

SIRAJGANJ ECONOMIC ZONE LIMITED

Environmental and Social Impact Assessment (ESIA) Draft Report Annexure (Part 4)



SIRAJGANJ
ECONOMIC ZONE
NESTING INNOVATION AND INVESTMENT

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Annex L: Climate Change and GHG Emission Assessment of SEZ

L.1 Introduction

EQMS has studied a brief overview of the critical future climate risks related to the Sirajganj Economic Zone project in Bangladesh. The study reviews the climate change context within which the different types of industries will be located in relation to existing extreme weather and climate change related risks based on publicly available data and information from the existing environmental and social impact assessment (ESIA) particularly in relation to project design and water.

The study provides a high-level assessment of the physical risks facing the development such as water availability, floods, storms etc. referring specifically to the potential impacts on EZ area. It identifies high level mitigation measures which could be implemented in order to reduce the risk or take advantage of opportunities facing the SEZ in Bangladesh. The remainder of this report is structured as follows:

- Section 2 provides a brief overview of the project to provide context for the remainder of the report
- Section 3 gives details of the geographical context in which the project is being developed in relation to the Jamuna River and the regional climate in the past.
- Section 4 analyses how climate change might impact the region and identifies the particular risks (at a high level) facing the SEZL
- Section 5 summarizes the key risks identified.

L.2 Project Overview

L.2.1 Geographical Context

Significant Geographical Features

The Jamuna River

The site lies on the banks of the Jamuna River which is a tributary of the Brahmaputra. It originates in the Tibetan plateau as the Tsangpo River, before turning south through the Eastern States of India in the Assam Valley, and then into Bangladesh where it confluences with the Teesta, becoming the Jamuna. Eventually the river reaches the Ganges in central Bangladesh.

The Jamuna is a very dynamic braided river, with channel development and abandonment a commonly observed phenomenon. The main river channel runs 1.5 km to the east of the project site; however, a connecting channel runs within the project area. During monsoon, this channel has been connected with the main branch, but in dry season the river gets dissected from the main branch due to siltation¹.

¹ Information from local people and also ESIA report of S4 Unit, Sirajganj; Annex T, Page-4

Himalayan snow melt and deglaciation provide ~25% of the runoff to the Brahmaputra River, although this varies considerably depending on seasonal variation during the year².

The lowest level of discharge is typically during the December to April period (as illustrated in) with the lowest water level of around 5000. Peak discharge is typically towards the end of the monsoon season in August and September when the highest water level is around 15m [above mean sea level].

River water temperature varies from 26.7 – 26.8°C on the surface³.

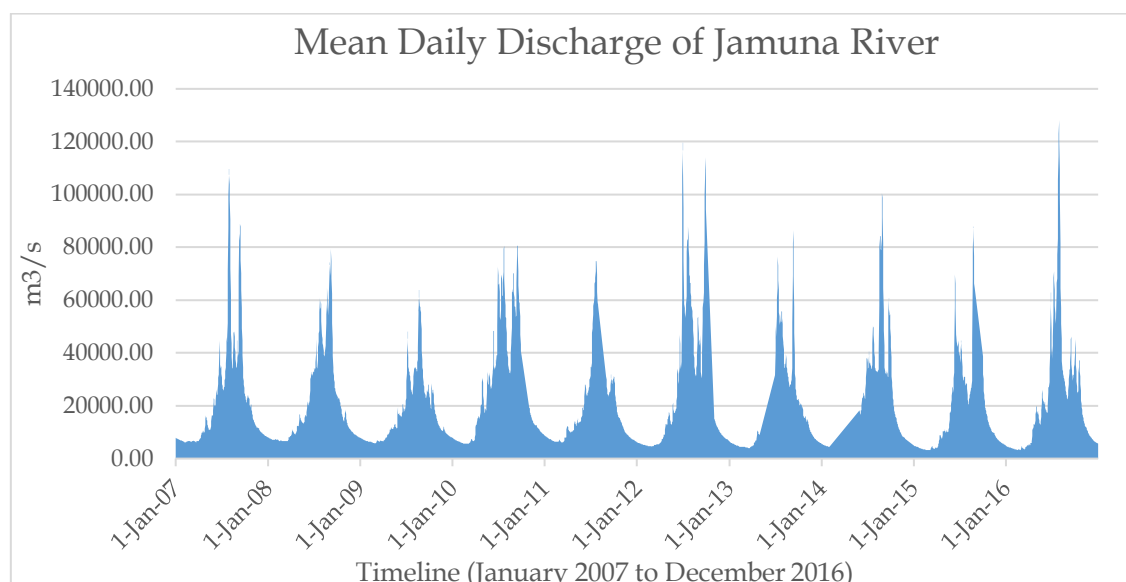


Figure L 1: Mean Daily Discharge of Jamuna River at Bahadurabad Ghat

Tidal influences

The Brahmaputra is a tidal river, with the lower portion receiving the direct effects of tidal conditions. It is one of the world's few 'tidal bore' rivers, meaning it is susceptible to leading waves, produced from extreme weather conditions (e.g. cyclone related storm surges) or tsunami, heading inland from the Bay of Bengal against the current of the river through the country's low lying delta.

The tidal and salinity limits of the Brahmaputra, during the dry season, reach approximately as far inland as the confluence between the Padma and the Jamuna rivers.

The Jamuna River branch does not typically experience the effects of these tidal bore events, being beyond the river's tidal limit during the dry season. No information has been identified as to if, and how often, particularly high tides combined with storm surges or tsunamis might result in shift of the tidal limit upstream of Sirajganj in the past or in the future.

² Lutz and Immerzeel, 2013.

³ Data sourced from ESIA documentation
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L.3 Current National and Local Climate

L.3.1 Overview

Bangladesh has a subtropical monsoon climate characterized by wide seasonal variations in rainfall, high temperatures and humidity. The country has three clearly identifiable seasons: a hot, humid summer from March to June, a cool, rainy monsoon season from June to October and a cool, dry winter from October to March. Sirajganj has a typical profile for the country.

The country's climate is notable for its intense cyclones, which develop over the Bay of Bengal. These typically occur during April and May and between September and November.

L.3.2 Temperature

Bangladesh has generally warm weather throughout the year. At Sirajganj, the coolest average month is January with an average maximum temperature of 25 °C and the warmest months are around April and May with an average maximum temperature of 34.1 – 34.4 °C as illustrated in Figure K2.

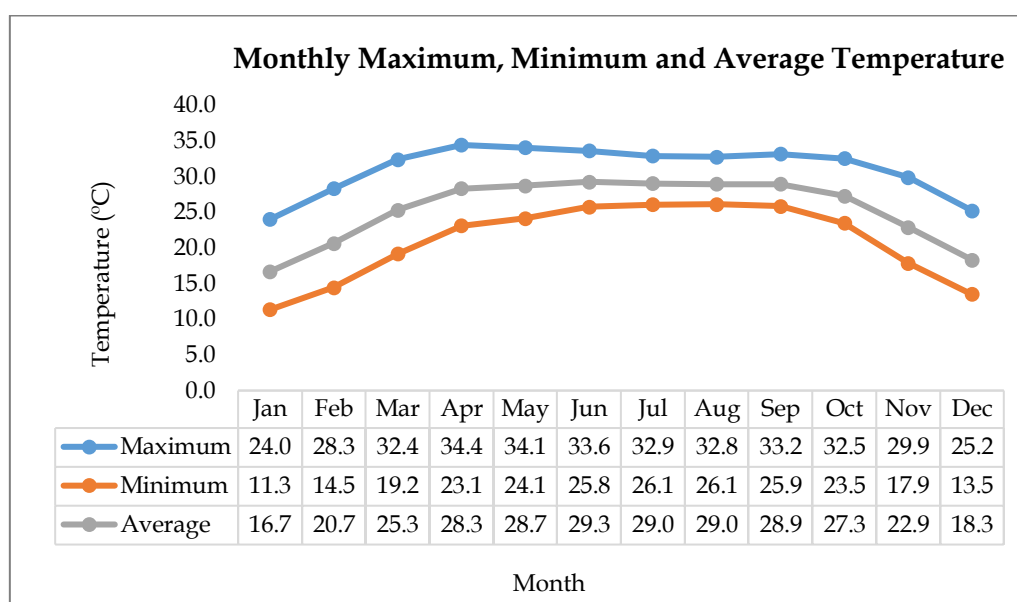


Figure L 2: Monthly Temperature Pattern in the Study Area⁴

L.3.3 Precipitation

Bangladesh receives the majority of its rainfall during the monsoon period and most parts of the country receive over 2,000 mm of rain per year. At Sirajganj, around 70% of the annual rainfall is received during the monsoon in June, July and August as illustrated in Figure K3. Mean rainfall across the country has decreased by 1.1mm per month per decade between 1960 and 2003, although there has been an increase in rainfall during the monsoon periods.

⁴ Data sourced from ESIA documentation
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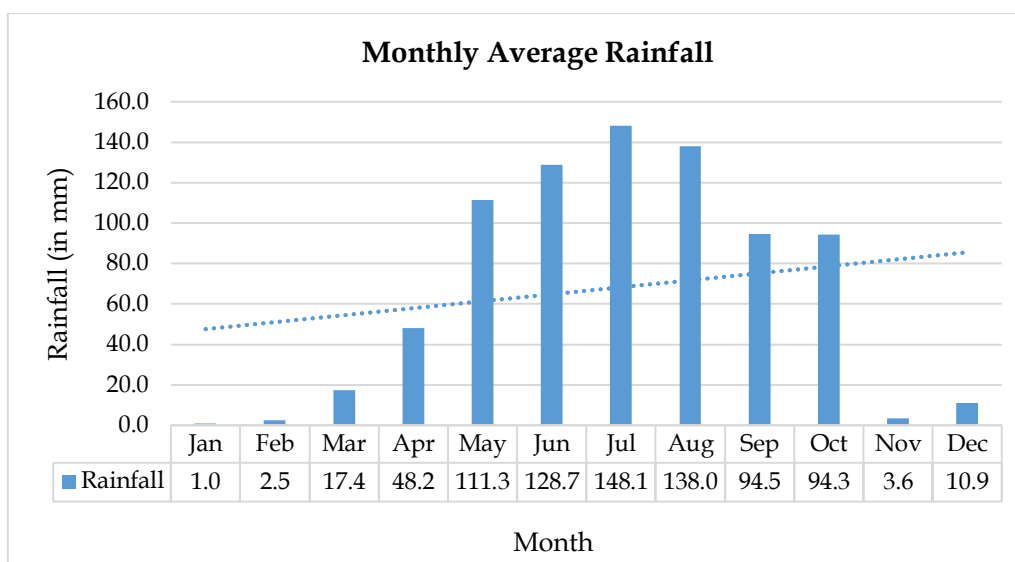


Figure L 3: Monthly average rainfall in the Study Area⁵

L.3.4 Tropical Cyclones

There is a significant risk of cyclones across much of Bangladesh, with the greatest severity and frequency experienced in the south of the country.

Figure L 4 illustrates the path of cyclones across the country, displaying a general direction of travel from south west to east.

There is a far greater concentration in the south of the country compared to the center and north.

⁵ Data sourced from ESIA documentation
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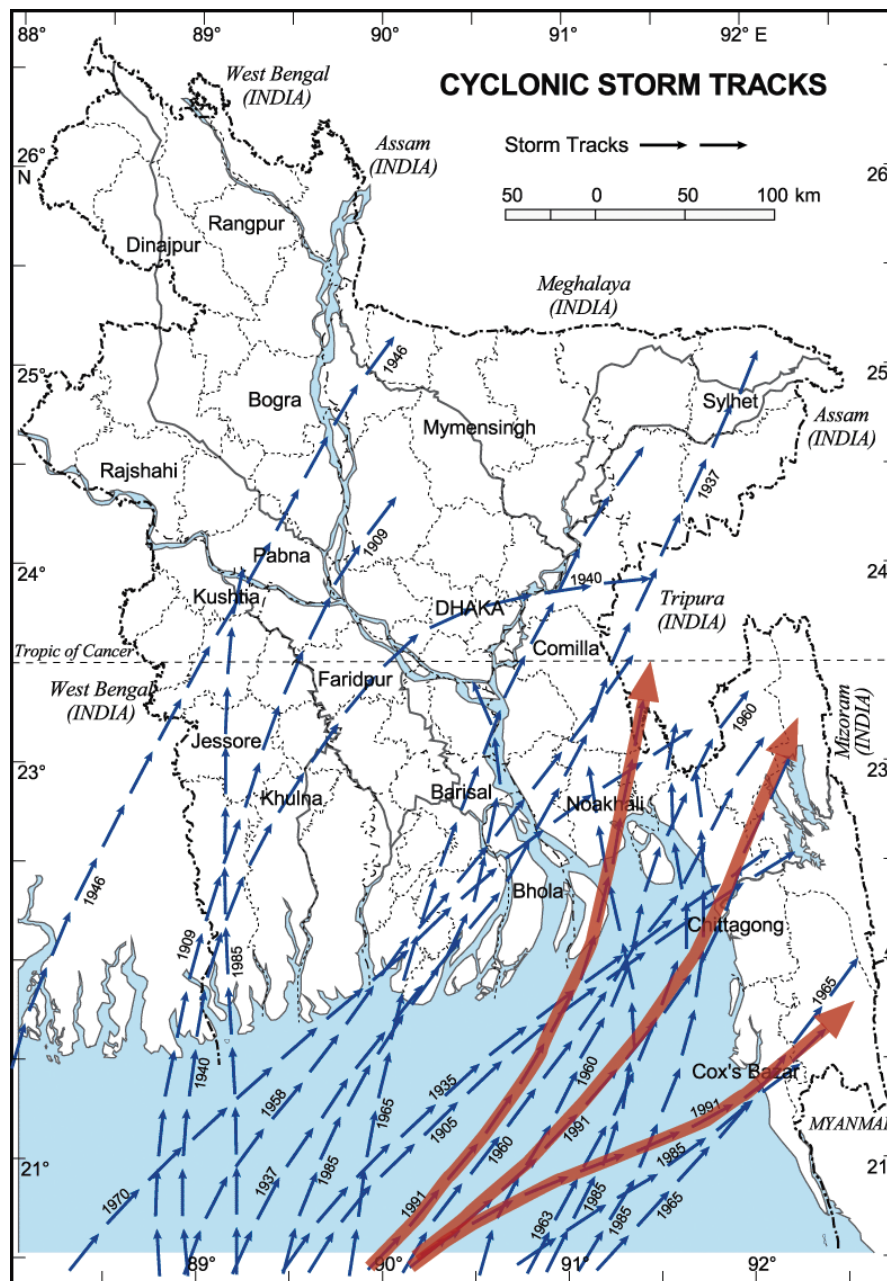


Figure L 4: Cyclone Storm Tracks over Bangladesh⁶

L.3.5 Flooding

Large parts of Bangladesh are low lying and flood regularly. Flooding due to unmanageable flow of the river is a major risk along the banks of the Jamuna. The site upon which the Sirajganj plant will be developed sites within the flood plain and has been raised by 4 – 5m in order for ground level to be around one metre above the 200-year high water level return period. The project specification indicates that this is in addition to concrete placed at the perimeter of the site to prevent water ingress.⁷

⁶ <https://people.uwec.edu/jolhm/EH2/Molnar/images/path.png>

⁷ ESIA Report of S4 Unit of Sirajganj; Annex T: Page - 8
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L.4 Climate Change Impact Assessment

L.4.1 Overview

The investigation of future climate change involves assessment of a range of different indicators modelled as part of the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report published in 2013. The assessment looks at projected change for the year 2050 for two future emission scenarios, RCP 4.5 and RCP 8.5. These consider variations on the same factors, including different emissions pathways, adaptation approaches and projected patterns of climate.

- RCP 4.5 is consistent with a future with relatively ambitious emissions reductions.
- RCP 8.5 is a high emissions scenario, consistent with a future with no policy changes to reduce emissions, and characterized by increasing greenhouse gas emissions that lead to high greenhouse gas concentrations over time.

