMEA)
- Chittagong Chamber of Commerce and Industry (CCC&I)
- Chittagong Metropolitan Chamber of Commerce & Industry (CMCC&I)
- Chittagong Women Chamber of Commerce & Industries (CWCC&I)

The local chambers based in the town in which the site is located should also be taken into communication loop.

Figure 77: Potential Institutional Network for Investment Promotion of economic zones



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 practice guides. Using these effectively requires that the agency dedicates staff to studying best practices and to reaching out to peers and policy advisors

6.6 Investment Promotion Action Program

An action program should be designed with activities along with policies needed 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 provides the action program and broad responsibilities:

Table 19: Investment Promotion Action Plan and Responsibilities

Action Program	Responsibility
1. Creating image on investment environment	
a. Achieve and show political commitment to the investors	BEZA
b. Organize workshops for zone development	BEZA and Private Investor
c. Learn best practices from other countries from network of other investment promotion agencies	BEZA
2. Coordination and cooperation and Streamlining Approvals	
a. Establish cordial relation with other investment promotion agencies and licensing authorities in the government	BEZA
b. Reduce number of licenses required for newly invested projects	BEZA
c. Reduce time for processing business licenses	BEZA
3. Image building measures	
a. Prepare investment brochure, video and website for the zone- Planning and proceeding media exposure of zone development (newspaper, international business/industrial magazines, exhibition screen at airport etc.)	Private Investor

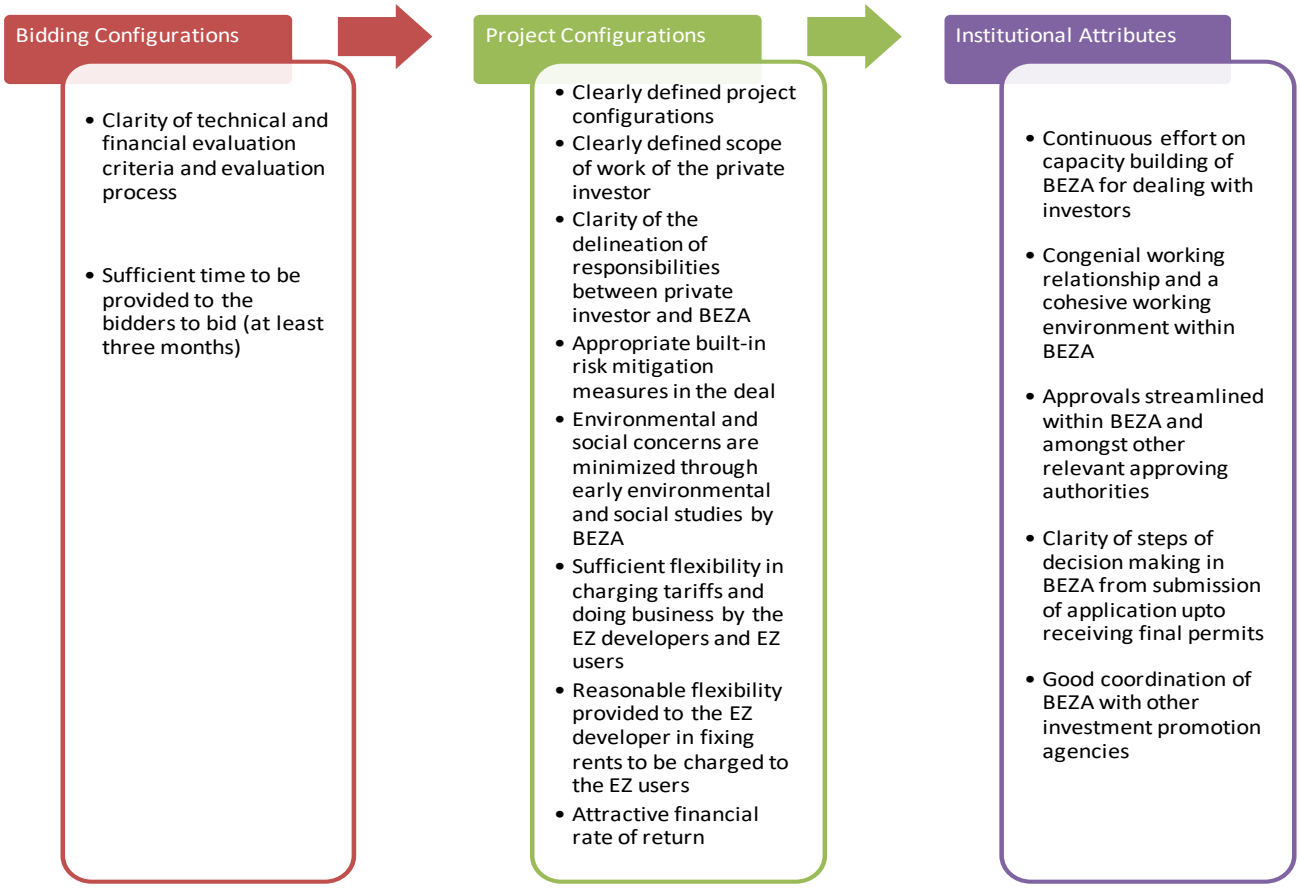
Action Program	Responsibility
b. Build constructive relationship among enterprises, organizations and governments	BEZA
c. Organize and attend overseas investment seminars and forums	BEZA and Private Investor
d. Develop proactive investment promotion peer network	BEZA
4. Investment Facilitation	
a. Coordinate policy dialogue between policy makers and businesses	BEZA
b. Make business directories of private companies like names, business field, address of office, person directly involved in, products list and future business plan for business match-making	BEZA and Private Investor
c. Provide counselling through providing information on (a) securing raw materials; (b) market access (national or regional); (c) seeking efficiency; and (d) gaining strategic elements for investors.	BEZA and Private Investor
d. Conduct coordinating with local and international financial entities	BEZA and Private Investor
e. Provide and improve business support facilities	BEZA
f. Assist investors for acquiring licenses	BEZA OSS
5. Targeting investors	
a. Focus on investors who are already in Bangladesh	Private Investor
b. Meet with target audience	Private Investor
c. Disseminate EZ development through representative offices in other countries and through international organizations in Bangladesh, with bilateral chamber of commerce	BEZA
d. Identify business and industrial trends through dialogue with international investors (Information to be collected would be names, functions, head of office, person directly involved in FDI, current cooperation, direction for future coordination)	BEZA and Private Investor
6. Regular evaluation	
a. Consult with BIDA, BEPZA, Prime Minister's Office and other related ministries for criteria, results, causes of success and failure	BEZA
b. Conduct survey of newly emerging factors and conditions and supportive tools to be continued	Private Investor

6.7 Success Factors

The success of an investment promotion program depends on not only promotional efforts, nor just the deal itself, rather it depends upon a number of inter-dependent factors. Investment promotion should not only create an impression of the zone but also convey a positive impression of the institution the investor would deal with *i.e.* BEZA. Therefore, continuous effort on capacity building, a congenial working relationship within the organization and a cohesive working environment are extremely important.

The following interdependent points are necessary for success of the investment promotion, indicated by a reasonable number of bids submitted. They are mostly related to the bidding and project configurations and institutional attributes:

Figure 78: Success Factors



Unless the above configurations and attributes are set right and they are discussed and crosschecked with potential investors, the efforts on promotion strategy by itself may not result in a successful investment.

7 Master Plan and Onsite Infrastructure

7.1 Master Planning Considerations for Mirsarai 2

The proposed zone is planned to function as an integrated bunch of industries having required services and facilities with future growth opportunities and envisioned as a self–contained, sustainable, holistic and intelligent zone. Therefore, an integrated planning exercise has been carried out so that the site can position itself suitably with the region. The following are concepts behind planning the zone.

Figure 79: economic zone Planning Concepts

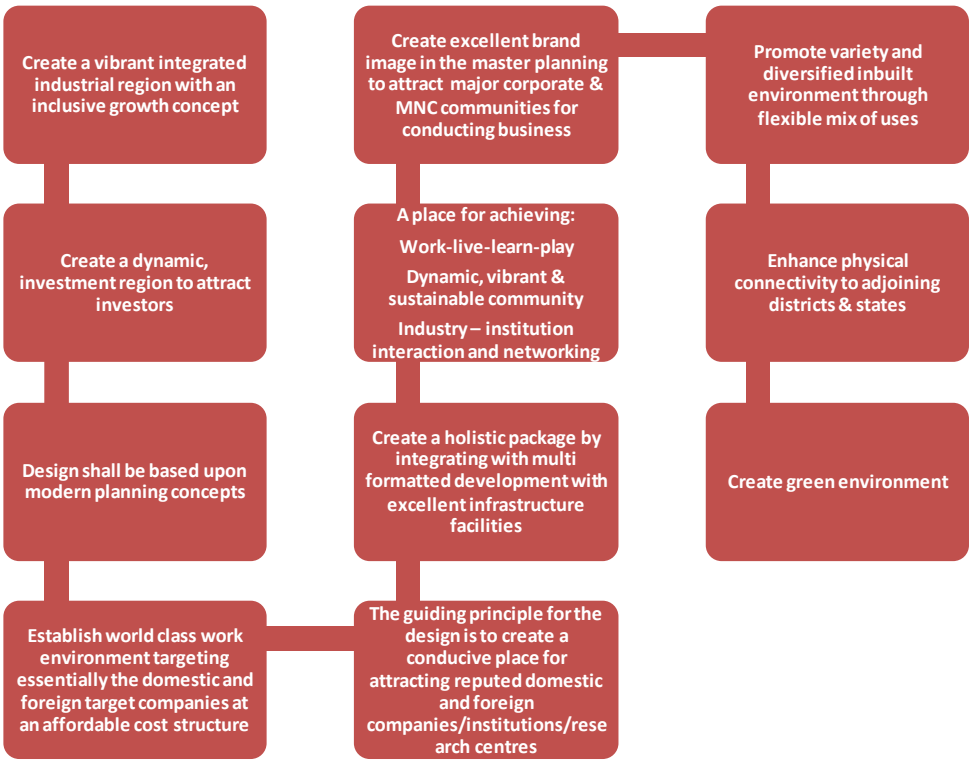
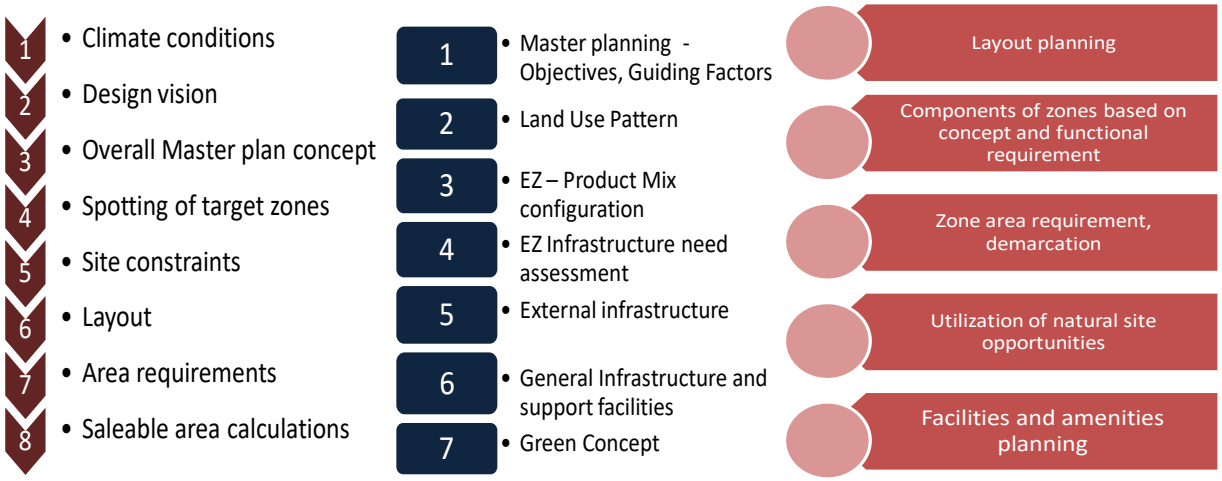


Figure 80: Master-Planning Considerations



In order to implement this uniquely conceived zone into a fully integrated facility, to promote a new 'industrial cluster image in Bangladesh and to develop confidence for foreign and local investors, certain planning objectives/principles are envisioned as depicted bellow:

Figure 81: Planning Principles & Objectives

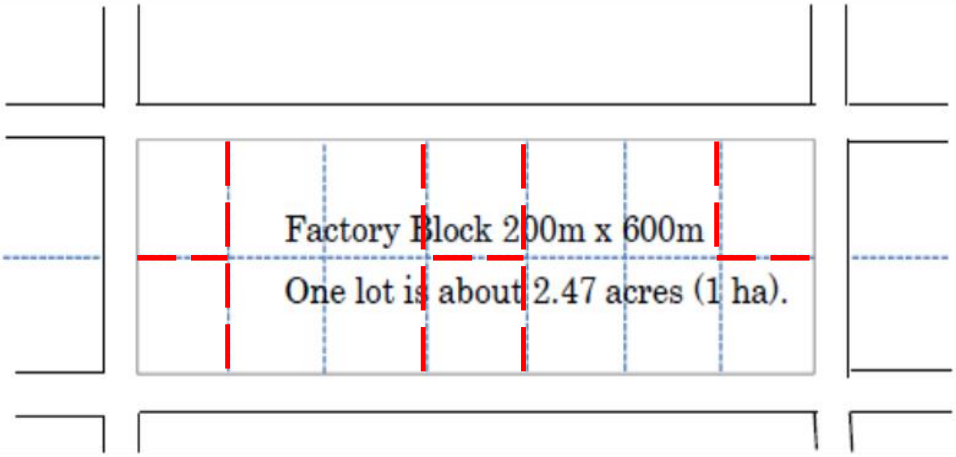
The zone has been divided into various sub-zones. Each sub-zone shall be dedicated to a specific sector. From the planning perspective, the zone is a package of a number of land uses. While the processing activities are core to the zone operation, those will be facilitated by other support services like infrastructure, marketing, R & D services, community facilities and greenery. Social and commercial amenities are also planned to provide convenience to the working people within the zone.

7.1.1 Plots inside the Zone

The standard factory plot is designed as 2.47 acres (1 ha) parcel 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 line. 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.

In addition, the plot layout is designed to be adjustable for increasing or decreasing, as desired. Tenants will be able to take lease of 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 82: Standard Factory Block and Road Network



Minimum setback from plot boundary is as follows:

- Frontage: 20m for the main road (width= 30m), 15m for the minor road (width =19.5m)
- Side Yard: 8m (on both sides)
- Back Yard: 10 m

The followings are regulations on the ground coverage.

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

Figure 83: Setbacks for Tenant Buildings on Major Roads

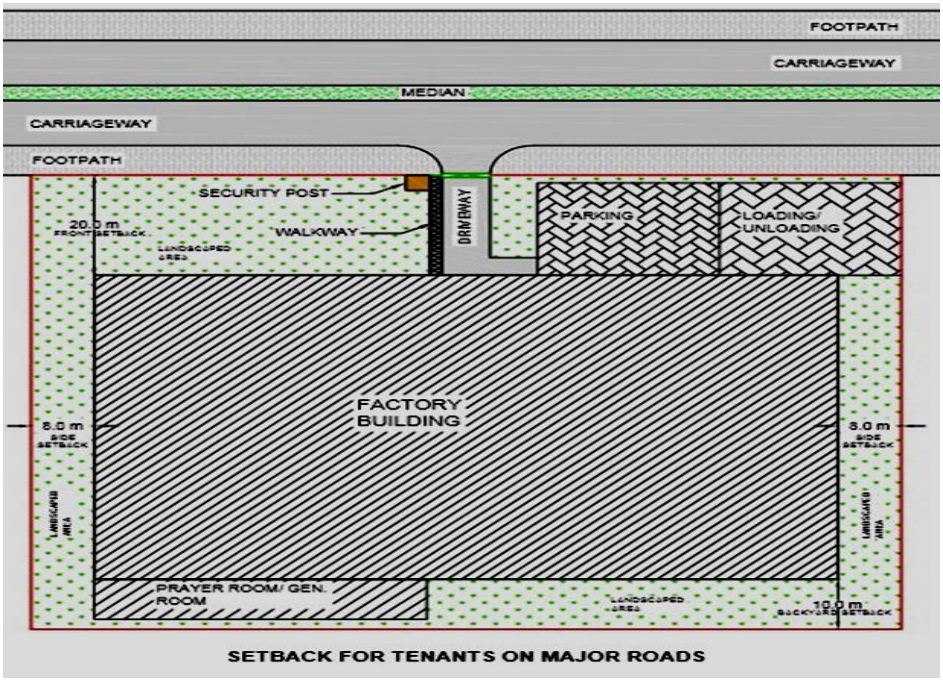
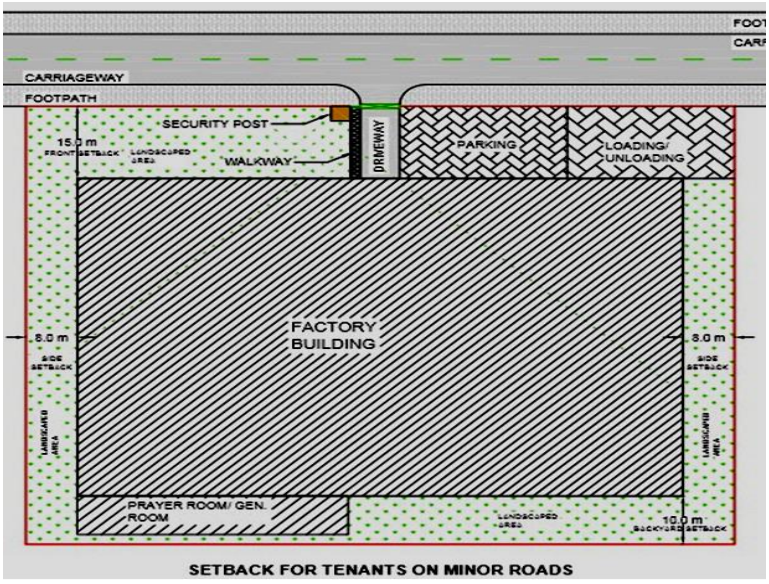


Figure 84: Setbacks for Tenant Buildings on Minor Roads

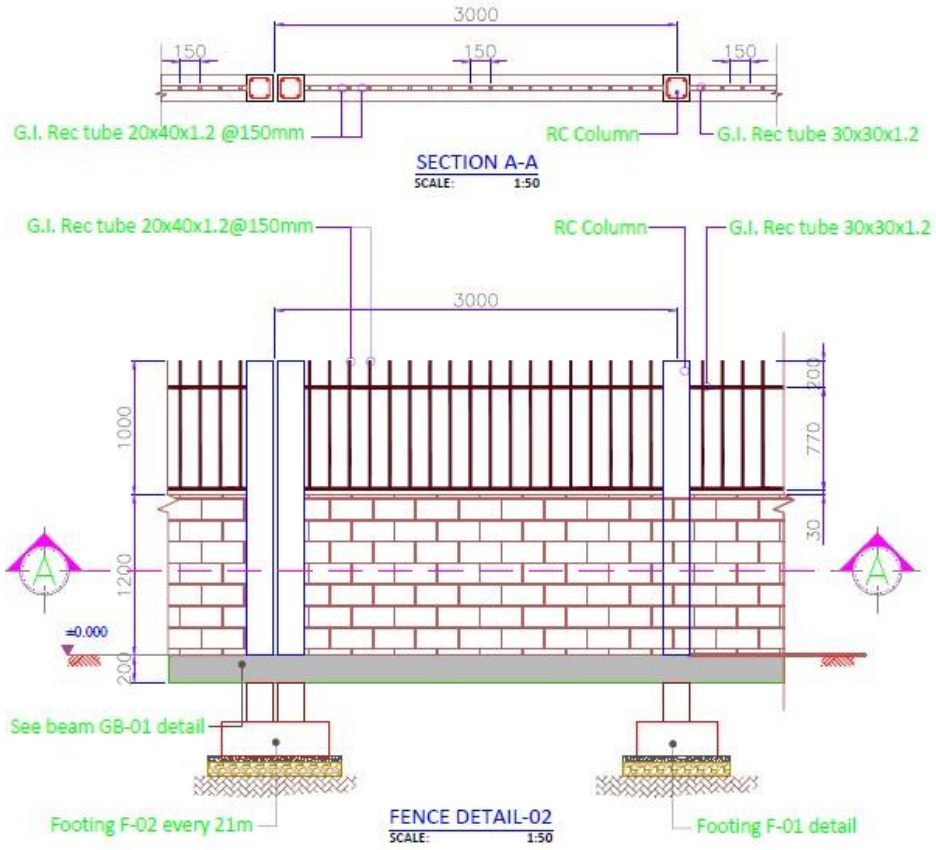


7.1.2 Fences

Each tenant will build the fence surrounding own leased land. The maximum height of fences shall be 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 below:

1) 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 colour and material should be discussed with the economic zone administration.
2) No concealing fences shall be erected facing the roads. On the other hand, the structure of the side and back fence should be closed type for security purposes.
3) 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.
4) The setback of 3.281 feet (1m) is required between the u-channel and the fence. This is for necessary maintenance of the fence foundation in the future. The setback should be grassed for the landscape purpose.

Figure 85: Standard Front Fence



7.1.3 Parking

- Parking for industries and other facilities is to be developed within the plot. Noon-street parking will be allowed within the zone.
- 30 percent of the set back area on the front can be used as open parking.
- 30 percent of the setback area on the front can be used for loading and unloading.

- All plots will have a minimum parking space allocation of 1 standard sized automobile (2.5mx4.6m) per 200 m^2 of floor space.
- An extra 5 percent of ground coverage is permissible for construction of automated multi- level/multi-level parking with ramp parking structures for additional needs.
- In the case of basement parking, it cannot exceed the set back line and maximum 20 percent of the ground coverage. It should be kept as service area (prayer room, generator room etc.).
- Space Standard for parking:

Table 20: Equivalent Car Space (ECS) in Different Type of Parking

Parking Type	Area in m2 Per ECS
Open shed	23
Basement	32
Multi-level with ramp	30
Automated multi-level	16

- For bicycle parking, one space per 500 sqm floor space is to be provided.
- The dimension of parking area and turning radius will be fixed in accord with the following table below:

Table 21: Recommended Dimensions for Parking Area Design

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

7.1.4 Gate System

The gate system of the proposed zone is carefully considered. The main gate (Gate 1) has main custom office, administrative building for handling all the administration for the entire zone. The following gates are planned:

- Gate system for Mirsarai Economic Zone 2A
    1. Gate 1 (main gate) located at entry point.
    2. Gate 2 (main gate) located between processing zone and non processing zone
    3. Gate 3 (minor gates) located at in core industrial area.
    4. Gate 4 (minor gates) located between medium size and large scale industries.
    5. Gates of individual tenants.

- Gate system for Mirsarai Economic Zone 2B.
    1. Gate 1 (main gate) located at entry point.
    2. Gate 2 (main gate) located between processing zone and non processing zone
    3. Gate 3 (minor gates) located at in core industrial area.
    4. Gate 4 (minor gates) located between medium size and large scale industries.
    5. Gates of individual tenants.

7.2 Land Use Pattern within the Economic Zone

The land use pattern of the zone is determined considering the land requirement for various processing units, logistics requirements, research, capacity development, skill development, residential facilities, schools and various social amenities etc.

A well-balanced land use is perceived with a judicial mix of business, commercial, social and residential zones as illustrated in the following figure:

Figure 86: Broad Zone Demarcation

Based on the above zone demarcation the following land use map has been drawn:

Figure 87: Land Use Map

The following tables provide the land use pattern for 2A and 2B.

Table 22: Land Use Pattern of Mirsarai 2A Economic Zone

Land Use Category	Plot Type	Number of Plot	Area in Acres	Area in Hectares	%
Processing Area	Food Processing	25	60.761	24.586	6.88
	RMG	29	71.601	28.971	8.115
	Integrated Textile	24	56.553	22.884	6.41
	Light Engineering/Automobile Parts Manufacturing	19	46.583	18.848	5.28
	Pharmaceutical	22	54.32	21.978	6.15
	Petro Chemical	31	79.532	32.181	9.01
	Cement Factory	12	29.347	11.875	3.33
	Ship Building/Steel Mill	2	63.364	25.643	7.183
	(a) Total Industrial Area	**164**	**462.061**	**186.966**	**52.358**
Specialized Infrastructure	Ware House	1	4.94	1.999	0.56
	Truck Stand	1	22.429	9.077	2.54
	QA & QC Lab	1	2.469	0.999	0.28
	Training Center	1	2.469	0.999	0.28
	CETP	1	21.925	8.873	2.48
	CSTP	1	16.203	6.557	1.84
	Power Plant	1	9.326	3.774	1.06
	Lake/Water Reservoir	3	67.114	27.16	7.6
	Road	4	76.604	31.001	8.68
	Green	9	111.049	44.939	12.58
	(b) Total Specialized Infrastructure	**23**	**334.528**	**135.378**	**37.9**
Non-Processing Area	Administrative Building & Custom House	1	4.941	1.999	0.56
	Commercial Area	1	2.69	1.088	0.3
	Club House	1	2.470	1.000	0.28
	Day Care Center	1	2.469	0.999	0.28
	Investors Club Resort	1	8.216	3.325	0.93
	Fast Food	1	2.469	0.999	0.28
	Fire Service	1	5.695	2.305	0.646
	Guest House	1	4.937	1.998	0.56
	Helipad	1	2.666	1.079	0.3
	High Class Residence	1	9.874	3.996	1.119
	Kinder Garten School	1	2.469	0.999	0.28
	Secondary School & Play Ground	1	4.925	1.993	0.55
	Water Treatment Plant	1	3.406	1.378	0.39
	Residential Area	1	14.811	5.994	1.679
	Sub-Station	1	2.009	0.813	0.228
	Textile College	1	4.940	1.999	0.56
	Walkway	1	2.616	1.059	0.3
	Mosque	2	3.844	1.556	0.44
	(c) Total Non-Processing Area	**19**	**85.45**	**34.58**	**10**
	Grand Total (a+b+c)	**207**	**882.558**	**357.134**	**100**

Table 23: Land Use Pattern of Mirsarai 2B Economic Zone

Land Use Category	Plot Type	Number of Plot	Area in Acres	Area in Hectares	%
Processing Area	Food Processing	29	75.165	30.416	17.54
	RMG	20	59.043	23.893	13.777
	Integrated Textile	10	24.475	9.905	5.71
	Light Engineering/Automobile Parts Manufacturing	16	40.098	16.226	9.36
	Electronics	12	29.628	11.988	6.91
	(a) Total Industrial Area	**87**	**228.409**	**92.428**	**53.297**
Specialized Infrastructure	Ware House	1	4.099	1.659	0.96
	Truck Stand	1	10.913	4.416	2.545
	QA & QC Lab	1	3.253	1.317	0.759
	Training Center	1	4.195	1.698	0.979
	CETP	1	6.905	2.794	1.61
	CSTP	1	7.317	2.961	1.71
	Power Plant	1	9.996	4.045	2.33
	Water Reservoir	2	2.571	1.041	0.6
	Road	2	53.308	21.573	12.43
	Green	10	48.945	19.807	11.41
	(b) Total Specialized Infrastructure	**21**	**151.502**	**61.311**	**35.333**
Non-Processing Area	Administrative Building & Custom House	1	3.655	1.479	0.85
	Commercial	1	3.108	1.258	0.73
	Club House	1	2.443	0.989	0.57
	Day Care Center	1	1.513	0.612	0.35
	Fast Food	1	0.933	0.378	0.22
	Fire Service	1	2.558	1.035	0.6
	Guest House	1	2.058	0.833	0.48
	High Class Residence	2	6.928	2.803	1.62
	Kinder Garten School	1	1.524	0.617	0.36
	Residential Area	1	4.492	1.818	1.05
	Sub-Station	1	1.856	0.751	0.43
	Mosque	3	6.537	2.646	1.53
	Medical Center	1	4.253	1.721	0.99
	Open Space	1	3.629	1.469	0.85
	Play Ground	1	3.163	1.280	0.74
	(c) Total Non-Processing Area	**18**	**48.650**	**19.689**	**11.37**
	Grand Total (a+b+c)	**126**	**428.561**	**173.428**	**100**

From the proposed land use distribution, it can be seen that industrial usage is the predominant land use. Besides offering a pleasant environment for people to work, the zone authority will offer a variety of ready to use land plots complete with infrastructure for clients to construct their own factory buildings.

The percolation of plots is done depending upon the types of industries to be accommodated. Occupant units can merge or sub-divide the prepared land into appropriate sizes to meet their own requirements. Conversely, the larger plots can be subdivided by introducing some minor roads to meet any demand for small plots. Prominent sites that normally command a slightly higher land premium are reserved for industrial brand names and multinational companies (MNCs) who desire these prime locations for enhancement of their corporate image and are ready to pay a premium price for the same. Apart from general infrastructure, specialized infrastructure required for a particular zone is also envisaged. Varieties of small and large plots are provided to meet the varied needs of the industrialists.

7.3 Onsite Infrastructure

The infrastructure is the key requirement for sustainable operation of the zone. Infrastructure requirements are categorized as follows:

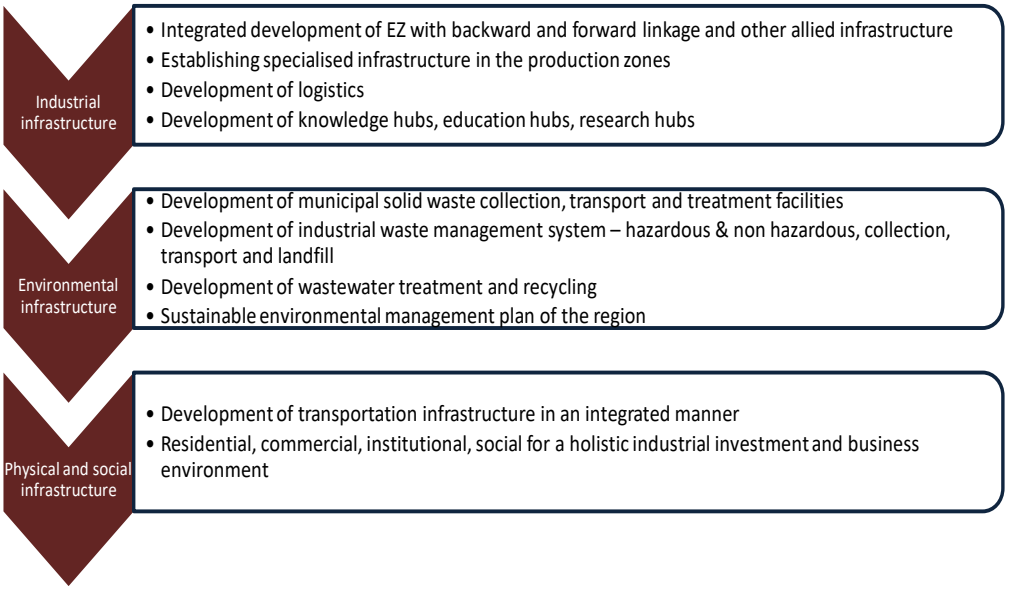
1) Infrastructure within the zone

2) Specialized infrastructure

3) External connectivity and offsite infrastructure for the zone.