Emissions scenarios describe future releases of greenhouse gases, aerosols, and other pollutants into the atmosphere and provide inputs to climate models. Representative Concentration Pathways (RCP) are consistent sets of projections of components of radiative forcing, i.e. the change in the balance between incoming and outgoing radiation to the atmosphere caused primarily by changes in atmospheric composition, that are meant to serve as input for climate modelling. In addition, for this study EQMS has used information from the United Nations Development Programme (UNDP) on extreme events. Further sources have included reports from the International Centre for Integrated Mountain Development and the Asian Development Bank (ADB). The remainder of this section looks at how the climate is projected to change under future scenarios and the potential impact this may have on the Sirajganj Economic Zone. It should be noted that this is a very high level study of publically available information and has not included any detailed site specific modelling. Recommendations have however been provided for further work for those impacts identified as potentially significant risks to the project.

L.4.2 Temperature

Air temperatures

The mean surface ambient air temperature in Bangladesh has increased by approximately 0.4°C since 1960, with the number of hot days per year⁸ increasing by 26 between 1960 and 2003.⁹ According to UNDP data, mean annual temperatures at the site are projected to increase between 0.9 and 2.6 °C by the 2060s.¹⁰ Projections demonstrate that the average annual rise in temperature is expected to be fairly consistent throughout the year, suggesting that temperatures might hit an average annual mean of between 35.9 and 37.6 °C during April – the month with the warmest annual high temperatures.

⁸ Hot days are defined as the annual count of days with at least 6 consecutive days when the temperature was above the 90th percentile for that day of the year. The 90th percentile values come from the statistics of the base period (1961-1990).

⁹ Karmalkar et al, 2010.

¹⁰ Ibid

For the economic zone, the impact of the temperature is currently unknown as the number of proposed industry cannot be fixed right now. So, after starting the operation phase a study related to temperature will be done based on the industries and also of its associated facilities. Cumulative study like to be done by the SEZL. But in general, considering the state of the other industries of Bangladesh, there will be no such direct effect of extreme temperature events on industries activities. There might be some indirect effects of extreme temperature which are:

- reduce of agro-processing production due to impact of temperature on agricultural activities;
- impact on lifestyle of the people related to SEZ;
- Impact on economic condition of the surrounding people.

L.4.3 Precipitation and Water Availability

Rainfall

Average rainfall is projected to increase most significantly during the summer monsoon months and to decrease slightly during the dry winter months as illustrated in **Figure L 3**. The overall impact of this on streamflow is expected to be minimal, as discussed in Section 0 below.

Under RCP 8.5, extreme precipitation events are projected to become more intense with an increase in the quantity of rain falling over a 24-hour period and over five consecutive days. In addition, the intensity of the most extreme events (i.e., 1:20 and 1:100-year return periods) is projected to increase¹¹. This suggests that the level of a 1:100-year flood could increase or that events of the current magnitude will occur more frequently. The same would be true for 1:200-year events.

Stream flow

Projections of how climate change may impact both the proportion of overall river runoff and the total quantity in the Brahmaputra river basin are uncertain. **Figure L 6** shows projected changes in glacier area for the Brahmaputra basin, displaying an expected decrease in the overall quantity of runoff from glaciers under any future scenario (with a reference of 2007, looking out to 2050).

However, the IPCC generally projects the conditions in Bangladesh will be warmer and wetter suggesting that the reduction in glacial area could be around 60% from 2007 to 2050.

¹¹ IPCC AR5, 2013
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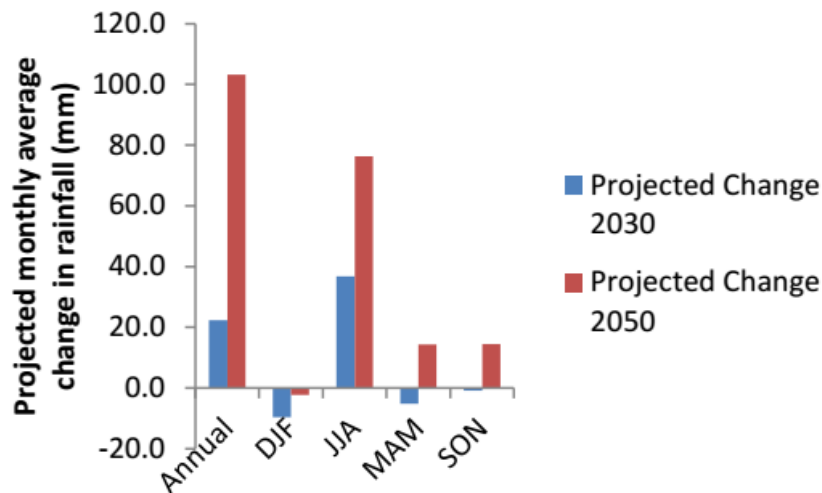


Figure L 5: Projected change in precipitation under RCP8.5 for 2030 and 2050¹²

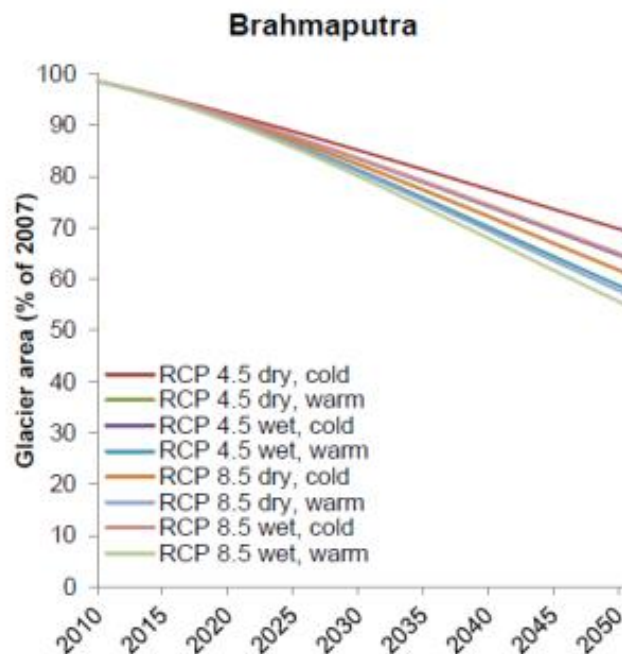


Figure L 6: Projected Changes in Glacier Area for the Brahmaputra Basin¹³

Figure L 7 illustrates changes in discharge for the Brahmaputra from Himalayan sources under RCP 4.5 and 8.5 for 2041-2050 with respect to 1998- 2007. It indicates that the contribution to streamflow is highest during the cooler dryer periods likely as a result of warmer temperatures increasing snow melt and deglaciation.

¹² Source: IPCC AR5, 2013

¹³ Source: Lutz and Immerzeel, 2013

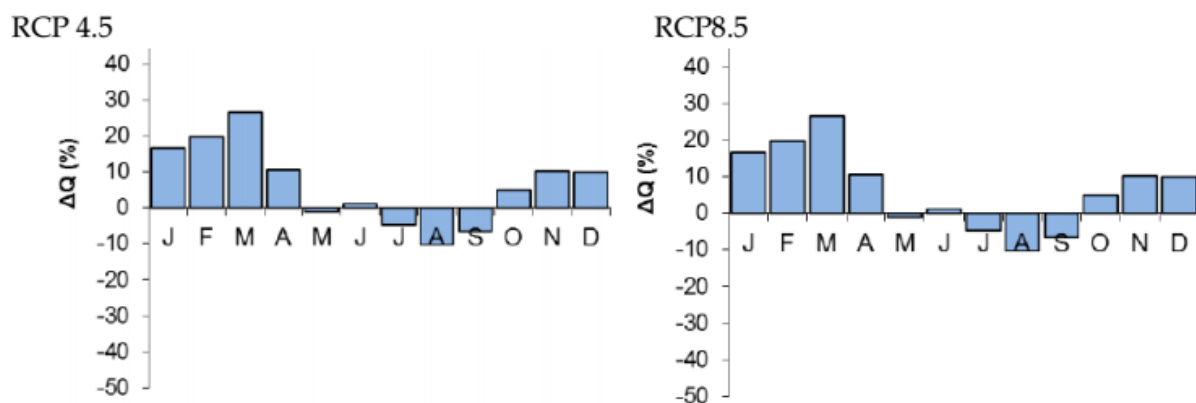


Figure L 7: Changes in discharge for Brahmaputra from Himalayan sources¹⁴

Figure 4.6 illustrates the changing hydrological characteristics for the Brahmaputra basin for 2041-2050 (from a 2007 reference period) for RCP 4.5 Cold, Wet Case and RCP 8.5 Warm, Dry Case. It is apparent that the overall trend for all forms of runoff is towards a similar or slightly higher level of runoff in the period up to 2050 – in part due to projected increased rainfall during the monsoon period. Figure 4.6 indicates that a greater proportion of rainfall in the overall runoff, similar or reduced levels of glacier and snow melt, as well as a slightly increased base flow.

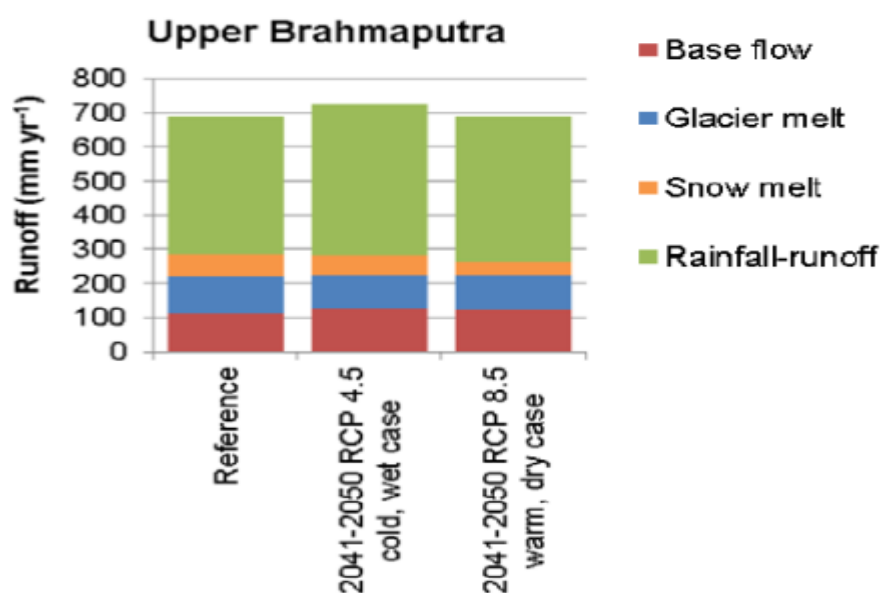


Figure L 8: Projected hydrological characteristics for Brahmaputra Basin in 2041 - 2050¹⁵

The project has a water demand of 7000m³/day or 291 m³/hr. or 0.08% of the minimum total hourly flow (which is recorded on 5th March 2013) in the river channel from which it will be abstracted. It is unlikely that future changes in stream flow will have a significant impact on water availability.

¹⁴ Source: Lutz and Immerzeel, 2013

¹⁵ Source: Lutz and Immerzeel, 2013

Drought

The World Resources Institute Aqueduct tool rates Bangladesh as low risk from water stress and drought risk⁽²⁾¹⁶. However, Sirajganj power complex is already under operation and using 43500 m³/day of ground water. So there may be competition for water after the establishment of the industries in the EZ area and also due to population increases for industrialization in which case, the availability of clean, potable water may be an issue.

Cyclones

It is expected that, as a result of climate change, the frequency of cyclones is likely to either decrease or remain essentially unchanged globally, but that cyclone intensity (measured by wind speed and rain rates) will likely increase¹⁷. The exact influence of climate change will vary by region.

IPCC has shown projected change in cyclone activity in the North Indian Ocean¹⁸. The (I) overall number of storms per year is likely to remain unchanged by 2081 - 2100 relative to the baseline of 2000 - 2009 although there is considerable uncertainty in this projection. The (II) frequency of category 4 and 5 storms and (III) the mean lifetime maximum intensity of the storms are expected to remain the same at present. There could be (IV) ~10% more extreme precipitation associated with cyclones making landfall.

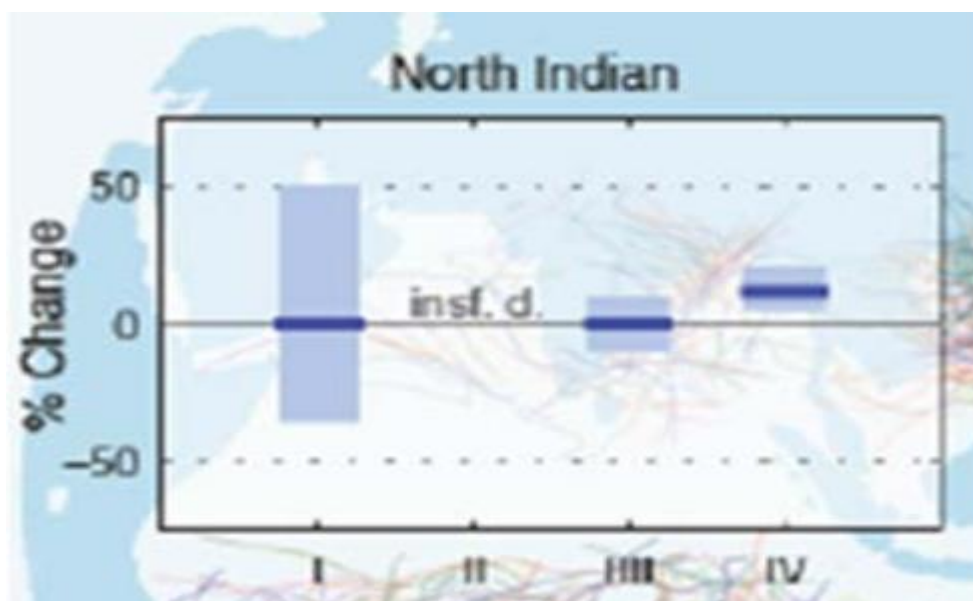


Figure L 9: Projected change in cyclone intensity and frequency¹⁹

Sea Level Rise

Under the RCP 8.5 scenario, sea level rise of between 0.6 - 0.7m is projected by 2081 - 2100 as illustrated in Figure 4.8.

¹⁶ Aqueduct <http://www.wri.org/our-work/project/aqueduct>

¹⁷ IPCC AR5, 2013

¹⁸ IPCC AR5, 2013

¹⁹ IPCC AR5, 2013

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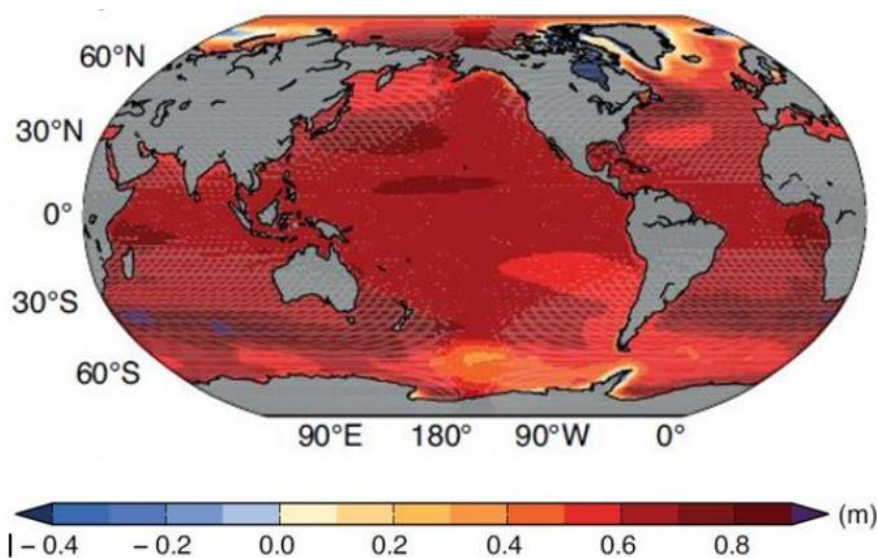


Figure L 10: Projected sea level risk under RCP8.5 by 2081 - 2100 ²⁰

An increase in sea level will result in an increase in the reach and impact of storm surges given the Bruun Rule, which describes the cross-shore response of a shore/beach to sea level rise²¹. According to Bruun's Rule, one unit of sea level rise results in 50 - 100 units of water movement landwards. For example, a rise in sea level of as little as 5 cm can mimic the effects of a 1 m rise in sea level following storm activity or tidal surges. Given this, it could be expected that, as a consequence of climate change, the tidal/salinity limit could move further upstream.

L.5 Climate and Disaster Risk Screening Results Summary

Building climatic and geophysical disaster resilience is a critical step in the battle against poverty and for long-term development. Screening for these threats increases the chances of a project's success and extends its life. At the idea stage of project development, the project-level Climate and Disaster Risks Screening Tool delivers early-stage due diligence on climate and disaster risks. Based on essential components of a project and its larger development context, the tool employs an exposure - sensitivity - adaptive capacity paradigm to analyze and characterize risks from climate and geophysical disasters.

The results of the screening procedure for the development of the Sirajganj Economic Zone Limited (SEZL) Project under IPFF II are summarized in this report. The possible risks highlighted in this report were found through the four screening phases by combining data on climatic and geophysical hazards exposure with the user's subject matter expertise and understanding of project components and sensitivity to rate the implications. The tool does

²⁰ Source: IPCC AR5, 2013

²¹ The Bruun rule has several limitations. Firstly, the rule does not account for longshore interactions, and secondly, the rule assumes the wave climate is steady and hence the equilibrium profile remains the same - simply translated landwards and upwards with the rise in mean sea level.

http://www.cmar.csiro.au/sealevel/sl_drives_short.html

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not give extensive risk evaluations; rather, it indicates potential hazards to help educate consultations, improve dialogue with local and other experts, and specify additional analytical work at the project site. This early-stage due diligence can be used to strengthen the consideration of climate and disaster considerations in key project design components, such as physical (e.g., dams and reservoirs, wastewater treatment plants, etc.) and non-physical aspects (e.g., capacity building of water managers, water resource planning and institutional strengthening at community level, hygiene promotion and education campaigns, etc.). The broader sectoral (e.g., appropriate water policies, emergency protocols in place to enable the water authority to respond to natural disasters, etc.) and development context conditions (e.g., strong legal enforcement of water pricing policies, climate related early warning systems, etc.) may be able to help mitigate the risks to the delivery of the outcome/service level.

Below are the results of the screening, along with a narrative to help guide their interpretation.

L.5.1 Project Information Summary

Table L.1 below provides key project information including the location and key project development objectives.

Table L. 1: Project Information

Project Information	
Title	Sirajganj Economic Zone Limited (SEZL)
Number	IPFF2 (Financial Intermediary) OP4.03 (Private sector Development)
Region	South Asia
Country	Bangladesh
Type of Assessment	Industry Projects
Purpose of Screening	Climate change risk screening
Current Project Phase	Under construction
Funding Source	World Bank
Keywords	Economic Zone, Industry
Brief Description of Project	To encourage private sector investment, an economic zone with centralized facilities such as electricity, water, effluent treatment, waste management, uninterrupted utility service, modern security and emergency management systems will be developed.

Location	Sirajganj Economic Zone (SEZ) is situated beside Elenga-Nalka-Hatikumrul Highway (N405) and Bangabandhu Setu West railway Station with a gross area of 415 acres of land at Saidabad Union and Rajapur Union under Sirajganj Sadar and Belkuchi Upazila respectively of Sirajganj district in Bangladesh. Connectivity feature are the following: • Sirajganj City: 13KM • Hazrat Shahjalal Int'l Airport (HSIA): 110 KM, flights to every major destination of the world • Mongla Sea Port: 328 KM • Bangabandhu Railway West Station: 1 km away from project approach road • National Highway: Elenga-Nalka-Hatikumrul Highway (N405) • Nearest land port: Hili Land Port, Dinajpur is about 160km away from the project site
Sub Sectors	Industry
Outcome/ Service Delivery	Provide space and services for development of the following categories (but not limited to) of industries by private sector: • Textile • Chemicals • Footwear • Healthcare • RMG • Knit, dying, composite, woven, yarn • Garments accessories • Plastics • Hospitality industry • Agro-business • Building/infrastructure construction items • Healthcare • Electronics

L.5.2 Summary of Exposure to Climate and Geophysical Hazards

Table L.2 summarizes the project location's exposure to climate and geophysical hazards for the Historical/Current and Future time frames. Because past records are not always indicative of future conditions, exposure to climate hazards is assessed over two time periods.

Using quality-controlled global data sets from the Climate Change Knowledge Portal, the descriptions provide an overview of each hazard's essential characteristics as well as some indication of trends in exposure from each hazard (CCKP). To comprehend the temperature range and the pace of yearly or decadal growth in a location, for example, as well as the seasonality fluctuations in precipitation patterns for historical and future time frames. Risk patterns must be understood since they affect individual and collective components/sub-sectors of the project in a variety of ways. There are no future estimates for geophysical risks such as tsunamis, landslides, and volcano eruptions, hence the exposure to these hazards can only be evaluated in the Historical/Current time frame.

Table L. 2: Summary of Exposure to Climate and Geophysical Hazards at Project Location

Hazard	Time Frame	Description of hazards for your location
Extreme Temperature	Current	Daily maximum and minimum temperatures are used to find out the frequencies of temperature $>36^{\circ}\text{C}$ and temperature $<10^{\circ}\text{C}$ for studying trends of heat waves and cold waves over the region ²² .
	Future	The annual mean temperature has increasing trends with $+0.012$ and $+0.017^{\circ}\text{C}/\text{year}$ respectively ²² .
Extreme Precipitation and Flooding	Current	Bangladesh has seen an increase in the unpredictability of rainfall and temperatures. River/monsoon flooding is a risk in the project area. Within walking distance of the project area, you'll find the Jamuna River.
	Future	In the Brahmaputra- Jamuna River flood plain, it is difficult to predict rainfall changes, with some models predicting wetter conditions and others predicting drier conditions. But runoff, rainy day intervals, and peak 5-day rainfall intensity are expected to decrease in the coming years.
Drought	Current	As per different studies in this area, it is proved that the area is vulnerable to climatic drought.
	Future	Agricultural drought is expected to increase due to the increase of the erratic nature of rainfall.

²²

Hazard	Time Frame	Description of hazards for your location
Sea Level Rise	Current	On average, Noakhali, Laxmipur, and their neighboring districts see a 6 to 9mm rise each year, while Chittagong and Cox's Bazaar have seen an 11 to 20mm rise each year. Other studies have shown that Khulna, Hironpoint, and Khepupara average annual water level increases by 6mm, 8mm, 7mm, and 8mm, respectively. The project does not take place in a coastal area. As a result, the effects of sea level rise are not a concern.
	Future	Uncertainty exists as to the degree of sea level rise in Bangladesh; one study suggests an increase of 30100 cm by 2100, while IPCC's Third Assessment gives a global average range of 9-88 cm. But sea level rise is unlikely to have any impact on the area.
Storm Surge	Current	Bangladesh was hit by 19 cyclones between 1960 and 2009. As a result of these cyclonic events, the eastern coast could be inundated by 2 to 3 meters. The project does not take place in a coastal area. As a result, there is no threat of storm surge.
	Future	While the storm surge height is expected to increase, it's difficult to predict. There is evidence that the peak intensity of tropical cyclones in the Bay of Bengal may increase by 5 to 10 percent and precipitation rates may increase by 20 to 30 percent, according to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2001). An increase in sea level of over 27 centimeters by 2050 is expected to exacerbate cyclone-induced storm surges. In East Asia, South-East Asia, and South Asia, tropical cyclone intensities are expected to increase by 10 to 20 percent in response to a 2 to 4°C increase in sea surface temperature (Knutson and Tuleya, 2004, IPCC 2007). However, because it is not near the coast, the area is not vulnerable to storm surges in the future also.
Strong Winds	Current	Significant increases in cyclone frequency across the Bay of Bengal have been documented around November and May, which are the peak months for cyclone activity in the Bay of Bengal.

Hazard	Time Frame	Description of hazards for your location			
	Future	In the future, tropical cyclones' maximum wind speeds are predicted to increase, although the projections are highly unreliable. By 2100, the maximum wind speed of cyclones is anticipated to increase by 10% due to increasing sea surface temperatures.			
Earthquake	Current	Project site falls under zone 2 which is a moderate earthquake zone. The Zone-II includes the greater districts of Dinajpur, Bogra, Dhaka and Chittagong and the shocks of intensity of VIII are possible.			
Tsunami	Current	Since the project location is not located in the sea-coast, there is no risk of tsunami.			
Landslide	Current	There is no risk of landslide in the area.			
Erosion	Current	Currently the area is vulnerable to erosion due to the Jamuna River which is crossing just beside of the project site			
	Future	The rate of erosion along this river varies over time and space. The history of riverbank erosion shows a decreasing trend in recent years. The erosion rate of the Jamuna was around 5,000 ha per year in the 1980s while in recent years the rate has been around 2,000 ha per year ²³ . But still, it poses the threat			
Insufficient Understanding	Not Exposed No Potential Impact No Risk	Slightly Exposed Low Potential Impact Low Risk	Moderately Exposed Moderate Potential Impact Moderate Risk	Highly Exposed High Potential Impact High Risk	

L.5.3 Summary of Overall Project Risk

According to Table L3, project components/subsectors are rated according to their impact on the project's outcome/service level for both the Historical/Current and Future timeframes. Risk information, subject matter expertise, and contextual understanding of the project are used to create the ratings, which are then scaled according to adaptive capacity and the greater development context of the water sector and country. The results show which components

²³ <https://core.ac.uk/reader/249333560>
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are at the greatest risk for failure. In addition to the ratings themselves, further consultations, dialogue, and future planning procedures should be informed by the ratings themselves.

L.5.3.1 Results Summary - by Component / Subsector

For Historical/Current and Future time frames, Table L.3 presents a characterization of climate and geophysical hazard hazards on project subsectors/components. In the end, the results highlight where climate and geophysical risks may exist within one or more components, and where additional effort may be required to decrease or manage these risks. Also, a regular impact assessment and a continuous procedure of monitoring risks may be appropriate. Hazard exposure can have a significant influence on important components/subsectors, however the non-physical components of the project might reduce or increase the impact (enabling and capacity building activities). Measures that promote readiness and long-term resilience could lessen hazards. It is important to understand the larger sectoral and development context in terms of major modulating elements when assessing climate threats in terms of adaptive capability. For SEZ, the entire risk summary looks like this:

- Physical components: **Impact from 'Low' to 'Moderate' in future**
- the Non-physical Components: **Slightly Reduces Impact**
- the Broader Development Context: **Slightly Increases Impact**
- Physical components: **Impact from 'Low' to 'Moderate' in future**
- Outcome/service delivery: **Impact from 'Low' to 'Moderate' in future**

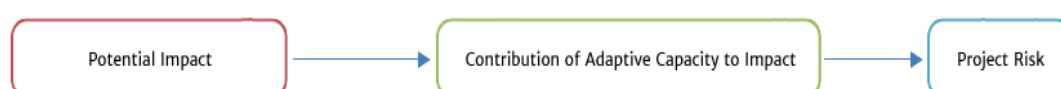


Table L. 3: Results Summary - by Component/ Subsector

Sub-sector	Physical Components		Non-Physical Components		Development Context		Outcome / Service Delivery	
Time Frame	Current	Future	Current	Future	Current	Future	Current	Future

Industry			Long- term strategic planning	Population growth
			Significantly Reduces Impact	Significantly Increases Impact
			Maintenance and operations	Legal enforcement
			Slightly Reduces Impact	Slightly Reduces Impact
			Data gathering, monitoring, and information management systems	Gender inequity
			Slightly Reduces Impact	Slightly increases Impact
			Overall	Overall
			Slightly Reduces Impact	Slightly Increases Impact

Impact on Project's Physical Infrastructure

As a result of this stage, the project's physical infrastructure and assets, as currently designed under relevant subsectors, can be assessed for the possible consequences of climate and geophysical risks. It's likely that climate and geophysical hazards will have a substantial impact on the structural integrity of your investments as well as their materials, placement, durability, and overall efficacy. Projected increases in precipitation could lead to further flooding along the Meghna River. This will also drive up the cost of building new offices and manufacturing plants. A high level of potential influence can be expected in the areas of operations and logistics. Temperatures are expected to rise dramatically, and the dry season may extend. As a result of both of these changes, concerns about wastewater quality would be raised. High temperatures can also depreciate machinery, resulting in higher maintenance and operation costs as a result. Accordingly, future impacts will range from "low" to "moderate."

Non-physical components and broader development context

This step provides information on how the project's soft components (enabling and capacity building efforts) and the larger development context modulate the possible impact on key components/subsectors owing to exposure to risks (including sector context and other social, economic and political factors). As part of this process, women, migrants and displaced communities are also taken into consideration.

To prevent "locking in" designs and features that are exclusively adapted to the current environment, future climatic variability and change must be considered when making investments with lengthy operating lifetimes, such as physical infrastructure. A considerable amount of groundwater will be extracted as part of the project for the purpose of producing bottled water. As a result of climate change unpredictability, groundwater extraction and availability in neighboring areas may be impacted. Groundwater well monitoring equipment will be installed as part of the project, which will provide for early warning and prediction of any unfavorable affects. Besides capacity enhancement, the project includes an emergency preparedness strategy, public awareness raising, and evacuation drills involving local communities living in the neighborhood of the industry. Additional help for budgeting will be provided, as well as an improvement in the flexibility of management protocols so that they can react to changing hazards. In the long term, climate resilience can be improved by strategic planning that analyzes how climatic and geophysical risks can affect important assets, system reliability, and demand. After the landfilling, the area will be 4-5 meter above of Jamuna River's historic high-water mark in SEZ site. In this approach, flooding along the Jamuna River can be reduced to a certain amount. Construction regulations and zoning restrictions that are properly enforced may assist reduce the vulnerability of industrial infrastructure to extreme weather events. Bangladesh's National Building Code, which takes wind and seismic loads into account when designing any building, will be followed. Such a system provides protection against natural calamities such as an earthquake or a powerful storm. The SEZ management will set aside funds for operations, maintenance, and repairs to equipment and structural elements that may deteriorate due to harsh weather events (Temperature, precipitation etc.). These characteristics, when combined, may lower the risk of climate and geophysical risks.

However, rapid population growth and possible migration from climate-affected areas will raise total population density and may have harmful effects on the environment as well. As a result of existing gender inequality in the area, responding to climate change's effects may be difficult. As long as the SEZL operation has an effective ESMS and monitoring system, some of these impacts may be mitigated.

Risks to Outcome/Service delivery of the project

This stage provides an indicator of the level of risk associated with the project's intended outcome/service delivery. Your project has a Moderate level of risk in terms of its outcome or service delivery. There are several factors that go into this rating: the project's soft components as well as its broader development environment, as well as information about hazards and subject matter expertise. The project design and soft components, which take flood risk into consideration, considerably reduce the potential risks to construction, logistics, and

operations as a result of floods. To some extent, this risk is exacerbated by the lack of emergency response systems to restore connectivity and crucial supplies in case of catastrophic weather occurrences. Because of this, the project's total risk is evaluated to be Moderate.

L.5.3.2 Detailed Results by Subsector

According to the industrial project's subsectors, including physical structures investments, Table L.4 gives specific findings. As you can see from the table, many assets could be negatively affected by climatic and geophysical risks. Based on the user's perception of the project's sensitivity, the effect ratings are calculated. As part of the project design process, a better understanding of the risks posed by the subsectors (and important features within each subsector) can inform the conversation, consultation, and analysis processes.

Table L. 4: Detailed Results Summary – by subsector

Subsector	Component	Potential Impact			
		Component Risk		Overall Risk	
		Current	Future	Current	Future
Industry	Physical infrastructure				
	Effluent Quality				
	Waste generation				
	Water Extraction				

The potential impact of these hazards are rated on four different aspects of the industrial installations:

- Physical infrastructure
- Effluent Quality
- Waste generation
- Water extraction

According to the project's historical and future sensitivity to climate and geophysical hazards, the potential impact of climate and geophysical hazards on the project's investments is rated. These impacts may have an impact on the investment, as well as on the project's ability to maintain or improve water supply in a changing climate. In the previous section, we talked about how projected increases in temperature and evapotranspiration could put industrial installations at risk. An approach to building resilience to these anticipated risks is to improve operations and maintenance management, as well as disaster and emergency management.