The industrial, environmental, physical & social infrastructure objectives of the zone are described in figure below:

Figure 88: economic zone Infrastructure Objectives



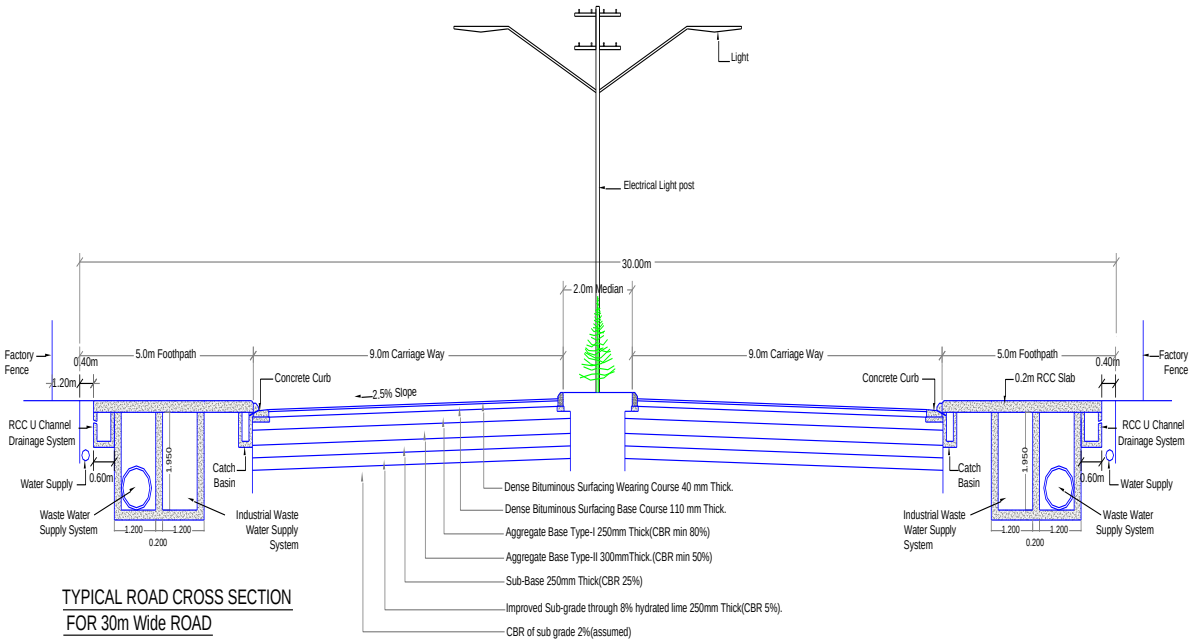
7.3.1 Road Network inside the Economic Zone

A concrete surface road is selected for the internal road in the economic zone in terms of resistance against heavy rain and heavy truckload that is very common in economic zones. Two types are selected for the road network design; main road (width: 30m) and minor road (width: 20m). The main road is divided by the central median. The carriageway of each direction of traffic is 9 m. A 5 m sidewalk is also provided on both sides of the road. Plants are provided on the median and street lightings are provided on the median of the main road.

The minor road is supposed to be an undivided 2-lane type which carriageway is 10.5 m. A 4.75 m sidewalk is to be also provided on both sides of the road. Street lightings are 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 into factory plots in the industrial zone. The road network is designed surrounding the factory lot block by approximately 200m x 700m for the minor road sections and 200m x 1,000m for the main road sections, on average, to optimize the traffic flow.

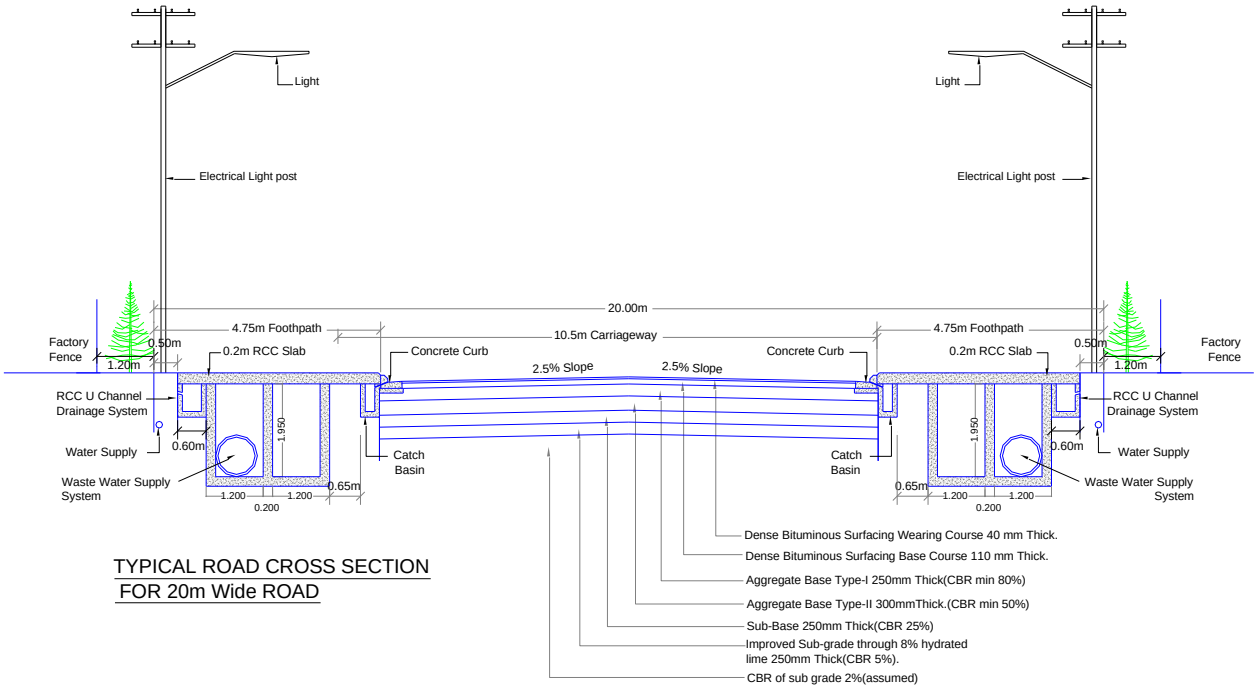
Figure 89: Typical Cross Sections of Major and Minor Roads

Major Road



TYPICAL ROAD CROSS SECTION
FOR 30m Wide ROAD

Minor Road



TYPICAL ROAD CROSS SECTION
FOR 20m Wide ROAD

7.3.2 Power Supply System

BEZA has already been signed a MoU with PGCB for grid substation at Mirsarai economic zone area within 50 acres of land which will be one of the biggest grid sub-station in Bangladesh. Each economic zone will have its own power plant to address shortage of power from national grid. Initially small power units would be setup as the number of industrial enterprises would grow slowly. However, overtime additional power units will be established based on the demand. A power plant of 10-20 MW is envisaged. For flexibility and immediate start-up HFO fuelled power plant is better suited for the economic zone. If LNG pipeline is connected with the zone, LNG fired power plant should also be pursued. However, in case of shortage of LNG, the HFO fuelled power plant will be kept reserved for emergencies. Internal networking will be done within the economic zone (EZ) to provide electricity to the customers.

Electrical System

In order to predict the electrical power system requirements, rough estimate is provided for the possible unit set ups of factory, residence, commercial in both areas of the zone. It is estimated to be 95 MW for 2A and 35 MW for 2B. Total power requirement for this site is 130 MW. Therefore, two power plants of capacities 120 MW and 50 MW are needed to provide power supply to 2A & 2B.

The industrial set ups will be provided power by 33kV and 11kV lines from 132 KV/33kV sub-stations in the power station area and will have separate 33kV/11KV sub-stations of required capacity with 11KV distribution lines, 11/0.4KV substations and 0.4KV lines according to the load requirement, covering the whole area of the respective zone with the required capacity to meet the load demand.

Power Connection to the Mirsarai-2 economic zone and proposed HFO-fired Power Plant (Offsite)

A 230 kV transmission line coming from Comilla north substation and going to Chittagong Hathazari 230kV substation passes over Mirsarai upazilla alongside Comilla to Chittagong highway at a place named Sonapahar. PGCB is also constructing a 132/33kV substation at Baraiyarhat half km away from BSRM Steel Mills at Mirsarai. PGCB has plan to extend the line to supply power to the proposed 132/33kV substation inside the zone. Although another 400kV line is under construction near Baraiyarhat, Mirsarai, this line will interconnect Meghnaghat network to Madunaghat network to evacuate power from Matarbari coal fired power plant.

The above 230 kV line has been brought tapped in and tapped out for BSRM Steel Mills at Sonapahar by PGCB. One 230/33kV substation having capacity 2x130/140 MVA has been built and commissioned there to supply power to BSRM Steel Mills. Provision has been kept to supply power to other consumers. The cost of the substation has been borne by BSRM. The sub-station is scheduled to be handed over to PGCB for normal operation and maintenance. For the sub-station and steel mills, BSRM has purchased 70 acres (28.34 hectares) of land.

In future, when the zone will have its (120+50) MW HFO based power stations constructed as per estimated load requirements of 125 MW with some option for supplying extra power to national grid through 132 kV transmission line connections with PGCB 400/ 230/132kV national grid. A land of fifty acres has been allotted to PGCB to construct a substation to supply power to the proposed economic zone of Mirsarai.

Some important revenue can be collected by selling the surplus energy from the power plant after they are constructed and energized.

Figure 90: Power Supply Connection from Baraiyarhat U/C Substation to Mirsarai economic zone

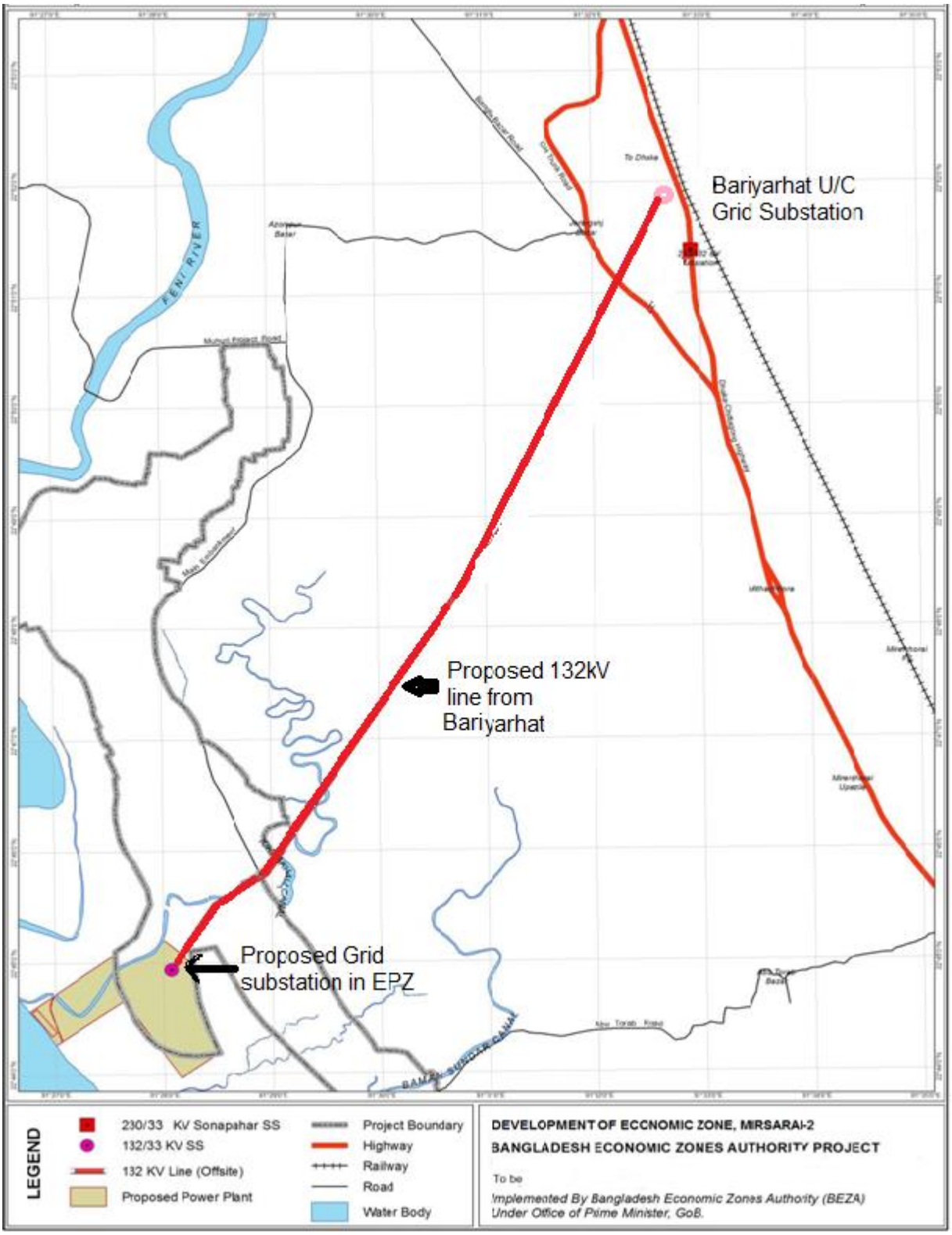
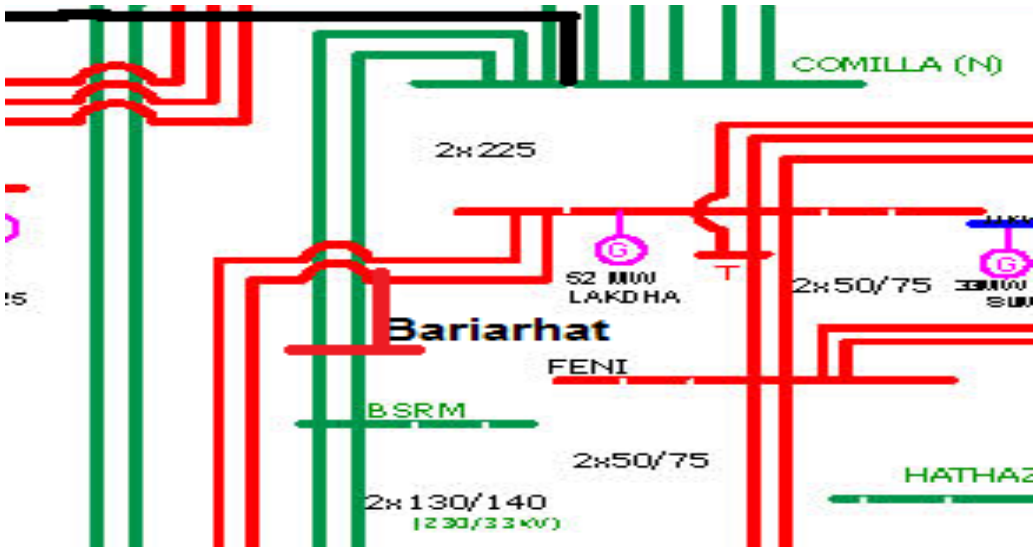


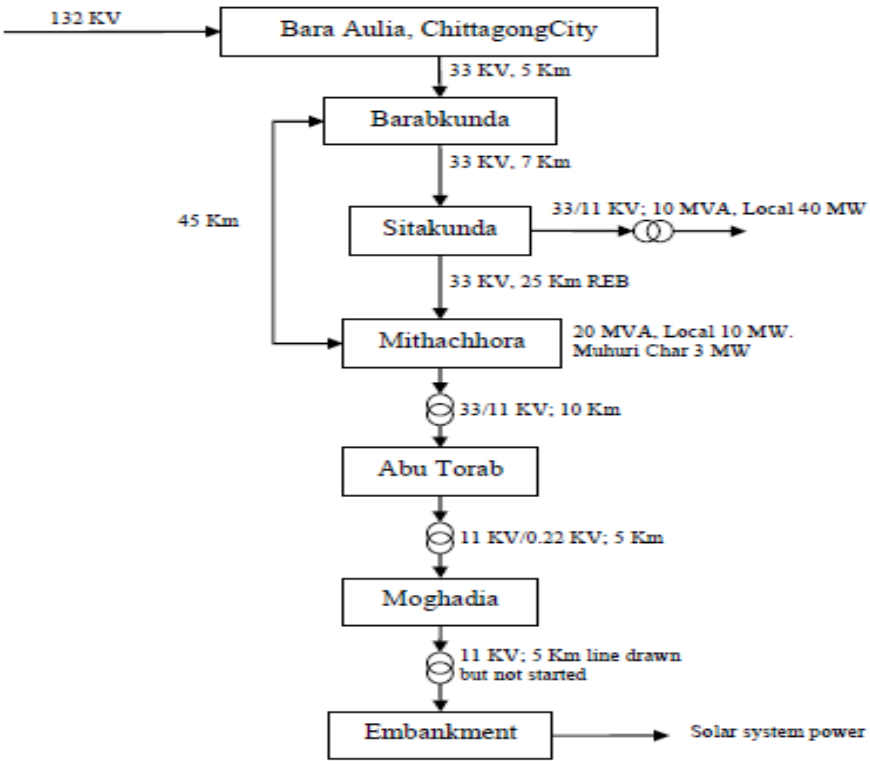
Figure 91: Existing Transmission Grid network in Mirsarai area



Existing Utility Condition

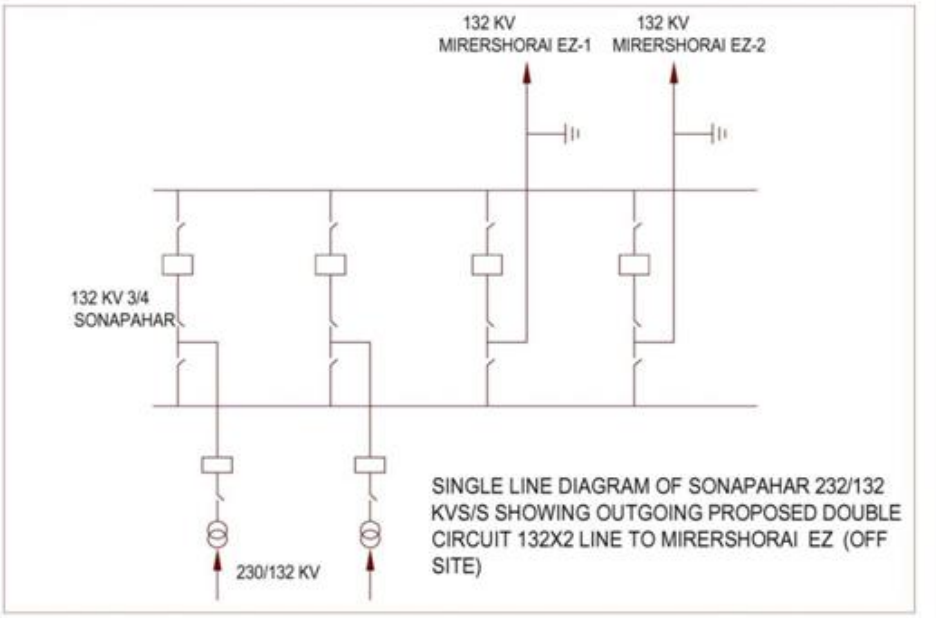
At present, electricity is supplied to the area by the Rural Electrification Board (REB) by 11 KV line connected to REB's 33 KV sub-station at Mithachara, capacity 20 MVA. But it can only deliver 10MW due to the limited power supply. Grid supply in the area is not available now. Some Solar Home systems are available.

Figure 92: Present Power supply situation at Mirsarai upazilla



Power distribution option inside the zone from Sonapahar Grid Substation near BSRM Steel Mils

Figure 93: Single Line Diagram of Sonapahar 230/33KV



Single Line Diagram of Sonapahar 230/33KV SS Showing Outgoing Proposed Double Circuit 2x132KV Line to Mirsarai economic zone (Off-site) in the final phase.

HFO based Power Plant inside the zone

Basic information about the proposed HFO based power plant project is as follows

- The proposed capacity of the plant: 120MW+50 MW
- Mode of operation: Base load
- Fuel: HFO

Properties of HFO System

HFO, also known as “residual fuel oil”, is based on the high viscosity, tar-like mass. As a residual product, HFO is a relatively inexpensive fuel – it typically costs 30% less than distillate fuels (MDO/MGO) (Verlinkung). It thus became the standard fuel for large marine diesel engines during the oil crisis in the 1970s and 1980s, and it required extensive adaptation of the injection system and other components of low and medium speed engines – which are still the only reciprocating engines capable of running on HFO.

Reciprocating Engine Generator

The Facility will include the complete (HFO) based reciprocating engine generator units, constructed with new and unused materials and equipment, having a total net power generation capacity of 120 MW to 130 MW at the Reference Site Conditions, to operate as a fully despicable plant.

It is required that the net capacity of each engine generator will be not less than 5 MW.

Facility will be operated using HFO (furnace oil) as fuel. The Project Sponsor will arrange the supply and delivery to the site of required quantities HFO for Bangladesh Petroleum Corporation or any other Fuel Supplier for use as fuel to the power generation facility. The fuel supply arrangements will be required to ensure an adequate and reliable supply of fuel and shall, along with the Fuel Supply Agreement. Fuel storage facility for operating the Facility for at least 15 days continuously at 80% plant factor shall be constructed by the Company at its own cost before Commercial Operations Date and the Company shall maintain this stock of fuel for all time.

Each reciprocating engine shall be of heavy duty, industrial type, of proven design, directly coupled to a 50 Hz generator. Each reciprocating engine generator shall be installed within an acoustic, ventilated enclosure incorporating fire detection and protection facilities. Each reciprocating engine shall be provided with all associated ancillary and auxiliary equipment and systems for the safe, efficient and reliable operation.

Generators

Generators shall have a minimum short circuit ratio of not less than 0.5. Each generator shall comply with IEC 34 and BPDB requirements and shall be rated to match the engine output over the full range of ambient temperatures specified. Generator and exciter windings shall possess insulation that is non-hydroscopic and of Class F type complying with IEC 85, but having a temperature rise not exceeding that of Class B under any operating condition within the specified output.

Quality of the management of the generator and accessories shall be in accordance with the requirements of ISO 9001, EN 29001 or BS 5750 Part 1 and other similar equivalent International quality standards. Anti-condensation heaters shall be provided for the air circuits, generator windings, excitation system and control cubicles. Heaters shall be capable of maintaining the air temperature above that of dew point to prevent condensation. These heaters shall automatically switch on when the generator is taken out of service. Temperature detectors shall be provided to monitor the maximum operating temperature of the machine. The generators shall be capable of supplying their rated power within 48.5 Hz and 51.5 Hz and ±10% of nominal rated voltage within the power factor range 0.85 lagging and 0.95 leading at the delivery point. A continuous fast acting automatic excitation control system of a proven design shall be provided to control the generator voltage without hunting/instability over the entire operating range of the generator.

The excitation system shall be provided with a fast-acting MVAr limiter so as to prevent the generator output falling below its safe limit. A power system stabilizer shall be incorporated in the excitation system of each generator. The Automatic Voltage Regulator (AVR) shall also be provided with but not be limited to Quadrature Droop Compensation, and Cross Current Compounding. Protection features as part of the system shall include over-voltage, over current, VT fuse failure, diode failure, over fluxing, and AVR power supply failure. A field shorting or discharge switch feature shall also be included in the system as protection against overstressing the generator insulation in the event of a fault. Manual excitation control facilities shall be provided as a backup to the automatic control, and shall have an adequate range to allow for control of excitation for testing purposes. A true null balance shall be provided to allow for smooth excitation transfer between manual and automatic control.

Cooling System

Method of cooling is to be design based on the availability of water and other Site condition.

Water Treatment Plant

A water treatment plant shall be provided to meet the Facility demand (if required). A water treatment plant will be provided to treat raw river water that will provide plant cooling water, service water, and de-mineralized 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)

Wastewater Treatment Plant

A wastewater treatment shall provided for the Facility to ensure that any water discharged from the Facility streams meets the Bangladesh and World Bank Group environmental standards or any internationally accepted Environmental standards. See GOB Environment Conservation Rule (1997) for the Bangladesh water discharge standards.

Liquid Fuel System

It will be needed to arrange a liquid fuel supply to the Facility. Required necessary arrangement for operation of the Facility with HFO including fuel transportation, receiving & handling, construction of jetty, pipe line up to the Facility storage, fuel measuring system, internal fuel supply system, fuel heating and purification/treatment system as per requirement of the offered plant shall be responsibility of the Company at its own cost.

Fuel storage facility for operating the plant for at least 15 days continuously at 80% plant factor shall be constructed by the Company at its own cost before COD and Company shall maintain this stock of fuel for all time thorough out the Term.

Power Transmission

Power generated from this HFO-fired power plant will be delivered to the 132kV switchyard to be constructed near the power station by PGCB. From this switchyard 2.5 Km long 132 KV transmission line on towers will be constructed (along with power transformers of required capacity including switch gears, protection system etc.) to connect it with the 230/33 KV Sona Pahar Grid Substation. This will ensure its connectivity to the national grid system of Bangladesh. Internal networking will be done within the zone to provide electricity to the customers.

Environmental Requirements

The facility will be designed to be capable of complying with the laws of Bangladesh and the

Environmental guidelines as applicable such as World Bank Group and Asian Development Bank environmental and social guidelines or any internationally accepted Environmental Guideline.

The construction of the planned power plant may start in 2018 when the demand is almost zero and can be supplied by the national grid. At the end of 2021 when the demand is about 10 MW both the power plants will start production (total 170MW). After completion of its construction in 2025 the total demand for power in the zone will be 130 MW when the full capacity of the power plant can be utilized in the zone.

Drainage

Oily water and chemical drains shall be treated to an approved quality before discharge. All drains and other liquids, if discharged from the Facility shall at all times comply with appropriate environmental regulations and meet the quality standards specified in GOB Environment Conservation Rule (1997).

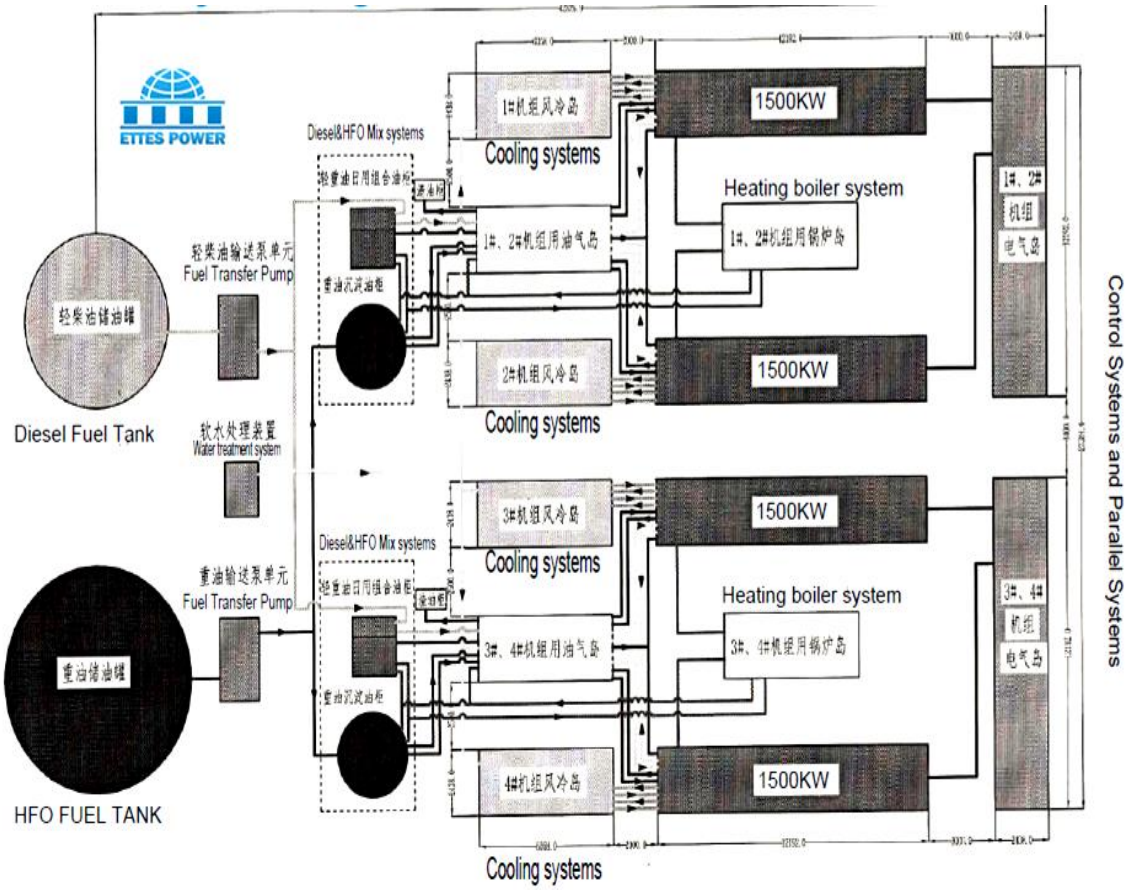
Exhaust Liquid Fuel Emissions and Air Quality

Exhaust Liquid Fuel emissions shall not exceed the emission rates allowed by those Bangladesh standards and the World Bank Group guidelines or any Internationally accepted Environmental Guideline can be followed for Stack emission Limits under all ambient conditions. The required air quality should be maintained by controlling emission limits and selecting appropriate stack height.

It is the responsibility of the Project Sponsor to fully investigate the timing and possible changes in the proposed standards and include appropriate provisions in the design of the Project.

Typical layout diagram is depicted below for HFO based power plant:

Figure 94: Layout Diagram of MAN HFO Power Plant

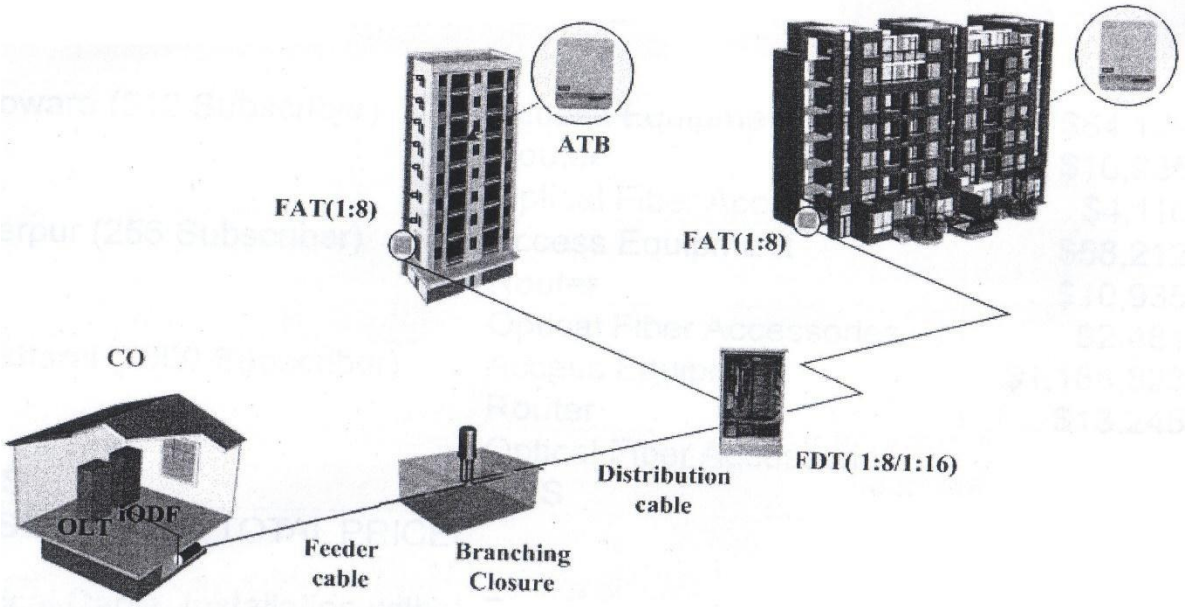


7.3.3 Telecommunication System

Connection (On-site)

The number of industries to have been estimated is 532 according to the number of plots in the Master Plan. Considering 6 telephone lines per industry and other connections, such as, connections in the BEZA administrative office, customs office, proposed power plant, and power supply office and some residential connections, the total numbers of telephone connections is estimated to be 3,500 LU and the number of distribution points is considered to be 800 in 2 phases. The capacity of the telephone exchange, considering future expansion in the surroundings, is assessed to be 6,000 LU and effective number of connections in the 1st Phase will be 2,000LU, proportional internet connections. The number of industries may be more or less than the number of plots. Some of the big industries may sometimes need more than one plot. On the other hand, more than one small industry may sometimes share one plot.