According to the report, current risks are rated as 'low', while future risks are rated as 'modest' According to an expert's judgment and an understanding of the local development context, the ratings have been determined.

L.2.4 Key Drivers of Risks

For each project component/subsector rating, Table L.5 outlines the key drivers of risk based on the hazards that are likely to pose the greatest challenge.

Using all of the available exposure data and their own expert judgment, each component/potential subsector's impact rating is based on an aggregate rating across multiple hazards. Water extraction can be affected by extreme weather conditions such as high temperatures and droughts, while increased rainfall may reduce demand from GW sources but increase the risk of flooding for downstream communities. Strong winds, floods, effluent dissipation, and high temperatures all have an impact on infrastructure integrity.

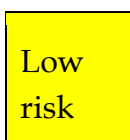
Hazards with high ratings, or those moving from moderate to high ratings over time, should be given special attention. If sea-level rise is not a key risk factor in the historical/current time frame, it may become one in the future (due to migration of people from climate-affected areas). It may be helpful to identify which hazards are the most important in the project's design and delivery if we know which hazards are most important in the project's design and implementation.

Table L. 5: Key Drivers of Risk

Project Sub-sector	Historical/Current Drivers	Future Drivers
Physical components	Earthquake	Extreme Temperature Extreme Precipitation and Flooding Strong Winds Earthquake Drought
Non-Physical Components	*	Non-compliance with regulations

Broader development outcomes	*	Population Growth	
		Gender inequity	
		Sea level rise	
Outcome / Service Delivery	*	Lack of disaster preparedness	
		Sea level rise	

Key:



*If a cell is blank it implies there is 'No high or moderate risks' identified for this aspect of the project.

L.5.4 Next Steps

By understanding which the water project components are most at risk from climate change and other natural hazards on the basis of the screening, measures to avoid their impacts can be taken by:

- Enhancing the consideration of climate and disaster risks early in the design stage of the project.
- Using the risk screening analysis to inform follow-up feasibility studies and technical assessments.
- Encourage local stakeholder consultations and dialogues to enhance resilience measures and overall success of the project.

Table L.6A provides some general guidance based on the risk ratings for the Outcome/Service Delivery, and Table 6B lists some climate risk management measures.

Table L. 6: General Guidance Based on Risk Ratings for Outcome/Service Delivery

Insufficient Understanding	Gather more information to improve understanding of climate and geophysical hazards and their relationship to the project.
No Risk	If it can be confident that the climate and geophysical hazards pose no risk to the project, continue with project development. However, keep in mind that this is a high-level risk screening at an early stage of project development. Therefore, it has been encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented.

Low Risk	If it can be confident that climate and geophysical hazards pose low risk to the project, continue with project development. However, it needs to be kept in mind that this is a high-level risk screening at an early stage of project development. Therefore, it has been encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented. It may also consider gathering additional information to increase the level of confidence in the rating.
Moderate Risk	For areas of Moderate Risk, it has been encouraged to build on this screening through additional studies, consultation, and dialogue. This initial screening may be supplemented with a more detailed risk assessment to better understand the nature of the risk to the project.
High Risk	For areas of High Risk, it has been strongly encouraged to conduct a more detailed risk assessment and to explore measures to manage or reduce those risks.

Table L. 7: Types of Climate Risk Management Measures for typical Industry Projects

Objective	Examples
Accommodate/ Manage	• Change the frequency of repair schedules and implement changes in maintenance protocols. • Develop contingency plans in the event of disruption and install redundant systems to back up a primary system. • Plan back-up power systems for critical facilities. • Setting up rapid emergency response teams to repair damaged facilities quickly. • Provide education and training for staff to effectively respond to system disruptions or emergency events. These actions often can be readily redesigned, based on an evaluation of progress, changing needs, and new information. • Establish or expand a contingency budget reserve or insurance plan to address unexpected disruptions and fund investments to restore services and facilities.
Protect/ Harden	• Upgrade design standards and codes (e.g., using stronger building materials) and their implementation for both new construction and renovation. • Design facilities to be waterproofed where increased flooding is expected. • Build dikes to contain flooding.

Objective	Examples
	• Add reinforcements to walls and roofs. • Increase drainage of facilities. • Fortify existing structures by incorporating extra foundational supports. • Erect protective barriers, levees or sea walls, or natural areas (i.e., green infrastructure such as wetlands or replenished barrier islands) to buffer infrastructure from climate impacts. • Elevate roads, bridges and structures, and change the curvature of drains and roads. • Use more resilient building materials. • Employ more robust specifications allowing structures to withstand more extreme conditions (such as higher wind or water velocity).
Site Selection/ relocate	• Relocate critical public buildings and machinery to higher or less vulnerable locations. • Site emergency response infrastructure (fire stations, helipad) in secure locations. • Locate critical infrastructure systems in more protected areas. • Relocate or refit extremely vulnerable existing infrastructure.
Build information collection and management systems	• Strengthen climate information systems, building on existing regional and national networks. • Build relevant local and/or regional research programs on the links between climate and services (e.g., vulnerability index). • Build capacity of national governments to harmonize data across regions.
Strengthen policies, planning and systems	• Integrate climate information into operational planning. • Update zoning and local codes to minimize operations in high-risk areas. • Strengthen disaster planning and response for infrastructure. • Improve training, education and outreach efforts and programs related to climate impacts and adaptation.

L.6 GHG Emissions

L.6.1 Overview

Gases that trap heat in the atmosphere are called greenhouse gases. Greenhouse gases trap heat and make the planet warmer. Human activities are responsible for almost all of the increase in greenhouse gases in the atmosphere over the last 150 years. This section provides information on emission sources of the main greenhouse gases to the atmosphere from the proposed industries of the SEZ.

L.6.2 GHG Gases

The most common GHG gases in the atmosphere are listed below:

- **Carbon dioxide (CO₂):** Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials, and also as a result of certain chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- **Methane (CH₄):** Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- **Nitrous oxide (N₂O):** Nitrous oxide is emitted during agricultural and industrial activities, combustion of fossil fuels and solid waste, as well as during treatment of wastewater.
- **Fluorinated gases:** Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydrochlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases ("High GWP gases").

L.6.3 GHG Emission Calculation

As per IFC, for the calculation of greenhouse gas emission from any project, normally 3 types of scope need to be considered. These are:

Scope 1: Stationary and unstationary sources of the project area including the building area, generator, project area own vehicle etc. are considered under the scope 1

Scope 2: Purchased energy from outsource like electricity, gas etc. are considered under the scope 2.

Scope 3: All the vehicles coming from the outside area to the project site providing by the third parties for the various materials related to construction and operation period are considered under scope 3.

For calculating the GHG emission for Sirajganj project area normally two stages need to be considered. First stage is the Construction stage and the second stage is the Operation stage. For construction stage period scope 2 and scope 3 data is currently not available at this stage. For scope 1, only fuel related data and approximate NOs of vehicles for the project site is available only. So, the calculation in construction stage is based on the limited available data provided by the SEZ authority.

For the operation period, scope 2 data is only available. But Scope 1 and scope 3 data is not available at this moment. So, the calculation of GHG emission in operation stage is based on the scope 2 only.

GHG Emission in calculation in construction stage:

During construction stage, around 3766500 liter (approximately) of diesel will be required for the heavy equipment and also for the generators. Also total Nos of 7 vehicle of project proponent will run in the project area. So, based on the available data and using the IFC Carbon Emission Estimator Tool, the total equivalent amount of CO₂ emission during construction phase is about 4212 ton/year.

GHG Emission in calculation in operation stage:

In the operation period, about 44.48 MVA power demand will be needed which is equivalent to 35584 kwh and the demand of gas is approximately 50 MMCFT which is equivalent to 28252.14 ton/day. So based on this information the total amount of equivalent CO₂ emission in operation period is approximately 196 ton in a day.

L.7 SUMMARY

Climate change could have a variety of impacts on operation of the Sirajganj Economic Zone in Bangladesh, particularly with regards to increased flood risk. **Table L. 8:** summarises the risks identified from the impacts discussed in section L and provides a relative indication of the level of threat in the future on a scale of low, medium and high. It is recommended that risks identified as high be investigated in further detail to fully understand the implications for operation of the plant in the future. Given that these both relate to the increased risk of flooding in the future, which will also apply to the Sirajganj Economic Zone as a whole and its surrounding communities, options to work closely with local authorities and the Sirajganj Economic Zone Limited on this issue should be investigated as a combined response is likely to be more cost-effective.

Table L. 8: Summary of climate change impacts at Sirajganj

Impact	Cause	Level of threat
Flooding of SEZ facility causing business interruption and damage to infrastructure	Higher monsoon rainfall, higher cyclone related rainfall, storm surges linked to sea level rise	Low
Flooding of local communities and impacts on staff housing and transport/supply chain	Higher monsoon rainfall, higher cyclone related rainfall, storm surges linked to sea level rise	High

Salination of water source impacting operation period	Sea level rise causing extent of storm surge/tsunami impact to move further Inland	Very low
Water temperatures reducing efficiency of water to use as water source	Increased temperatures	Very Low
Higher ambient air temperatures leading to reduced operational efficiency/production	Increased temperatures	Very Low
Higher ambient air temperatures leading to health and safety impacts (e.g. heat stress) for staff	Increased temperatures	High
GHG Emission	Increased GHG emission	Possibility of Medium low to Medium High

Annex M: Framework Management Plans

- M1 Pollution Prevention Management Plan**
- M2 Waste Management Plan**
- M3 Traffic Management Plan**
- M4 Environmental and Social Management System (ESMS)**

M.1 Pollution Prevention Management Plan

M.1.1 Introduction

A Framework Pollution Prevention Management Plan (PPMP) has been prepared for the proposed project in order to guide the development of detailed management plan. The PPMP is developed to assist the operation to meet the objectives of prevention of pollution which would result due to the construction related activities of the project and its associated facilities. The PPMP is based on the assessment of impacts on air quality, ambient noise levels, and water quality, which would occur during the site preparation and construction phase of the Project. This PPMP builds on the conceptual information presented in the Project documents and applies to all of the activities conducted during the site preparation and construction. The PPMP is to be read in conjunction with the other environmental management plans.

M.1.2 Scope

Site preparation and Construction Phase: The responsibility to frame the detailed PPMP and its implementation will be with the Contractor selected by SEZL for the phase.

Areas: Project site and associated facility areas where any preparation/construction activity will be carried out related to the Project.

Define: Project site, water pipeline, labour accommodation, roads, lay down areas, batching plant, etc.

Note: This is a guidance framework for pollution prevention and it is expected that this framework will be developed into specific plans by the Contractor for maintaining ambient air quality, water quality, noise levels within the project and surrounding areas during the construction phase. Each plan developed under the pollution prevention management plan framework is expected to follow the framework content and requirements.

M.1.3 Objectives

The PPMP aims to ensure that discharges and emissions from the project during the construction phase do not result in unacceptable impacts on the environment and surrounding community. It focuses on the strategies to be used to monitor the air quality (particulate levels, in particular), ambient noise levels, water quality, mitigation of emissions and discharges at sources, monitoring and reporting and reviewing of monitoring results in terms of ESIA requirements. The objectives of pollution prevention management plan for the Project are as follows:

- To develop inventory of emission and discharge sources;
- To maximize pollution control at source;
- To analyze alternate emission and disposal control strategies and technologies;
- To identify critical issues after implementation of mitigation measures; and
- To address pollution issues by adopting additional mitigation measures and regular monitoring.

M.1.4 Applicable Legislations And Regulatory Standards

The following acts, regulations and guidelines have been reviewed and are applicable to PPMP fully or partly in the Project:

S.N	Applicable Legislation	Agency Responsible	Applicability
1.	Environmental Conservation Rules, 1997 and subsequent amendments in 2002 and 2003	Department of Environment	Applicable Projects falls under Red Category and require environmental clearance and to follow standards prescribed in ECR
2.	Water Pollution Control Ordinance, 1970	Department of Environment	Applicable and has to take measures for the prevention, control and abatement of existing or potential pollution of any waters, including construction, modification, extension or alteration of disposal systems Applicable and has to take measures for the prevention, control and abatement of existing or potential pollution of any waters, including construction, modification, extension or alteration of disposal systems
3.	The Ground Water Management Ordinance, 1985	Upazilla Parishad	Proposed Project will use surface water source however, should groundwater also be required then licenses will need to be obtained prior to installation of any tubewells, and ground seepage
4.	Ozone Depleting Substances (Control) Rules, 2004	Ministry of Environment and Forests	Applicable
5.	Noise Pollution (Control) Rules 2006	Ministry of Environment and Forests	Applicable, follow standards for noise levels.

M.1.5 Impact Avoidance And Impact Mitigation

Pollution Prevention - Policies and Principles

Pollution prevention within the context of this Management Plan (MP) and the Project refers to:

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- Air emissions due to various Project activities including excavation of soil to create building and equipment foundations; pile driving for the equipment foundation; exhaust emission from movement of heavy loaders, trucks; loading and unloading of materials, installation of gas pipeline; concreting works, including operation of concrete batching plant, which will be located away from sensitive receptors and additional net fencing on section of boundary wall facing the residential receptors to reduce dust transport; operation of diesel generators and other diesel based construction machineries, dust generated from stockpiles of materials, waste, loose earth, handling and moving excavated material and transporting wastes on vehicles,
- Water pollution both on surface and ground water media due to release or discharge of effluents and wastewater, polluted storm water runoff, inappropriate storage of waste leading to water quality impacts from runoff entering the adjoining channel to the Project site or seepage to ground water
- Noise and vibration generation due to various Project activities such as usage of heavy equipment during the construction activities, off-site and on-site activities, people movement, etc.; and
- Soil pollution due to civil work activities; transportation of construction material, equipment and personnel; storage of construction materials including hazardous material; storage, handling and disposal of wastes generated from site clearance, site excavation and formation, civil works and activities of construction workers (general waste and sewage) etc.
- The pollution issues relating to waste management, traffic and transport have been dealt in detail in the corresponding MPs which should be referred. This MP is supplementing to the above referred issue-specific MPs and should not be construed as contradictory.

M.1.6. Approach

The overall approach for avoiding and mitigating impacts comprises the following elements:

- Contractor will adopt a Best Practicable Environmental Option approach to each discharge/emissions issue.
- Pollution prevention measures will adopt life-cycle assessment principles wherein residual impacts, if any will be avoided to the extent possible;
- The approach of impact avoidance, minimization and mitigation will be adopted in pollution prevention and management; and
- The Duty of Care principle will be followed - whereby the polluter will ensure that each of the pollution issue is properly managed.

M.1.7 Pollution Prevention & Management

The pollution prevention will have following management elements, out of which the notable ones are explained in the subsequent sub-sections:

- Inventory of discharge and emission sources
- Conduct pre-Project surveys
- Analysis of alternate disposal and emission control strategies and technologies

Inventory of Pollution & Emission Sources

Preparing an inventory of all pollution and emission sources from the Project activities is essentially the first step towards managing the impacts. The Management Plan will involve preparation of an up to date inventory of all emission and discharge sources based on the latest Project activity related information. A preliminary list of emission and discharge sources at Project footprint area is presented below.

- Air emission sources
 - Site preparation and levelling including protection for lay down areas, project areas, site roads and drainage within project boundary;
 - Excavation of soil to create building and equipment foundations;
 - Pile driving for the equipment foundation;
 - Exhaust emission from movement of heavy equipment by heavy loaders, trucks;
 - Loading and unloading of materials,
 - Installation of gas pipeline;
 - Concreting works, including operation of concrete batching plant, which will be located away from sensitive receptors and additional net fencing on section of boundary wall facing the residential receptors to reduce dust transport;
 - Operation of diesel generators and other diesel based construction machineries;
 - Dust generated from stockpiles of materials, waste, loose earth, handling and moving excavated material and transporting wastes on vehicles.
 - Discharge sources
 - Workshop and washing effluent (due to washing of equipment and machinery);
 - Sewage and sanitary waste;
 - Storm water runoff;
 - Soil contamination at waste dumps, chemical storage, vehicle parking, oil and fuel spills and leaks
- Noise and Vibration sources
 - Usage of heavy equipment during the construction activities
 - piling and concrete foundations works
 - transport,
 - people movement

An inventory of pollution and emission sources at all Project footprint area shall be prepared as part of this management element. Inventory of pollution and emission sources helps in formulating the following management approaches:

- Avoidance of discharge or emission, if feasible
- Source reduction
- Resource recovery options
- Recycle options
- Optimal treatment strategies and technologies
- Post-treatment, resource recovery and recycle options
- Ultimate disposal considering the local environmental sensitivities

The inventory database of discharge and emission sources along with standard requirements shall be kept as a living document and updated as and when any new sources are cited at any point in time of the Project period. Any intermittent discharge and emission sources shall also be identified and included in the inventory.

Conduct Pre-Project Survey

The Contractor will conduct the pre-Project survey at various environmental receptors identified in earlier stage specifically and in overall ambient environment generally. The pre Project survey will serve as the benchmark levels throughout the Project construction phase and during reinstatement of the footprint areas.

Assess Discharge & Emissions Impact Using Modelling Approaches & Other Assessment Tools

Based on the complete details that will be available at the time of management plan preparation, modelling or other appropriate objective assessment tools to assess the impacts due to discharge and emission from the well sites and other Project footprint areas will be undertaken for following scenarios:

- No mitigation measure
 - Alternative mitigation options (for example Best Practicable Environment Options).
- Cumulative scenario, if prevailing at the Project site
- Worst-case scenario

The outcome of this exercise will be to select appropriate methods of treatment for specific discharge and emissions. The Project will adopt a level of treatment/control to achieve regulatory prescribed standards.

M.1.8 Monitoring, Reporting And Review

Mitigation measures have been developed to minimize the likelihood, extent or duration of occurrence, and any associated adverse effects of the construction related activities as part of the ESIA, which needs to be implemented to mitigate the adverse impacts identified due to the Project in the construction phase.

M.1.9 Accountabilities

The Contractor will be responsible for day to day implementation of management plan and SEZ HSE and project management team will be monitoring of the implementation of this management plan. All employees and sub-contractors of the Contractor will be provided with environmental awareness training through a site induction process. All employees and contractors of Contractor will have a responsibility to manage operations in an environmentally responsible manner and report any visible emission/ discharge/ accidental spillage. All pollution related environmental incidents will be reported to the Environmental

Coordinator / HSE Manager/ Project Manager. The Contractor will define detailed responsibilities for activities required as per the PPMP.

L1.10 Reporting And Review

The Contractor team will present to the SEZL management on a monthly basis the following:

- What is the overall environmental performance of the Project against the national standards and set targets
- How is the pollution prevention at source is being managed and what is the progress against the set targets
- Any environmental issues that have come up in pollution prevention that has triggered a fine or a complaint by the government authorities, the root cause and actions taken;
- Any complaints or grievance from the local community of pollution issues and action taken. Time line for closing of the action.
- Any major issue emerging that will need SEZL management inputs as well as budget for pollution prevention -e.g. need for additional water treatment/ capacity augmentation, etc.

M.2 Waste Management Plan (WMP)

M.2.1 Introduction

The Project Company recognises that unplanned storage and disposal of waste have the potential to directly impact land and water environment. These impacts have been recognised during the ESIA study and thus a framework Waste Management Plan (WMP) has been prepared in recognition of the impact. This WMP builds on the conceptual information presented in the Project documents and applied to all of the activities conducted during the site preparation and construction till the handover to the Project Company.

M.2.2 Scope

Site preparation and Construction Phase: The responsibility to frame the detailed WMP and its implement will be with the Contractor selected by SEZL for the phase.

Areas: Project site and associated facility areas where any preparation/construction activity is going on related to the Project.

Define: Project site, water pipeline, Labour accommodation, roads, lay down areas, batching plant, etc.

Note: This is a guidance framework for waste management and it is expected that this framework will be developed into specific plan/s by the Contractor for managing waste generated due to various site preparation and construction activities within the project and surrounding areas during the construction phase. The WMP is to be read in conjunction with the other environmental management plans.

M.2.3 Objectives

The objectives of waste management in the Project are as follows:

- To identify waste types and quantities on site and inventorize them;
- To ensure the disposal of wastes conform applicable guidelines or standards;
- To ensure areas where fuels, oils or other potential contaminants are stored are appropriately banded;
- To prevent any reactions between waste due to incompatibility in nature
- To ensure sewage disposal does not degrade the environment;
- To investigate methods to minimise waste generated and implement reasonable and feasible measures to minimise waste
- To identify potential re-use or recycling opportunities and ensure appropriate handling and collection procedures are in place; and
- To have procedures in place for appropriately handling of relevant wastes.

M.2.4 Applicable Legislations and Regulatory Standards

The following acts, regulations and guidelines have been reviewed and are applicable to WMP fully or partly in the Project:

S.N	Issues	Applicable Legislation	Agency Responsible	Applicability
1.	Industrial Solid Waste	Bangladesh National Environmental Policy	Department of Environment	• To phase-in corrective measures in polluting industries; • To conduct EIAs for all new public and private industrial developments; • To ban, or find environmentally sound alternatives for, the production of goods that cause environmental pollution; • To minimize waste and ensure sustainable use of resources by industry
2.	Hazardous Wastes Management	The National Conservation Strategy, 1992 provides recommendations for sustainable development of the industrial sector.	GoB	Hazardous or toxic materials/wastes shall not be imported as raw materials for industry; • Import of appropriate and environmentally-sound technology shall be ensured; and • Dependence on imported technology and machinery should gradually be reduced in favour of sustainable local skills and resources.
3.	Protection of water quality, including strengthening regulations concerning agrochemical and industrial effluent	The National Water Policy, 1999	Upazilla Parishad	Applicable, as water for cooling is to be drawn from the Jamuna river with discharge of treated water on land and the river course will also be used for transport of heavy equipment.
4.	Basel Convention on Transboundary Movement of Hazardous Waste, 1989	Ozone Depleting Substances (Control) Rules, 2004	DoE	Preventing any transboundary movement of hazardous waste from the project and environmentally sound management of such waste as close as possible to the source of generation

M.2.5 Impact Avoidance and Impact Mitigation

Approach

The overall approach for avoiding and mitigating impacts comprises the following elements:

- The Contractor will adopt a Best Practicable Environmental Option (BPEO) approach to each waste stream;
- All wastes should be moved to an acceptable permanent grave as soon as practicable. Storage is viewed as a temporary requirement and should be used for as short a time as possible; and
- The Duty of Care principle will be followed - whereby the waste producer will ensure that a waste is properly managed even after that waste has been transferred to a third party.

Treatment of waste simply transfers the pollutant to a different medium; therefore, treatment is less preferable than reuse or recycling as a waste management option. Following the waste management principles outlined above, where the generation of waste is unavoidable, waste minimisation techniques will be followed which may include a) a focus on reducing waste at the source, wherever possible, and b) waste reuse and recycling. A pre-requisite to the adoption of this approach is the development of a detailed inventory of waste generated by during different project activities. Details on the inventory and the sequence of activities that follow from this information are outlined below and described in the following sub-sections on waste management and final disposal.

M.2.6 Managemet of Solid and Hazardous Waste

Waste Inventory

A summary of main waste streams that will be generated during the construction phase activities as identified in ESIA. The waste inventory database will be updated once more accurate information about the activities to be carried out by the Contractor within site and construction activity areas.

Waste Classification

All wastes will be classified at the point of production to determine appropriate segregation procedures, storage and ultimate treatment/disposal. Initial classification will result in the waste being assigned as liquid or solid waste. Then the classification will further categorise the waste within one of the following categories:

- Inert;
- Non-hazardous; and
- Hazardous.

The classification process will initially involve reference to the waste inventory and, in particular, the details relating to segregation, labelling, storing and treatment of each waste item. In the event that the waste is not included in the inventory or unrecognisable, samples will be taken and analysed to allow classification according to the above waste classes. The inventory will then be updated. If a waste is unrecognisable and sampling is not deemed appropriate or practical, the waste will be deemed hazardous and disposed of in a manner consistent with hazardous waste management procedures set out in this plan. This will be further detailed in site waste management procedures. The waste classification process will generate information that will be used to determine safe exposure levels for employees, as appropriate, for hazardous substances used or handled onsite, thereby protecting the health of workers. In particular, the following will be determined:

- The hazardous substances that are to be used or generated during different project activities and the associated risks these substances may pose to people's health;
- The precautions required before handling hazardous substances;
- The procedures required to prevent people being exposed to hazardous substances; where this is not reasonably practicable, procedures for controlling exposure levels will be developed;
- Training requirements with respect to handling hazardous materials to ensure that employees/workers are properly informed, trained and supervised.
- In addition, the information will assist in the development of plans and procedures to deal with accidents, incidents and emergencies involving hazardous materials. Material Safety Data Sheets (MSDS) will be obtained for all hazardous substances and held at sites generating or handling the respective wastes. The MSDSs will be readily accessible to all employees/ workers in local languages.

Waste Handling

All personnel who are involved in the handling of hazardous and nonhazardous waste will undergo specific training in:

- The procedures to be followed to ensure adequate segregation of wastes;
- The duty of care system and how to complete the documentation correctly;
- Waste handling;
- Waste treatment; and
- Waste storage.

Waste Container Labelling

The relevant team will ensure that all waste containers are clearly identifiable and accurately describe the type of waste contained therein. Full descriptions of the waste are required to assist site and external personnel to handle the material safely and to ensure that non-compatible materials are not stored or transported together. Any unidentified wastes will be

treated initially as hazardous and will be subject to the classification process outlined above. All waste containers on-site (bins, skips, drums etc) will be clearly labelled to show which wastes can be disposed into them and which wastes they contain. Any previous labelling will be removed or covered to avoid confusion.

Waste Storage and Segregation

The following general storage and segregation procedures will be observed:

- Different types of wastes require segregation. This will typically require separate storage areas or physical separation for hazardous and nonhazardous wastes and/or the segregation of different types of hazardous wastes;
- Voluminous waste as some construction waste will be stored in earmarked areas only;
- Wastes require covered storage, away from direct sunlight, wind and rain. In the case of non-hazardous wastes this requirement may be satisfied by the use of sealed containers such as 'wheeled bins'.
- Hazardous wastes, depending upon their form, may be stored either in similar containers or in tanks, drums or other smaller containers. In such cases storage under cover is important to protect the integrity of the container. Solid waste will be stored in such a way as to prevent it blowing away in high winds.
- Hazardous liquid wastes will be stored in bunded area with provision of spill collection, if any;
- Storage of non-hazardous general waste (except food waste), will be done in a manner to reduce health, safety and environment risks associated with the storage of this materials. The waste will be stored using either shipping containers or temporary earth bunding and will be designed in such a way to minimise leachate, odour and biogas generation;
- As far as practicable, the storage of waste will be kept to a minimum. This is both good housekeeping and, in the case of hazardous wastes, reduces the risks associated with the storage of large quantities of hazardous materials;
- Storage areas for waste will be secure from the general public, in particular children, and clearly marked so as to indicate the hazards of the stored material.
- Waste will be stored in a way to prevent, as far as possible, access by stray dogs and vermin. Waste will only be stored for as long as necessary before transferred off-site for appropriate treatment and disposal;
- Waste storage containers used will be appropriate in terms of volume, composition, shape, and opening for the material that is being stored. Only containers in a good condition will be used. Bungs and lids will be securely fastened or other forms of covering shall be provided;
- Containers that are susceptible to reaction with the wastes, which may lead to the release of harmful substances, must not be used;
- Only one category of hazardous waste may be placed in any one container. Solid and liquid wastes must not be mixed; and

- If a hazardous waste is mixed with other wastes the entire consignment will be considered as hazardous for disposal purposes.

Site Waste Collection Points

Waste Collection Points (WCPs) will operate at various activities areas. Here the waste will be segregated and stored temporarily prior to transfer to the Waste Storage Area (WSA) and final disposal sites. The WCPs will typically comprise of a dedicated area, storage containers, and secondary containment for hazardous liquid wastes (oils etc.). Separate storage containers will be provided for prime recyclables (paper, cardboard, scrap metal), domestic waste, and hazardous waste requiring segregation including oils, oily solids, chemicals and batteries. Care will be taken to ensure that chemicals are kept in separate containers in order to avoid a chemical reaction.

Waste Storage Area (WSA)

WSAs will be created at appropriate locations. WSAs are secure compounds and comprise the following:

- Waste reception area for weighing or estimating waste volumes and masses, by weighing unit or volume-mass conversion chart (per waste type);
- Waste Segregation Area;
- Hazardous waste storage area, including secondary containment and roofing;
- Laydown areas (e.g., for skip laydown/storage);
- Absorbents for dealing with leaks/spillages from containers;
- Returnable (to original supplier) storage area (if possible);
- Reusable and recyclables storage area;
- Separate drainage, spillage control kerbs and sump;
- PPE store;
- Eyewash and emergency shower; and
- Emergency equipment including fire-extinguisher.

Secure storage will be provided for the interim storage of selected wastes for which there is a realistic expectation of future reuse or recycling. The facility will also be used for the temporary storage of wastes requiring special handling. Any unknown wastes that require repackaging prior to disposal would be handled in this area. Wastes may also be stored in this area should they require short-term, well-ventilated storage out of direct sunlight.

Transportation of Wastes

Strict measures will apply to the transportation of wastes. Contractors will be required, at a minimum, to cover the following issues:

Disposal of hazardous waste will be done by engaging DOE approved waste management agencies or alternatively through appropriate agencies post background verification.

- Ensure that the nature, integrity and protection provided by packaging and containers used for transport are appropriate for the kind and quantity of material involved;
- Ensure adequate transport vehicle specifications, including enclosed compartments or incorporating cloth tarpaulins to facilitate odour control and ensure waste is not lost en-route;
- Consider routes used to minimise disturbance to local communities;
- Follow loading and unloading procedures to facilitate safe operations and avoid loss of wastes;
- Inform employees involved in transporting wastes of how to respond to accidents and emergencies;
- Provide the necessary means for emergency response.

Vehicles (including third party vehicles) will be checked for their suitability and maintenance and driver training will be in line with the Project driving requirements. Waste transportation contractors will be contractually required to comply with Project requirements and local legislation for vehicle maintenance and safety as these specific requirements will be included in their contractual agreements. Drivers of vehicles used to transport hazardous wastes will have been trained to use spill clean-up materials. Vehicles will be provided with spill clean-up materials and, as appropriate, carry a MSDS, and hazardous warning signs in accordance with international standards.

Transfer Procedures

Transfer of waste from a WCP to a WSAs and/or to a third party facility will be fully documented on a Waste Transfer Note. At a minimum, the following will be recorded:

- Waste originator;
- Waste description and type(s);
- Consignment reference number;
- Form (e.g. solid, liquid, sludge);
- Quantity(ies) (weight) and units (e.g. number of containers, drums);
- Name and signature of originator;
- Name and signature of waste transporter plus receiving party and
- Verification details of the waste disposal/treatment/recycling agency;

Only authorized personnel (i.e. those that have received the appropriate training) will be able to complete the Waste Transfer Notes. Waste received at the WSAs will undergo any further sorting and segregation as required, prior to being transferred from the WSAs to final treatment and disposal facility or further interim storage site. The tracking steps listed above may be modified as appropriate to enhance the waste tracking process.

The Contractor will maintain a register recording the details of all wastes generated, and the quantity of wastes sent to and received by the WSAs or final disposal/treatment facility. Wastes both received at the WSAs and despatched by the WSAs for disposal or interim storage will be recorded in a register held by the WSAs Site Supervisor (or delegate).

The register will record details of:

- Wastes received by the WSAs; and
- Wastes despatched by the WSAs for disposal or interim storage.
- The following information should be held in the register:

Waste originator;

- Waste type(s) collected and delivered (hazardous/non-hazardous), including a general description of waste;
- Waste Transfer Note reference number (in and out);
- Form (e.g., solid, liquid, sludge);
- Quantity(ies) and units (e.g. number of containers or skips) collected and delivered;
- Transporter (e.g. truck) number and type;
- Date delivered to WSAs;
- Date despatched;
- Name of WSAs Site Supervisor (or delegate); and
- Waste receiver site (once despatched) and confirmation of receipt.