Figure 95: Connection Diagram (On-site)



As in all EPZs in Bangladesh, BTCL have their PSTN network, it is recommended that Telecom development works in economic zones shall be offered to BTCL. BTCL has two modes of financial systems, a) a Contributory work, and b) a Self financed work.

a) Contributory work: When a corporate body asks BTCL to establish a telephone network, BTCL submits estimates for the contribution of funds. After placing of a fund by a corporate body, BTCL expands the network as required.

b) Self financed work: when BTCL finds that an area is under development, BTCL includes expansion work in ongoing or in future sand expands their net work for expansion of own business from their own fund.

c) Due to an abrupt fall of revenue rate of BTCL service, BTCL has become reluctant to do any self- financed work. One BTCL spokesman remarked that, if the government is interested in these works and place the required budget, BTCL can do them with their own finance.

Finally, it is proposed that, BEZA should write to BTCL through the Ministry of Telecommunications, informing them that offices of economic zones going to be built, at (a) Sherpur, Maulavibazar in Sylhet Division, (b) Mirsarai, Chittagong in Chittagong Division and (c) Anwara (Gohira), Chittagong in Chittagong Division, as a part of the infrastructure development of Bangladesh.Finally, the Ministry should be requested to instruct BTCL to include the following places in their future expansion project.

As a matter of urgency and showing the demand of the EZ sites, BTCL should be asked to submit an estimate for contributory work .Particularly as Mirsarai EZ is going to be developed on a priority basis, BTCL may be requested by BEZA to include the development work of telecoms in the future development work in an on-going Project of BTCL.

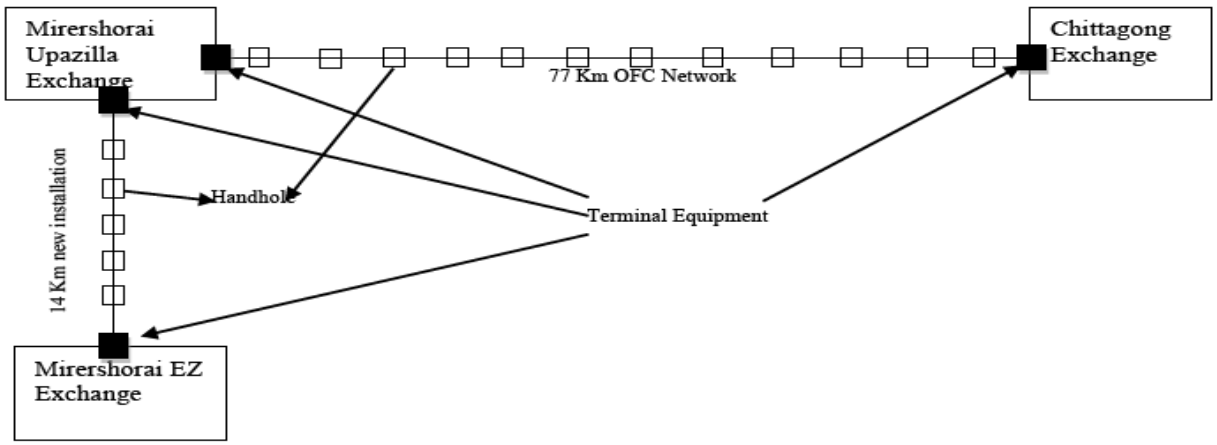
Information can also be given to the approved private PSTN Operators, Mobile Phone Operators and ISPs that they can expand their network for their own business expansion. It is recommended that Bangla Phone should be offered to the opportunity to establish their network without any conditions.

Telecommunications (Off-site)

If Bangladesh Telecommunication Company Limited (BTCL) fixed phone network is to be installed in Mirsarai economic zone site, a Fibre Optic Cable (FOC) connection will be established between Mirsarai economic

zone site and Chittagong main Exchange. Also Telephone Exchange/exchanges of BTCL shall be installed at the site and the local network will be expanded according to need. Mirersharai economic zone area is very large. Local network by copper cable will be difficult with single Exchange. To cover the network by copper cable, a minimum of two BTCL Exchanges need to be installed. Because by copper cable, subscribers can be connected up to a maximum distance of 4 Km. If only one Exchange is installed, OFC network would have to be expanded for the local network. The cost of a telecommunications system is calculated most modern soft switching (SS) technology, as in near future technologies are being changed very rapidly. Since power transmission lines in the site will be overhead, the FOC line can be hung overhead to reduce the local network expansion cost.

Figure 96: Connection Diagram (Offsite)



Communications Network:

In Bangladesh there are two types of national network; Radio Link Network and OFC Link. BTCL has both the types. PGCB also has an OFC overhead network throughout Bangladesh along the high tension power transmission Towers.

7.3.4 Water Supply System

In Mirsarai 2A & 2B, the water consumption demand will be about 134,666 cubic meters per day. Per day volume of water requirement is given bellow for Mirsarai 2A and 2B:

Mirsarai 2A: 106,133 m3/Day
Mirsarai 2B: 28,533 m3/Day

Detailed water requirement calculation is shown in Annexure 4. A technical committee formed by BEZA, led by Bangladesh Water Development Board (BWDB) has prepared a technical report (June 2016) for examining water supply possibilities in the economic zone (covering 8,000 acres, as was originally planned in the JDI report). Based on the recommendation of the committee the water to the zone can be supplied from river and ground:

river Water. A water reservoir is planned to be built on 100 acres of land in Mirsarai 2A. The water in the water reservoir will be taken from Feni river through Icchakhali channel. It is to be mentioned that Muhuri Dam project draws water from the river for irrigation purpose. Therefore, only the excess water after meeting the demand for irrigation, can be extracted for the zone, as per BWDB report. After treatment, the water can be supplied to both 2A & 2B. Initially whole year's water requirement may be fulfilled from this source. However over time, as new industries will be set-up, additional source of water needs to be pursued.

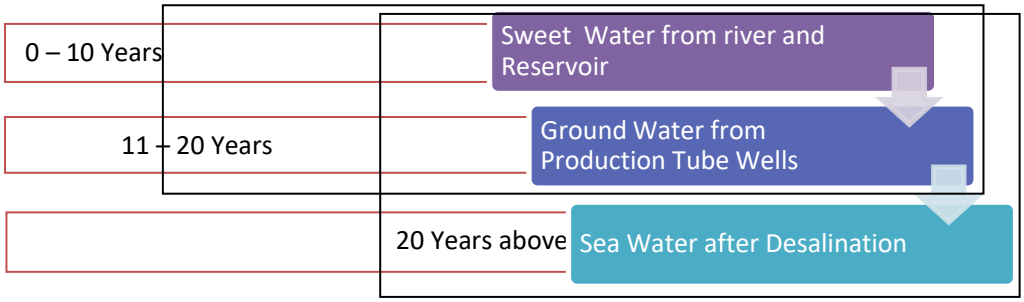
In full capacity of 2A and 2B around 7-8 months water can be extracted from river. At that stage, during dry season, the water from ground water source will be required.

Ground Water. After certain number of years, for avoiding seasonal fluctuation during dry season, water may be drawn by installing production tube wells in the project area to meet the water demand. Each tube well can supply 500 cubic meter of water per day. Around 50 tube wells are recommended to be set in 2A and 2B. The BWDB report has not considered sea water as a source. However, river and ground water may not be sufficient for full development, because of seasonal limitation of river water and environmental limitations of ground water. Therefore, sea water might be the next preferred option.

Sea Water. If the water from the Feni river and ground is not sufficient to meet the demand, then sea water needs to be used. Therefore, a desalination plant, to convert the saline water of the sea into sweet water, is recommended to set up at a later stage outside the economic zone as part of overall Mirsarai Industrial City development.

The water supply sources can be phased out in following manner:

Figure 97: Indicative Water Supply Source Phasing



Water Distribution Network:

Water Distribution Networks deliver water to each factory along the roads, coming through the tower and tank at several places built inside the zone.The treatment system is composed of the following:

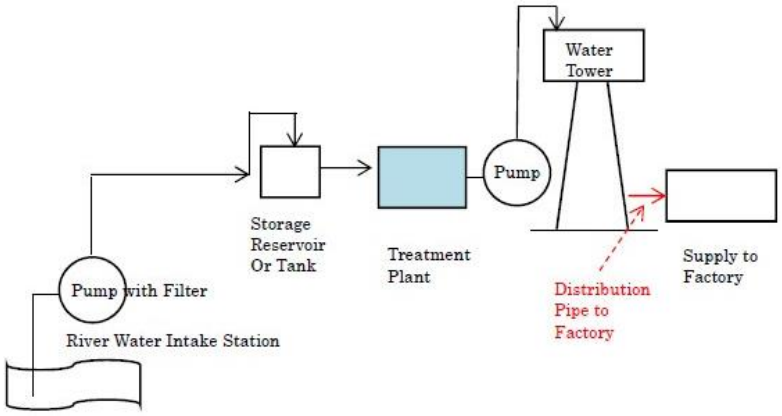
- river water intake
- Reservoir
- Treatment Plant
- Tank and Tower
- Distribution Pipe Network

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 main water supply pipe will be from 150 mm. –350 mm. and water supply pressure is in the range of 1.0 – 3.0 bars. Main water supply pipe will be of high density polyethylene (HDPE) if available, to avoid corrosion as well as breaking in the future.

Basic Concept Drawing of Water Supply System:

The basic water supply system is shown in the following figures.

Figure 98: Water Supply Distribution Network



7.3.5 Drainage

The rain discharging flow has been designed using the engineering analysis. As a first step, rain fallen on the ground and factory roofs are expected to flow into the u- channel along the road. Next, the rainwater flows into the ditch along the dike. Finally, the rainwater will flow into the retention pond and flows out to the sea. The flow system of the u-channel drain is shown in the figures.

7.3.6 Fire Protection System

For the fire protection system, besides a fire station and a fire truck, fire hydrants will be provided along the project roads at intervals of 200 meters or according to the local standard to supply water in case of fire protection need.

7.3.7 Data connectivity

A robust infrastructure for high-speed internet connectivity is essential for ensuring the sustainable operation of the Economic Zone. On top of that, it is imperative to have connectivity from multiple operators to maintain high uptime and seamless service levels to the tenants. An operator with sufficient capability may provide network connectivity inside the Economic Zone and maintain clientele among tenants independently.

7.3.8 Industrial Effluent Treatment System

The industrial effluents will be collected from the industries through an effluent pipe network and will be treated in the CETP. The industries will be responsible to do preliminary treatment for their industrial effluent. Maximum value for some critical wastewater parameters that can be discharged to the central effluent treatment plant will be set up to prevent overloading of the treatment operation.

Industrial effluent will be collected and transported via a network of drains to the effluent treatment plant. Effluent treatment involves following stages:

a) Pre-treatment

Pre-treatment stage is the first stage of effluent treatment process of CETP, where materials that can be easily collected from the raw wastewater before they damage or clog the machineries will be removed:

- *Screening*: In screening, large objects or floating solids will be removed from the influent water. This will be done with a bar screen which are cleaned manually. The solids will be collected and later disposed in a landfill or incinerated.
- *Grit removal*: In grit removal, pre treatment may include a sand or grit channel or chamber where the velocity of the incoming wastewater will be carefully controlled to allow sand, grit and stones to settle.

b) Primary treatment

In this stage, the effluent will be converted to a homogeneous liquid capable of being treated biologically. The effluent will be taken to equalization tank through a lift pump for chemical dosing. The chemical dosing is usually done by using alum, ferric chloride, calcium hydroxide or sodium hydroxide. Then the effluent is taken to mixing tank. The pH of the effluent will be corrected here.

c) Secondary treatment

The secondary treatment will be done to degrade the biological contents of the effluent. Through aeration secondary treatment will be done. The purpose of secondary treatment is to reduce the organic compounds of the effluent through bacteria formation and help in coagulation of the compounds to create removable solids.

- *Activated Sludge*: This process will be used for aeration. Activated sludge plants encompass a variety of mechanisms and processes that use dissolved oxygen to promote the growth of biological floc that substantially removes organic material.

  The final step in the secondary treatment stage is to remove the biological flocs or filter material and produce effluent containing very low levels of organic material. In this purpose, the effluent will be passed to clarifier through lift pump. Later on, it will be passed through bio-filter.

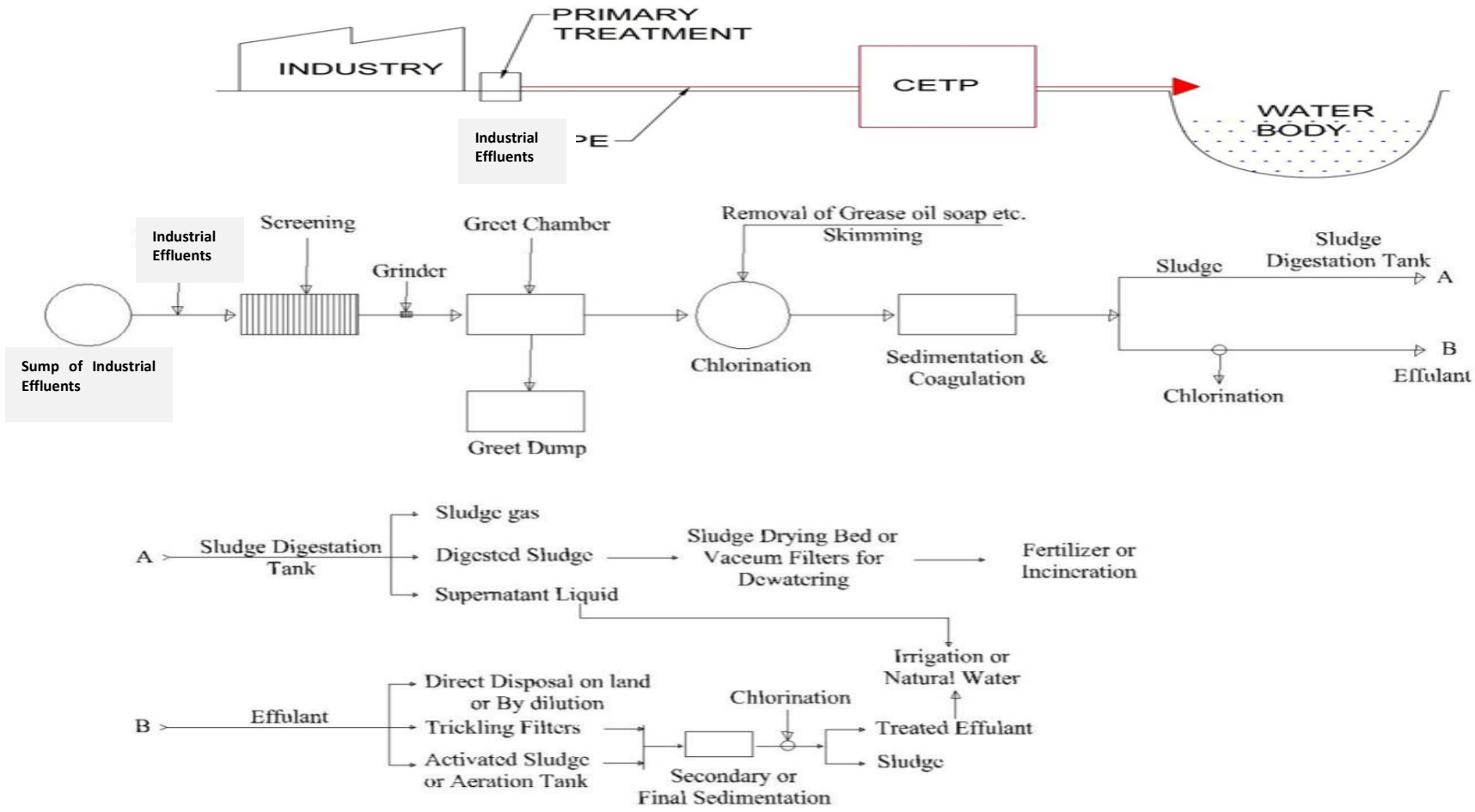
- *Bio-filter:* Bio-filter includes a reactor filled with a filter media. The media either is in suspension or supported by a gravel layer at the foot of the filter. The dual purpose of this media is to support highly active biomass that is attached to it and to filter suspended solids. Then the final treated effluent will be passed through final outlet.

d) Sludge disposal

When a liquid sludge is produced, further treatment may be required to make it suitable for final disposal. Typically, sludge is thickened (dewatered) to reduce the volumes for disposal. Near the settling tank, there is a sludge drying bed. By dewatering the sludge, sludge cake will be produced. The sludge cake will be used to make clay bricks.

The following figure shows the sketch for effluent treatment system.

Figure 99: Effluent Treatment System



Mirsarai 2A: total volume of industrial effluent 85,000 m3/Day
Mirsarai 2B: total volume of industrial effluent 23,000 m3/Day

Table 24: Recommended First and Second Level Standard for the economic zone

.	Parameters	Unit	First Level Standards for the Industries	Standards for CETP
1	Temperature	^0C	<45	40
2	pH		10	8-Jun
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	<1,200	<1,000
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
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

7.3.9 Domestic Waste Treatment

The individual industrial units will carry out their own domestic waste treatment through small treatment facilities on their own.

7.3.10 Solid Waste Treatment and Management[112]

The management of waste is a key component in a business' ability to maintaining ISO14001 accreditation. Companies are encouraged to improve their environmental efficiencies each year by eliminating waste through resource recovery practices, which are sustainability-related activities. One way to do this is by shifting away from waste management to resource recovery practices like recycling materials such as glass, food scraps, paper and cardboard, plastic bottles and metal.

Resource recovery is the systematic diversion of waste, which was intended for disposal, for a specific next use. It is the processing of recyclables to extract or recover materials and resources, or convert to energy. These activities are performed at a resource recovery facility. Resource recovery is not only environmentally important, but it is also cost effective. It decreases the amount of waste for disposal, saves space in landfills, and conserves natural resources.

[112] Adapted from Wikipedia

Resource recovery (as opposed to waste management) uses LCA (life cycle analysis) attempts to offer alternatives to waste management. For mixed organic solid waste a number of broad studies have indicated that administration, source separation and collection followed by reuse and recycling of the non-organic fraction via anaerobic digestion is preferred.

Recycling is a resource recovery practice that refers to the collection and reuse of waste materials such as copper and steel used in light engineering, automobile parts manufacturing and ship building, old steel furnishings or equipment, rubber tyres, polyethylene and PET bottles, glass bottles and jars, paperboard cartons, and corrugated fibre board boxes.

The materials can be reprocessed into new products. The industrial solid waste materials may be collected separately from general waste collection points using collection vehicles, a procedure called kerbside collection. Apart from industrial solid waste, the most common consumer solid waste products recycled include aluminium such as beverages cans. PVC, LDPE, PP, and PS (see resin identification code) are also recyclable. These items are usually composed of a single type of material, making them relatively easy to recycle into new products. The recycling of complex products (such as industrial solid waste) is more difficult, due to the additional dismantling and separation required.

7.3.11 Administration/One-stop Service Building and Other Supporting Buildings

The administrative/One-Stop Service Building shall be built at the right side of the entrance with two storied building having 4,000 m2 (2000 m2 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

Supporting buildings: Fire Station, Clinics and Police Station

In order to support the investors, in their measures to protect the workforce from fire, to prevent accidents and to provide healthcare, a fire station, a small clinic and a police station shall be constructed near the controlling building. All of these supporting buildings are one floor with the total area of 500 m².

The cost for inner facilities of fire station, clinic and police station is not included. These facilities will be arranged when operation begins.

8 Environmental Footprint

8.1 Baseline Environment

Mirsarai economic zone is proposed to be located in Mirsarai upazilla of Chittagong district, Bangladesh near Abu Torab village. As of now, there is no infrastructure development including power, drainage, electrical, water, sewage and telecom line and buildings at the proposed site. The site is flat low land classified as Char/wet land as per records. The land belonged to government and has now been transferred to BEZA.

8.1.1 Topography

The topography varies in altitude from the Lalmai Hills (30 metre MSL) and the base of the Tripura Hills (7–8 metre MSL) to the bank of the Meghna (1–2 metre MSL). The floodplain varies in between 1 to 5 metre MSL. Tidal effects along the coast are generally up to 2 m above mean sea level on the floodplain and are generally masked by the depth of river flooding. This region occupies the northern edge of the young Meghna Estuarine Floodplain. It comprises smooth, almost level, floodplain ridges and shallow basins.

8.1.2 Hydrography

Bangladesh has about 24,000 Km of rivers, streams and canals that together cover about 7 percent of the country's surface. Most parts of the country are linked by a complex network of waterways which reaches its 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.

Feni river originates in the eastern hills of Tripura and enters Bangladesh at Belchhari of Matiranga upazilla of Khagrachhari District. It flows through Ramgarh (Khagrachhari), Fatikchhari (Chittagong) and then flows along the border of Chittagong (Mirsarai upazilla) and Feni (Chhagalnaiya, Feni, Sonagazi upazillas) districts, before discharging into the Bay of Bengal near Sonagazi. The length of the river is 108 Km.

The principal tributary of the Feni river is the Muhuri river, which drains the Feni plain. Lemua canal is also a tributary to this river.

8.1.2.1 Past Maximum Water Surface Level

During the monsoon, the mean and maximum ranges of the tide in the Feni estuary have been given in the following table. The seasonal mean high water level of the Feni river near the Feni regulator[113] is also shown in following table**.** From this table it has been found that the average mean high water level during pre-monsoon, monsoon, post-monsoon and the dry period are 13.21, 15.05, 13.75 and 12.82m respectively. Analysis of the daily mean high water level of Feni river downstream of the Feni regulator[114] shows that the monsoon high water level exceeds 4.50 m (PWD-Public Works Department) elevation few times a year (PWD= SOB + 0.46).

[113] for the period 2010-2016
[114] from 2010 to 2016

Table 25: Mean High Water Level of Feni river at Ramgarh Station

Year	Mean Water Level in Meters			
	Pre Monsoon (March- May)	Monsoon (June- Sept.)	Post-Monsoon (Oct.-Nov.)	Dry Period (Dec- Feb)
2010	13.57	14.84	13.74	12.75
2011	13.46	14.61	13.07	12.59
2012	12.98	14.48	13.21	12.62
2013	12.94	14.42	14.31	12.86
2014	13.27	15.67	13.52	13.16
2015	12.84	16.27	14.66	12.78
2016	13.38	-	-	12.99
Mean	**13.21**	**15.05**	**13.75**	**12.82**

According to the web data from the Flood Forecasting & Warning Centre, the Bangladesh Water Development Board (BWDB), the past maximum water surface level is +17.49 m in Ramgarh. This point is 50 Km upstream of the site. In Parshuram (80 Km upstream of EZ) the Muhuri river had a past highest water level of +13.0 m. These figures are critical for designing the flood protection system. Following table describes the average mean high water level during pre-monsoon, monsoon, post-monsoon and the dry period are 9.79, 12.37, 10.28, 8.84m respectively.

Table 26: Mean High Water Level of Muhuri river at Parshuram Station

Year	Mean Water Level in Meters			
	Pre Monsoon (March- May)	Monsoon (June- Sept.)	Post-Monsoon (Oct.-Nov.)	Dry Period (Dec- Feb)
2010	10.05	11.21	11.44	9.39
2011	9.47	12.34	9.63	8.71
2012	9.24	11.80	10.8	8.66
2013	9.97	12.32	10.19	8.83
2014	9.53	13.08	9.47	8.85
2015	9.57	13.48	10.14	8.61
2016	10.71	-	-	8.86
Mean	**9.79**	**12.37**	**10.28**	**8.84**

8.1.2.2 Sedimentation Volume

The Muhuri and Feni river of Muhuri Irrigation Scheme carry a heavy concentration of silt loads, on the order of 2 million tons per year. However, due to the construction of the closure dam and Feni regulator, a major portion of this sediment is now trapped in the reservoir. Only a small quantity is carried by the discharge through the Feni regulator. Therefore, the contribution of upland sediment discharge downstream of the closure dam is very small. The major source of sediment in the Feni estuary is silt carried by the seawater. It is found that the concentration towards the regulator site is gradually reduced and average sediment concentration near the regulator site during high water flow is about400 mg/l. At the outfall of the estuary, a higher value of sediment concentration is observed.

8.1.2.3 Sea Condition

Bangladesh has about 9,000 sq. nautical miles of territorial waters and 20,000 sq. nautical mile in the sea. The bottom topography of the coastal waters in Bangladesh is very shallow having several detached shoals

with shifting sand banks. Therefore, navigation by the ocean-going ships in these waters is hazardous and demands regular hydrographic surveys and studies.

- General

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

Table 27: Mean Sea Level Measured by JICA

Year	Total Heights	Numbers of Values	Mean
1993	20,813.33	5,832	3.569
1994	26,944.64	7,866	3.425
Total	**47,757.97**	**13,698**	**3.497(Average)**

JICA's computed MSL value in the mouth of the Karnaphuli river differs about 1 (one) meter from the BIWTA's computed MSL value at Sadarghat, Chittagong. The tidal levels in different stations are found to be different as measured.

8.1.2.4 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 mile/h) which caused the highest storm surge in the area with 6 meters (20 ft.) height. The death toll was 138,000 with approximately 40,000 in Anwara and Banshkhali area. The storm caused an estimated damage of $1.5 billion. The high velocity wind and the storm surge devastated the coastline. The extensive damage caused a huge increase in the price of building materials. However, the land level in Mirsarai region is quite high because it is located very close to the hilly areas of Sitakunda. That is why the damage here was not as much as the damage in the Anwara area. Going through the collected data on tide levels of different years in the coastal areas of Bangladesh, it was found that the tidal height was about 3.5 meter in average. On normal occasions, the tidal height varies from 3-4.5 meters. The highest surge height was found during the 1991 cyclone, about six meters. Therefore, the formation level for the site at Mirsarai will be eight and the height of the dike should be 10 meters predicting the highest projected tidal surge of 8 meters. This dike can be a traditional dike without much heavy protection.

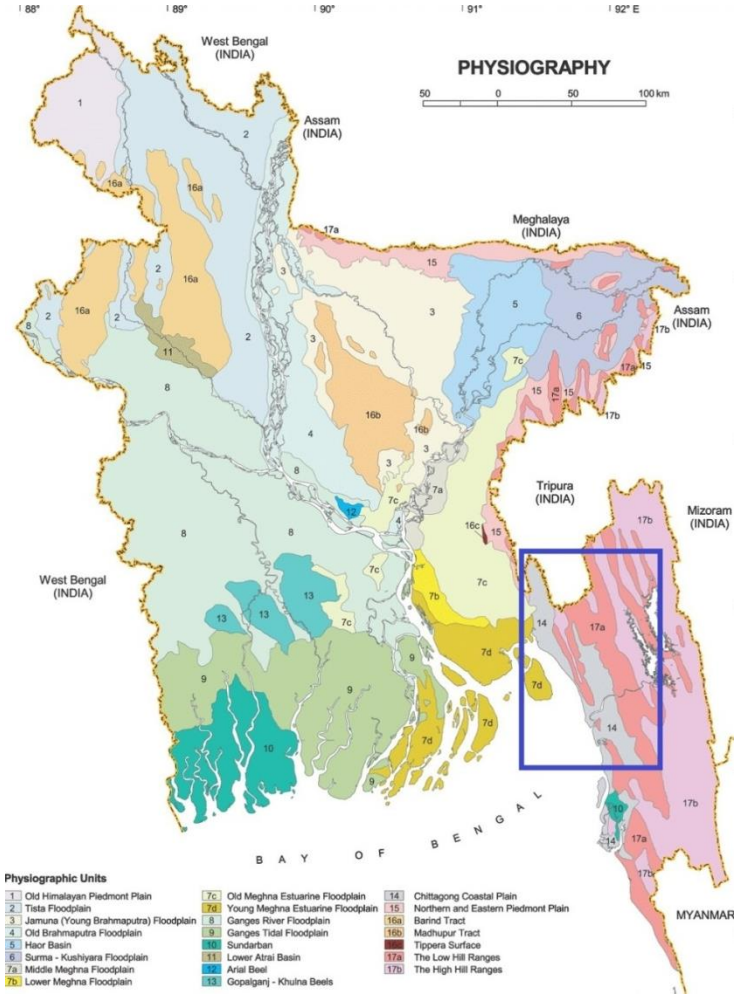
8.1.2.5 Dredging

No dredging points were identified. It will require further study.

8.1.3 Physiography

Mirsarai upazilla is approximately 60 km from the Chittagong city. Mirsarai upazilla of Chittagong District has an area of 482.88 km^2, is bounded by Tripura State of India, Chhagalnaiya and Feni Sadar Upazilas on the north, Sitakunda and Sandwip Upazilas on the south, Fatikchhari upazilla on the east, Sonagazi and Companyganj (Noakhali) Upazilas on the west. The main river is Feni; Sandwip Channel is notable for enhancing transportation with the western districts. There are 30 canals, most noted of which are Ichhakhali, Mahamaya, Domkhali, Hinguli, Koila Govania and Mayani khal. The hills range on the northern and eastern side of this upazilla along the bank of the Feni river extended up to Chittagong and the Chittagong Hill Tracts. Cyclonic surges in the 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.

Figure 100: Physiography of Mirsarai 2 economic zone



Soil

The hill soils (dystric cambisols) are mainly yellowish brown to reddish brown loams which grade into broken shale or sandstone as well as mottled sand at a variable depth. The soils is very strongly acidic. Soil erosion is one of the challenging problems in Upland Watershed. Clearance of forests in Himalayan Watershed, in the hill of Tripura, Meghalaya and Chittagong Hill tracts, are making the existing condition of the degraded area more intensive.

The soils of Mirsarai 2 economic zone are sandy loam to clay loamy soils in some areas. Most of the farmlands are on sandy loams with some black cotton soils in the low lands. Black cotton soils characteristically host Acacia wood plant. Soils change to more sandy and gravel texture all the way to the foot of the escarpment. Likewise, the soil patches of sandy soil can be seen between Mirsarai 2 economic zone and Muhuri flood plain. Silt loam soils predominate on the higher lands and silt clay to clay in lowlands. Non-calcareous Dark Grey Floodplain soils are the only general soil type of the area. 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 meters (m) above sea level.

Geology

The surface geology of Chittagong and Chittagong hill tract districts includes Valley Alluvium and Colluviums, Beach and Dune Sand, Dihing and Dupitila Formation, Girujan Clay Formation and Tipam sandstone Formation, BokaBil and Bhuban Formation. 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 geology of the project area can generally be classified as sedimentary with metamorphic rocks such as limestone including travertine. These occur as either of the following: quartzite, graphitic schist, chlorite, amphibone, mica and kyalite schist, hornblende, bitite and garnet, gneiss, acid gneiss, granulate, or charnokite.

Water Quality

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 generally muddy and saline in nature. The depth of the water table varies from a few meters to 20 meters. The proposed project is surrounded by a riparian environment, falling under the estuarine and coastal areas, with rivers rising and falling under the natural system of high and low tides. There are small and medium ponds, which are used for multiple purposes. Ground and river water are both saline. People usually boil pond water and harvested rain water for drinking purposes. There is a scarcity of drinking water in the dry season consequently people suffer from lack of potable water as pond water level declines.

Ground Water

Sample from one ground water point was collected on 16th July 2016 to analyze Arsenic, Chloride, Hardness, Iron & Sulphate. The analyses of the parameters have been done in DPHE Central Laboratory, Dhaka and results dated 24th July 2016 has been placed in the report.

The sampling point is listed in the table below:

Table 28: Ground Water Quality Monitoring Point and Location

Identity No.	Location	GPS Location
ID # 1	Mirsarai 2 Economic Zone	22^0 45.936 N & 091^0 27.781E

Analysis Results

Table 29: Ground Water Quality Analysis Report

Sl. No.	Parameter	World Health Organization (Drinking Water)	Bangladesh Standard (Drinking Water)	ID # 1
1	Arsenic	0.01 mg/L	0.05 mg/L	0.002
2	Chloride	250 mg/L	150-600 mg/L	16
3	Hardness	-	200-500 mg/L	53
4	Iron	0.3 mg/L	0.3-1.0 mg/L	0.69
5	Sulphate	-	400 mg/l	3.1

Result Summary

The analysis result of the ground water listed in the **Table 6.2.1.5B** shows that all the parameters are within the standard limit. Therefore, it can be concluded that the ground water is not creating any harm to the environment in terms of water quality.