Final Disposal

An assessment of the Best Practicable Environmental Options for identification of best possible waste management solutions will be undertaken considering each waste stream and balancing such aspects as environmental impact, accident potential, technical standards, financial costs and local availability. In line with the waste management hierarchy approach, the Contractor and Project Company will investigate and implement, where practicable reuse, recycle and other options in preference to sending waste to landfill and/or incineration, if required. Only those waste treatment companies that are approved by DOE for use by the Project will be utilised. The following subsections detail waste management disposal options to be considered by the Project.

Reuse / Recycle

The Contractor will identify different wastes which can be utilized for recycle/reuse. The following measures will be considered to minimise waste generation, and to promote reuse and recycling:

- Reduce material consumption (e.g. extending the useful life of consumables);

- Inventory control and management (e.g. reduce losses of materials due to expired shelf-life and improper storage conditions);
- Favour suppliers who use less packaging or practice 'take-back' schemes;
- Material substitution (e.g. where practicable, select non-hazardous replacements for hazardous materials to reduce the amount of hazardous wastes requiring disposal, recognising that this may not result in an actual reduction in the quantity of waste produced);
- Volume reduction (e.g., through material substitution and filtration);
- Reuse chemical containers; and
- Review establishment of food composting.
- General Site Waste Management

The following actions/strategies will be put into practice to minimise the accumulation/generation of waste on site:

- All personnel working on the project are to undergo a site induction. The site induction will include the waste management practices on the Project.
- All waste areas are to be clearly identified as waste storage areas. This includes bins and other receptacles for domestic waste, and which would be marked according to the type of waste accepted, e.g. scrap metal, oil filters and oily rags, other recyclables, general waste, etc.
- Clear written instructions are to be erected at appropriate locations detailing recycling and waste separation information.

M.2.7 Central Effluent Treatment Plant (CETP)

SEZ authority will discharge wastewater at the adjacent branch of the Jamuna River after complying with the national standard. They will install a Central Effluent Treatment Plant in the project area to treat all kind of wastewater from all the industry. There is a provision of wastewater (where applicable) for all the industries. From the ETP, the treated water will come to the CETP for final treatment.. As per the EIA report, detail design, specification, layout will be finalized in consultation with DoE before installation. Current information from the SEZ authority is that they will follow the process of SBR methodology for the CETP. Total capacity of CETP will be 6 MLD. Studying secondary source, common process flow of the CETP following SBR technology has been imagined in **Figure L1**. Detail layout of the CETP is still not available. But, SEZ authority has chosen a suitable place for the construction of the CETP which is in Utility section of the proposed economic zone.

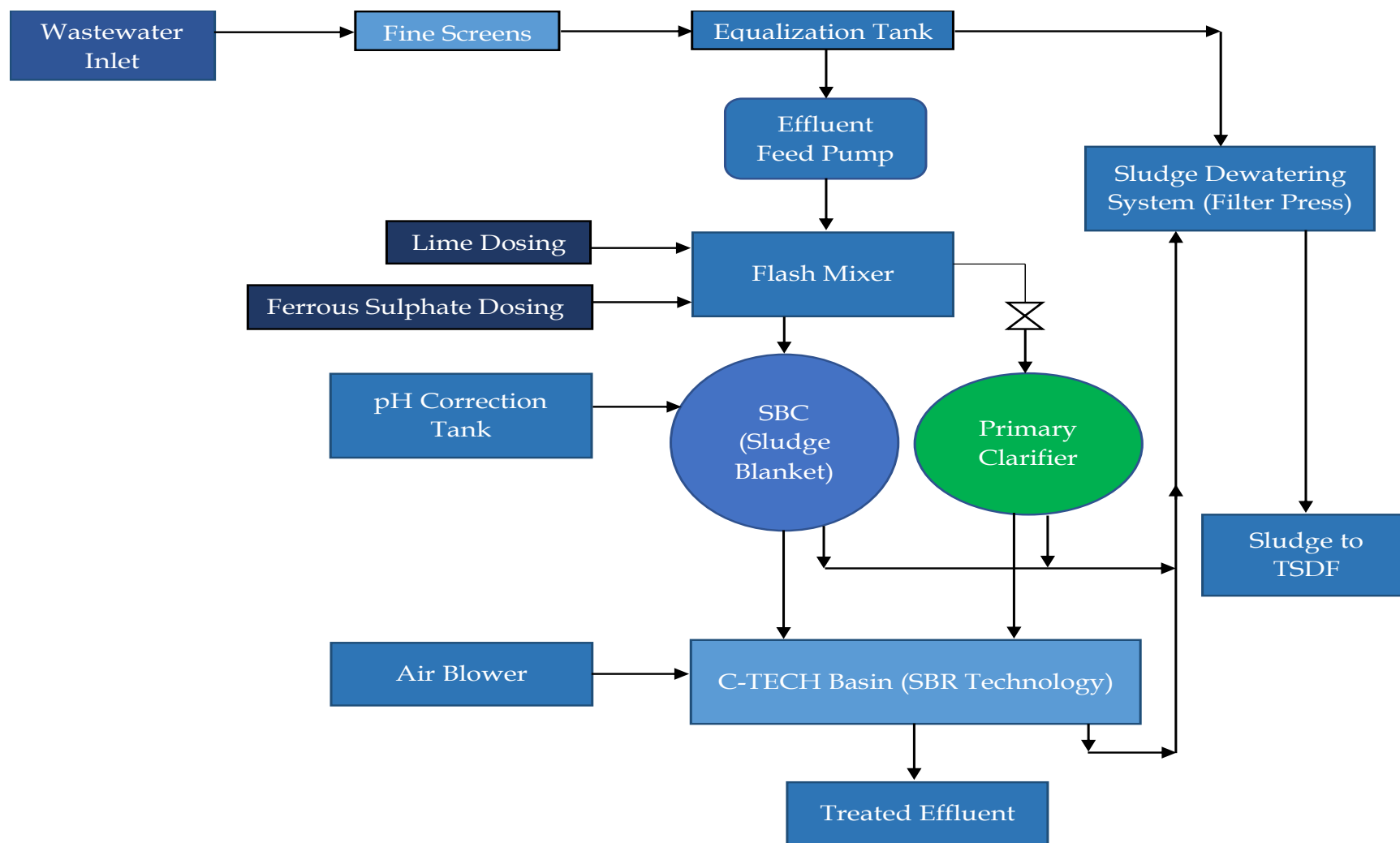


Figure M 1: : Process flow of CETP

M.2.8 Sewage Treatment Plant (STP)

Sewage treatment is the process of removing contaminants from wastewater, comprising of storm run-off, domestic sewage and primary treated effluent. It includes physical, chemical and biological processes to remove various contaminants. In the feasibility report, it was proposed to establish a central STP for the treatment of the sewerage. But as the industries are different, so as per the guidelines of IFC, separate STP is needed for the separate kind of industries at their premises. From the STP, the treated wastewater will go to the CETP through the sewerage line.

Detail treatment process of sewerage water as per IFC guideline is given below;

Textile Manufacturing

Process Wastewater Treatment: Since textile manufacturing operations use a myriad of raw materials, chemicals and processes, wastewater treatment may require the use of unit operations specific to the manufacturing process in use. Techniques for treating industrial process wastewater in this sector include source segregation and pre-treatment of wastewater streams as follows:

- (i) High load (COD) streams containing non-biodegradable compounds using chemical oxidation,
- (ii) reduction in heavy metals using chemical precipitation, coagulation and flocculation, etc. and
- (iii) treatment of highly colored or high TDS streams using reverse osmosis. Typical wastewater treatment steps include: grease traps, skimmers or oil water separators for separation of floatable solids; filtration for separation of filterable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD); biological nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals in designated hazardous waste landfills.

Additional engineering controls may be required for:

- advanced metals removal using membrane filtration or other physical/chemical treatment technologies,
- removal of recalcitrant organics, residual pesticides and halogenated organics using activated carbon or advanced chemical oxidation,
- residual color removal using adsorption or chemical oxidation,
- reduction in effluent toxicity using appropriate technology (such as reverse osmosis, ion exchange, activated carbon, etc.),
- reduction in TDS in the effluent using reverse osmosis or evaporation, and containment and neutralization of nuisance odors.

Other Wastewater Streams & Water Consumption: Guidance on the management of non-contaminated wastewater from utility operations, non-contaminated storm water, and sanitary sewage is provided in the General EHS Guidelines of IFC.

Water Consumption

Water consumption in textile manufacturing has a significant environmental impact, in terms of freshwater needs, wastewater/sludge production, and energy used in heating. Recommendations to reduce water consumption, especially where it may be a limited natural resource, are provided in the General EHS Guidelines of IFC. Recommendations specific to this sector include:

- Reuse of dye baths;
- Adoption of continuous horizontal washers and vertical spray washers or vertical, double-laced washers;
- Adoption of counter current washing (e.g. reuse the least contaminated water from the final wash for the next-to-last wash);
- Use of water flow-control devices to ensure that water only flows to a process when needed;
- Reuse of preparation and finishing water.

Electronics manufacturing

Process Wastewater Treatment: Since the semiconductors and electronics manufacturing operations use a diverse range of raw materials, chemicals and processes, wastewater treatment may require the use of unit operations specific to the manufacturing process in use and the specific contaminant. Techniques for treating industrial process wastewater in this sector include

- (i) source segregation and pretreatment of wastewater streams containing high concentrations of non-biodegradable compounds using phase separation such as solvent recovery, air stripping, chemical oxidation, adsorption processes, etc.
- (ii) reduction in heavy metals using chemical precipitation, coagulation and flocculation, electrochemical recovery, ion exchange, etc.
- (iii) chemical oxidation of cyanides; and
- (iv) dewatering and disposal of residuals in designated hazardous waste landfills.

Additional engineering controls may be required for;

- advanced metals removal using membrane filtration or other physical/chemical treatment technologies,
- removal of recalcitrant organics and halogenated organics using activated carbon or advanced chemical oxidation,
- reduction in effluent toxicity using appropriate technology (such as reverse osmosis, ion exchange, activated carbon, etc.), and

- containment and treatment of volatile organics stripped from various unit operations in the wastewater treatment system.

Other Wastewater Streams & Water Consumption: Guidance on the management of non-contaminated wastewater from utility operations, non-contaminated stormwater, and sanitary sewage is provided in the General EHS Guidelines of IFC.

Manufacturing of Wood Products

Process Wastewater treatment: Techniques for treating industrial process wastewater in this sector include: separation of floatable solids such as wood fines using Dissolved Air Floatation (DAF); filtration for separation of filterable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD); dewatering and disposal of residuals in designated waste landfills, recognizing that some residuals may be hazardous. Additional engineering controls may be required for

- (i) arsenic removal using ion exchange or membrane processes such as reverse osmosis,
- (ii) advanced metals removal using ion exchange or membrane filtration or other physical/chemical treatment technologies,
- (iii) removal of recalcitrant organics, pesticides, wood preservatives, and non-biodegradable COD using activated carbon or advanced chemical oxidation, and
- (iv) reduction in effluent toxicity using appropriate technology (such as reverse osmosis, ion exchange, activated carbon, etc.)

Other Wastewater Streams & Water Consumption: Guidance on the management of non-contaminated wastewater from utility operations, non-contaminated storm water, and sanitary sewage is provided in the General EHS Guidelines of IFC.

Pharmaceuticals

Process Wastewater Treatment: Techniques for treating industrial process wastewater in this sector include source segregation and pre-treatment concentrated wastewater streams, especially those associated with active ingredients. Typical wastewater treatment steps include: grease traps, skimmers, dissolved air floatation or oil water separators for separation of oils and floatable solids; filtration for separation of filterable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD); biological nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals in designated hazardous waste landfills. Additional engineering controls may be required for;

- (i) containment and treatment of volatile organics stripped from various unit operations in the wastewater treatment system,

- (ii) advanced metals removal using membrane filtration or other physical/chemical treatment technologies,
- (iii) removal of recalcitrant organics and active ingredients using activated carbon or advanced chemical oxidation,
- (iv) residual color removal using adsorption or chemical oxidation,
- (v) reduction in effluent toxicity using appropriate technology (such as reverse osmosis, ion exchange, activated carbon, etc.),
- (vi) reduction in TDS in the effluent using reverse osmosis or evaporation, and
- (vii) containment and neutralization of nuisance odors.

Other Wastewater Streams & Water Consumption : Guidance on the management of non-contaminated wastewater from utility operations, non-contaminated storm water, and sanitary sewage is provided in the General EHS Guidelines of IFC.

Metal and Plastic Products

Process Wastewater Treatment: Since general manufacturing operations, including metals, plastics and rubber products use a myriad of raw materials, chemicals and processes, wastewater treatment may require the use of unit operations specific to the manufacturing process in use. Techniques for treating industrial process wastewater in this sector include source segregation and pre-treatment of concentrated wastewater streams. Typical wastewater treatment steps include: grease traps, skimmers, dissolved air floatation or oil water separators for separation of oils and floatable solids; filtration for separation of filterable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD); biological nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals in designated hazardous waste landfills. Additional engineering controls may be required for

- (i) containment and treatment of volatile organics stripped from various unit operations in the wastewater treatment system,
- (ii) advanced metals removal using membrane filtration or other physical/chemical treatment technologies,
- (iii) removal of recalcitrant organics using activated carbon or advanced chemical oxidation,
- (iv) residual color removal using adsorption or chemical oxidation,
- (v) reduction in effluent toxicity using appropriate technology (such as reverse osmosis, ion exchange, activated carbon, etc.),
- (vi) reduction in TDS in the effluent using reverse osmosis or evaporation, and
- (vii) containment and neutralization of nuisance odors.

Other Wastewater Streams & Water Consumption: Guidance on the management of non-contaminated wastewater from utility operations, non-contaminated stormwater, and sanitary sewage is provided in the General EHS Guidelines of IFC.

Food and Beverage

Process Wastewater Treatment: Techniques for treating industrial process wastewater in this sector include grease traps, skimmers or oil water separators for separation of floatable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically anaerobic followed by aerobic treatment, for reduction of soluble organic matter (BOD); biological nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals; in some instances composting or land application of wastewater treatment residuals of acceptable quality may be possible. Additional engineering controls may be required to contain and neutralize nuisance odours.

Other Wastewater Streams & Water Consumption: Guidance on the management of non-contaminated wastewater from utility operations, non-contaminated storm water, and sanitary sewage is provided in the General EHS Guidelines of IFC.

Tanning and Leather Finishing

Process Wastewater Treatment : Techniques for treating industrial process wastewater in this sector include source segregation and pre-treatment for removal/ recovery of chromium; grease traps, skimmers or oil water separators for separation of floatable solids; filtration for separation of filterable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD); biological nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals in designated hazardous waste landfills. Additional engineering controls may be required for

- I. advanced metals removal using membrane filtration or other physical/chemical treatment technologies,
- II. reduction in effluent toxicity using appropriate technology (such as reverse osmosis, ion exchange, activated carbon, etc.),
- III. reduction in TDS in the effluent using reverse osmosis or evaporation, and
- IV. containment and neutralization of nuisance odors.

Other Wastewater Streams & Water Consumption: Guidance on the management of non-contaminated wastewater from utility operations, non-contaminated storm water, and sanitary sewage is provided in the General EHS Guidelines of IFC.

MONITORING, REPORTING AND REVIEW

Waste management data will be documented and reported to Project Company/ SCU. The information will include the quantities and type of waste removed off site for recycling or disposal, the contractor engaged to remove the wastes and the final destination for all waste products. Details will be provided on the implementation success of the WMP implemented and any areas that require improvement will be highlighted.

ACCOUNTABILITIES

All employees/ workers/ sub-contractors that are engaged by the Contractor directly or indirectly to work in the Project will be responsible for:

- Ensuring the effective implementation of this Plan with respect to their work areas;
- Ensuring any potential or actual waste management issues, including environmental incidents, are reported to the HSE manager/supervisors;
- Ensuring that all wastes are placed into the appropriate storage areas or receptacles;
- Ensuring they comply with all on-site requirements;
- Ensuring they engage in safe work practices; and
- Undertaking work practices that comply with this WMP.
- The Contractor will define detailed responsibilities for activities required as per the WMP.