Surface Water

Sample from two surface water points were collected on 16th July 2016 to analyze BOD_5, DO, EC, pH, Salinity, TDS & TSS. The analyses of the parameters have been done in DPHE Central Laboratory, Dhaka and results dated 24th July 2016 has been placed in the report.

The sampling points are listed in the table below.

Table 30: Surface Water Quality Monitoring Point and Location

Identity No.	Location	GPS Location
ID # 1	Ishakhali Channel Point	22^0 45.087 N & 091^0 27.548E
ID # 2	Bumonsundor Channel Point	22^0 43.976 N & 091^0 30.286E

Analysis Results

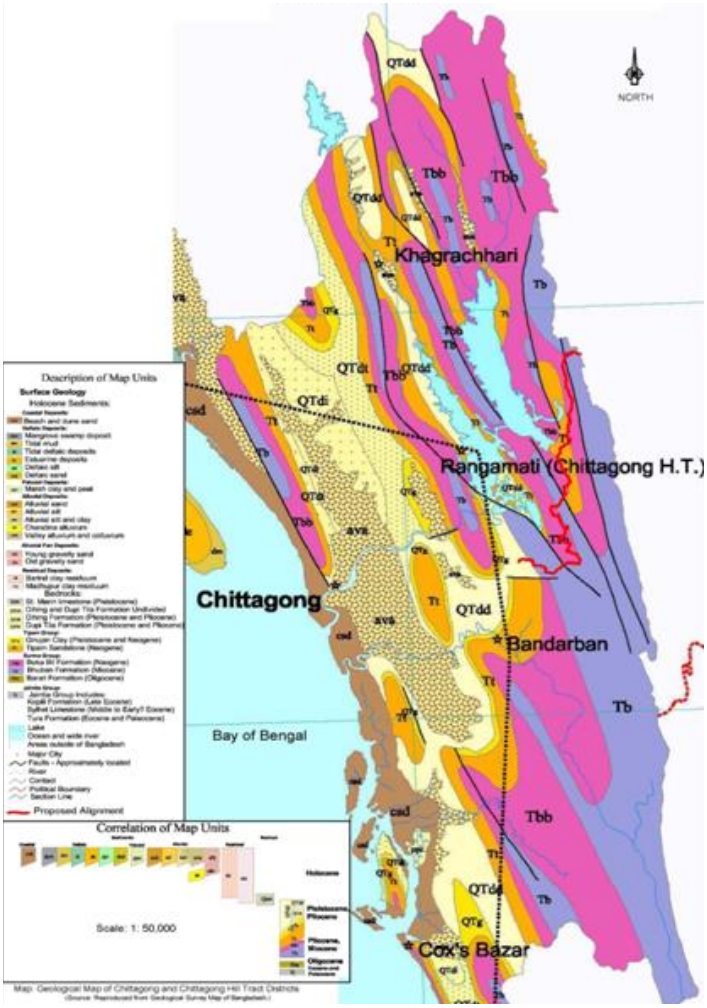
Table 31: Surface Water Quality Analysis Report

Sl. No.	Parameter	World Bank (Surface Water)	Bangladesh Standard (Surface Water)	Point-1	Point -2
1	BOD_5	50 mg/L	50 mg/L	3	23
2	DO	5 mg/L	4.5-8 mg/L	6.42	5.45
3	EC	-	1200	616	11210
4	pH	6-9	6-9	7.7	8.2
5	Salinity	-	%	0.34	6.63
6	TDS	1000 mg/L	2100 mg/L	296	5381
7	TSS	50 mg/L	150mg/L	117	12

Result Summary

The analysis result of the surface water listed in the above table shows that all the parameters are within the standard limit except one point of EC & TDS. There is no standard for Salinity.

Figure 101: Geological survey map of Chittagong and Chittagong Hill Tracts



Ambient air quality

Air quality in the vicinity of the project area is likely to be adversely affected, though temporarily, due to dust and exhaust gases generated by earth moving machinery and transport vehicles. Also other operations like excavation, dredging, trenching and back filling etc. would cause dust to be blown around. The main sources of emission will be due to the transportation, movement and operation of construction equipment at site and fugitive dusts from handling of cement, sand and stone chips, etc. During operational phase of the project, the visiting vehicles would cause emissions of SPM, SO_2 and NO_x thereby affecting air quality.

Table 32: WHO Air Quality Guidelines and Interim Targets for Particulate matter: 24-hour Concentrations

	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	Basis for the Selected Level
Interim target-1 (IT-1)	150	75	Based on published risk coefficients from multi-centre studies and meta-analyses (about 5% increase of short term mortality over the AQG value).
Interim target-2 (IT-2)	100	50	Based on published risk coefficients from multi-centre studies and meta-analyses (about 2.5% increase of short term mortality over the AQG value).
Interim target-3 (IT-3)	75	37.5	Based on published risk coefficients from multi-centre studies and meta-analyses (about 1.2% increase in short-term mortality over the AQG value).
Air quality guideline (AQG)	50	25	Based on relationship between 24-hour and annual PM levels.

Air Pollution

One representative sample of air was collected on 16th July 2016 to analyze PM10, PM2.5, SO2, NOx & CO. The analyses of the parameters have been done in Atomic Energy Centre Laboratory, Dhaka and results dated 19th July 2016 have been placed in the report. The Ambient Air standards in Bangladesh as per Department of Environment suggest standards for different categories of areas:

Density in microgram per cusec meter (cubic meter)

Table 33: Standard for Ambient Air

Sl. No.	Categories of area	Suspended Particulate Maters (SPM)	Sulphur di oxide	Carbon Monoxide	Oxides of Nitrogen
A	Industrial and Mixed	500	120	5000	100
B	Commercial and Mixed	400	100	5000	100
C	Residential and rural	200	80	2000	80
D	Sensitive	100	30	1000	30

According to the location of the most part would fall under 'A' category, which is 'Industrial and Mixed area". No data should exceed the Bangladesh regulatory limit.

Notes:

1. At national level, sensitive area includes monuments, health cancer, hospital, archeological site, educational institute, and government designated areas (if any).

2. Industrial units located in areas not designated as industrial areas shall not discharge pollutants which may contribute to exceeding the standard for air surrounding the area specified at sl. Nos. c and d above.

3. Suspended Particulate Matter means air borne particles of a diameter of 10 micron or less.

The sampling points are listed in the table below.

Table 34: Air Monitoring Point and Location

Identity No.	Location	GPS Location
ID # 1	Mirsarai 2 Economic Zone	22^0 45.704 N & 091^0 28.243E

Analysis Results

Table 35: AIR Monitoring Report

Sl. No.	Parameter for Analysis	World Bank Standard (Industrial and Mixed Area)	Bangladesh Standard (Industrial and Mixed Area)	Point -1
1	PM_{10}	50 Microgram per cubic meter	150 microgram per cubic meter	38.3
2	$PM_{2.5}$	25 Microgram per cubic meter	65 microgram per cubic meter	32.3
3	SO_2	125 Microgram per cubic meter	365 microgram per cubic meter	35
4	NOx	200 Microgram per cubic meter	100 microgram per cubic meter	59
5	CO	-	40 milligram per cubic meter	<0.3

Result Summary

The analysis results fully comply with the DoE standards. Therefore, it can be concluded that the air is not creating any harm to the environment in terms of air quality.

Climate

The climate of project area is tropical in Chittagong. Chittagong has a tropical monsoonal climate (Köppen-Geiger classification: Am) with a dry season and a heavy monsoon the rest of year, no cold season. According to the Holdridge life zones system of bioclimatic classification Chittagong is situated in or near the tropical moist forest biome. The average temperature is 25.1 degrees Celsius (77.2 degrees Fahrenheit). Humidity in the Chittagong varies from 40% in day time of February month to 90% in month of July & August. Rainy season is very prominent in this region like other coastal areas of the country. June July and August are month of highest rainfall in the area. Average yearly rainfall of the area is 3215 mm. Average annual rainfall of the Mirsarai region is 2540 mm. As per BMD, windiest month is May with average wind speed of 4 m/s and least windy month is October with average wind speed of 2m/s. Site is wetland area. As per inundation risk map, inundation depth varies from 5 m to 6 m.

Area is highly prone to cyclone and has faced severe cyclones in past. Surface water system of the study area comprise of Feni river, Isakhali Canal & Bamonsundar Canal. Flow in Feni river varies from 20.5 m^3 in February to 164.3 m^3 in August. Water level of the river varies from 3.47 m to 4.146 m. Water of Feni river is fresh in upstreams and saline in downstreams. Salinity in downstreams varies with season. Maximum salinity recorded in the river is 21.2 ppt. Ground water in Shallow aquifers in Mirsarai region is also saline. Fresh ground water is available at depth of 700-900 ft.

8.1.4 Meteorological Status

The weather of Chittagong is characterized by tropical monsoon climate. The dry and cool season is from November to March; pre-monsoon season is from April to May which is very hot. The sunny and the monsoon season is from June to October, which is warm, cloudy and wet. Chittagong suffered its deadliest cyclone in 1991; it killed 138,000 people and left as many as 10 million homeless.

Table 36: Climate data for Chittagong

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	31.7 (89.1)	33.9 (93)	37.2 (99)	38.9 (102)	36.7 (98.1)	36.7 (98.1)	34.4 (93.9)	33.9 (93)	35.0 (95)	34.4 (93.9)	34.9 (94.8)	31.1 (88)	38.9 (102)
Average high °C (°F)	26.0 (78.8)	28.0 (82.4)	30.6 (87.1)	31.8 (89.2)	32.3 (90.1)	31.5 (88.7)	30.9 (87.6)	31.1 (88)	31.6 (88.9)	31.5 (88.7)	29.8 (85.6)	27.0 (80.6)	30.2 (86.4)
Daily mean °C (°F)	20.0 (68)	22.1 (71.8)	25.5 (77.9)	27.6 (81.7)	28.5 (83.3)	28.4 (83.1)	28.0 (82.4)	28.1 (82.6)	28.3 (82.9)	27.8 (82)	25.1 (77.2)	21.3 (70.3)	25.9 (78.6)
Average low °C (°F)	13.9 (57)	16.2 (61.2)	20.3 (68.5)	23.4 (74.1)	24.7 (76.5)	25.2 (77.4)	25.1 (77.2)	25.1 (77.2)	25.1 (77.2)	24.0 (75.2)	20.3 (68.5)	15.6 (60.1)	21.6 (70.9)
Record low °C (°F)	5.2 (41.4)	6.6 (43.9)	10.2 (50.4)	13.6 (56.5)	14.3 (57.7)	18.1 (64.6)	19.4 (66.9)	19.9 (67.8)	17.2 (63)	12.7 (54.9)	10.0 (50)	7.5 (45.5)	5.2 (41.4)
Average **precipitation** mm (inches)	5.6 (0.22)	24.4 (0.961)	54.7 (2.154)	147.4 (5.803)	298.6 (11.756)	607.3 (23.909)	727.0 (28.622)	530.6 (20.89)	259.3 (10.209)	184.8 (7.276)	67.5 (2.657)	11.9 (0.469)	2,919.1 (114.925)
Average precipitation days	1	2	4	8	13	16	19	17	13	7	3	1	104
Average **relative humidity** (%)	73	70	74	77	79	83	85	85	83	81	78	75	79
Mean monthly **sunshine hours**	264.1	244.3	276.4	242.7	227.2	116.7	105.1	124.4	166.7	218.2	241.3	245.5	2,472.6

Source: Bangladesh Meteorological Department

Climate

The weather of Chittagong is characterized by tropical monsoon climate. The dry and cool season is from November to March; pre-monsoon season is from April to May that is very hot. The sunny and the monsoon season are from June to October, which is warm, cloudy and wet. Chittagong suffered its deadliest cyclone in 1991; 138,000 people died and as many as 10 million people became homeless. Following table shows the Climate data for Chittagong.

Table 37: Climate data for Chittagong

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	31.7 (89.1)	33.9 (93)	37.2 (99)	38.9 (102)	36.7 (98.1)	36.7 (98.1)	34.4 (93.9)	33.9 (93)	35.0 (95)	34.4 (93.9)	34.9 (94.8)	31.1 (88)	38.9 (102)
Average high °C (°F)	26.0 (78.8)	28.0 (82.4)	30.6 (87.1)	31.8 (89.2)	32.3 (90.1)	31.5 (88.7)	30.9 (87.6)	31.1 (88)	31.6 (88.9)	31.5 (88.7)	29.8 (85.6)	27.0 (80.6)	30.2 (86.4)
Daily mean °C (°F)	20.0 (68)	22.1 (71.8)	25.5 (77.9)	27.6 (81.7)	28.5 (83.3)	28.4 (83.1)	28.0 (82.4)	28.1 (82.6)	28.3 (82.9)	27.8 (82)	25.1 (77.2)	21.3 (70.3)	25.9 (78.6)
Average low °C (°F)	13.9 (57)	16.2 (61.2)	20.3 (68.5)	23.4 (74.1)	24.7 (76.5)	25.2 (77.4)	25.1 (77.2)	25.1 (77.2)	25.1 (77.2)	24.0 (75.2)	20.3 (68.5)	15.6 (60.1)	21.6 (70.9)
Record low °C (°F)	5.2 (41.4)	6.6 (43.9)	10.2 (50.4)	13.6 (56.5)	14.3 (57.7)	18.1 (64.6)	19.4 (66.9)	19.9 (67.8)	17.2 (63)	12.7 (54.9)	10.0 (50)	7.5 (45.5)	5.2 (41.4)
Average precipitation mm (inches)	5.6 (0.22)	24.4 (0.96)	54.7 (2.15)	147.4 (5.80)	298.6 (11.75)	607.3 (23.90)	727.0 (28.62)	530.6 (20.9))	259.3 (10.20)	184.8 (7.27)	67.5 (2.65)	11.9 (0.46)	2,919.1 (114.92)
Average precipitation days	1	2	4	8	13	16	19	17	13	7	3	1	104
Average relative humidity (percent)	73	70	74	77	79	83	85	85	83	81	78	75	79
Mean monthly sunshine hours	264.1	244.3	276.4	242.7	227.2	116.7	105.1	124.4	166.7	218.2	241.3	245.5	2,472.6

Source: Bangladesh Meteorological Department, 2016

Rainfall

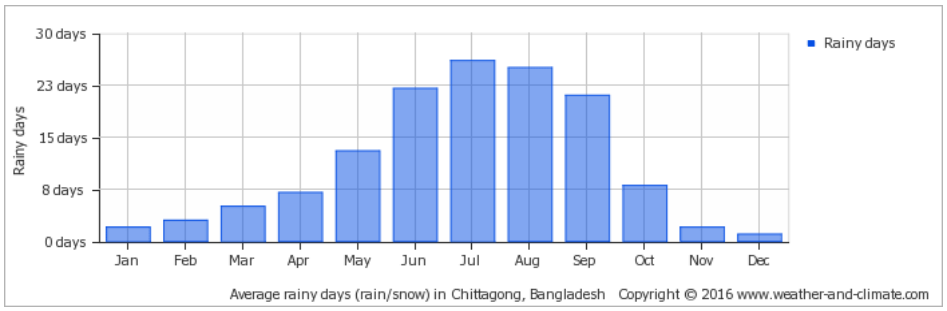
Rainfall Data are collected from BWDB. Rainfall data over a year is provided in Annex 5.

District	Station	Station_id	Year	Yr_rf_total (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chittagong	Mirsarai	CL320	2005	3672.00	0.00	0.00	129.00	253.00	296.00	563.00	813.00	1090.00	250.00	276.00	2.00	0.00
Chittagong	Mirsarai	CL320	2006	1789.00	0.00	0.00	0.00	76.00	517.00	364.00	365.00	93.00	338.00	33.00	3.00	0.00
Chittagong	Mirsarai	CL320	2007	3641.00	0.00	77.00	28.00	318.00	214.00	762.00	1200.00	516.00	489.00	0.00	37.00	0.00
Chittagong	Mirsarai	CL320	2008	3003.30	18.00	0.00	6.00	0.00	193.00	439.70	1056.60	819.00	293.00	178.00	0.00	0.00
Chittagong	Mirsarai	CL320	2009	3091.80	0.00	0.00	0.00	153.30	359.00	508.70	893.60	547.60	290.20	329.40	10.00	0.00
Chittagong	Mirsarai	CL320	2010	3700.10	0.00	0.00	16.60	69.00	377.60	1141.50	461.20	936.00	392.20	300.00	3.00	3.00
Chittagong	Mirsarai	CL320	2011	3816.02	0.00	7.00	75.00	21.00	377.00	757.62	622.80	1323.20	513.80	118.60	0.00	0.00
Chittagong	Mirsarai	CL320	2012	4146.00	0.00	3.00	0.00	461.80	351.30	842.40	1171.80	816.90	238.10	260.70	0.00	0.00
Chittagong	Mirsarai	CL320	2013	3602.40	0.00	0.00	4.00	32.40	715.60	532.40	439.40	769.60	773.00	336.00	0.00	0.00
Chittagong	Mirsarai	CL320	2014	3991.40	0.00	2.00	5.00	105.00	258.00	1101.00	672.00	857.40	991.00	0.00	0.00	0.00
Chittagong	Mirsarai	CL320	2015	5135.00	2.00	0.00	2.00	524.00	289.00	789.00	1616.00	677.00	604.00	632.00	0.00	0.00
Chittagong	Mirsarai	CL320	2016	1515.00	0.00	71.00	0.00	198.00	515.00	731.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: BWDB

- Most rainy days are in June, July, August and September.
- Chittagong has dry periods in January, November and December.
- On average, July is the rainiest.
- On average, December has the least rainy days.

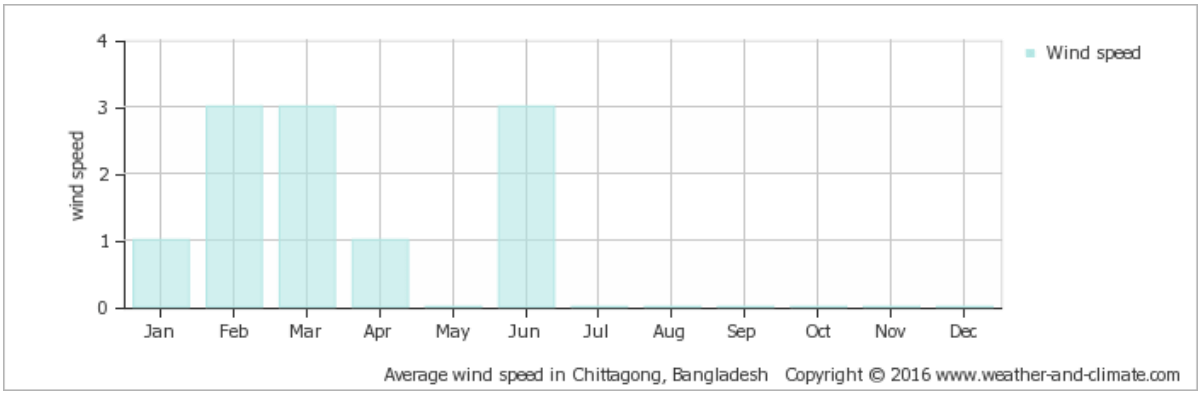
Figure 102: Average Monthly Rainy Days in Chittagong



Wind

- On average, the most wind is seen in March.
- On average, the least wind is seen in July.

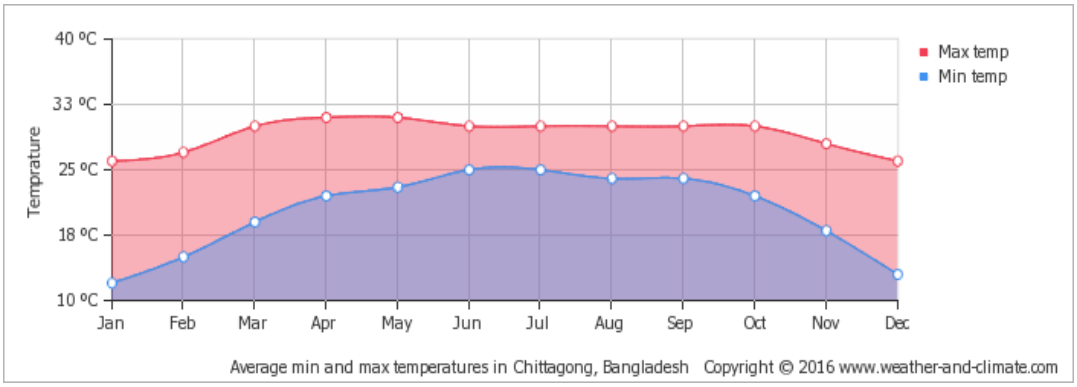
Figure 103: Average wind speed in Chittagong



Temperature

- On average, the temperatures are always high.
- On average, the warmest month is April.
- On average, the coolest month is January.

Figure 104: Average minimum and maximum temperature over the year

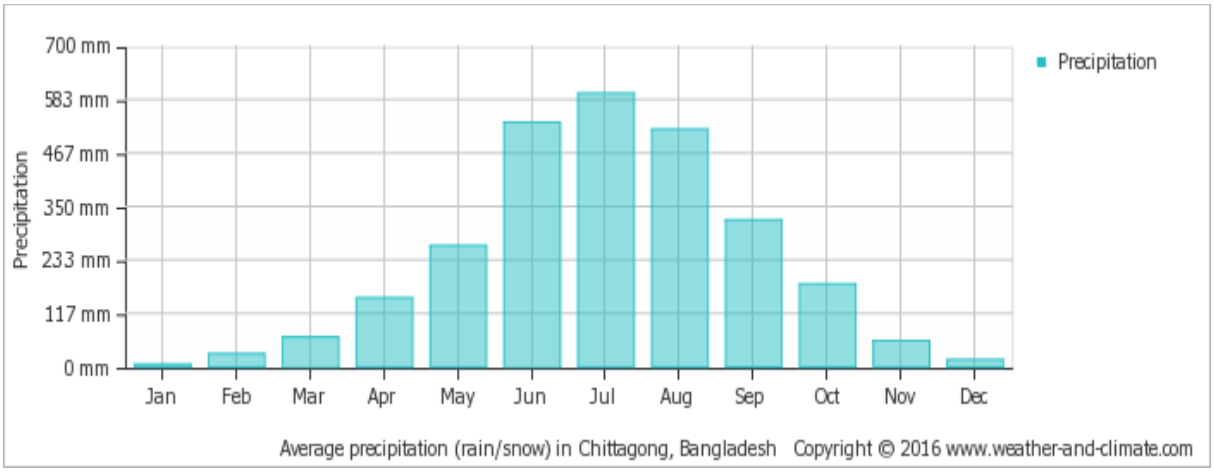


Precipitation

- A lot of rain (rainy season) falls in the months: April, May, June, July, August, September and October.
- Chittagong has dry periods in January and December.
- On average, July is the wettest month.

- On average, January is the driest month.

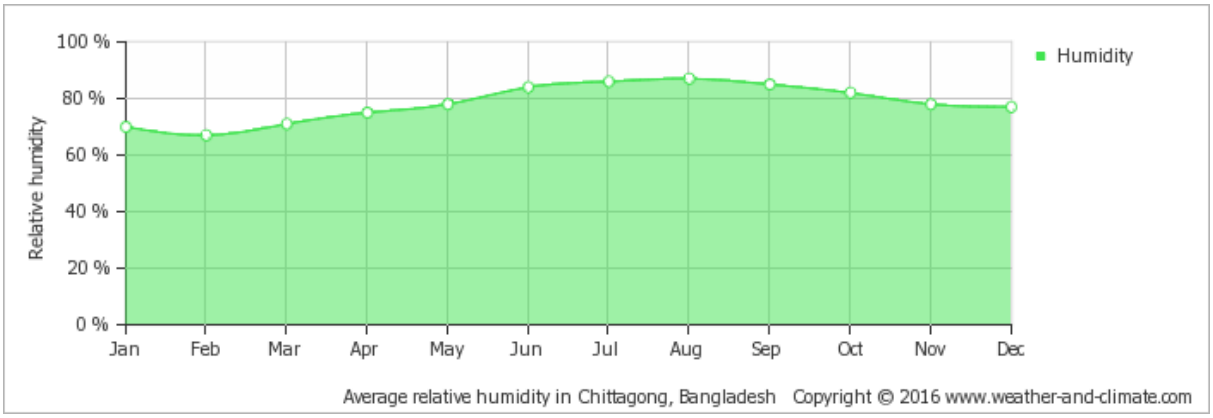
Figure 105: Average monthly snow and rainfall in Chittagong (millimeter)



Humidity

- On average, August is the most humid.
- On average, February is the least humid month.

Figure 106: Average humidity in Chittagong



8.1.5 Flooding and Tidal Effect

According to primary survey, the project area is affected in tide and heavy rainfall. Sometimes high tide causes water stagnation. Drainage is good; as water drains out quickly through canal lines with insignificant water logging problem. In many parts along the coast of this region brackish/saline water of marine origin renders the groundwater unsuitable for irrigation and potable water supply.

8.1.6 Air Pollution

One representative sample of air was collected on 16th July 2016 to analyze PM10, PM2.5, SO2, NOx & CO. The analyses of the parameters have been done in Atomic Energy Centre Laboratory, Dhaka and results dated 19th July 2016 have been placed in the report.

The ambient air standards in Bangladesh as per Department of Environment suggest standards for different categories of areas.

Density in microgram per cusec meter (cubic meter)

Table 38: Standard for Ambient Air

Sl. No.	Categories of area	Suspended Particulate Maters (SPM)	Sulphur di oxide	Carbon Monoxide	Oxides of Nitrogen
A	Industrial and Mixed	500	120	5000	100
B	Commercial and Mixed	400	100	5000	100
C	Residential and rural	200	80	2000	80
D	Sensitive	100	30	1000	30

According to the location of the most part would fall under 'A' category, which is 'Industrial and Mixed area". No data should exceed the Bangladesh regulatory limit.

Notes:

1. At national level, sensitive area includes monuments, health cancer, hospital, archaeological site, educational institute, and government designated areas (if any).
2. Industrial units located in areas not designated as industrial areas shall not discharge pollutants that may contribute to exceeding the standard for air surrounding the area specified at sl. Nos. c and d above.
3. Suspended Particulate Matter means air borne particles of a diameter of 10 micron or less.

The sampling points are listed in the table below.

Table 39: Air Monitoring Point and Location

Identity No.	Location	GPS Location
ID # 1	Mirsarai 2 Economic Zone	22^0 45.704 N & 091^0 28.243E

Analysis Results:

Table 40: AIR Monitoring Report

Sl. No.	Parameter for Analysis	World Bank Standard (Industrial and Mixed Area)	Bangladesh Standard (Industrial and Mixed Area)	Point -1
1	PM_{10}	50 Microgram per cubic meter	150 microgram per cubic meter	38.3
2	$PM_{2.5}$	25 Microgram per cubic meter	65 microgram per cubic meter	32.3
3	SO_2	125 Microgram per cubic meter	365 microgram per cubic meter	35
4	NOx	200 Microgram per cubic meter	100 microgram per cubic meter	59
5	CO	-	40 milligram per cubic meter	<0.3

Result Summary

The analysis results fully comply with the DoE standards. Therefore, it can be concluded that the air is not creating any harm to the environment in terms of air quality.

8.1.7 Water Environment

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 generally muddy and saline in nature. The depth of the water table varies from a few meters to 20 meters. The site is surrounded by a riparian environment, falling under the estuarine and coastal areas, with rivers rising and falling under the natural system of high and low tides. There are small and medium ponds, which are used for multiple purposes. Ground and river water are both saline. People usually boil pond water and harvested rainwater for drinking purposes. There is a scarcity of drinking water in the dry season consequently; people suffer from lack of potable water as pond water level declines.

Ground Water

Sample **from** one ground water point was collected on 16th July 2016 to analyze Arsenic, Chloride, Hardness, Iron & Sulphate. The analyses of the parameters have been done in DPHE Central Laboratory, Dhaka and results dated 24th July 2016 has been placed in the report. The sampling point is listed in the table below:

Table 41: Ground Water Quality Monitoring Point and Location

Identity No.	Location	GPS Location
ID # 1	Mirsarai 2 Economic Zone	22^0 45.936 N & 091^0 27.781E

Analysis Results:

Table 42: Ground Water Quality Analysis Report

Sl. No.	Parameter	World Health Organization (Drinking Water)	Bangladesh Standard (Drinking Water)	ID # 1
1	Arsenic	0.01 mg/L	0.05 mg/L	0.002
2	Chloride	250 mg/L	150-600 mg/L	16
3	Hardness	-	200-500 mg/L	53
4	Iron	0.3 mg/L	0.3-1.0 mg/L	0.69
5	Sulphate	-	400 mg/l	3.1

Result Summary

The analysis result of the ground water listed in the Table-2 shows that all the parameters are within the standard limit. Therefore, it can be concluded that the ground water is not creating any harm to the environment in terms of water quality.

Surface Water

Sample from two surface water points were collected on 16th July 2016 to analyze BOD_5, DO, EC, pH, Salinity, TDS & TSS. The analyses of the parameters have been done in DPHE Central Laboratory, Dhaka and results dated 24th July 2016 has been placed in the report.

The sampling points are listed in the table below.

Table 43: Surface Water Quality Monitoring Point and Location

Identity No.	Location	GPS Location
ID # 1	Ishakhali Channel Point	22^0 45.087 N & 091^0 27.548E
ID # 2	Bumonsundor Channel Point	22^0 43.976 N & 091^0 30.286E

Analysis Results

Table 44: Surface Water Quality Analysis Report

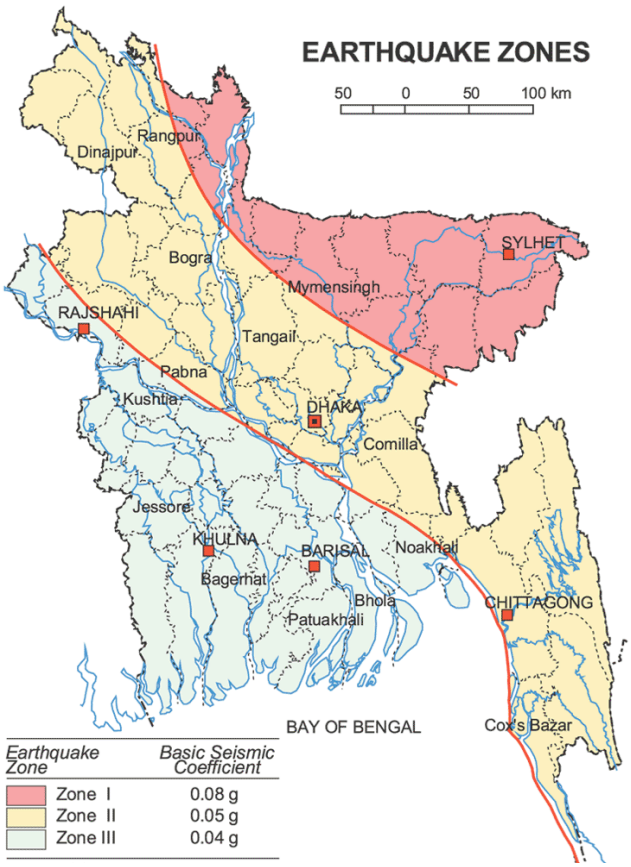
Sl. No.	Parameter	World Bank (Surface Water)	Bangladesh Standard (Surface Water)	Point-1	Point -2
1	BOD_5	50 mg/L	50 mg/L	3	23
2	DO	5 mg/L	4.5-8 mg/L	6.42	5.45
3	EC	-	1200	616	11210
4	pH	6-9	6-9	7.7	8.2
5	Salinity	-	%	0.34	6.63
6	TDS	1000 mg/L	2100 mg/L	296	5381
7	TSS	50 mg/L	150mg/L	117	12

Result Summary

The analysis result of the surface water listed in above table shows that all the parameters are within the standard limit except one point of EC & TDS. There is no standard for Salinity.

8.1.8 Seismicity

Bangladesh is located in a tectonically active region close to the plate boundaries of the north moving Indian plate and the Eurasian plate to its north and east. Bangladesh is extremely vulnerable to seismic activity. Accurate historical information on earthquakes is very important in evaluating the seismicity of Bangladesh, especially in combination with assessment of the geotectonic elements. Information on earthquakes in and around Bangladesh is available for the last 250 years. The earthquake record suggests that since 1900, more than 100 moderate to large earthquakes occurred in Bangladesh, out of which more than 65 events occurred after 1960. This brings to light an increased frequency of earthquakes in the last 30 years. This increase in earthquake activity is an indication of fresh tectonic activity or propagation of fractures from the adjacent seismic zones.



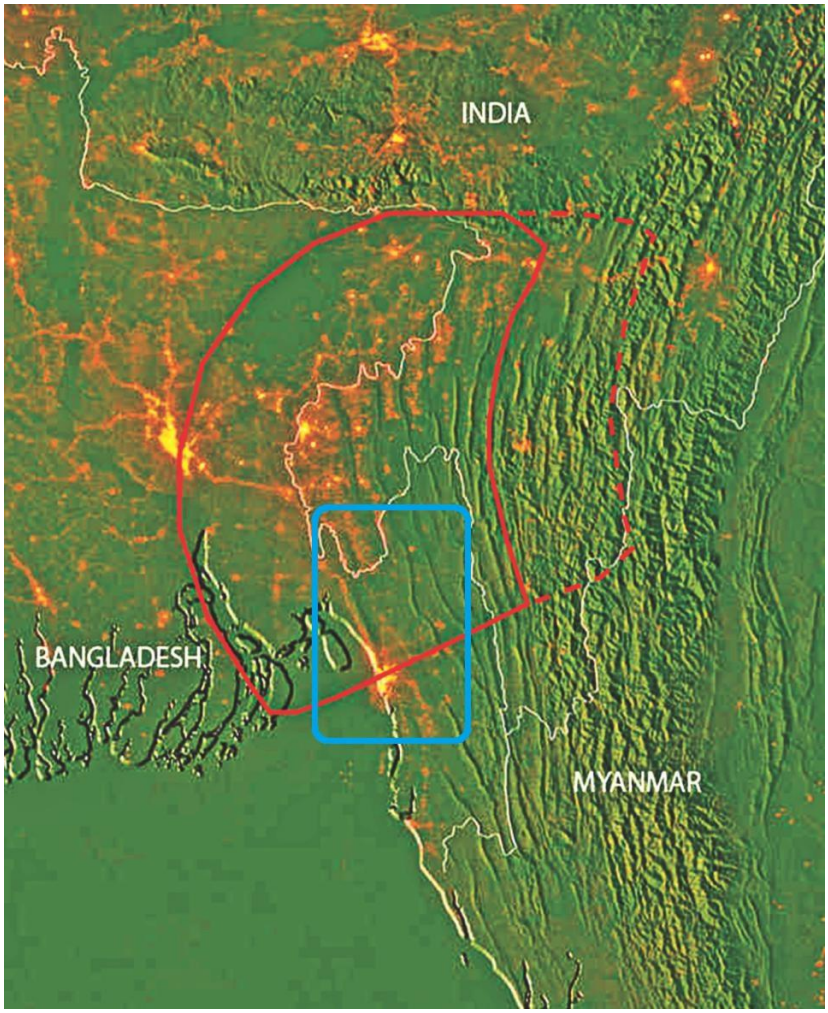
Although in the recent past Bangladesh has not been affected by any large earthquakes, the evidence of large scale earthquakes in the region serves as a reminder of the possibility of big earthquakes in the future. Past major earthquakes in and around Bangladesh include the 1548 earthquake that hit the Sylhet and Chittagong regions, the 1642 earthquake in Sylhet District with damage to building structures, 1762 earthquake hit most part of Bangladesh including Dhaka & Chittagong caused loss of life and properties.

The 1997 Chittagong earthquake, or the 1997 Bandarban earthquake, occurred on November 21, 1997 at 11:23 UTC in the Bangladesh-India-Myanmar border region. It had a magnitude of Mw 6.1 (USGS, 2014).

Collapsed in Chittagong, Bangladesh (A5C, 2008). An earthquake occurred on 22 July, 1999 at Maheshkhali Island with the epicenter in the same place, a magnitude of 5.2. The earthquake was severely felt around Maheshkhali Island and the adjoining sea. Houses cracked and in some cases collapsed. The Borkol earthquake occurred in the early morning of 27 July 2003 at 5:18:17.96 am local time, killed three people, injured 25 people and damaged about 500 buildings in Chittagong and the Chittagong Hill Tracts. Power supply to some areas was cut as a transformer exploded at the Modunaghat Grid Substation in Hathazari, Chittagong. The epicenter was situated 27 km southeast of Dhaka at the eastern bank of Kaptai reservoir. It had a magnitude measured Mw 5.7. Dhaka shook with MM intensity IV. Many people were awakened, especially residents of upper floors of high rise buildings.

The recent study on seismicity of Bangladesh after using ground and satellite GPS came up with a finding that the subduction zone of an area of 62,500 sq km between Chittagong and Sylhet is very active. The overriding Burma plate has been loading up with stress for at least 400 years without any release. The Indian plate is actually thrusting the Burma plate at a rate of 13 to 17 mms a year. A huge quantity of energy has accumulated there which has not been released in hundreds of years.

Figure 107: Hidden Fault Line



8.1.9 Biological Environment

Flora

Throughout the project area there is a distinct habitat in the immediate vicinity of homes, comprising a managed agro-forestry and pond environment. The main agricultural areas coincide with the wetland and lowland areas, although some higher dry land systems do exist. During the monsoon, agricultural fields become a seasonal part of the aquatic ecosystem linking wetlands and the main rivers. Main crops are paddy, pulse, potato, brinjal, vegetables, bamboo etc. Extinct or nearly extinct crops are sugarcane, jute, arahar, mustard, sesame, linseed, ground nut etc. Main fruits are Mango, blackberry, jackfruit, banana, papaya, litchi, pineapple, water-melon etc.

Fauna

The proposed area does not have a notified wildlife habitat within a 5 Km radius. any threatened species as per IUCN list is not present in the project area. Some migrant and local birds; animals like jungle cats, squirrels and rodents like rats and snakes are reported. Bird landing sites were not found in the proposed area except on the mudflats beside the coastal strip. Some birds in common Bengali name found include House Sparrow (*Chorui*), Dove (*Doel*), Bank Myna (*Shalik*), Kite (*Chil*), Brown Hawl Owl (*Pecha*), Crow (*Kak*), *Tuntuni,* White-throated Bulbul, Ashy Bulbul, Olive Bulbul (*Bulbuli*), Cuckoo (*Kokil*) *etc*.

Aquatic Flora and Fauna

The aquatic environment includes river, canals, water bodies and ponds. As stated, the entire agricultural land is inundated during monsoon season and dries up in the dry season every year. When cyclone strikes near the coast the whole proposed area is inundated by tidal wave result in intrusion of saline water in the locality. The biological characteristics indicated presence of moderate variety of species and aquatic plants. Blue green algae and planktons are also found in ponds, water bodies and canals. The wet land flora as found in the project area listed in Bengali includes *Helencha, Hejol, Kudipana, Kuchuripana, Shapla, Shaluk, Lotus, Nol, Sola, Kalmi* etc. Aquatic fauna reported in the area includes *crabs* and *oyster/ear shell*, etc.

Fish

Most of the people of Mirsarai are dependent on fishing in the Bay of Bengal. The preferred species for fishing are major and minor saline water species. In general, there are 296 species of fish in sweet water and saline water and 511 species of sea fish, including shrimp. 54 species are endangered critically and 12 species are designated vulnerable.

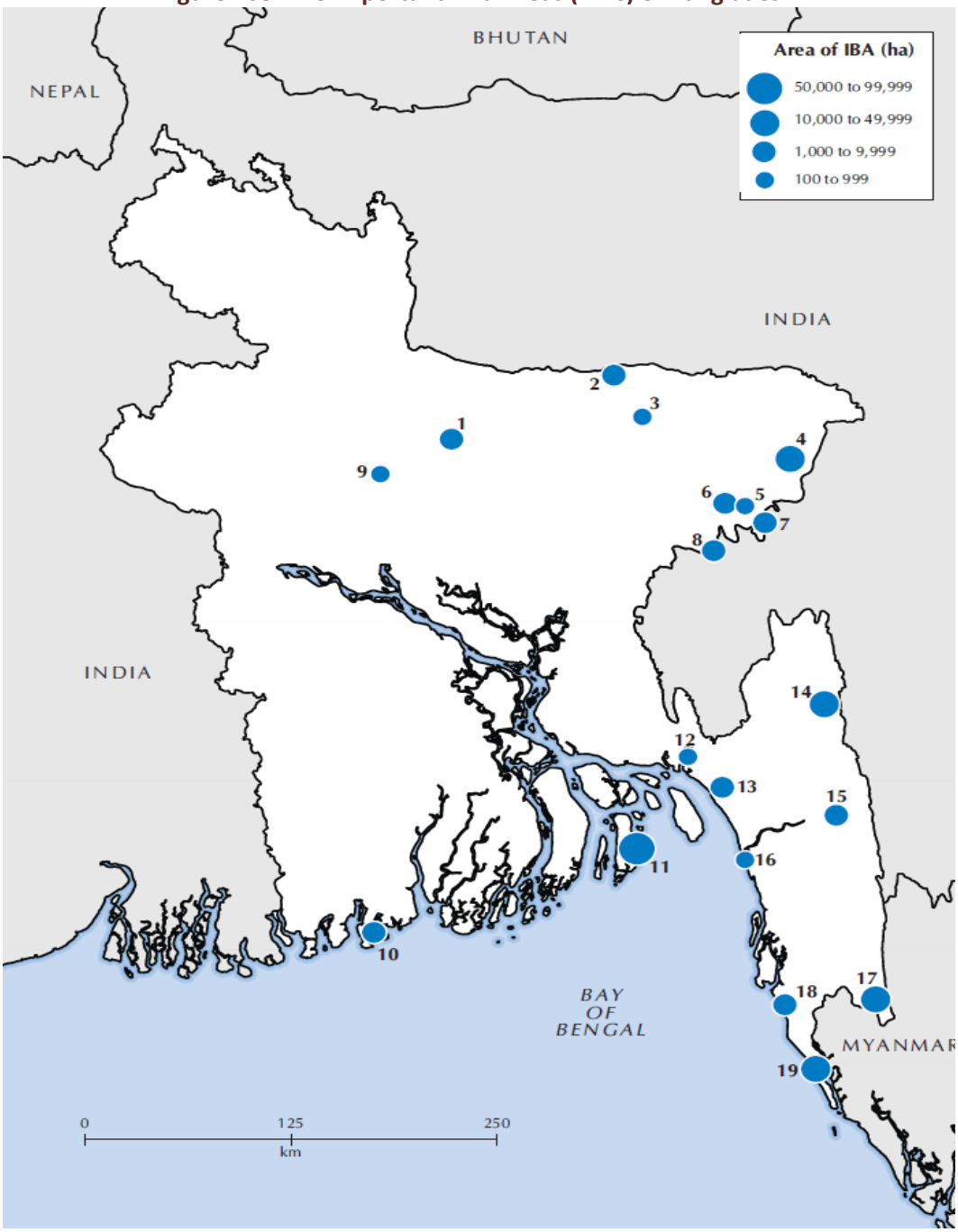
Important Bird and Biodiversity Areas (IBAs)

Table 45: Important Bird and Biodiversity Areas (IBAs) near the Project

Location	Central Coordinate	Area
Sonadia Island	91° 53.00' East 21° 30.00' North	4,916 ha
Sunderbans (East, South, West Wildlife Sanctuaries)	89° 40.00' East 21° 50.00' North	139,699 ha
Teknaf Game Reserve	92° 14.00' East 21° 0.00' North	11,615 ha
Sangu Matamuhari	92° 35.00' East 21° 25.00' North	20,000 ha
Rampahar-Sitapahar Wildlife Sanctuary	92° 20.00' East 22° 30.00' North	3,026 ha

Location	Central Coordinate	Area
Patenga Beach	91° 48.00' East 22° 14.00' North	500 ha
Pablakhali Wildlife Sanctuary	92° 17.00' East 23° 11.00' North	42,087 ha
Himchari National Park	92° 2.00' East 21° 22.00' North	1,729 ha
Hazarikhil Wildlife Sanctuary	91° 40.00' East 22° 40.00' North	2,903 ha
Ganges-Brahmaputra-Meghna delta	91° 10.00' East 22° 18.00' North	75,000 ha
Sitakunda Eco Park And Botanical Garden	91o 40' East 22o 36' North	-

Figure 108: The Important Bird Areas (IBAs) of Bangladesh



8.1.10 Noise Pollution

One representative point of Noise monitored 16th July 2016 to analyze Noise level. The analyses of the parameters have been done in Atomic Energy Centre Laboratory, Dhaka and results dated 19th July 2016 have been placed in the report. The most part of the area would fall under 'E' category, which is 'Mixed area". No data exceed the Bangladesh regulatory limit.

Notes:

1. The time from 6 a.m. to 9 p.m. counted as day time.

2. The time from 9 p.m. to 6 a.m. counted as night time.

3. Area up to a radius of 100 meters around hospitals or educational institutions or special institutions/ establishment identified/ to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

The sampling points are listed in the table below.

Table 46: Noise Sampling Point and Location

Identity No.	Location	GPS Location
ID # 1	Mirsarai 2 Economic Zone	22^0 45.894 N & 091^0 28.684E

Analysis Results

Table 47: Noise Analysis Results

Sl.	Point	Bangladesh Standard	Test Time	Result
1	Mirsarai 2 Economic Zone	Day Time 75 dBa	Day	44.5±2.1 dBa
		Night Time 70 dBa	Night	43.5±2.0 dBa

Result Summary

The analysis results fully comply with the DoE standards. Therefore, it can be concluded that the noise is not creating any harm to the environment in terms of noise quality.

8.1.11 Relevant Government of Bangladesh Environmental Legislations

Legislation	Description	Regulatory Body	Applicable Requirements for the Project
Environmental Conservation Act of 1995 and amendments in 2000, 2002 and 2010	- Provide, amongst others items, standards and guidelines for: (i) categorization of industries and development projects, (ii) requirement for undertaking IEE and EIA, as well as formulating an EMP according to categories of industries/development projects/activities, (iii) procedure for obtaining environmental clearance; and (iv) environmental quality standards for air, surface water, groundwater, drinking water, industrial effluents, emissions, noise and vehicular exhaust - Specify which activities are permissible and which restricted in ecologically critical areas	Department of Environment (DoE) under the Ministry of Environment and Forest (MoEF)	- Restriction on operation and process, which can be continued or cannot be initiated in the ecologically critical areas - Regulation on vehicles emitting smoke harmful to the environment - Remedial measures for injuries to ecosystems - Standards for quality of air, water, noise and soil for different areas for various purposes - Standard limit for discharging and emitting waste - Environmental guidelines
Environmental Conservation Rules of 1997 and amendments in 2002 and 2003			- Environmental clearances - Compliance to environmental quality standards
Forest Act of 1927 and amendments (2000)	- Emphasis is on the protection of reserved forest: (i) all rights or claims over forestlands have been settled at the time of the reservation and prohibits the grant of any new rights of any kind to individuals or communities; (ii) any activity within the forest reserves is prohibited, unless permitted by the Forest Department; (iii) most of the violations may result in court cases; and (iv) empowers the Forest Department to regulate the use of water-courses within Reserve Forests.	Forest Department	- Clearance for any felling, extraction, and transport of forest produce
Bangladesh Climate Change Strategy and Action Plan of 2009	- A comprehensive strategy to address climate change challenges built around the following six themes: (i) food security, social protection and health; (ii) comprehensive disaster management; (iii) infrastructure; (iv) research and knowledge management; (v) mitigation and low carbon development; and (vi) Capacity building and Institutional strengthening	Climate Change Unit of MoEF	- Ensure existing assets (e.g., coastal and river embankments) are well maintained and fit for purpose and that urgently needed infrastructures (cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change. - enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change
National Water Policy of1999	- All agencies and departments entrusted with water resource management responsibilities (regulation, planning,	Water Resources Planning Organization (WARPO) under	- EIA for water development projects and increase surface water flow - Pre-screening of IEEs/EIAs for water sector projects by WARPO, in

Legislation	Description	Regulatory Body	Applicable Requirements for the Project
	construction, operation and maintenance) will have to enhance environmental amenities and ensure that environmental resources are protected and restored while executing their activities. The policy has several clauses related to the protection and conservation of the natural environment to ensure sustainable development.	the National Water Resources Council of the Ministry of Water Resources	advance of submission to DOE for final clearance. - Augmentation for dry season water flow - Awareness-raising in consumptive use of surface and groundwater for irrigation - Structural and non-structural mitigation (early warning and flood proofing)
National Safe Drinking Water Supply and Sanitation Policy of 1998	- Basic framework for the improvement of public health quality and to ensure an improved environment, together with a set of broad sectoral action guidelines.	Department of Public Health Engineering (DPHE)	- Pourasabhas and WASAs will take actions to prevent wastage of water. In addition they will take necessary steps to increase public awareness to prevent misuse of water. - Sanitation systems shall be self- sufficient and self- sustaining. - Pourasabhas shall be responsible for solid waste collection, disposal and their management. DOE shall be consulted on solid waste management. - Where WASAs exists, they shall be responsible for sewerage and storm water drainage systems.

Note: ECA Amendment 2000 focuses on ascertaining responsibility for compensation in cases of damage to ecosystems, increased provision of punitive measures both for fines and imprisonment and the authority to take cognizance of offences. ECA Amendment 2002 elaborates restrictions on polluting automobiles; restrictions on the sale, production of environmentally harmful items like polythene bags; assistance from law enforcement agencies for environmental actions; break up of punitive measures; and authority to try environmental cases. In ECA Amendment 2010, no individual or institution (government or semi-government/non-government/self-governing can cut any hill or hillock; fill-up or changed any remarked water body however in case of national interest; the mentioned activities can be done after getting clearance from respective the departments.

8.1.12 World Bank Safeguard Policies

World Bank has a number of safeguard policies. The following table elaborates them with the condition when they are triggered:

Table 48: Applicable safeguard policies of World Bank

Safeguard Policies	Triggering
Environmental Assessment (OP 4.01) – a full Environmental Assessment (EA) will be required.	- Use a screening process - physical, biological, socio-economic and physical cultural resources, including transboundary and global concerns, and potential impacts on human health and safety - legal and institutional framework, - sitting alternatives, including the "no action" alternative - . Involve stakeholders, including project-affected groups and local nongovernmental organizations - . Disclose draft EA in a timely manner
Natural Habitats (OP 4.04) – including river bed, coastline, and on-shore habitats which may be impacted by disposal of dredged material and/or other on-land activities, as well as critical habitat (including but not limited to legally designated protected areas) and other natural habitat which may be affected by induced development resulting from the opening of a new transportation corridor through a currently isolated region.	Natural resources management to ensure opportunities for environmentally sustainable development legally protected, (b) officially proposed for protection, (c) identified by authoritative sources for their high conservation value, or (d) recognized as protected by traditional local communities Consult key stakeholders, design and implementation of mitigation Disclose draft mitigation plan
Forests (OP 4.36) -- the new connectivity route will affect forested areas.	for potential impacts on forest health and quality and on the rights and welfare of the people who depend on them forest restoration projects preference to small-scale community-level management approaches Use forest certification systems
Physical Cultural Resources (OP 4.11) – particularly with respect to locations of on-land dredge disposal.	to identify PCR and prevent or minimize or compensate "chance find" procedures
Involuntary Resettlement (OP 4.12) – to be confirmed during implementation, but some land acquisition is likely to be required for on-land disposal of dredged material, as well as potentially for construction of access roads or river port development activities.	Ref: Social Impact Assessment
Indigenous Peoples (OP 4.10) – for any IWT included in the final prioritized list that passes through connectivity (road through forest land and dredged navigational route), this policy may apply	Ref: Social Impact Assessment

Policy Opportunities: There are policy opportunities for greening the environment as evident from the following features.

- Policy initiatives, strategies and plans emphasize on sustainable natural resources management.

- Environment quality standards (EQS) for ambient water quality, air quality, noise and effluent/ emission discharges standards have been set.
- EIA has been accepted as mandatory tool to identify and predict impacts and undertake proper mitigation measures in the execution of a project. A good number of Sectoral EIA guidelines have been prepared to assist the process.
- Acknowledges linkage between poverty, population pressure, illiteracy, inadequate health care and environment management in achieving sustainable development DoE has been able to undertake measures to amend certain Acts and Rules to better enforce the law to protect the environment from further degradation. These include:
    - Bangladesh Environment Conservation Act, 1995 (Amendment 2010).
    - Environment Court Act 2010
    - Hazardous Waste and Ship Breaking Waste Management Rules, 2011.
    - Bangladesh Bio-safety Rules, 2012.
    - Brick Manufacture and Brick Kiln Installation (Control) Act, 2013.

Multilateral Environmental Agreements (MEA's) and their Implications: Bangladesh has so far signed, ratified and or accessed 35 international Conventions, Treaties and Protocols (ICTPs). Among them the following ICTP's received attention of the government for follow up implementation.

- Stockholm Convention on Persistent Organic Pollutants
- Vienna Convention for The Protection of Ozone Layer.
- Montreal Protocol on Substances that Deplete the Ozone Layer (1987).
- UN Framework Convention on Climate Change (UNFCCC) 1992.
- Kyoto Protocol to The UN Framework Convention Climate Change (1997).
- United Nations Convention on Biological Diversity (CBD).
- Cartagena Protocol on Bio safety.
- Convention on Wetland of International Importance Especially as Waterfowl Habitat.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora.
- United Nations Convention to Combat Desertification.
- Basel Convention on the Control of Trans-Boundary Movements of Hazardous Wastes and their Disposal.
- The United Nations Convention on the Law of the Sea.
- The International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto.
- Minamata Convention on Mercury.
- Nagoya Protocol on Access and Benefit sharing

Other Laws: There are a number of other laws and regulations applicable which are relevant for the project. These are presented in the Table below.

Table 49: Relevant Laws and Regulation, Brief description and Responsible Agency

Act/Law/Ordinance	Brief description	Responsible Agency
The Vehicle Act (1927) and The Motor Vehicles Ordinance (1983)	Provides rules for exhaust emission, air and noise pollution and road and traffic safety	Road Authority
Rules for Removal of Wrecks and Obstructions in inland Navigable Water Ways (1973)Dredging	Rules for removal of wrecks and Obstructions. Safe depositing of spoils from dredging activity	BIWTA
The Water Supply and Sanitation Act (1996)	Regulates the management and control of water supply and sanitation in urban areas.	MoLG, RD&C

Act/Law/Ordinance	Brief description	Responsible Agency
The Ground Water Management Ordinance (1985)	Describes the management of ground water resources and licensing of tube wells	upazilla Parishad
The Private Forests Ordinance (1959)	Deals with the conservation of private forests and afforestation of wastelands.	MoEF
The Antiquities Act (1968)	Describes the preservation of cultural heritage, historic monuments and protected sites	DoArch

International Treaties Signed by GoB: Bangladesh has signed most international treaties, conventions and protocols on environment, pollution control, bio-diversity conservation and climate change, including the Ramsar Convention, the Bonn Convention on migratory birds, the Rio de Janeiro Convention on biodiversity conservation and the Kyoto protocol on climate change. An overview of the relevant international treaties signed by GoB is shown in the following table.

Table 50: Relevant International Treaties

Treaty	Year	Applicability and how to address	Relevant Department
Protection of birds (Paris)	1950	Protection of birds in wild state Broadly applicable for birds in and around the project influence area; mitigation measures included in EMP address potential impacts on birds as well.	DoE/DoF
Ramsar Convention	1971	Protection of wetlands. Broadly applicable for wetlands in and around the project influence area; mitigation measures included in EMP address potential impacts on wetlands and associated resources as well.	DoE/DoF
Protocol on Waterfowl Habitat	1982	Amendment of Ramsar Convention to Protect specific habitats for waterfowl. Broadly applicable for wetlands in and around the project influence area; mitigation measures included in EMP address potential impacts on wetlands and associated ecological Resources as well.	DoE/DoF
World Cultural and Natural Heritage (Paris)	1972	Protection of major cultural and natural Monuments. Not applicable since no major cultural or natural monuments are known to exist in the project influence area. However Chance Find Procedures have been included in the EMP	DoArch
CITES convention	1973	Ban and restrictions on international trade in endangered species of wild fauna and Flora. Not directly relevant to the RMIP since the project does not involve in any international trade of endangered species of wild fauna and flora. General restrictions have however been included in the Environmental Code of Practice.	DoE/DoF
Bonn Convention	1979	Conservation of migratory species of wild Animals. Broadly applicable to the migratory birds in and around the project influence area. Project activities are not likely to have any significant impacts on these species; precautionary measures have nonetheless been included in EMP.	DoE/DoF
Prevention and Control of Occupational hazards	1974	Protect workers against occupational exposure to carcinogenic substances and agents. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP.	MoH

Treaty	Year	Applicability and how to address	Relevant Department
Occupational hazards due to air pollution, noise & vibration (Geneva)	1977	Protect workers against occupational hazards in the working environment. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP.	MoH
Occupational safety and health in working environment (Geneva)	1981	Prevent accidents and injury to health by minimizing hazards in the working environment. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP.	MoH
Occupational Health services	1985	To promote a safe and healthy working environment. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP.	MoH
Convention on oil pollution damage (Brussels)	1969	Civil liability on oil pollution damage from ships. Not applicable since any oil carrying cargos are involved in the proposed project.	DoE/MoS
Civil liability on transport of dangerous goods (Geneva)	1989	Safe methods for transport of dangerous goods by road, railway and inland vessels. Broadly applicable to transportation of substances such as fuels during the project construction phase. Appropriate mitigation measures are included in the EMP.	MoC
Safety in use of chemicals during work	1990	Occupational safety of use of chemicals in the work place. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP.	DoE
Convention on oil pollution	1990	Legal framework and preparedness for control of oil pollution. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP.	DoE/MoS
UN framework convention on climate change (Rio de Janeiro)	1992	Regulation of greenhouse gases (GHGs) emissions. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP to minimize emissions of GHGs.	DoE
Convention on Biological Diversity (Rio de Janeiro)	1992	Conservation of bio-diversity, sustainable use of its components and access to genetic resources. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP for the conservation of biodiversity.	DoE
International Convention on Climate Changes (Kyoto Protocol)	1997	International treaty on climate change and emission of greenhouse gases. Broadly applicable to the construction and O&M activities under the project. Appropriate mitigation and protective measures have been included in the EMP to minimize emissions of GHGs	DoE

Table 51: Likely Government of Bangladesh Classification of Subproject Components

	Subproject	Component	Equivalent in Schedule I of ECR	DoE Classification
1.	Roads, bridges and culverts	Road provisions (include new road, road resurfacing, roadside footpath, roadside drains, road signs,	Construction, re-construction and extension of road (feeder road, local road)	Orange – B

	Subproject	Component	Equivalent in Schedule I of ECR	DoE Classification
		road/pavement markings, intersection improvement, or high mast lighting)		
		Bridges	Construction, re-construction and extension of bridge (length below 100 meters)	Orange – B
			Construction, re-construction and extension of bridge (length above 100 meters)	Red
		Culverts	No similar facility	Orange – B (because impacts likely to be similar to roads and bridges less than 100 m)
2.	Solid waste management	Community storage bins	No similar facility	Green (because bins and STS are small and unlikely to have major impacts)
		Secondary transfer station		
		Waste disposal (includes sanitary landfill, composting site, or access road)	Land-filling by industrial, household and commercial wastes	Red
3.	Cyclone shelters	New or refurbishment of cyclone shelters	Hotel, multi-storied commercial and apartment building	Orange – B
4.	Boat landing stations	New or refurbishment of boat landing stations	Engineering works (up to 10 hundred thousand Taka capital	Orange – B
5.	Markets	New or refurbishment of markets		
6.	Bus terminals	New or refurbishment of bus terminals		
7.	Drainage and flood control	Primary network (includes domestic connections or primary drains)	Engineering works (up to 10 hundred thousand Taka capital	Red
		Secondary network (includes secondary drains)		
		Tertiary network (includes main drains and drainage outfalls)		
8.	Water supply	Source augmentation (includes tube wells, surface water intake, overhead or ground reservoir, pumps and pump house, water treatment plant [WTP] or chlorination facility)	Engineering works (up to 10 hundred thousand Taka capital	Red
		Water transmission (includes pumping main, overhead reservoir, or pumps and pump houses)	Water, power and gas distribution line laying/relaying/extension.	Red
		Network improvements (include ring main, distribution/ carrier mains, bulk valves and flow meter, household connections or household meters)		
9.	Sanitation	Toilet facilities and latrines	Public toilet	Orange – B
		Septage and wastewater treatment plants	Sewage treatment plant	Red

8.1.13 Environmental Clearance Requirements

Rule 7 of the ECR indicates that the application for ECC must be made to the relevant DoE Divisional Officer, and the application will include the following:

1. Green category projects:

a) Completed Application for ECC, and the appropriate fee,
b) General information about the project;
c) Exact description of the raw materials to be used and the product to be manufactured (where relevant); and
d) No objection certificate from the local authority.

2. Orange A category projects:

a) Same requirements as Green Category projects, plus the following:
b) Process flow diagram;
c) Layout plan (showing location of effluent treatment plant [ETP]);
d) Effluent discharge arrangement; and
e) Outlines of the plan for relocation and rehabilitation (if applicable).