REPORTING AND REVIEW

The Contractor team will present to the SEZL management on a monthly basis the following:

- Inventories of waste, its disposal and management records;
- How is the waste being reused and recycled and what is the progress against the targets if any defined by SEZL.
- Any issues that have come up in waste management, the root cause and actions taken;
- Any complaints or grievance from the local community of waste management issues and action taken. Time line for closing of the action.
- Any major issue emerging that will need SEZL management inputs as well as budget for waste management.

M.3 Traffic Management Plan (TMP)

M.3.1 Introduction

This Framework Traffic Management Plan (TMP) has been prepared to address the environmental, health and safety impacts associated with the transportation of large quantity of construction material and equipment to the Project site by road including man and material transportation between the Project Site and construction laydown area/s. This TMP builds on the conceptual information presented in the Project documents and applied to all transportation activities to be conducted during the site preparation and construction by the Contractor.

M.3.2 Scope

Site preparation and Construction Phase

The responsibility to frame the detailed TMP and its implementation will be with the Contractor selected by SEZL for the phase.

Areas: Project site and associated facility areas, roads where any transportation activity will take place related to the Project.

Define: Roads connecting Project site, Staff accommodation, roads, lay down areas, material transport routes, batching plant, etc. The TMP is to be read in conjunction with the other environmental management plans.

M.3.3 Objectives

The objectives of this framework management plan relates specifically to the following traffic and transport management issues:

- Traffic management,
- Driver training,
- Strengthening/ improvement of road infrastructure,
- Vehicle management and maintenance,
- Community liaison and safety and
- Emergency response.

M.3.4 APPLICABLE LEGISLATIONS AND REGULATORY STANDARDS

The following national regulations apply fully or partly on transport vehicle management and maintenance issues in the Project:

- The Vehicle Act, 1927
- The Motor Vehicle Ordinance, 1983
- The Bengal Motor Vehicle
- The Environment Conservation Act, 1995

The Contractor/SEZL would be encouraged always to seek the guidance and advice of local Road Transport Authority or Bangladesh Road Transport authority, Sirajganj division, which

is responsible for maintenance and strengthening of the road infrastructure, on any clarifications, new legislation and latest amendments, especially on vehicular emission norms and maintenance, strengthening/widening of roads.

M.3.4 Impact Avoidance And Impact Mitigation

The framework avoidance and mitigation measures will involve a combination of following management elements:

- Transport management planning,
- Route selection and management,
- Pre-condition survey,
- Traffic management implementation,
- Driver training,
- Road maintenance,
- Vehicle management and maintenance, and
- Community liaison and safety.

The essential features of each element are outlined below.

M.3.5 Traffic Management Planning

Movement of all heavy equipment and vehicles from main road to project site needs to be coordinated with the logistics team of SCU. Considering the laydown area on the other side of highway and heavy traffic movement on the national highway (Dhaka – Bogra Highway), specific traffic management planning will be carried out by the Contractor. The Traffic Management Plan aims to maximise optimum use of road based vehicles and reduced congestion as well as impact on community. The Traffic Management Plan would cover arrangements for the following aspects:

- Sourcing or recruitment for drivers and number of qualified drivers needed,
- Driver training and approval,
- Hours of driving and rest periods,
- Driver, vehicle and load security arrangements,
- Driver communication with control point and vehicle equipment,
- Language/communication,
- Source of suitable vehicles,
- Vehicle quality and specification,
- Number of vehicles required,
- Vehicle preventative maintenance programme,
- Vehicle database relating to emission control and noise
- Vehicle routes, route planning and alternative routes,
- Placement of traffic stewards for smooth traffic movement
- Overall vehicle movements,
- Emergency recovery of vehicle,
- Community safety, and
- Spot checks and audit of the transport system.

Route Selection and Management

Route for transportation of construction material will be through the National Highway to the Project site. The Traffic Management Plan will detail procedures to be adopted to ensure appropriate Project speed limits. The Project vehicles will not traverse through routes other than approved route/s. In the event of changing the route from the identified route, appropriate permit procedures will be followed to have a control on such events. In addition, all the vehicles engaged (owned/ contracted) will comply with all statutory vehicle limits (width, height, weight, loading, etc.).

Pre-condition Survey

The Contractor will undertake a pre-condition survey to assess the existing road conditions, loading/ unloading and parking facilities. Photographs will be taken as a record of condition. Local authorities will also be consulted during the pre-condition survey.

Traffic Management Implementation

In order to minimise the disruption due to the heavy traffic movement, The Contractor will adopt the following measures:

- Traffic flows will be timed and Project related traffic at peak traffic hours will be avoided to the extent possible;
- Clear signs, traffic stewards and signal posts will be set up as necessary;
- Appropriate supervision will be provided to control the flow of traffic while entering the national highway;
- Ensure that traffic activities requiring 'Heavy Vehicle Transport' will be in accordance with the regulatory requirements.

The Road Transport Authority or Traffic Police shall be consulted on the procedures required to be followed;

- The Project traffic or any Project activity will not obstruct the access to neighbouring properties;
- Vehicles speed will be minimised during the periods children are travelling to and from school;
- In the unlikely event of a road closure, diversions will be planned and communicated to the authorities and affected communities in advance.
- All diversion will be constructed to the specifications of the applicable road authority and will be maintained in good drivable conditions until the completion of the re-instatement work;
- The enforcement of speed controls, and the implementation of further pollution control measures, such as damping down the key access roads that have suspended particulate matter levels going above NAAQS;
- Appropriate speed limits for HMTVs will be determined as part of the management plan based on type of road available for the construction material transportation;
- Avoidance of passage through and near settled areas during night time hours.

Where there is the potential for cumulative impacts from congestion and related impacts from Project traffic to settlements near or en-route to Project location, transport phasing will be carefully considered in order to minimize disturbance impacts.

Parking

Signposted parking facilities will be provided at Project Site. The parking of Project vehicles on footways, along single lane roads and double parking shall be avoided. Temporary hard-standing areas will be provided on the Project site for the parking of emergency service vehicles. These areas will be kept free of other vehicles and will be appropriately signed. Another potential impact in vehicles and construction equipment is the oil and fuel spillage/leakage. The vehicle maintenance procedures will address the oil and fuel spills due to leakage etc. Oil and fuel spill during parking or whenever the vehicle is idling will be addressed by providing readily available oil and fuel adsorbent materials or drip trays. Vehicles will not be allowed to park outside of dedicated areas. Project personnel will report any spillage and leakage for immediate rectification.

M.3.6 Driver Training

The Contractor is required to ensure that all drivers and driver trainers are suitably trained in accordance with driver training requirements. Driver qualifications, skills of drivers and contractor's driving assessors will be checked by the Contractor in accordance with the approved training requirements. The Contractor shall issue a specific permission to each driver and for each vehicle type after assessment and approval of driver's competency. Unauthorised passengers in Project vehicles are strictly prohibited. The following issues and documents are to be addressed during driver training and in a language mostly appropriate to individual drivers:

- Journey Management Plan;
- Road to Better Driving Manual;
- Health and Safety Standards and Practices;
- National and local legal requirements to drive a vehicle; and
- Any additional requirements for Project drivers.

M.3.7 Road Maintenance

Throughout the construction period, The Contractor will be responsible for monitoring the condition of roads used by Project traffic and for ensuring that they are maintained in a condition that is at least as good as the condition they were in before the start of the Project and to the satisfaction of the Project and road maintenance authorities. The Contractor also need to liaison with the Road and Bridge (R&B) Department, Local Government Engineering Department (LGED) and the Bangladesh Bridge Authority (BBA) for strengthening and maintenance of roads (within the key project activity areas), which would be used for heavy vehicles movement for construction materials to the project site and return. The Contractor will aim to keep road free from debris by covering of all the construction transport vehicles carrying construction materials and rejects.

M.3.8 Vehicle Management and Maintenance

In order to ensure that accident rates and the overall transport fuel consumption are minimised, the Project shall ensure that the vehicle fleet working on the Project (whether directly for the contractor or for the contractor's subcontractors) is maintained according to the manufacturers' specifications, as well as mechanically maintaining vehicles to manufacturer specifications so as to minimise fuel consumption. The following in respect of vehicle maintenance, noise and emission standards will be required:

- All vehicles shall be maintained so that their noise and emissions do not cause nuisance to workers or local people;
- An up to date database of all Project vehicles will be maintained and supplied on demand or for audit inspections. The database will contain details about the periodical maintenance, schedule of maintenance, vehicular emission and noise emission testing done as per regulatory requirements;
- New vehicles: vehicles/equipment purchased 'as new' after contract award shall comply with regulation noise and air quality emission standards in force on the purchase date;
- Method statements shall be produced to cover vehicle/equipment emission measurement and routine maintenance. Method statements shall require regular maintenance of diesel engines to ensure that emissions are compliant.
- Routine maintenance shall be to a high standard to ensure that vehicles are safe and that emissions and noise are compliant.
- Oil and fuel leaks must be addressed within specified time duration, from the time of observation or reporting.
- Vehicle maintenance and management parameters will form a critical component of reporting under this plan.

M.3.9 Community Liaison and Community Safety

Traffic safety in local communities must be a high priority for the Project. The Traffic Management Plan will have procedures that will minimise traffic impacts on communities. The Contractor along with SEZL will ensure communities are advised in advance of Project progress where transport issues have the potential to impact local communities. The Project Stakeholder Engagement Plan will be utilised to communicate with the communities in this regard. The communications to the community will discuss the timing (*start, duration and finish of Project activities in their vicinity*) of traffic and transportation activities. Traffic Management will include a programme of traffic safety awareness for inhabitants of villages affected by significant increases in Project related road traffic. The Contractor will provide these communities with sufficient information on safety measures related to road traffic prior to commencement of work and continue to provide sufficient opportunity for community members to air and resolve traffic related complaints during Project period. Efforts will be made to brief women particularly on safety measures. As the primary caretakers, women are well positioned to pass on safety information to their children. The CSR Team will carry out the traffic safety awareness programme as part of or separate to the comprehensive safety

awareness programme. Any grievances will be recorded as per GRC framework specified in the ESIA Report or as further updated for the Project by the Project Company.

M.3.10 Monitoring, Reporting And Review

Traffic management data will be documented and reported monthly to SCU. The information will include the traffic congestion, nuisances, incidents and accidents, training records, awareness programmes etc. Details will be provided on the implementation success of the TMP implemented and any areas that require improvement will be highlighted.

M.3.11 Accountabilities

All employees/workers/ sub-contractors that are engaged by the Contractor for the transportation requirement will be responsible for:

- Comply with the road safety rules and regulations; and
- Ensure any potential or actual traffic management issues are reported to the Project Manager, Supervisor or Task Coordinator.

The Contractor will be responsible for the following activities as described in the TMP:

- Approve appropriate resources for the implementation of this Plan;
- Ensure the effective implementation of strategies designed to reduce traffic induced impacts;
- Authorise internal and external reporting requirements of this Plan;
- Fortnightly/ monthly review of internal reports and incidents;
- The Contractor will define detailed responsibilities for activities required as per the TMP.

M.3.12 Reporting And Review

The Contractor team will present to SEZL management on a monthly basis the following:

- Actions taken against the mitigation measures adopted for road safety and control of pollution due to use of heavy equipment within the site and transportation of raw materials
- Any issues that have come up in traffic management that has triggered a fine or a complaint by the government authorities, the root cause and actions taken;
- Any complaints or grievance from the local community on health and safety, pollution or noise and action taken. Time line for closing of the action.
- Any major issue emerging that will need management inputs as well as budget for traffic management-e.g. additional parking area/s, signage, noise barriers, etc.

M.4 Developing a ESMS

Core elements of a ESMS are :

- Environmental and social policy;
- Procedures to screen projects, assign environmental risk category, and conduct due-diligence to evaluate environmental and social risks;
- projects under consideration;
- Monitoring and record keeping;
- ESMS review and continuous improvement;
- External reporting;
- Roles and responsibilities for implementing the ESMS;
- ESMS budget, training and Senior Management approval.

Environmental and social policy	• Written statement • Approved by Senior Management • Communicated to all employees, in particular operational staff of the Financial Institution • Communicated to all stakeholders including clients
Procedures to screen and assess project under consideration	• Screen activities of project • Review industry sector and technical aspects of the project • Categorize the project by environmental risk • Conducting due-diligence to evaluate environmental and social risk
Monitoring and record keeping	• Evaluate the environmental and social performance of on-going projects on a periodic basis (e.g. monthly, quarterly, annually) • Keep records for each project
ESMS review and continuous improvement	• ESMS needs to be reviewed periodically to ensure that it remains relevant and effective over time and incorporates organization's evolving needs
External reporting	• Report immediately if clients experience major accidents or incidents that have received media attention • Report on any High-Risk projects prior to loan decision • Report annually on environmental and social performance

Roles and responsibilities for implementing the ESMS	• ESMS Officer (management-level) with assistance from Environmental Coordinator(s) (operational-level) as necessary • Examples of responsibilities of different roles
ESMS budget, training and Senior Management approval	• Budget resources and funds for ESMS • Organize ESMS training for staff, using consultants as needed, to explain • Obtain approval and sign-off from Senior Management to ensure that the ESMS meets all necessary criteria

Part II. Implementing a ESMS:

Communicate across the Financial Institution the importance of the ESMS and its implementation- Office memo/email, staff meeting, bulletin board, newsletter.

M.5 Management of Occupational health risks

M.5.1 Occupational health risks

The main health risks in construction are:

Musculoskeletal disorders: back and other muscle and joint injuries (see Moving, lifting and handling loads);

Hand-arm vibration syndrome: pain and numbness in the fingers and hands caused by the use of vibrating tools **Dermatitis:** redness and inflammation of the skin related to exposure to hazardous substances such as cements and solvents

Noise-induced hearing loss: deafness or ringing in the ears caused by exposure to high levels of noise;

M.5.2 Hazardous substances and processes

Any hazardous substances that are going to be used, or processes which shall produce hazardous materials, shall be identified. The risks from work that shall affect site workers or members of the public shall then be assessed. Contractor shall eliminate hazardous materials from their sites. Where this is not possible, they shall specify the least hazardous products which perform satisfactorily.

If workers use or are exposed to hazardous substances as a result of their work, the Control of Substances Hazardous it shall be contractor's duty to assess the health risks involved and to prevent exposure or else adequately control it.

M.5.3 Identification of hazards:

In general people shall be exposed to hazardous substances either because they handle or use them directly (such as cement and solvents), or because the work itself results in the creation of a hazardous substance (such as scabbling concrete generates silica dust). Identify and assess both kinds of hazard.

Some hazardous substances shall be on site before any work starts, such as sewer gases or ground contaminants. Contractor shall assess these risks in the same way as for other hazardous substances. Information to help identify these risks shall be collected from different agencies, the Contractor shall be contained in the pre-construction-stage health and safety plan.

Assessment of hazards:

Contractor shall monitor the people who are exposed to the hazardous substance in the particular job that they are about to do. Decide whether it is likely to harm anyone's health.

M.5.4 Harm could be caused by:

- **Breathing in fumes, vapors, dust:**

Contractor to verify whether:

- does the manufacturer's information say that there is a risk from inhaling the substance? Are large amounts of the substance being used?
- Is the work being done in a way that results in heavy air contamination, such as spray application?
- Is the work to be done in an area that is poorly ventilated, such as a basement?
- Does the work generate a hazard, such as hot cutting metal covered with lead causes lead fumes to be given off?

- **Direct contact with skin:**

Contractor to verify whether:

- Does the manufacturer's information say there is a risk from direct contact?
- How severe is it, such as are strong acids or alkalis being used?
- Does the method of work make skin contact likely, such as from splashes when pouring from one container to another, or from the method of application?

- **Swallowing or eating contaminated material:**

Some construction materials usually contaminate the skin and hands. The contamination can then be passed to a person's mouth when they eat or smoke. This is a particular problem when

handling lead and polishing lead-based paint. Contractor shall make sure people do not smoke or eat without washing first. Once a full assessment has been completed and where the same work is being done in the same way under similar circumstances at a number of sites, the risk assessment does not have to be repeated before every job but Contractor shall check it to make sure there are no real differences. Contractor shall continuously look out for new safer ways of working and new products, which could be safer substitutes.