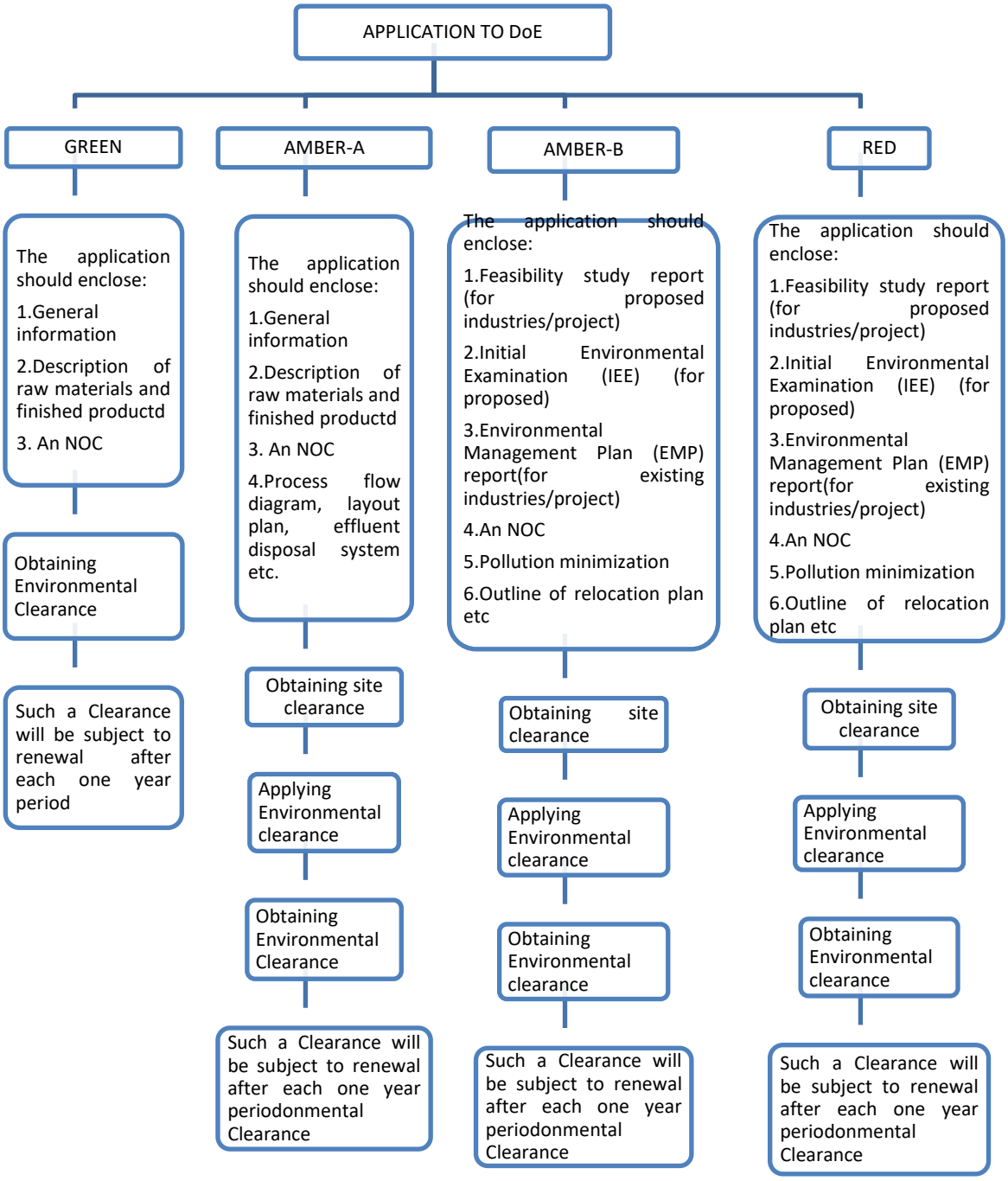
3. Orange B category projects:

a) Completed Application for ECC, and the appropriate fee;
b) Report on the feasibility of the project;
c) Report on the IEE for the project, plus Process Flow Diagram, and in the case of an industrial project: layout plan (showing ETP), and ETP design;
d) Report on the environmental management plan (EMP);
e) No objection certificate from the local authority;
f) Emergency plan relating to adverse environmental impact and plan for mitigation of the effect of pollution; and
g) Outline of the relocation and rehabilitation plan (where applicable).

4. Red category projects: Same requirements as Orange Category B, except that Item 3 (IEE) is amended to read as follows:

Report on the IEE for the project, and Terms of Reference for the EIA; or EIA report prepared on the basis of ToR previously approved by DoE, plus (in the case of an industrial project): layout plan showing location of ETP, process flow diagram, design and time schedule of the ETP.

Table 52: DOE Approval Process



The ECR'97 describes the procedures for obtaining Environmental Clearance Certificates (ECC) from the department of environment for different types of proposed units or projects. Any person or organization wishing to establish an industrial unit or project must obtain ECC from the director general. The certificate is issued on the basis of the EIA for red category projects, and on the basis of IEE for Orange B category projects, along with payment of applicable fees and completion of prescribed forms. The validity of such certificate is one year for both red and orange category, and compulsory requirement for renewal of certificate at least 30 days before expiry of its validity. Under the ECR DOE has 60 days to respond to receipt of the ecc application for a red category project and 30 days for an Orange-B category project.

8.2 Environmental Impacts

Environmental impacts assessment was carried out considering present environmental setting of the project area, and nature and extent of the proposed activities.

The project will mainstream climate risk reduction into policy formulation and infrastructure development. A key feature is climate proofing and disaster resilient designs to ensure that infrastructure are less vulnerable to floods, storm surge, landslides and impacts of other extreme weather events. Main activities include preparing a climate change resilient infrastructure management plan, a climate vulnerability mapping of the coastal town areas (with a focus on the project areas) as well as designing and introducing adaptation strategies to improve flood and drought management.

8.2.1 Stakeholder Consultation

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 Readymade Garments (RMG) Manufacturers 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 Mirsarai. Peoples' concerns basically focused on the construction impacts, land acquisition, and resettlement issues which will be addressed during detailed EIA if the client approves the study. However, consultation outcomes are expressed in the following table.

Issues	Participants' Opinion, Comments and Suggestions	Response to Questions and Concerns	Action Points during Detailed Design of economic zone
General perception about the project and the awareness about the proposed project.	Most of the participants are in favor 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

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 business groups.

8.2.2 Anticipated Environmental Impacts Due to Project Implementation

Impact Field	Anticipated Impact on the Environment
Design phase	
Environmental clearances	Environmental clearances, consents, and permits are required (Section II of the EARF) in order to implement the project. If not pursued on time, this can delay the project. Necessary environmental clearances and permits have to be obtained and must follow the guidelines issued by the authorities.
Construction phase	
Air quality	Emissions from construction vehicles, equipment, and machinery used for excavation and construction, resulting in dust and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons
Surface water quality	Mobilization of settled silt materials, runoff from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality.
Noise levels	Increase in noise level due to earth-moving and excavation equipment and the transportation of equipment, materials, and people. Operation of heavy equipment and machines in the nighttime can cause nuisance to the surrounding environment/ people.
Ecological resources	Felling of the trees affects terrestrial ecological balance.
Sources of materials	Extraction of materials can disrupt natural land contours and vegetation, resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.
Existing infrastructure, facilities and utilities	Telephone lines, electric poles and wires, and water pipes (old) existing within right-of-way (ROW) require shifting without disruption to services. Health risk due to closure of existing water supply, such as community tanks, water stations, and privately-owned small water pipes
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas	Locations may cause encroachment/impact either directly or indirectly on adjacent environments. It may also include impacts on the people who might lose their homes or livelihoods due to the project activities. Temporary air and noise pollution from machine operation, and water pollution from storage and use of fuels, oils, solvents, and lubricants. This may cause conflict with residents and problem of waste disposal and disruptions to residents.
Construction waste	Excavation works, cleaning of drainages and trenching will produce additional amounts of waste soil. Accumulation of debris waste materials and stockpiling can cause environmental visual pollution.
Social and cultural resources	Sites of social/cultural importance (schools, hospitals, religious places, tourism sites) may be disturbed by noise, dust, vibration, and impeded access. Ground disturbance can uncover and damage archaeological and historical remains.
Landscape and aesthetics	Solid wastes as well as excess construction materials create unacceptable aesthetic conditions.
Traffic	Traffic flow will be disrupted if routes for delivery of construction materials and temporary blockages during construction activities are not planned and coordinated.
Accessibility	Traffic problems and conflicts in ROW. Roads, people, and businesses may be disturbed by repeated trenching.
Income	Impede the access of residents and customers to nearby shops. Shops may lose business temporarily.
Occupational health and safety	Occupational hazards which can arise during construction (e.g., trenching, falling objects, etc.).
Community health and safety	Community hazards can arise during construction (e.g., open trenches, air quality, noise, falling objects, etc.). Trenching on concrete roads using pneumatic drills will cause noise and air pollution. Traffic accidents and vehicle collision with pedestrians during material and waste transportation
Post-construction phase	

Impact Field	Anticipated Impact on the Environment
Clean-up operations, restoration and rehabilitation	Impacts on social or sensitive receptors when post-construction requirements are not undertaken, e.g. proper closure of camp, disposal of solid waste, and restoration of land after project construction.
Operation and maintenance phase	
Environmental Clearance Certificate renewal	For orange and red category projects the ECC must be renewed every year, for which the fee is 25% of the original application.
General maintenance	Maintenance activities may cause disturbance to sensitive receptors, dust, and increase in noise level.
Economic development	Impediments to residents and businesses during routine maintenance
Biodiversity fauna and flora	No areas of ecological diversity occur within the project location. Due to the nature and locality of the project, there is unlikely to any significant impacts on biodiversity within the area during maintenance works. The use of fertilizers and herbicides in maintenance of newly planted trees, landscape and vegetation may, however, affect the environment.
Health and safety	Danger of operations and maintenance-related injuries Safety of workers and general public must be ensured. Poor waste management practices and unhygienic conditions at the improved facilities can breed diseases. Standing water due to inadequate storm water drainage systems and inadequate waste management practices pose a health hazard by providing breeding grounds for disease vectors such as mosquitoes, flies, and rats.
Solid waste	Solid waste residuals which may be generated during operations and maintenance activities. Sludge will be generated from water treatment plants. Bio-solids will be generated from treatment plants.
Hazardous chemicals	Water treatment involves the use of chemicals for coagulation, disinfection, and water conditioning.

8.3 Sustainability Initiatives

The development of the economic zone is driven on strong foundation of sustainability concepts and these needs were built right in the conceptualization stage itself. As a whole, the Mirsarai2 economic zone will have a safe dike and modern infrastructure such as an efficient drainage system, a reliable power supply plant, a water supply treatment plant replenished by river water and rainwater as source, a wastewater treatment plant and communication systems equipped to international standards. These strategically designed infrastructure elements are ready for receiving advanced foreign industries and will hopefully provoke new industrial chains in Bangladesh. “A New Gateway to Bangladesh” is the development concept recommended for recognition as a future industrial development for Bangladesh.

The sustainable elements conceived in the concept plan include use of eco-friendly materials, recyclable material, avoidance of toxic chemicals, usage of environmental friendly products, waste minimization technologies, scientific treatment of waste and energy recovery possibilities to reduce power consumption etc.

9 Social Footprint

9.1 Baseline Socio-Economic Condition

The total population at Mirsarai is 398,716 (Male 187,323 and Female 211,393), sex ratio 89:100, population density 826 per sq. km., number of people displaced by the Mirsarai 2 economic zone is much less than the total population of these upazilla. Private land ownership includes agricultural lands, homes, and ponds. It seems that no one is likely to be adversely affected by the Mirsarai 2 economic zone. The household pattern, sanitation facilities and behavior shows a grim picture of poverty in the proposed Mirsarai 2 economic zone area. Most of the households have kutcha houses in all the mouzas including all in Companinagar. A very low percentage of households have pucca houses. The number of people using proper sanitary toilets is small - most people having non-water sealed sanitary ones. Fifty percent of households in Companinagar and 15-30 percent in other areas either have non-sanitary toilets or no toilets at all.

The key parameters that are required to establish a baseline socio-economic profile of population within the project's area of influence includes gender, ethnicity, social structure, employment patterns, sources of income, local tenure and property rights arrangements, use of community and natural resources.

Population: The population of Chittagong district is 76,16,352 (Male- 38,38,854 and Female- 37,77,498), Sex ratio 102:100, Population Density 1442 sq. km. and annual growth rate is 1.40 percent. The population at Mirsarai is 398,716 (Male- 187,323 and Female- 211,393), Sex ratio 89:100, Population density 826 per sq. Km. number of people displaced by the Mirsarai 2 economic zone is much less than the total population of these upazilla.

Table 53: Population Statistics

Location	Population	Male	Female	Sex Ratio	Population Density (per square km)	Growth Rate **(percent)**
Chittagong (District)	76,16,352	38,38,854	37,77,498	102:100	1442	1.40 percent
Mirsarai (upazilla)	398716	187323	211393	89:100	826	-

Source: BBS, District Statistics 2011, Chittagong.

Land patterns: The land includes agricultural lands, homes, and ponds.

Education: Education rate - 52.01 percent (Aged 7+ population). School-going students 80,455 (5-24 aged

Table 54: Educational Institution Statistics

	Number/Percentage
Education rate (Aged 7+ population)	52.01 percent
School-going students (5-24 aged)	80,455
Government primary schools	145
Government registered primary schools	23
Community primary schools	14
Private unregistered primary schools	12
Private high schools	44 (including 5 girls' school)
Madrasas	41 (1 women's madrasa)
Private degree colleges	3
Intermediate colleges	2 (1 girls' college)
Textile engineering college	1

Source: BBS

Small Ethnic communities: There are few Tripura people in the hilly areas of Mirsarai, which is quite far from the Mirsarai 2 economic zone, there is no tribal population living within 20 km of the Mirsarai 2 economic zone area. None of tribal population lives in the proposed Mirsarai 2 economic zone area or adjacent areas

and no tribal lands will be acquires for the purpose of development of Mirsarai 2 economic zone and proposed approach roads, thus there is no foreseeable risk of any of them being displaced by the project.

NGO activities: Operationally important NGOs include Proshika, BRAC, ASA, Sheba, Grameen Bank, ICDDRB; CARE, Hunger Project, DORP, BaisOpka, IPSA, Fatema Palli, Swasthya Shikkha Centre and Eva.

Household structure and Sanitation facilities: The household pattern, sanitation facilities and behavior shows a grim picture of poverty in the area. Most of the households have kutcha houses in all the mouzas including all in Companinagar. A very low percentage of households have pucca houses. The number of people using proper sanitary toilets is small - most people having non-water sealed sanitary ones. Fifty percent of households in Company Nagar and 15-30 percent in other areas either have non-sanitary toilets or no toilets at all.

Table 55: Sanitation facilities Statistics near Project area

	Percentage of households having non-sanitary or no toilets
Company Nagar	50 percent
Other Areas	15 percent-30 percent

Source: BBS

The World Bank Social Safeguards and their policy objectives are briefly described below:

OP/BP 4.11 - Physical Cultural Resources (PCR). Policy objective is to assist in preserving PCR and in avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, religious, (including graveyards and burial sites), aesthetic, or other cultural significance. There is no such found in the project area

OP/BP 4.12 - Involuntary Resettlement. Policy objective is to avoid or minimize involuntary resettlement caused by land acquisition or loss/restriction of access to land and related resources. Where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre- displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

9.1.1 Labour availability

Currently there is concentration of habitat in Chittagong city and nearby town Feni. Therefore, there is a strong likelihood that Mirsarai economic zone will largely draw workforce from Chittagong city and Feni region. One of the reasons for Mirsarai to be a suitable place for economic zone development is the presence of semiskilled workforce in the vicinity areas.

Especially Chittagong city already has a stock of experienced workforce in light engineering industries. Also there is a large work force in Chittagong port, which can be drawn to Mirsarai.

9.1.2 Commuting and Transport Facilities

A large group of people will be commuting from nearby cities to the project site every day. This will create traffic congestion around the site area, including the national highway, and also increase the chance of road accidents and critical injuries. This issue can be addressed by short term and long-term initiatives.

Short-term initiatives will include introducing local transport services from the designated city hubs such as Chittagong, Feni, Noakhali, Sitakunda, Mirsarai, etc.

Long-term initiatives will include rail connectivity with the zone, which will serve the purpose of mass transportation for the future expansions as well. Furthermore, setting up a number of small, low-end

townships or residential areas within the future expansion is recommended. This will minimize the volume of mass transportation relocating the labours closer to the economic zones.

9.1.3 Stakeholder Consultation

During the field visits, various consultations were held with local inhabitants and government officials in the locality of the proposed project area:

- Shop owners staying near the access road in temporary structures
- Fishermen
- Women
- Health authorities
- Union Parishad officials
- Students
- Small businessmen

The local inhabitants are aware of the Mirsarai 2 economic zone project and they are eager to find direct and indirect employment opportunities in the proposed economic zone project.

During the consultations, the major topics of discussion were:

- Current Socio-economic conditions of the population
- Women's employment
- Children's education
- Prevailing healthcare facilities;
- Anticipated impact of the development of Mirsarai 2 Economic Zone on local inhabitants

The local inhabitants expect positive impact on the socio-economic development in the area as a result of the development of the economic zone project.

Since, there are no relocation and resettlement involved in the offsite and onsite infrastructure development, the stakeholders (especially the people staying near the Mirsarai 2 economic zone area) generally had positive opinions in the consultation meetings on the development of the Mirsarai 2 economic zone. They expect that the Mirsarai 2 economic zone would generate employment opportunities for the local communities and would improve communication and transportation facilities in the locality. This shall improve the overall socio-economic conditions of the local communities. It was also perceived that the project would adequately contribute to the increase in employment and income opportunities of the people by various means, thereby alleviating poverty in this region.

The key findings of the consultations with the local community are summarized below:

- Development of the Mirsarai 2 economic zone would improve overall socio-economic conditions of the local people;
- New livelihood opportunities will be available to the people during the construction and commissioning phases of the Mirsarai 2 economic zone;
- Direct employment opportunities for the local people (especially construction workers and unskilled labors) are expected to increase;
- Local inhabitants expect that the development of Mirsarai 2 economic zone would provide various indirect employment opportunities (such as small shops, restaurants etc. around the Mirsarai 2 economic zone area).
- The residents want that opportunities be given to the local workforce in the Mirsarai 2 economic zone during the construction and commissioning phases;

- Local inhabitants expect that the development of Mirsarai 2 economic zone would lead the area to become more secure in terms of criminal activities such as theft, loot etc.;
- Women empowerment through employment generation since gender inequality is deep rooted in the area;
- Stable employment opportunities throughout the year for communities dependent on seasonal income opportunities.

The main findings of the consultations from the Union Parishad and Government Officials are depicted below:

- The upcoming Mirsarai 2 economic zone will help in the economic upliftment of the local people, Ichhakhali union, and
- The majority of the workforce is unskilled; therefore, in order to provide employment opportunities in the skilled sector, there is a need to establish a "Vocational Training Institute" for the skill enhancement of the local people, especially the youth and women in the area. This may be done in coordination with the UNO office as they are the nodal agency for the implementation of government programmes on social welfare and livelihood for the people in that area.

9.2 Possible Social Impacts

The site selected for the development does not apparently involve any negative impact as the land identified for the establishment of economic zone is government land. The entire area is, currently, barren. Also, at present, there is no human habitation and, therefore, no livelihood activities to be countered with. Rather the economic zone would improve overall socio-economic condition of the local people. New livelihood opportunities will be available during the construction, commissioning and operation phases of the economic zone. Direct employment opportunities for the local people are expected to increase.

The expansion of the access road will displace 14 squatters staying adjacent to the existing access road and will have impacts on 82 people. These people are categorized as Project Affected Person (PAPs). There are about 14 PAHs and 82 PAPs in this project. 12% of them received secondary education and about 64% are uneducated. Employment level in the area is very low, almost half of the working people are wage labourers and about 76% of total PAPs are unemployed. The establishment of the economic zone will have a significant positive impact on their livelihood pattern[115].

Employment opportunities that will be created by the economic zone will reduce poverty through increased income from various livelihood options. By means of industrialization and related trades, such diversification of livelihood will occur for all strata of people. Diverse livelihood options and better wages for the locals will reduce poverty for many households. The industries that will be housed in the economic zones have different employment generation rates. Based on the survey data and other publicly available information, the following rates of number of employees per acre are envisaged:

Table 56: Number of employees per acre by industries

Industries/Components	Number of Employees/acre
Cement	60
Textile	376
Electronics	151
Food Processing	24.89
Leather	108
Light Engineering	170
Pharmaceuticals	18
RMG	1,156

[115] Source of data of this paragraph: *Social Impact Assessment Report of Mirsharai Economic Zone Phase 2*, PwC, August 2016

Ship Building	74
Steel	104

Based on the above table, Zone 2A and 2B is expected to create around 222,000 employment.

The following are likely impacts on the social lives of the local population due to establishment of the zone:

Table 57: Potential Social Impacts and Management

Issues	Impacts	Impact Management
Poverty	The unskilled local community may feel unhappy if preferential treatment is given to the people outside Mirsarai area for skilled jobs. Vast employment opportunities potentially created by the Mirsarai 2 economic zone will reduce poverty via increased income through various livelihood options. By means of industrialization and related trades, diversification of livelihood will occur for all strata of people. This will enormously benefit cross section of population and both gender.	To help PAPs improve their production level or to impart new skills or up-grade skills through training, a training needs assessment is required. As the project affected persons are dependent on livelihood from agriculture, have no skill endowment, training is an important component of income restoration. Training Needs Assessment will be carried out considering the proposed industries to identify then specific training package for the PAPs. Skill training programs by relevant government agencies and NGOs will be needed for efficient utilization of this huge manpower. Measures should be taken to prohibit child labor in the Mirsarai 2 economic zone as per the National Child Labor Elimination Policy 2010 of Ministry of Labor and employment
Food security	With increased income, the families will be able to ensure food security for their families. The small landowners are not able to cover their food security by their production. As these earning are not enough for the small farmers, seasonal workers, food security for them or a standard livelihood, they prefer a better livelihood and secure earning options. The Mirsarai 2 economic zone will provide them with that opportunity.	As agricultural lands will be acquired, special care needed for the small and marginal farmers who are solely or mainly dependent on these lands. Better livelihood options and food security should be ensured for them.
Health, Accommodations and Sanitation	There will be an increase in the demand for accommodation, housing and basic services including sanitation, health and emergency services in Mirsarai 2 economic zone. Increased population inflow will occur in Mirsarai as the workers and employees will tend to settle in the area due to the availability of infrastructure facilities. Better access to health facilities due to increased ability and better communication and access to health services is expected.	Issue of health hazards caused by the Mirsarai 2 economic zone industries need to be identified. If there are any, steps need to be taken to prevent and minimize such hazards. Need to develop a long-term residential plan for the area including the future expansions to improve the quality of basic amenities for the increasing population in the coming years. Further studies are required.
Children and Girls' Education	The child education rate is likely to increase leading to a reduction in children's informal or agriculture-based labor due to increase in family income.	During construction and while the Mirsarai 2 economic zone gets operational, children's safety needs to be ensured. Local community needs to be sensitized and NGOs can be engaged with them.
Social mobility	With improved employment opportunities and higher and secured income, impoverished people will be able to move up the social ladder.	
Women's Empowerment	The absence of gender inclusive policies and procedures may lead the women to take up unskilled and low skilled jobs. Women are mostly in household work category. Thus, employment opportunities for women created by the proposed economic zone directly or indirectly are expected to provide them better socioeconomic status.	Equal employment opportunities should be given to women, especially those who are now unemployed or are working in the service sector as daily wage workers. Care should be taken to promote women advancement and to ensure that women are not confined to low skill, low paid and low-prospect jobs. The Mirsarai 2 economic zone enterprises should undertake special efforts to ensure that women workers are not discriminated against equal wages for work of equal value.

10 Institutional Framework

10.1 Institutional Framework of the Authority

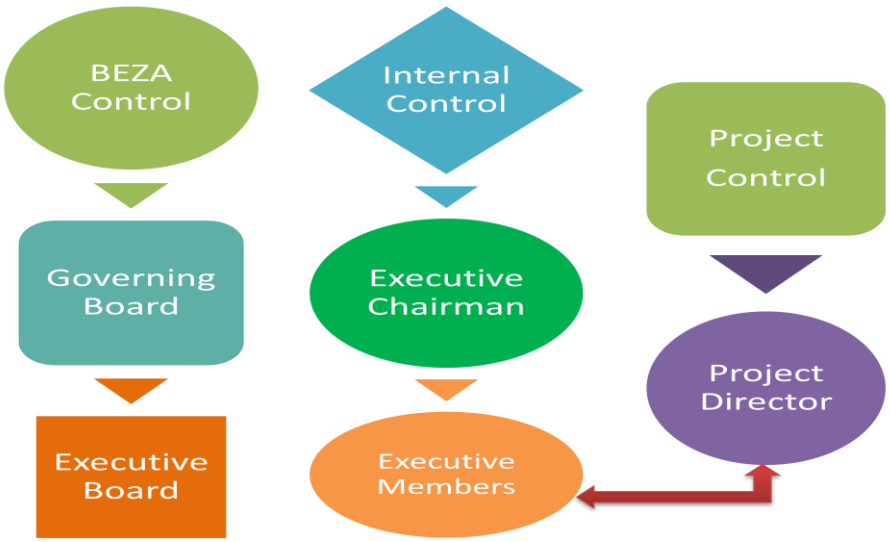
Bangladesh Economic Zones Authority was constituted under Prime Minister's Office in August 2010, with an aim to establish economic zones in potential areas of Bangladesh for employment generation, FDI and inclusive growth of the country. BEZA is attached with the Prime Minister's Office (PMO) and is mandated to establish, license, operate, manage and control economic zones in Bangladesh.

The Governing Board is the highest body that undertakes overall policy decisions. It is headed by the Honorable Prime Minister with top-level representations from Ministries or Divisions of Industries, Commerce, Finance, Planning, Science and Information and Communication Technology, Power, Energy and Mineral Resources, Communications, Labour and Employment, Environment and Forests, Agriculture, Posts and Telecommunications, Foreign Affairs, Home, Shipping, and the Prime Minister's Office including the apex chambers and private sectors.

The Executive Board consisting of an Executive Chairman (as Chief Executive) and 3 Executive members to oversee day to day operation of BEZA. The Executive Board exercises all powers and performs all functions as may be exercised and performed by the Authority.

The BEZA Office/Secretariat performs all day to day activities as guided by the Executive Board. BEZA has an approved staff strength of 72 officers and staff.

Figure 109: BEZA's Supervisory Framework



Bangladesh Economic Zones Act 2010 was promulgated under which Bangladesh Economic Zones Authority was established, with broad objectives to:

- Identify and select sites for Economic Zones for industrial activities
- Acquire land for Economic Zones
- Ensure off-site infrastructure development for the Economic Zones
- Establish Economic Zones through Public-Private Partnership (PPP) and G-to-G
- Provide One Stop Service

The Act provides for legislations for developing economic zones of the country and powers and functions of the authority.

10.2 Institutional Options for Mirsarai economic zone

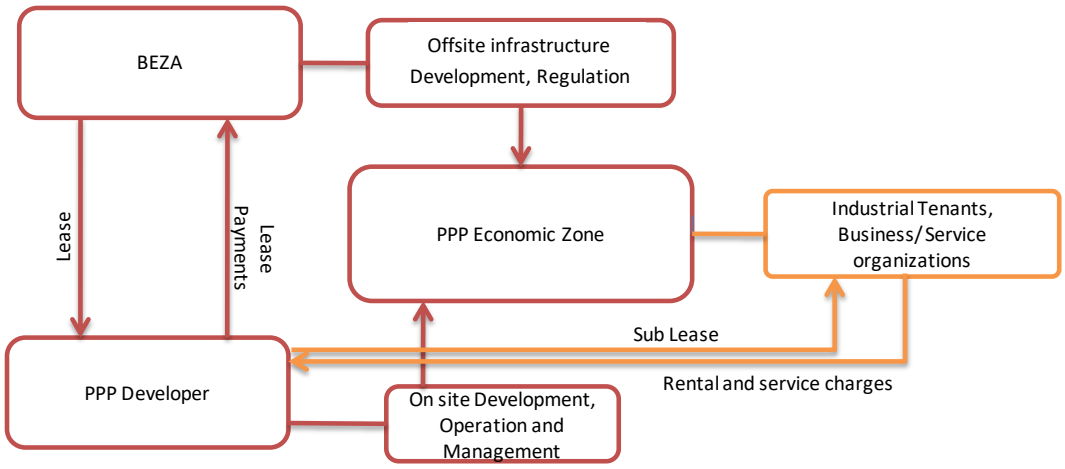
BEZA Act provides specific categorization of the Economic Zones. As per the act, there are six types of economic zones as following:

1. PPP Economic Zone
2. Private Economic Zone
3. Government Economic Zone
4. Special Economic Zone
5. G2G Economic Zone
6. Economic Zones

10.2.1 PPP Economic Zone

Such zones are established through Public and Private Partnership (PPP) by local or foreign individuals, body, or organization. BEZA acquires the land to be developed as economic zone. Then the authority invites tender from potential private developers to build and operate the park. In parallel, authority carries out necessary off site infrastructure development. After the evaluation of the bids, the private developer will be selected and awarded the project. It will then build and operate the. The selected private developer will receive the land as lease. The ownership of land will remain with the authority. The private developer then will sub-lease the plots to industrial tenants. After end of a pre-fixed term, the private developer will transfer the park to BEZA.

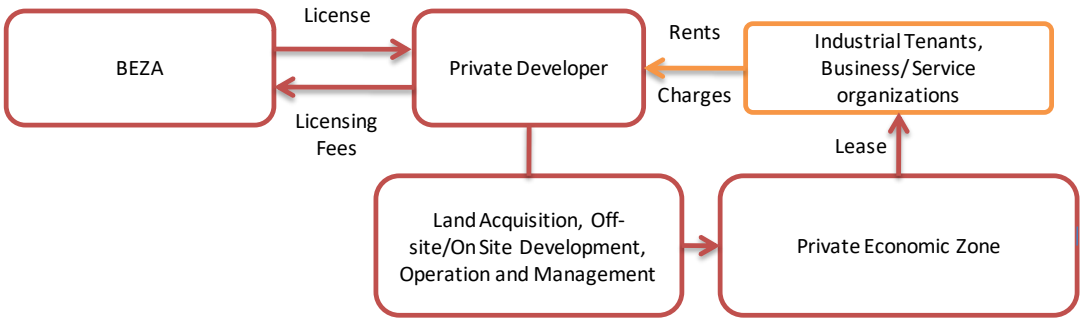
Figure 110: PPP Economic Zone Institutional Framework



10.2.2 Private Economic Zone

Private economic zones are established individually or jointly by local, non-resident Bangladeshis or foreign investor, body, business organization or groups. In this case, a private developer owns or purchases the land directly from land-owners and applies for license to the authority. After evaluating the application and supporting documents (feasibility study, EIA and SIA studies) the authority may issue license to the private developer. In such case, involvement of BEZA will be minimal except some broad facilitator role. In this option, the project may not be viable, as private sector needs to bear the burden of investment in land purchase as well. In this case, authorities control on the development and operation of the park will be minimum.

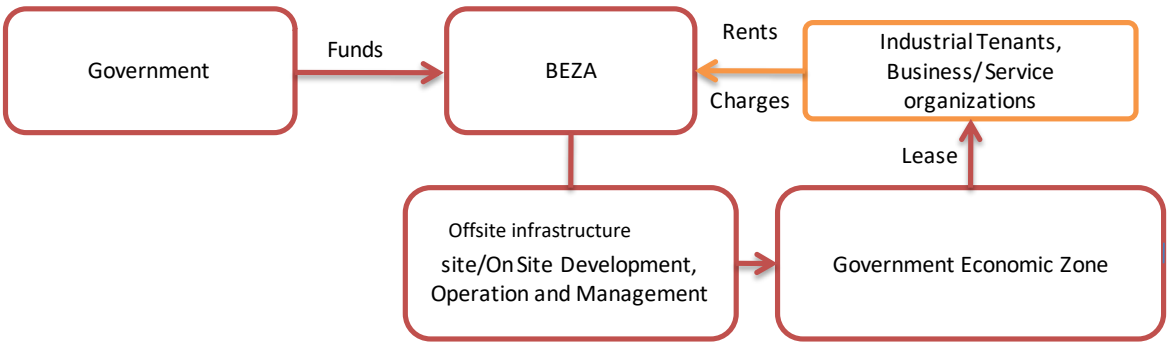
Figure 111: Private Economic Zone Institutional Framework



10.2.3 Government Economic Zone

Government economic zones are established and owned by the Government, i.e. BEZA. The authority will be fully involved in development, operation, and management of such economic zone. These types of economic zones are crucial to boost up the economy in such underdeveloped regions where general interests of private investors are bare minimum.

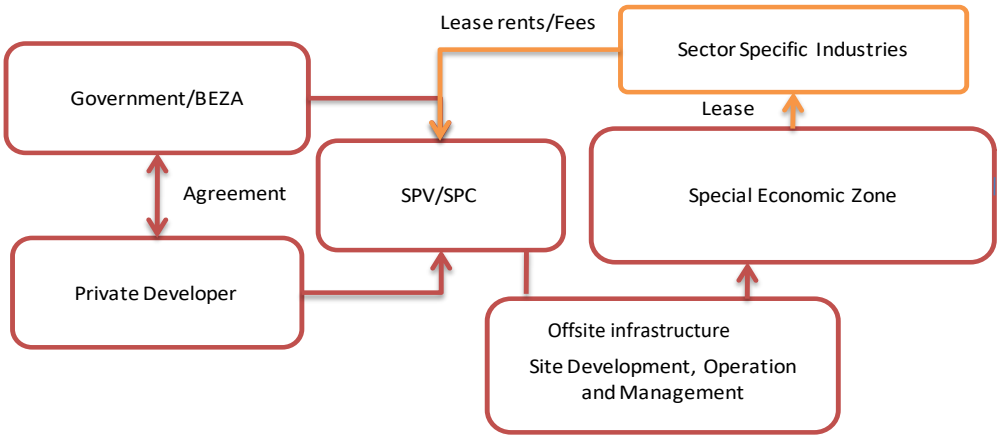
Figure 112: Government Economic Zone Institutional Framework



10.2.4 Special Economic Zone

Such zones are established privately by public private partnership or by the Government initiative, for establishing any kind of specialised industry or commercial organization. Examples of such zones may be IT SEZs, RMG SEZ, SME SEZs etc. These economic zones provide growth potential to selective sectors.

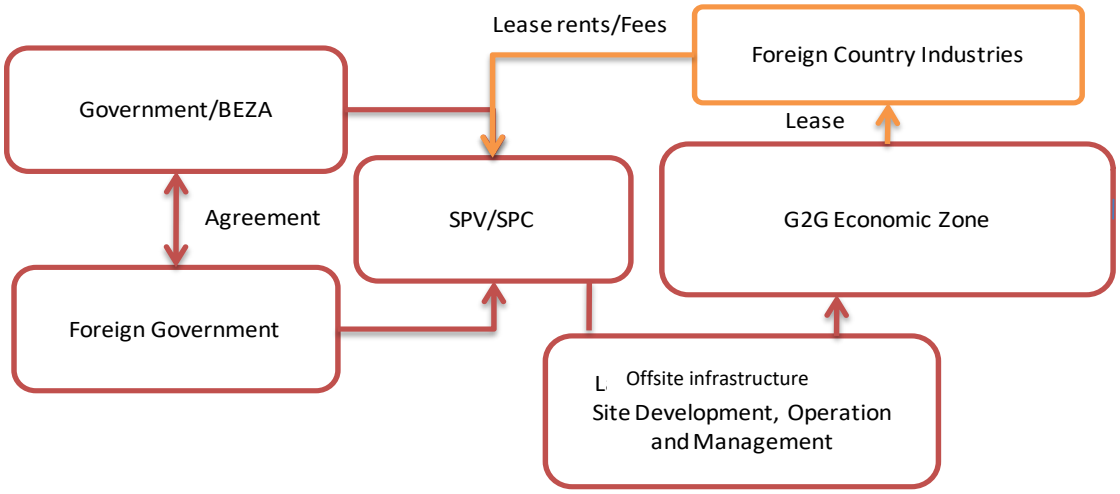
Figure 113: Special Economic Zone Institutional Framework



10.2.5 G2G Economic Zone

G2G economic zones are established upon initiative by the government of a foreign country of the Government of Bangladesh and/or in Partnership between Government of Bangladesh and Government of a foreign country. Chinese government has recently signed an MOU with BEZA for establishing a G2G economic Zone at Anowara, Chittagong.

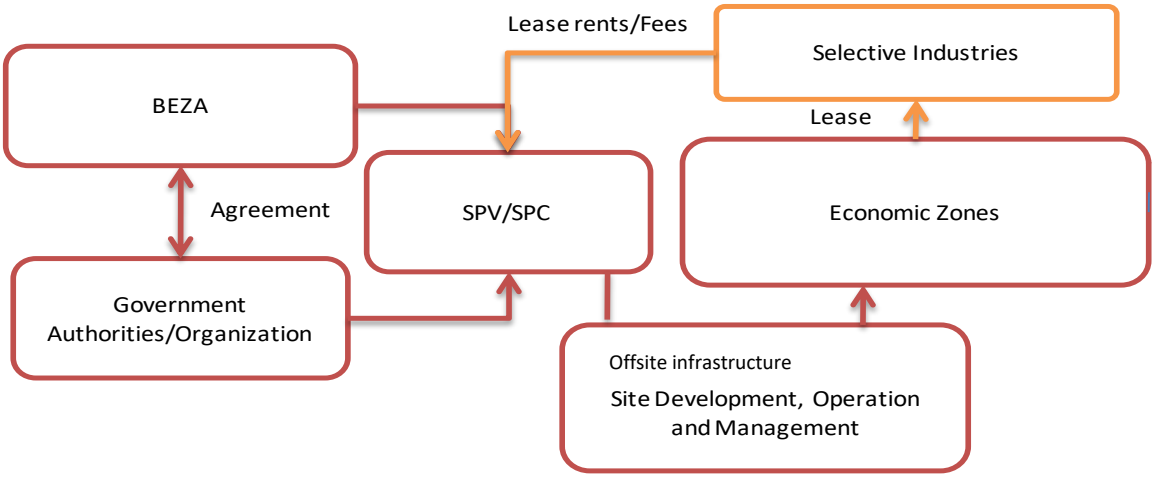
Figure 114: G2G Economic Zone Institutional Framework



10.2.6 Other Economic Zones

Such types of economic zones are established in collaboration with and/or partnership between Government Authorities or Organizations. For example, Bangladesh Hi-Tech Park Authority (BHTPA) may partner up with BEZA to establish an IT SEZ.

Figure 115: Other Economic Zones Institutional Framework



10.3 Comparison of Options

The options involve varying levels of public private participation and varying roles of each. The following table provides a comparison of options in terms of land acquisition/purchase and development and operation of the park:

Table 58: Comparison of Options

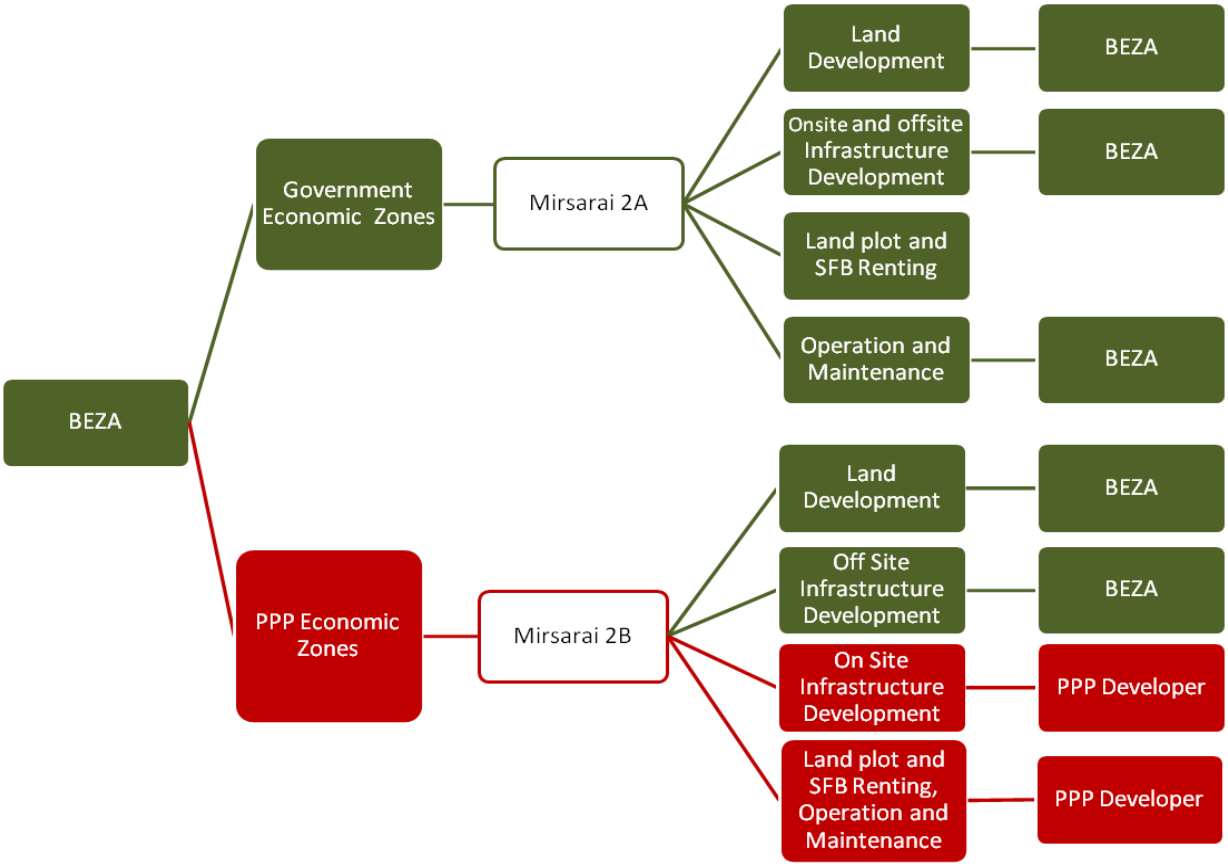
Options	Investment in Land Acquisition by	Off-site Infrastructure development by	On-Site Development by	Operation by
PPP Economic Zone	Government budget allocation or BEZA's own fund	BEZA	PPP Developer	PPP Developer
Private Economic Zone	Private Developer	Private Developer	Private Developer	Private Developer
Government Economic Zone	Government budget allocation or BEZA's own fund	BEZA	BEZA	BEZA
Special Economic Zone	Government budget allocation/BEZA's own fund/PPP Developer	BEZA	SPC	SPC
G2G Economic Zone	Foreign Government/BEZA	BEZA	SPC	SPC
Other Economic Zones	Government budget allocation or BEZA's own fund	BEZA/SPC	SPC	SPC

10.4 Institutional Framework for Mirsarai economic zone

Based on the available institutional options and consultations with the officials of BEZA, Mirsarai economic zone will be developed in following manner:

- Mirsarai 2A – Government Economic Zone
- Mirsarai 2B- PPP Economic Zone

Figure 116: Institutional Framework of Mirsarai economic zone



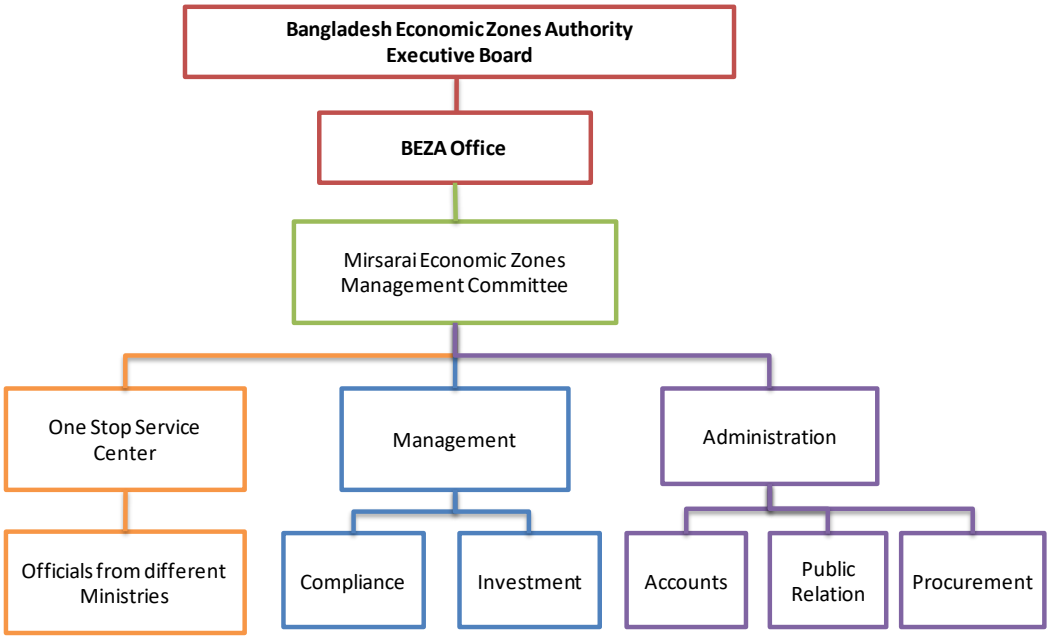
For Mirsarai 2B, BEZA will carry out the offsite infrastructure development including land development, access roads, embankments etc. The PPP developer will be responsible for onsite infrastructure development and operation and maintenance of the site.

For Mirsarai 2A, BEZA will also develop on-site infrastructure. Both party's duties and responsibilities will be governed through an agreement.

10.4.1 Management Framework

Mirsarai has the potential of becoming the largest Economic Zone site in Bangladesh. The Mirsarai-1 Economic Zone, Mirsarai 2a and Mirsarai 2b these are the initial phases of a much larger economic zone development plan in that region. BEZA has future expansion plans in that region. Considering the issue, there should be a centralized management for all the economic zones, present and future, for streamlined operation and management. Based on BEZA's organizational structure, following management framework is suitable for the zone.

Figure 117: Management Framework of Mirsarai economic zone



Mirsarai Economic Zones Management Committee (MEZMC) will be responsible for the overall operation, management and maintenance of the economic zones in that region. The committee will have following three sub committees/departments as follows:

1. One Stop Service Centre: Responsible for providing One Stop Service to each economic zone.
2. Management: Responsible for monitoring and evaluating legal, environmental, social compliances along with investment promotion and investment appraisals.
3. Administration: Responsible for carrying out and oversee accounts, public relation and procurement of goods and services.

10.4.2 Staff Profile for Mirsarai economic zone

A major factor contributing to the success of economic zone is the autonomy and effectiveness of the authority in charge of overseeing zone operations in areas such as staffing, control over budgets, funding, partnership with zone developers, and business facilitation services. Following table provides a guideline of the roles and responsibilities of the staff in MEZMC:

Table 59: Staff Roles and Responsibilities at MEZMC

Designation	Roles and Responsibilities:
Compliance Officer	• Develop, initiate, maintain, and revise policies and procedures for the general operation of the compliance officers (environmental, social, legal) and their related activities to

Designation	Roles and Responsibilities:
	prevent illegal, unethical, or improper conduct within the economic zone. • Develop and periodically review and update Standards of Conduct in providing guidance to management and employees. • Collaborate with other departments (e.g., OSS, Investment, Accounts) to direct compliance issues to appropriate existing channels for investigation and resolution. Consult with the legal advisor as needed to resolve difficult legal compliance issues. • Respond to alleged violations of rules, regulations, policies, procedures, and Standards of Conduct by evaluating or recommending the initiation of investigative procedures. Develops and oversees a system for uniform handling of such violations. • Act as an independent review and evaluation body to ensure that compliance Issues/concerns within the economic zones are being appropriately evaluated, investigated and resolved. • Identify potential areas of compliance vulnerability and risk; develop/implement corrective action plans for resolution of problematic issues, and provide general guidance on how to avoid or deal with similar situations in the future. • Provide reports on a regular basis, and as directed or requested, to keep the Management subcommittee of the MEZMC informed of the operation and progress of compliance efforts. • Ensure proper reporting of violations or potential violations to duly authorized enforcement agencies as appropriate and/or required. • Work with the administration sub-committee and others as appropriate to develop an effective compliance training program, including appropriate introductory training for new employees/workers as well as ongoing training for all employees/workers and managers.
Investment Officer	• Support the development of investment appraisal guidelines and quality standards for the operations function for Government economic zones, specifically initiate amendment of project appraisal processes to suit the changing business environment. • Guide investment officers in analyzing financial projections, budgets, and the investment evaluation process. • Carryout detailed analysis of all project proposals, interrogate all appraisal reports, examine adherence to governance requirements and other standards set by the Authority and monitor risk factors to ensure projects meet institutional standards. • Gather and analyze company financial statements, industry, regulatory and economic information to determine viability of proposed Government economic zone investment projects. • Prepare reports for Management subcommittee summarizing data, describing current and long term investment risks, economic influences pertinent to proposed investments and suitability of investment in view of the Authority's standard. • Develop and maintain contacts to gain market information, research and analyzes financial information to forecast business, industry, and economic conditions, for use in making investment decisions. • Interpret data concerning price, yield, stability, and future trends of investments and disseminate the information to investment officers and management. • Contribute to the enhancing of bilateral economic relations and promotion of investment opportunities between the Authority and potential local and foreign investors. • Provide advice and assistance to local and foreign industries about the local business environment and opportunities, and about political and economic developments that affect or change these.
Accounts Officer	• Monitor and coordinate the separate accounts for each individual zone developers/unit investors with regard to generation of revenue • Compile & record the revenue generation and maintain and monitor sources of revenue streams. • Carry out annual physical verification of assets and prepare physical verification report

Designation	Roles and Responsibilities:
	and submit to the administration subcommittee. • Prepare periodic reports and submit to administration subcommittee. • Carry out other required day to day accounting services with respect to the economic zones.
Public Relations Officer	• Handle all aspects of planned publicity campaigns and PR activities during periods of crisis. • Plan publicity strategies and campaigns • Writing and producing of presentations and press releases • Deal with enquiries from the public, the press, and related organisations • Organise promotional events such as press conferences, open days, exhibitions, tours and visits for internal and external officials • Speak publicly at interviews, press conferences and presentations • Provide potential investors with information about new promotional opportunities and current PR campaigns progress • Analyse media coverage • Commission or undertake relevant market research • Liaison with clients, managerial and journalistic staff about budgets, timescales and objectives • Design, write and/or produce presentations, press releases, articles, leaflets, 'in-house' journals, reports, publicity brochures, information for web sites and promotional videos.
Procurement Officer	• manage procurements of services and goods and ensure full compliance with internal policies and procedures and relevant laws and regulations • support Administration subcommittee and Compliance staff in managing contractual arrangements in place, including monitoring of performance reporting and activity as prescribed by the contract • manage business relationships with developers and unit investors, advising them of procurement and contracting options available to them to best meet their business requirements. • identify synergies and opportunities for procuring service across departments, developing integrated working through procurement to improve efficiency • manage relationships with potential investors and developers, and engaging with them to ensure that they are equipped to bid effectively for contracts and do business at Mirsarai economic zone. • ensure that all contracts are awarded in compliance with Government of Bangladesh public procurement regulations and/or world bank or other donor funds procurement procedures based on the source of the fund.

The OSS Centre will basically comprise of officials or representatives from different government organizations and will provide various services to speed up the investment or operation of the Economic Zones. All the subcommittees will be chaired by a coordinator who will oversee the roles and responsibilities and provide periodic report.

11 Economic and Financial Analysis

11.1 Economic Analysis

This section presents the assumptions and results of the economic analysis of the Economic zone. The purpose of the economic analysis is to quantify the impact of the Economic zone project on the Bangladesh economy. Similar to the financial analysis, it also estimates the return on investment albeit the return to the economy rather than the return to the Economic zone developer. The economic analysis is important to demonstrate the rationale for public sector involvement through investment in supporting the development of the Economic zone and to illustrate the nature and scale of the economic benefits of this involvement.

Since this is a small project (in terms of area coverage, capital investment) and given that large scale (on-site and/or off-site) infrastructure projects are not expected to flow from this project, it is accepted that the project would not have a large economy-wide impact. It can be assumed that the project would only have marginal impact on the economy (in as much as it would not result in any changes to relative prices in the economy) However, the project would help to overcome significant infrastructure constraints (such as access to reliable power) for industries in the participating industries and would lead to increased value addition in the relevant sectors.

11.1.1 Economic Rationale for the Project

The Economic zone is intended to expand employment opportunities and facilitate government by encouraging the growth of different industries, i,e. shipbuilding, petro chemical, pharmaceutical, RMG, Textile, LE/Automobile Parts, Food Processing. These industries provide critical inputs into other important sectors in the economy. Providing small businesses in these industries with reliable and high-quality infrastructure services will both improve their productivity and their ability to participate in local supply chains. Industries operating out of the Economic zone will not only benefit from better infrastructure but will also reap the full benefits of clustering and shared facilities. It is widely accepted that the how enterprises manage the process of mastering, adapting and improving upon existing technologies is the single most important determinant of industrial development.

However, because they are costly and take time to develop, firms will inherently under-invest in strengthening these activities, particularly industries whose resources are limited. Co-ordinated action is therefore very important in the development of more sophisticated industrial activities. Analyses of the East Asian experience of industrialisation have highlighted the importance of co-ordination across R&D, training and product development activities within selected sectors. An Economic zone for the different industries is an important step, not only to improving access to essential infrastructural services but also to improving the capabilities (technical, managerial, organisational) of participating firms.

11.1.2 Economic Analysis Methodology

Undertaking economic analysis requires the quantification of various costs and benefits in 'economic equivalent' terms. It also requires the identification of 'externalities' and the valuation of inputs and outputs at their true economic prices, or 'opportunity cost', i.e. their value in their best alternative use. This is true even if resources are obtained for free as its use is a cost to the economy. Financial analysis only looks at the project from the perspective of developer and is only concerned with items that entail monetary outlays. On the other hand, an economic analysis looks at the project's costs and benefits to the wider economy. Hence, all costs to the government are considered in the economic analysis. Some important aspects considered while undertaking economic analysis are:

1. Economic analysis is presented in **constant prices** in local currency terms after removing the impact of inflation. Thus, while accounting for economic costs and benefits, all costs and benefits must be

measured in 'real' terms. For the computation of the Economic Rate of Return (ERR), all costs and benefits were deflated and expressed in 2015-16 prices.

2. To undertake the economic analysis, financial costs were converted to their economic cost equivalents. Financial components include Capital Costs (land acquisition, development and construction cost, etc), and Operating Expenses.

3. Items such as taxes and duties, included in financial costs are excluded as these are market distortions.

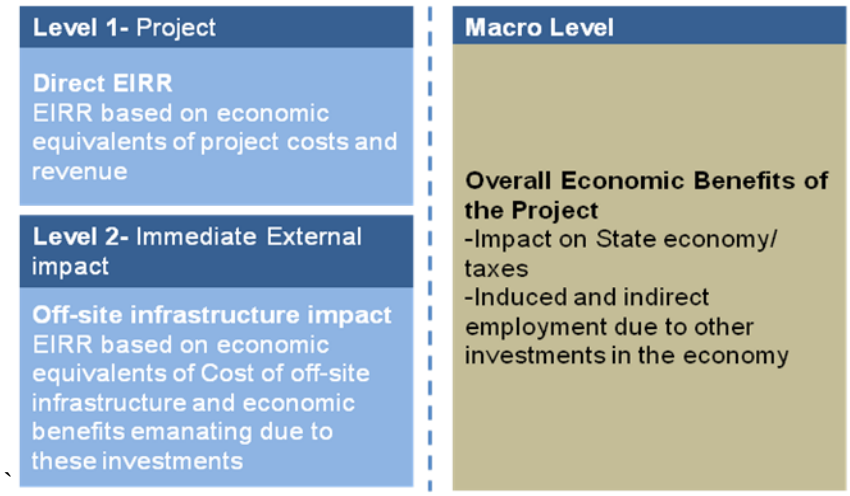
4. Debt service costs are not included as costs in an economic analysis as the interest payments do not entail the use of a resource. The economic analysis for the proposed Economic zone is undertaken at three levels:

• **Level 1:** Estimation of ERR by considering the economic equivalents of direct costs and benefits of the project. Benefits in terms of employment generation are also estimated.

• **Level 2:** Estimation of cost of off-site infrastructure and its impact on the economy. While data on the cost of off-site infrastructure is available, data on commensurate economic benefits that will accrue due to the provision of off-site infrastructure is not readily available. Hence, a description of economic benefits stemming from the project has been provided.

• **Level 3:** This level refers to an appraisal of economy-wide benefits of the project in terms of income and employment multipliers affects. Typically these effects are relevant when the project is relatively large. A description of various types of benefits has been provided. Figure 1 shows the overall approach and components of the economic analysis module.

Figure 96: Economic Analysis – Overall Approach



11.1.3 Economic Assumptions

The economic model for the project is developed taking into account economic costs and benefits stemming from the project over a time period of 25 years. The model draws its assumptions from, and is inter-linked with, the financial model developed for the project and discussed in this Chapter.

11.1.4 Cost related Assumptions

1. **Cost of Land:** The cost of land has not been considered as part of the project cost in the financial model. However, the cost of land is a cost to the economy and hence is considered towards economic cost in the economic model.

   While the land price available is based on the government rates in Bangladesh, it is widely recognized that the market price of the land tends to be around 50% higher than the recorded government rates in

Bangladesh. Hence, to convert the land cost to economic cost, a multiplication factor of 1.5 has been applied to the cost of land.

2. **Cost of Land Development, Boundary wall:** The cost of land development, boundary wall and other common zone facilities has been considered in the financial model as the cost is being incurred by the Government of Bangladesh. However, since this cost is being incurred at a cost to economy, this has been added to the economic cost.

4. **Capital Expenditure (capex)**: The capex incurred on various components has been provided in the financial model. This capex is segregated into three components:

   (a) Material: 50% of the total capex ,
   (b) Equipment: 40% of the total capex,
   (c) Labour: 10% of the total capex

5. **Operation and Management (O&M) Expenditure (Opex)**: The opex incurred on various components as provided in the financial model is also segregated into three components, in the following proportion:

   (a) Material: 10% of the total opex,
   (b) Equipment: 20% of the total opex,
   (c) Labour: 70% of the total opex.

Land lease expenses considered in the financial model as part of the opex have not been included since economic value of land has already been entirely considered in capex. Furthermore, capex and opex are converted to economic equivalent /market costs using following assumptions:

(a) **Cost adjusted for inflation effects** to get the 'real cost' of capital works. For this purpose the cost escalation factor of 15% considered in the financial model has been adjusted.

(b) **Standard Exchange Rate Factor**[117] (SERF) of 1.03 and **Shadow Wage Rate Factor**[118] (SWRF) of 0.75 has been considered based on Bangladesh Planning Commission information and previous ADB economic analysis reports for Bangladesh. These have been applied to tradable inputs and labour component to get domestic equivalents. It may be noted that since SERF is applied on the costs, factors such as the import duty is considered to be adjusted in the SERF and hence import duty is not considered separately.

6. **Project Management Cost**: The following costs incurred on account of project management, which are essentially cost of services, have also been added to the economic cost. a. Consultancy Fees for Feasibility Study: Tk 5 m b. Offsite Infrastructure Consultancy Fees: Tk 1 m c. Legal Support: Tk 15 m. These would be treated as equipment to convert to economic costs.

7. **Equipment:** It has been considered that around 75% of the equipment and machinery used for the project would be imported.

8. **Treatment of Tax**: Since tax, subsidies and incentives are distortionary in nature, their impact is required to be zeroed out by making necessary adjustments. On the 75% of the equipment that is imported, Shadow Exchange Rate Factor (SERF) has been applied that is the rate after adjusting for all distortions including trade restrictions, duty etc. Therefore, on this component after adjusting by SER, the import duty need not be reduced as it has already been taken into account while arriving at SER. On the domestic

[117] Shadow Exchange Rate (SER): The economic price of foreign currency used in the economic valuation of goods and services. Shadow Exchange Rate Factor (SERF): The ratio of economic price of foreign currency to its market price. Alternatively, the ratio of the shadow to the official exchange rate. For economic analysis using the domestic price numeraire, the SERF is applied to all outputs and inputs, including labour and land that have been valued at border price equivalent values, with project effects measured at domestic market price values left unadjusted.

[118] Shadow Wage Rate Factor (SWRF): The ratio of the shadow wage rate of a unit of a certain type of labor, measured in the appropriate numeraire , and the project wage for the same category of labor. Alternatively, the ratio of the economic and the SWRF can be used to convert the financial cost of labor into its economic cost.

component (25%) of the equipment, VAT or other applicable rates are reduced to convert to economic cost.

11.1.5 Economic Benefits-related Assumptions

1. **No. of Industrial units in the Economic zone and Phasing**: The total number of units means the number of industrial plots considered for Mirsarai 2A and 2B.
2. **Deadweight**[119]: This concerns the proportion of Economic Zone at the national level which would have happened anyway, irrespective of whether the proposed Economic zone went ahead. This has been considered as 10%. It is estimated that the deadweight is low as this is a unique project focused exclusively on industries and it is considered that many of the enterprises locating there would not originate, expand and develop but for the presence of the Economic zone.
3. **Displacement**: It is to be taken into account that all units established in the Economic zone would not be new (incremental), since some of the industries would probably relocate to the Economic zone to avail benefits of common infrastructure provided at the Economic zone. The market surveys shows that all the units interviewed have shown interest in moving to the Economic zone. Further, this facility will go towards meeting part of the supply deficit for good quality manufacturing facility but which will also entail a cost. Only those units that are focusing on relatively higher value addition may find it economical to shift to the new location. Therefore, marginal units will continue to operate from existing facilities. Therefore, it has been assumed that 60% of the units would be displaced and 40% of the units will be new units established in the Economic zone.
4. **Increase in productivity**: Since the project is providing common infrastructure facilities (Training Centre, Recreational Facilities, Commercial Facilities, and Residential Facilities) and captive power plant, CETP, it is envisaged that the project would overcome some of the key constraints faced by the industries which limit productivity. It is therefore envisaged that the industries, which will set up in Economic zone, would be able to achieve higher efficiencies and hence better productivity. It has been considered that better facilities at the Economic zone would lead to enhancement in the productivity by a minimum of 10%. Since this parameter will have a direct impact on the returns calculated, the output of the model would be sensitive to this factor. In order to capture this benefit, the following assumptions are made:

    a. **Industry Output**: This has been projected based on the survey results and an average output figure of Tk million per industry unit

    b. **Growth rate:** The GVA growth rate for manufacturing has been used as output growth rate. The GVA growth rate has been adjusted by GDP deflator of 5.4% to bring it down to real terms.

    c. **Value added:** The industry value add is calculated based on the output and growth rates as explained above. The productivity enhancement has been applied to the value add thus calculated, as below:

    - For relocated industries: Since these industries would have continued to produce even if this Economic zone project would not have happened, the entire value add of these industries has not been considered as economic benefit of the project. However, since the units would benefit from better infrastructure in the Economic zone and overcome critical constraints such as power, an incremental value add of 10% is considered for these industries.
    - For new industries: The industries that are assumed to be new, the entire 100% of the value add, plus productivity enhancement of 10%, as explained above is considered as benefit to the economy.

[119] Please note that the deadweight is applied to total number of industries, and the displacement is calculated on the remaining industries.

5. **Lease Rental**: The economic value generated due to lease of space for warehouses has been captured by applying the rates available for Dhaka Export Processing Zone, since these would have been the alternative rates where these units could have taken-up space in the absence of the Economic zone. The lease rentals are considered for new units only.

6. **Surplus Power availability**: Surplus power may be available from the Economic zone that can be supplied to the surrounding areas. The economic generation cost per unit of power is Taka 12.1 (based on previous industry reports). A USAID report on 'Economic Impact of Poor Power Quality on Industry' pegs the outage estimates to be $ 0.34 per unit (~24 Taka per unit) which has been used to arrive at the benefits of the surplus power. Based on the cost and benefit assumption, the economic benefit of this surplus power work out to the tune of Tk 28.53 m for Mirsarai 2A and Tk 11.62 m for Mirsarai 2B over a 20 year period.

7. **Economic Discount Rate** of 12% has been considered based on ADB's in-country discount rate for economic appraisal of social and infrastructural projects in Bangladesh.

11.1.6 Level 1: Economic Impact of the Project

The development and operation of the Economic zone would lead to economic value additions and subsequently an Economic Internal Rate of Return (EIRR). While this gets captured in the 'value added', an attempt has been made to estimate the total employment generation in terms of jobs created, as below:

Direct employment generated during operations of the Economic zone (permanent employment): The industry and employee forecast undertaken based on the market survey provides the total number of employees within the Economic zone. Deadweight and displacement factors are applied on the gross employment to arrive at net jobs generated. This has been calculated based on the total capital expenditure divided by the GVA for construction sector. *Construction sector GVA*[120] per capita is Tk. 650,520 million.

Net permanent and temporary employment has been estimated by adjusting deadweight and displacement, as below:

a. *Deadweight:* A proportion of the jobs at the national level would have happened anyway, irrespective of whether the proposed development went ahead. A deadweight of 25% has been assumed.

b. *Displacement:* It has been assumed that 60% of projected benefits would be delivered by construction activity that is displaced from elsewhere in Bangladesh.

Full Time Equivalent jobs: Convention in economic appraisals of this nature typically assumes that 10 person-years of employment can be taken as equivalent to one permanent full-time job created. On this basis, full time equivalent jobs have been projected.

Gross Indirect/ Induced employment: Estimation of induced and indirect employment generation during Economic zone construction and operations is based on Economic Multiplier Coefficient of 2.8 which is the International Labour Organisation (ILO) income multiplier. It may be noted that associated investments required for induced/indirect employment have not been considered or estimated.

Based on the economic costs and benefits quantified as above, the model provides as follows in the base case scenario:

Mirsarai 2A

EIRR	38%
Benefit-Cost Ratio	1.82
Total Employment	130,000

[120] Source: http://www.nationmaster.com/country-info/stats/Industry/Gross-value-added-by-construction#2012

Mirsarai 2B

EIRR	34%
Benefit Cost Ratio	3.89
Total Employment	92,000

11.1.7 Level 2: Impact of Development of Off-Site Infrastructure

Expenditure on development of off-site infrastructure would be incurred by relevant government departments. This cost for off-site infrastructure has been considered in the financial model. However, this is an economic cost that would be incurred for development by the Government of Bangladesh. There would also be associated economic benefits due to development of off-site infrastructure such as roads. Link roads developed for the project would lead to enhanced connectivity of the area to the main highway. It is typically seen that development of roads also has impact on the surrounding areas in terms of appreciation of land value.

Further, as estimated, there would be surplus power and water available from the Economic zone that could be supplied to the surrounding area. Better connectivity of the area along with off-site infrastructure such as laying of power lines, telecom infrastructure, and development of the Economic zone may give a spur to development of the surrounding area and increase investments in this area. Additional employment would be generated due to development of the area. In general, such developments in the area surrounding the Economic zone would lead to better quality of life for the population staying in this area and enhanced productivity of the work force from the surrounding area.

11.1.8 Level 3: Macro Level Economic Impacts

Macro level economic impacts would be in the nature of induced and indirect employment generated by the Economic zone. Since the project is comparatively small, and may not have large scale economic impacts, there would still be some induced effects. For one, since this is a unique project, it may lead to spin-off of similar projects for industry development in Bangladesh, leading to wider impacts in the future.

The expenditure of additional companies on goods, services and labour, would support additional economic activity throughout the country. In turn, this expenditure would support additional (indirect) jobs, and the salaries paid out to these workers will result in additional (induced) expenditure throughout the Bangladesh economy. Wider impacts such as access to labour markets could change for local firms (e.g. through related transport improvements), Improvements in access to more diverse of highly skilled labour markets (following investment in new training and educational facilities) can increase levels of productivity amongst local firms, and create employment opportunities for those living in Bangladesh by promoting accessibility to new labour markets.

Other wider impacts include economic development linkages though supplier linkages, business clusters, increased competitiveness of Bangladesh firms/ industries in linking up to the global value chains, workforce development and support to wider economic development activities. Indirect employment growth will arise locally through services and supplies to the construction process benefiting local suppliers of temporary building materials and sub-contractors of subsidiary construction tasks. Induced benefits will also arise as construction workers, and those employed in providing services to the construction process, will spend some of their incomes locally, and this will generate further local employment.

Following is the methodology, an introduction of core businesses and component businesses that would be generated from the economic zones with broad parameters. Business model and assumptions of the financial analysis are discussed in detail and the findings and results of the analysis are presented.

The financial analysis is based on information gathered from the demand forecast, conceptual master plan of the site and development costs based on similar costs across the country. Assumptions on operational costs, cost escalations and capital structure have been made for the financial analysis. The model was then used to assess the viability of the zone using three different demand forecast scenarios: the base case; the aggressive case; and the conservative case. For each scenario, the financial analysis indicates the internal rate of return (IRR) of the project and allows for sensitivity analysis on costs and other factors to see their effect on the IRR.

The financial analysis conducted is based upon Option A: Government Led Model for Mirsarai 2A and Option B: PPP Model for Mirsarai 2B.

11.2 Identification of Economic Zone Businesses

The financial model considers broadly two types of sub-businesses.

- Core/Main Business (designated as M1, M2, M3 etc)
- Component Businesses (designated as C1, C2, C3 etc)

The core business is leasing out land to different industries and rents collected from the floor space and other facilities of training center, recreational and commercial amenities.

The component businesses are premised on different sub-components of the project that have individual cost recoveries, such as power supply, electricity supply etc. The capital, O&M costs and revenues for the component business have been matched exactly so that the resulting tariffs do not have any element of cross subsidization.

11.2.1 Land Lease

The economic zones will lease out land to different industries and receive revenue. Assumptions and estimates have been made on the following major items for each zone with respect to land lease and zone-wide operation and maintenance:

1. Land Lease Tariff to be charged from the industrial units
   (The lease tariff covers the conservancy tax for cleaning, security, street lighting etc.)
2. Total leasable area
3. Total Capital Cost for construction of Boundary Wall, Admin Building, land filling etc.
4. O & M Expense (zone wide)
   - 4.1 Maintenance
   - 4.2 Salary and Allowances

It has been assumed that 95% of the leasable space will be taken up at full capacity. 5% of the leasable area is estimated to be transitional, i.e. in-between lease and unoccupied. The capital cost covers the cost for boundary wall, internal road, common zone facilities, etc.

11.2.2 Training Centre

One of the core businesses of the economic zones is to provide training center facilities, lease out spaces of training center and receive revenue. Assumptions and estimates have been made on the following major items for each zone with respect to operation and maintenance of training center:

1. Rental Tariff to be charged from the training center lessees
2. Total Floor Space of training center
3. Total Capital Cost for construction of the training center
4. O & M Expense for operating the training center
    - 4.1 Maintenance
    - 4.2 Salary and Allowance
    - 4.3 Land Rent
    - 4.4 Utilities

It has been assumed that 95% of the leasable space will be taken up at full capacity. 5% of the leasable area is estimated to be vacant for transition.

11.2.3 Recreational Facilities

Providing recreational facilities (more appropriately dedicated space for recreational facilities with equipment and logistics) to the workers and officers of the economic zone are one of the important responsibilities as seen by the international standards. Major assumptions that have been made with respect to operation and maintenance of recreational facilities are as follows:

1. Rent Tariff for space to be charged from users
3. Total Floor Space to be constructed for Recreational Facilities
3. Total Capital Cost for building the facilities
4. O & M Expense for operating the facilities
    - 4.1 Maintenance
    - 4.2 Salary and Allowance
    - 4.3 Land Rent
    - 4.4 Utilities

It has been assumed that 95% of the leasable space will be taken up at full capacity. 5% of the leasable area is estimated to be transitional, i.e. in-between lease or unoccupied.

11.2.4 Commercial Facilities

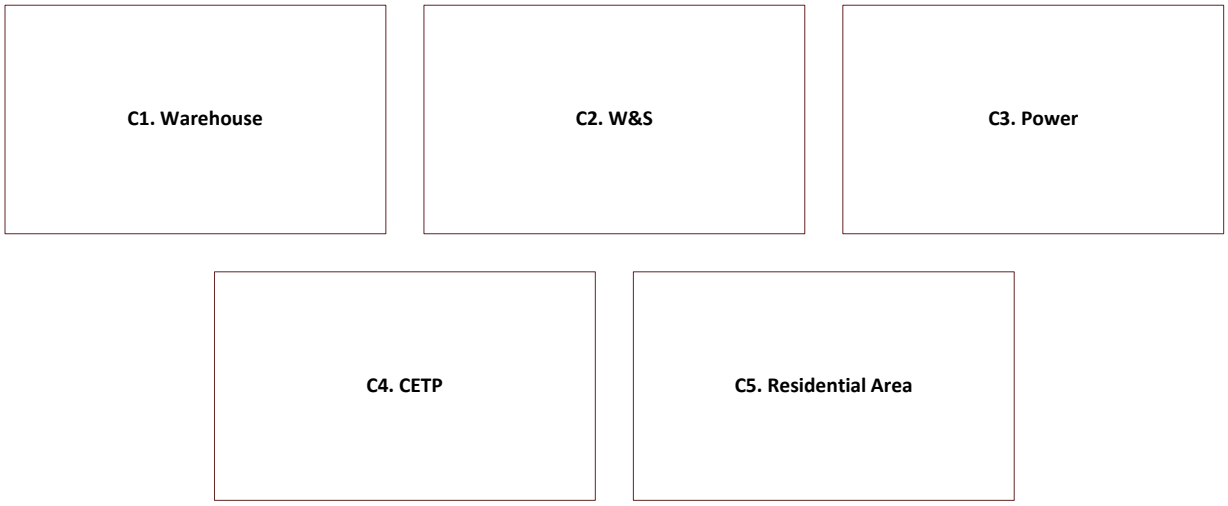
One of the main services of an economic zone is to lease out commercial facilities/spaces and possessions to the different vendors, shop owners, banks etc. Major assumptions and estimates made with respect to commercial facilities are as follows:

1. Rent Tariff
2. Total Floor Space
3. Total Capital Cost for constructing the commercial facilities
4. O & M Expense for maintaining the Commercial Facilities

4.1 Maintenance
4.2 Salary and Allowance
4.3 Land Lease Rent
4.4 Utilities

It has been assumed that 95% of the leasable space will be taken up at full capacity. 5% of the leasable area is estimated to be transitional, i.e. in-between lease or unoccupied.

The Economic Zone will earn substantial revenue from different facilities and services (component businesses) offered in the forms of charges for the use of warehouses, water supply, power, CETP and rent of residential areas. The CEPZ tariff rates have been applied in the component businesses for determining the overall tariff of the Economic Zone.



11.2.5 Warehouse

A component business of economic zone is to provide warehouse facilities to different industries. Major items on which assumptions have been made with respect to construction and operation and maintenance of warehouse facilities are as follows:

1. Rent Tariff for space in the warehouse
2. Total Floor Space of the warehouse
3. Total Capital Cost for constructing the warehouse
4. O & M Expense for operating and maintaining the facilities
    4.1 Maintenance
    4.2 Salary and Allowance
    4.3 Land Lease Rent
    4.4 Utilities

Rent for spaces of warehouse is based on the rates of CEPZ in the country. It has been assumed that 95% of the leasable space will be taken up at full capacity. 5% of the leasable area is estimated to be transitional, i.e. in-between lease or unoccupied.

11.2.6 Water and Sewerage System

Water and sewerage services may be treated as a Component business to determine the tariff rate for water & sewerage services to be charged to the industries. The Economic Zone will have rainwater harvesting,

install deep tube wells, underground reservoir, surface water reservoir, water treatment plant, overhead tank, pipeline for providing these services. The Economic Zone will also lay water and sewerage pipes and pumps, and also be responsible for operation and maintenance of the water and sewerage system. The Economic Zone will charge tariff to different industries for these services. The tariff will be charged based on the amount of water supplied (Taka / m3) to the industries. Major assumptions made for C3 are as follows:

1. W & S Charge (tariff to be charged from tenants)
3. Capacity of the system
3. Total Capital Cost for constructing the system
4. O & M Expense for running the system
    - 4.1 Maintenance
    - 4.2 Salary and Allowance
    - 4.3 Land Lease Rent
    - 4.4 Utilities

The tariff of Water and sewerage system is based on the rates of CEPZ in the country. The above facilities are for surface water and ground water, which can cover around 50% of total water requirement. Later sea water needs to be used through a desalination plant, which will be a separate facility and would be run by a separate entity.

11.2.7 Power

The Economic Zone is responsible for providing power connections to industrial enterprises to be located within the zone. Therefore, the Economic Zone has to either build its own power generation plant, or enter into an agreement with a third party to construct a power plant and supply power to the zone inside tenants/industries. Tariff (Tk/kWh) will be charged to the industries for the electricity supplied. There will two power plants; one for 2A and another for 2B.

Major assumptions and estimates have been made for C4 on the following items:

1. Power Tariff
2. Capacity of the Power Plant
3. Total Capital Cost for constructing the power plant
4. O & M Expense for running the power plant
    - 4.1 Maintenance
    - 4.2 Salary and Allowance
    - 4.3 Land Lease Rent
    - 4.4 Fuel and Utilities

The tariff of power is based on the rates of CEPZ in the country. The plants are not always operated at 100% load factor. The Plant Load Factor (PLF) has been considered as 50%.

11.2.8 CETP

Central Effluent Treatment may be treated as a Component project to determine the tariff rate to be charged to the industries for providing Effluent Treatment services. The tariff will be charged based on the amount of effluent treatment (Taka/m3) to the industries. The financial model contains major assumptions and estimates that have been made with respect to CETP for the following items:

1. Charge (tariff) for effluent treatment
2. Capacity of the CETP
3. Total Capital Cost for constructing the CETP

4. Operation and Maintenance Expense of CETP
    - 4.1 Maintenance
    - 4.2 Salary and Allowance
    - 4.3 Land Rent
    - 4.4 Utilities

The tariff of CETP system is based on the rates of CETP at CEPZ.

11.2.9 Residential Facilities

Residential facilities would add value with respect to suitability and attractiveness to locate industries in the economic zones. The economic zone after constructing the residential facilities may rent out the spaces and receive revenue. The financial model assumes and shows estimates for the following major parameters with respect to construction and operation of residential facilities:

1. Rent for housing (tariff)
2. Total Floor Space to be made available for housing
3. Total Capital Cost for construction of the residential facilities
4. Expense for maintaining the facilities
    - 4.1 Maintenance
    - 4.2 Salary and Allowance
    - 4.3 Land Lease Rent
    - 4.4 Utilities

It has been assumed that 95% of the leasable space will be taken up at full capacity. 5% of the leasable area is estimated to be transitional, i.e. in-between lease or unoccupied.

11.3 Term/Business Period

The business period over which the Economic Zone would receive a profitable return on his investment is very important. However, this would depend on the following factors:

- sources of capital and its repayment terms;
- economic life of major depreciable assets;
- revenue earnings;
- capability of the tenants/ buyers to pay the cost; and
- phasing of the Zone's infrastructure.

The financial model is prepared considering a period of 20 years, although law permits for 50 years lease period. From financial point of view, longer project period will not carry any significant impact on the results of the financial model. Moreover 50 years, a very long investment recovery period will eventually discourage the investors.

11.4 Capital Cost Estimates

Capital cost estimates are based on the premise that land development, land filling, external/ off-site infrastructure, which include connectivity infrastructure like road, gas or power outside the zone premises are borne by the government.

For Mirsarai 2A, the on-site infrastructure such as roads, utilities, warehouse etc. are also to be constructed by the government and included as its capital cost. The social infrastructure ensures proper living conditions of the people inside the zone, which includes administrative buildings, a clinic, a mosque, public toilets, a training center and commercial facilities. These are the part of capital cost but some of the social infrastructure like the mosque, clinic, etc. will not generate direct revenue. The capital cost also include the commercial facilities like shops, restaurants, banks, etc. are essential for day-to-day life of the tenants inside the Zone. Capital costs have been estimated both at the base year (2016) and subsequently at the point when they will be incurred with escalation during time elapsed:

Table 60: Capital Cost of Mirsarai 2A

		Rate, Tk per unit	Amount	Units	%	BEZA Tk m	Other Agencies Tk m
1. Land Development and Boundary Wall					**2%**		
1.1	Land Filling	217	4,900,000	cum	1.5%	1,064	
1.2	Boundary Wall	13,437	8,038	m	0.2%	108	
2. Off-site Infrastructure					**1.0%**		
2.1	Access Road	7,050	86,100	sqm	0.9%		607
2.2	Optical Fiber Cable		LS		0.1%		101
3. On-site Infrastructure					**65%**		
3.1	Common Facilities and Businesses						
	3.1.1 Internal Roads	7,707	309,994	sqm	3.5%	2,389	
	3.1.2 Other Common Zone Facilities	45,000	189,000	sqm	12.4%	8,562	
	3.1.3 Social Facilities	45,000	59,906	sqm	11.7%	8,100	
	3.1.4 Training Center	45,000	20,000	sqm	1.3%	900	
	3.1.5 Recreational Facilities	45,000	65,000	sqm	4.2%	2,925	
	3.1.6 Commercial Facilities	50,000	122,000	sqm	8.8%	6,100	
3.2	Component Businesses						
	3.2.1: C1. Warehouse	12,000	40,000	sqm	0.7%	480	
	3.2.2: C2. Water Supply and Sewerage System	Details in the assumption sheet			3%	2,043	
	3.2.3: C3. Power Supply System	Details in the assumption sheet			14%	9,766	
	3.2.4: Internal Gas Pipeline (to be borne by Industrial units)						
	3.2.5: C4. CETP	LS	27,891,621	cum	0.7%	450	
	3.2.6: C5. Residential Area	25,000	119,876	sqm	4.3%	2,997	
4. Project Preparatory Costs of BEZA					**0.0%**		
4.1	Consultancy Fees for Feasibility Study Offsite Infrastructure Consultancy	LS			0.01%	5	
4.2	Fees	LS			0.002%	1	
4.3	Legal Support	LS			0.02%	15	
Total					**68%**	**45,905**	**708**
5. Cost Escalation					**32.4%**	22,364	
Total Capital Cost Mirsarai 2A					**100%**	**68,269**	**708**

Table 61: Capital Cost of Mirsarai 2B

		Rate, Tk per unit	Amount	Units	%	BEZA Tk m	Other Agencies Tk m	Private Developer Tk m
1. Land Development and Boundary Wall					**1%**			
1.1	Land Filling	217	2,000,000	cum	1%	434		
1.2	Boundary Wall	11,972	6,116	m	0.2%	73		
2. Off-site Infrastructure					**1.2%**			
2.1	Access Road	7,050	57,000	sqm	1.0%		402	
2.2	Optical Fiber Cable			LS	0%		53	
3. On-site Infrastructure					**60%**			
3.1	Businesses							
	3.1.1 Internal Roads	7,671	215,737	sqm	4%			1,655
	3.1.2 Other Common Zone Facilities	45,576	99,000	sqm	11%			4,512
	3.1.3 Social Facilities	45,000	89,000	sqm	10%			4,005
	3.1.3 Training Center	45,000	60,000	sqm	7%			2,700
	3.1.4 Recreational Facilities	45,000	15,000	sqm	2%			675
	3.1.5 Commercial Facilities	45,000	89,000	sqm	10%			4,005
3.2	Component Businesses							
	3.2.1: C2. Warehouse	12,000	20,000	sqm	1%			240
	3.2.2: C3. Water Supply and Sewerage System	Details in the assumption sheet			0.3%			118
	3.2.3: C4. Power Supply System	Details in the assumption sheet			12%			4,703
	3.2.4: Internal Gas Pipeline (to be borne by Industrial							
	3.2.5: C5. CETP	LS	7,498,341	cum	0.66%			260
	3.2.6: C6. Residential Area	25,000	36,357	sqm	2.31%			909
4. Project Preparatory Costs of BEZA								
4.1	Consultancy Fees for Feasibility Study	LS			0.01%	5		
4.2	Offsite Infrastructure Consultancy Fees	LS			0.004%	1		
4.3	Legal Support	LS			0.04%	15		
Total					**63%**	**528**	**455**	**23,782**
5. Cost Escalation					**29%**	**44**	0	**11,584**
6. Interest During Construction					7.7%			**3,034**
Total Capital Cost of Mirsarai 2B					**100%**	**572**	**455**	**38,400**
							39,427	

11.5 Cost Escalation and Contingency

It is assumed that all costs are escalated from the time of their estimation to the time the cost is actually incurred at the rates shown in the following table:

Table 62: Cost Escalation Rates

	Cost Item	Escalation Rate (per year)	Comments
1.	Land Filling Cost Escalation	5%	Percentage adapted as per industry norms.
2.	Cost Escalation for Off-site infrastructure	15%	Average of Construction Material Price Indices and recent trend, Bangladesh Bureau of Statistics
3.	Cost Escalation for On-site infrastructure	15%	As above

11.6 Demand Forecast

The model has been used to assess the viability of developing the economic zone using three different demand forecast scenarios.

The three different scenarios analyzed are as follows:

Table 63: Time Required for Land Take-up

		Base Case	Optimistic Case	Conservative Case
1.	RMG, Food Processing, Led/ Automobile Parts, Textile, Shipbuilding industries	7 years	5 years	10 years
2.	Petro chemical and Pharmaceutical industries	10 years	7 years	15 years
3.	Commercial facilities, residential facilities, warehouse, and training centre	10 years	7 years	15 years

The above land take up rates have been taken in consideration of the following:

- **Investment Trends.** The demand forecast considers new company formation trends and viability of existing business enterprises as a way to establish a baseline upon which the demand estimations are based.
- **Relocation Trends.** The economic zone will be heavily marketed to attract companies wishing to relocate from city. As such, consultants explored these firms' stated willingness—and actual proclivity—to locate or relocate, external pressures to move, and analyzed the types of firms that would actually move.
- **Uptake Rates in Bangladesh.** The demand forecast reviewed actual land uptake rates of other economic zones in Bangladesh in support of high demand for serviced industrial space.

The details are shown in Section 5.3. For each scenario, the financial analysis indicates the internal rate of return (IRR) of the project and allows for sensitivity analysis on costs and other factors to see their effect on the IRR.

11.7 Identification of Revenues and Expenses

11.7.1 Revenues

The Economic Zone is expected to earn revenue from a number of sources. The financial model considered the following sources.

CRS activities were considered in the financial model, such as day care center, kinder garten school, secondary school, Textile College etc. Assumptions were made in the financial model that, the zone developers will outsource these facilities to third parties and receives yearly royalty from them.

11.7.2 Depreciation

Depreciation is a non-cash expense. Though it does not directly influence cash flow, it influences tax obligations from income of the business, by offering tax savings adding to depreciation. Depreciation like interest is a tax deductible item considered by the tax authorities.

Basis of Depreciation

The Income Tax Ordinance, 1984 allows deduction of depreciation of assets from the income of the particular year to determine the taxable income for that period. Section 29(1) (VII) and (IX) of the Income Tax Ordinance provides provisions for the following methods of depreciation:

(a) Normal Depreciation

(b) Accelerated Depreciation

The ordinance also provides prescribed rates of depreciation irrespective of actual life of the assets. Normal Depreciation method is used in the model. It is briefly described in the following section. The Income Tax Ordinance prescribes the depreciation schedule.

The "Normal Depreciation Method" is considered as base case for the financial model. The following table provides the prescribed rates for normal depreciation.

Table 7: Schedule for Normal Depreciation

	Types of Assets	Depreciable amount [121]
1.	Building (general)	10%
2.	Factory building	20%
3.	Furniture and fixture	10%
4.	Machinery and plant (general rate)	20%

Each year, depreciation has been charged by the above prescribed percentage on the written down value *i.e.* the value of asset less accumulated depreciation in the previous years. In accounting concept, it is referred to as declining balance method. Depreciation each year will be reduced as the same percentage as applied on a declining balance. This method of depreciation has been used in the financial model as the base case, as the depreciation is mainly calculated for determining taxable income and thereby tax to be paid.

According to S.R.O No. 227 and S.R.O No. 229 of Finance Act 2015, Developers of Economic Zone in Bangladesh will enjoy the following Income Tax Exemption

Duration of Tax Exemption	Rate of Tax Exemption
First Ten (10) year	100%
Eleventh (11) year	70%
Twelfth (12) year	30%

[121] As Percentage of written down value

As tax exemptions are already provided in the front-end of the years of operation, accelerated depreciation will not be beneficial as such, as that would not result any tax saving. Rather normal depreciation may result some tax saving for the developer at the back-end as this method will result some level of depreciation over the whole period of operation.

11.7.3 Operating Expenses

Each of the facilities developed and constructed by the Economic Zone has operational costs, which include salary and allowances of employees, maintenance costs, and utilities costs. In addition, the cost of fuel used in the power plant is also an operational cost. Maintenance costs associated with training centre, recreational facilities, and commercial facilities are based on the amount of revenue generated from each items. The O&M cost will be higher if the buildings are in full capacity and lower if not all leasable spaces are taken up.

Economic Zone will also operate and maintain 120 MW power generation units for 2A and 120 MW Power Plant for 2B. Fuel costs associated with running the power plant, operation and maintenance costs and salary of staff of the power plant has been estimated and incorporated in the model. Economic Zone will construct warehouse for storing products and raw materials. The O&M cost consists of the salaries of the personnel of the Economic Zone, the maintenance charges, the amount of lease for land required for warehouse and the electricity cost for it.

O & M Cost of W&S, CETP and residential area also considered. Maintenance of roads, sewerage system all have yearly operations and maintenance costs associated with them. Estimates on the amount of O&M cost has been made on the basis of investment. In addition to the internal infrastructure, there are also costs associated with the operations of the Zone such as landscaping, security, etc. All such costs have been incorporated in the model.

For O & M expense calculation of both main and component business, the salary and allowance is based on the latest rate (pay scale 2015) declared by the pay commission of Bangladesh. The allowance including medical, festival and New Year bonuses, house rent, conveyance, education for children etc.

Table 12: O &M Cost Escalation Estimates

Salary and Allowances Escalation Rate	5%	per yr
Land Lease Rate Escalation to Industrial Units	2.5%	per yr
Other O&M Expenses Escalation Rate	2.5%	per yr

11.7.4 Workers' Welfare Fund

As per Bangladesh Labour (amendment) Act 2013, zone developers will maintain a workers welfare fund for zone users. To maintain the fund, it is assumed in the financial model that the developer will yearly deposit 1% of net income to the fund.

11.7.5 Corporate Social Responsibilities

Corporate Social Responsibility (CSR) activities has been considered in the financial model, such as day care center, kinder garten school, secondary school, Textile College etc. Assumptions were made in the financial model that, the zone developers will outsource these facilities to third parties and receives yearly royalty from them.

11.8 Return from the Project

The internal rate of return (IRR) on a project is the annualized effective compounded return rate or discount rate that makes the net present value of all cash flows from the project equal to zero. Internal rates of return gives an indication on the desirability of investments or projects. The higher a project's IRR, the more desirable it is to undertake the project. Amongst other factors, returns depend upon tariff rates. The following tariff rates have been assumed:

Table 64: Assumed Tariff Rates – Mirsarai 2A

			Unit	Comparison		Unit
1.1 M1. Land Lease Charge	Mirsarai 2A	2.20	$/sqm/yr	CEPZ Charge	2.20	$/sqm/yr
1.5 C2. Power	Mirsarai 2A	8.06	Tk/kWh	CEPZ Charge	8.06	Tk/kWh
1.6 C3. Water and Sewerage	Mirsarai 2A	24.74	Tk/m3	CEPZ Charge	24.74	Tk/m3
1.4 C1. Warehouse	Mirsarai 2A	2.75	$/sqm/yr	CEPZ Charge	2.75	$/sqm/yr
1.5 C4. CETP	Mirsarai 2A	23.25	Tk/m3	CETP at CEPZ	23.25	Tk/m3
1.6 C5: Residential Facilities	Mirsarai 2A	2,500	Tk/sqm/yr	Rates in Chittagong	2,500	Tk/sqm/yr
1.7 M2. Rent of Training Center	Mirsarai 2A	3,500	Tk/sqm/yr	Rates in Chittagong	3,500	Tk/sqm/yr
1.8 M3. Rent of Recreational Facilities	Mirsarai 2A	3,500	Tk/sqm/yr	Rates in Chittagong	3,500	Tk/sqm/yr
1.9 M4. Rent of Commercial Facilities	Mirsarai 2A	3,500	Tk/sqm/yr	Rates in Chittagong	3,500	Tk/sqm/yr

Table 65: Return from Mirsarai 2A

Output	
Equity IRR	**27%**
Project IRR	**27%**
Equity Payback Period (years)	**8**
Project Payback Period (years)	**8**

Table 66: Assumed Tariff Rates – Mirsarai 2B[122]

			Unit	Comparison		Unit
1.1 M1. Land Lease Charge	Mirsarai 2B	2.20	$/sqm/yr	CEPZ Charge	2.20	$/sqm/yr
1.2 C4. Power	Mirsarai 2B	8.06	Tk/kWh	CEPZ Charge	8.06	Tk/kWh
1.3 C3. Water and Sewerage	Mirsarai 2B	24.74	Tk/m3	CEPZ Charge	24.74	Tk/m3
1.5 C2. Warehouse	Mirsarai 2B	2.75	$/sqm/yr	CEPZ Charge	2.75	$/sqm/yr
1.6 C5. CETP	Mirsarai 2B	23.25	Tk/m3	CETP at CEPZ	23.25	Tk/m3
1.7 C6: Residential Facilities	Mirsarai 2B	2,500	Tk/sqm/yr	Rates in Chittagong	2,500	Tk/sqm/yr
1.8 M2. Rent of Training Center	Mirsarai 2B	3,500	Tk/sqm/yr	Rates in Chittagong	3,500	Tk/sqm/yr
1.9 M3. Rent of Recreational Facilities	Mirsarai 2B	3,500	Tk/sqm/yr	Rates in Chittagong	3,500	Tk/sqm/yr
2.0 M4. Rent of Commercial Facilities	Mirsarai 2B	3,500	Tk/sqm/yr	Rates in Chittagong	3,500	Tk/sqm/yr

[122] Rates for residential facilities, training center, recreational and commercial facilities for Mirsarai 2B is assumed to be higher due to better quality of service by the developer

Table 67: Return from Mirsarai 2B

Output	
Equity IRR (after tax)	34%
Project IRR (after tax)	22%
DSCR	
Average	2.9
Maximum	4.17
Minimum	0.91

The equity IRR of the project is calculated from the projected cash flow to equity. Scenario analysis of different options demonstrates that the difference in financial indicators in the base case and optimistic case is not very high. Therefore, the financial health of the project is not very highly dependent on the rate of space take-up in the zone but in other factors such as lease rates, capital cost, etc.

Table 68: Scenario Analysis for Mirsarai 2A

Equity IRR		
Base Case	*1*	**27%**
Aggressive Case	*2*	31%
Conservative Case	*3*	22%
Project IRR		
Base Case	*1*	**26.6%**
Aggressive Case	*2*	30.8%
Conservative Case	*3*	22.2%
Equity Payback Period		
Base Case	*1*	**8**
Aggressive Case	*2*	7
Conservative Case	*3*	10
Project Payback Period		
Base Case	*1*	**8**
Aggressive Case	*2*	7
Conservative Case	*3*	10

Table 69: Scenario Analysis for Mirsarai 2B

Equity IRR		
Base Case	*1*	**34.3%**
Aggressive Case	*2*	44.7%
Conservative Case	*3*	26.0%
Project IRR		
Base Case	*1*	**22.1%**
Aggressive Case	*2*	25.6%
Conservative Case	*3*	18.8%
Equity Payback Period		
Base Case	*1*	**8**
Aggressive Case	*2*	6
Conservative Case	*3*	9
Project Payback Period		
Base Case	*1*	**8**
Aggressive Case	*2*	7
Conservative Case	*3*	9

11.9 Sensitivity

Various factors affect the equity IRR of the Economic Zone project. In order to understand the importance of each factor in determining the viability of the project, it is important to carry out a sensitivity analysis. The following factors have significant effect on the equity IRR:

- Capital Cost;
- O&M Cost;
- Lease Rate

Each of the above factors was varied by 10% in both directions and the effects on the equity IRR were observed.

Table 70: Sensitivity to Equity IRR for Mirsarai 2A

	-25%	-20%	-10%	0%	10%	20%
Capital Cost		30.8%	28.5%	27%	24.9%	23.4%
O&M Cost		26.8%	26.7%	27%	26.4%	26.3%
Lease Rate		22.6%	24.6%	27%	28.4%	30.1%

Table 71: Sensitivity to Equity IRR for Mirsarai 2B

	-25%	-20%	-10%	0%	10%	20%
Capital Cost		39.7%	36.8%	34.3%	32.0%	30.0%
O&M Cost		34.7%	34.5%	34.3%	34.0%	33.8%
Lease Rate		27.4%	30.9%	34.3%	37.4%	40.5%