If, however, there are many processes that result in different hazardous substances being used in a wide range of circumstances, a fresh assessment shall be made for each job or set of similar jobs. This will make sure the assessment is relevant to the job being done and the circumstances in which it is being carried out. It shall be borne in mind that to assess both immediate risks, such as being overcome by fumes in a confined space, and longer-term health risks. Materials like cement can cause dermatitis.

M.5.5 Prevention of hazards:

If harm from the substance is possible, the first step to take is to try and avoid it completely by not using it at all. This will mean either:

- doing the job in a different way, such as instead of using acids or caustic soda to unblock a drain, use drain rods; or
- Using a substitute substance, such as instead of using spirit-based paints, use water-based ones, which are generally less hazardous. However, always check one hazard is not simply being replaced by another.

M.5.6. Control of hazards:

If the substance has to be used because of no alternative, or because use of the least hazardous alternative still leads to significant risk, the next step is to try and control exposure.

The ways these could be done which include:

- Transferring liquids with a pump or siphon (not one primed by mouth) rather than by hand. Keep containers closed except when transferring;
- rather than spraying solvent-based materials, use a roller with a splash guard or apply by brush;
- using as little of the hazardous substances as possible – don't take more to the workplace than is needed;
- using cutting and grinding tools and blasting equipment fitted with exhaust ventilation or water suppression to control dust;

- Ensuring good ventilation in the working area by opening doors, windows and skylights. Mechanical ventilation equipment shall be needed in some cases.

M.5.7 Personal protective equipment (PPE)

If, **and only if**, exposure cannot be adequately controlled by any combination of the measures already mentioned, Contractor shall provide personal protective equipment (PPE). PPE shall be selected with care of good quality equipment which is CE-marked. It shall be better, the user of the equipment help's to choose it – they will be more willing to wear it. Explain to the user why the equipment has to be worn and the hazard(s) the equipment protects against.

M.5.8 Respiratory protection

Respirators can protect against dusts, vapors and gases. There are many types of respiratory protective equipment (RPE), including:

- disposable face mask respirators;
- half-mask dust respirators;
- high-efficiency dust respirators;
- positive-pressure powered respirators;
- ventilator visor or helmet respirators;
- compressed air line breathing apparatus;
- Self-contained breathing apparatus.

Contractor shall make sure, the respirator is the correct type for the job; dust masks shall not protect against vapors or vice versa. If the respirator has replaceable cartridges, Contractor shall make sure that the correct type is fitted, that they have not become exhausted or clogged and are still in.

A competent person shall select RPE that is both suitable for the user and the job, as this choice will depend upon a number of factors, including:

- the nature of the hazards and materials;
- the measured level of the contaminant;
- the period of exposure;
- if working outdoors, the prevailing weather conditions;
- Suitability for each user, such as field of vision, provision for communication and the ease of movement in cramped working places, such as confined spaces.

It shall be ensured that the respirators fit well around the face. To be made sure that the user knows how to wear the equipment and check for a good face seal. Respirators do not seal well against a beard, so when the user has a beard, alternative protection is needed, such as air-fed visors, which do not rely on a good face seal.

M.5.9 Skin protection

Dermatitis is an inflammatory skin condition caused by certain irritants contained in many industrial materials. There are two general types:

- Irritant dermatitis: usually caused by the skin coming into contact with an irritant substance. Anyone shall be affected and the strength of the irritant together with the duration of exposure will affect the seriousness of the complaint;
- Sensitizing dermatitis: where a person develops an allergic reaction to a substance. The reaction shall follow weeks, months or even years of use without any ill effects but once it has occurred, any future exposure to the substance will produce an adverse reaction.

Reaction of the skin to an irritant varies from one individual to another. The reaction shall be only a mild redness but this can develop into swelling, blisters and septic ulcers that are both unsightly and painful. In addition to dermatitis, some substances can cause other skin problems, such as oil acne from bitumen-based products and skin ulcers from corrosive substances.



Example of contamination of workers working by uncovered hands

In the course of their work, construction workers shall come into contact with many skin irritants. The most common types include:

- cement, lime and plaster;

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- paint;
- tar, pitch and bitumen;
- solvents, thinners and de-greasers;
- certain epoxy, acrylic and formaldehyde resins;
- mineral oils and grease.

Protective clothing when provided (such as overalls and gloves), care shall be taken of the right type to protect the wearer against the particular hazard they are going to encounter. Generally all manufacturers offer advice on the most suitable gloves for specific types of hazard. When using gloves to help prevent dermatitis, users shall avoid getting contaminants inside the gloves when putting them on and taking them off.

It is also essential to provide washing facilities, with a supply of hot and cold (or warm) running water, soap and a means of drying the hands, to help prevent dermatitis.

M.5.10 Personal hygiene:

Substances can also be a hazard to health when they are transferred from workers' hands onto food, cigarettes etc. and so taken into the body.

This shall be avoided by adopting good and adequate personal hygiene, such as by:

- Washing hands and face before eating, drinking and smoking and before, as well as after, using the toilet;
- Eating, drinking and smoking only away from the work area.
- In cases where clothing shall become contaminated, people shall change out of this clothing before eating and drinking.
- Make sure those at risk know the hazards. Provide good washing facilities and somewhere clean to eat meals. Good clean welfare facilities can play an important part in protecting the health of everyone involved in the work.
- Make sure as few people as possible are exposed to hazardous substances by excluding people not directly involved in the work from the contaminated area.

M.5.11 Health surveillance

Sometimes workers' health shall be protected by checking for early signs of illness. Such surveillance is a duty in a restricted range of cases for work involving some health risks such as asbestos. Surveillance shall be appropriate in other cases, such as for workers regularly engaged in blast-cleaning surfaces containing silica, or where workers are exposed to high levels of noise or hand-arm vibration, especially for long periods.

Where appropriate, arrangements shall be made for workers to have regular examinations by an occupational health professional to detect early signs of skin complaints, such as dermatitis. In addition, workers shall be encouraged to carry out 'self-checks' and report skin irritations to their supervisor at an early stage.

Noise safety:

- Regular exposure to high noise levels causes deafness or tinnitus (a permanent sensation of noise and ringing in the ears) – the longer the exposure and the higher the noise level, the greater the degree of hearing loss. This hearing loss is incurable and distressing.
- Noise on construction sites usually comes from machinery used for demolition, excavation or piling and from compressors and concrete mixers etc.
- Other operations, such as hammering, riveting and the use of cartridge-operated fixing tools, shall also be the source of excessive noise.
- Check which work will involve noisy equipment. Assess how much the noise from this work is going to affect people working at the site.
- The manufacturers and suppliers of equipment have a duty to provide information on the noise their equipment produces.
- This information shall give a good idea if there is likely to be a noise problem. Go back to the manufacturer or supplier if the information is not clear.
- Poor maintenance of tools can lead to increased noise levels.
- Contractor need to make sure that equipment is properly maintained and that any noise reduction measures, such as pneumatic silencers, are kept in place.

Assessment of Noise:

- To examine at how equipment will actually be used on site by verifying the person using the equipment talk to someone 2 m away without having to shout to be understood?
- If they have to shout, the noise from the equipment is probably loud enough to damage their hearing, so action will have to be taken.
- Get the noise levels assessed by someone with the skill and experience to measure noise and who can identify what needs to be done. In the meantime, offer workers ear defenders (earmuffs or earplugs) to wear.

Prevention of noise

- Can the job be done in another way that does not involve using noisy equipment? If not, can a quieter item of equipment be used? When buying or hiring equipment, choose the quietest model.
- Practical action shall be taken to carry out the noisy job well away from where other people are working. Workers who are not involved in works shall be taken out of the noisy area.
- Signs shall be erected to keep people out of the noisy area.

Control of noise:

- Contractor shall take mitigation measures to reduce the noise at source, such as fit mufflers to breakers, drills etc. Keep the covers closed on compressors. Most modern compressors are designed to run with all covers closed, even in hot weather.
- To make sure the silencers on mobile plant are in good condition. Maintain equipment regularly to prevent noise from loose bearings and leaky compressed-air hoses and joints.
- Noise levels shall be reduced by making sure the exhausts of compressors, generators and other plant are directed away from work areas.
- Screens faced with sound-absorbent materials shall be placed around plant.
- If it is not possible to eliminate the noise source or reduce the noise, ear defenders shall be provided to workers with (muffs or plugs).
- Ear defenders shall be selected carefully and shall be kept them in good condition & workers shall be trained in their use.
- Ensure that they fit well and are kept in good condition.
- Make sure that where defenders are needed they are actually used.
- Check that the hearing protection does not interfere with other safety equipment, such as if ear defenders are difficult to wear with a hard hat, get defenders that fit onto the hat.

M.5.12 Vibration

Many jobs in construction involve the use of hand-held power tools. The vibration from such equipment can cause hand-arm vibration syndrome (HAVS). This condition affects the fingers, hands and arms and, in the long term, causes permanent damage. Eventually parts of the fingers go white and numb and there is a loss of touch. This condition is often called 'vibration white finger'.

Vibration damage to the fingers, hands or body is very much dose-related. The greater the exposure to vibration, the more likely there is to be damage. Other factors that can influence the degree of severity of hand-arm vibration syndrome which include:

- The grip, push and other forces used to guide and apply the vibrating equipment. The tighter the grip, the more vibration energy is transferred to the hands;
- the exposure pattern, length and frequency of work and subsequent rest periods;
- the hardness of the material being worked upon; and
- Factors that can affect blood circulation, such as workplace temperature, smoking and individual susceptibility.

Some of the tools used in construction that are likely to result in high levels of exposure to vibration are:

- road and concrete breaking drills;
- concrete vibro thickeners and concrete pokers;
- plate vibrators;
- chisels (air or electric);
- compressor guns;
- pneumatic and percussive drills;
- angle grinders;
- sanders and other similar 'rotary' tools;
- abrasive wheels;
- cutting-off wheels and discs;
- Power hammers and chisels.

Assessment of Vibration

The information from the manufacturer or supplier, the amount of time the tools are used and discussions with the people using the tools shall reveal the tools most likely to present a risk.

Make sure workers using vibrating tools know about the risks and what they need to do to minimize them.

Prevention of Vibration

Can the job be done in another way that does not involve using hand-held power tools (such as by using a hydraulic breaker to break a concrete beam rather than spending long periods using hand-held breakers or using a chemical method for pile capping or surface preparation)?

Control of Vibration

Contractor shall maintain equipment so that it is properly balanced, has no loose or worn out parts and blades/cutters are sharp etc. Contractor shall use the power tool and attachment which will do the job properly in the shortest time.

It is good practice for workers to keep their hands warm to get a good flow of blood into the fingers by:

- wearing gloves;
- having hot food or drinks;
- massaging the fingers;
- not smoking (as this can cause narrowing of the blood vessels).

M.5.13 Electricity

Electrical equipment is used virtually at every site. Everyone is familiar with it, but unlike most other hazards, which shall be seen, felt or heard, there is no advance warning of danger from electricity, and **electricity can kill**.

Electrical systems and equipment shall be properly selected, installed, used and maintained. Hazards arise through faulty installations, lack of maintenance and abuse of equipment. Accidents happen because people are working on or close to equipment which is either:

- Assumed to be dead, but is in fact live; or
- Known to be live, but workers have not received adequate training or adequate precautions have not been taken.

It is essential that the electricity power supply requirements are established before any work takes place. Arrangements for the electricity supply shall be completed with the local electricity supplier and the supply system installed.

Electrical equipment used on construction sites (particularly power tools and other portable equipment and their leads) faces harsh conditions and rough use. It is likely to be damaged and therefore become dangerous. Modern double-insulated tools are well protected, but their leads are still vulnerable to damage and shall be regularly checked.

To eliminate risks; Contractor shall use cordless tools or tools which operate from a 110V supply system, which is center-tapped to earth so that the maximum voltage to earth shall not exceed 55V, will effectively eliminate the risk of death and greatly reduce injury in the event of an electrical accident. For other purposes such as lighting, particularly in confined and wet locations, still lower voltages shall be used and are even safer.

Mains equipment is more appropriate to dry indoor sites where damage from heavy or sharp materials is unlikely. Where mains leads to sockets shall be damaged, they shall be:

- positioned where they are least likely to be damaged, such as run cables at ceiling height; or
- Protected inside impact-resistant conduit.

Alternatively, special abrasion-resistant or armored flexible leads shall be used.

Electrical systems shall be regularly checked and maintained. Everyone using electrical equipment shall know what to look out for. A visual inspection can detect about 95% of faults or damage. Before any 230V hand tool, lead is used, Contractor shall check that:

- no bare wires are visible;
- the cable covering is not damaged and is free from cuts and abrasions (apart from light scuffing);
- the plug is in good condition, such as the casing is not cracked, the pins are not bent and the key way is not blocked with loose material;
- there are no taped or other non-standard joints in the cable;
- the outer covering (sheath) of the cable is gripped where it enters the plug or the equipment. The coloured insulation of the internal wires shall not be visible;
- the equipment outer casing is not damaged and all screws are in place;
- there are no overheating or burn marks on the plug, cable or the equipment;

Workers shall be instructed to report any of these faults immediately and stop using the tool or cable as soon as any damage is seen. Managers shall also arrange for a formal visual inspection of 230V portable equipment on a weekly basis. Damaged equipment shall be taken out of service as soon as the damage is noticed.

Inspection and checks:

Suggestions for inspections and test frequencies are set out in Appendix 1.

- With lighting systems, to provide protection for cabling in the same way as for tools. Protect bulbs against breakage. If breakage does occur, the exposed filaments shall

present a hazard. Make sure there is a system for checking bulbs to maintain electrical safety and also to keep the site well lit.

- Tools and equipment shall be suitable for site conditions. Also observe other restrictions on use imposed by manufacturers.
- If work is to be done in areas where there is a risk of flammable vapors (such as in a petrochemical works), it will be necessary to select specially designed electrical equipment to prevent it acting as a source of ignition due to sparks and overheating.
- Precautions shall be covered in the project health and safety plan and the operator of the premises shall be able to provide advice. Specialist advice shall also be needed.

M.5.14 Overhead power lines

Contact with overhead power lines is a regular cause of death and injury. Any work near electric distribution cables or power lines shall be carefully planned to avoid accidental contact.

The most common operations leading to contact with overhead lines are:

- operating cranes and other lifting equipment;
- raising the body or inclined container of tipper lorries;
- operating excavators and other earth-moving equipment;
- handling long items such as scaffold tubes, metal roof sheets, ladders etc;
- Using MEWPs.

Where overhead line are very near in contact with working areas in such events the works shall be done in an area well clear of the line itself.

If plant is working in the vicinity of an overhead power line, the distance between the plant and the overhead line shall be **at least**:

- 15 m (plus the length of the jib) if the lines are suspended from steel towers; or
- 9 m (plus the length of the jib) if the lines are supported on wooden poles.



Ground level barrier for plant working near an overhead power line.

In addition to the specific precautions required when working in the vicinity of overhead power lines, Contractor shall also:

- erect high-visibility barriers at least 6 m away, to prevent inadvertent approach by other site vehicles (see Figure 50);
- install clearly marked crossing points beneath the lines at a height specified by the electricity supplier;
- Prohibit the storage of materials in the area between the overhead lines and the ground-level barriers.

M.5.15 Working in confined spaces

Description:

A 'confined space' shall be either:

- a place which is substantially, though not always entirely, enclosed; or
- a place where there is a reasonably foreseeable risk of serious injury from hazardous substances or conditions within the space or nearby.

Risks to work in a confined space:

Air in the confined space is made un-breathable either by harmful gases and fumes or by lack of oxygen. There is not enough natural ventilation to keep the air fit to breathe. In some cases the gases shall be flammable, so there shall also be a fire or explosion risk. Working space shall be restricted, bringing workers into close contact with other hazards such as moving machinery, electricity or steam vents and pipes. The entrance to a confined space, such as a manhole, shall make escape or rescue in an emergency more difficult.

How does a confined space become dangerous?

Some confined spaces are naturally dangerous, such as because of:

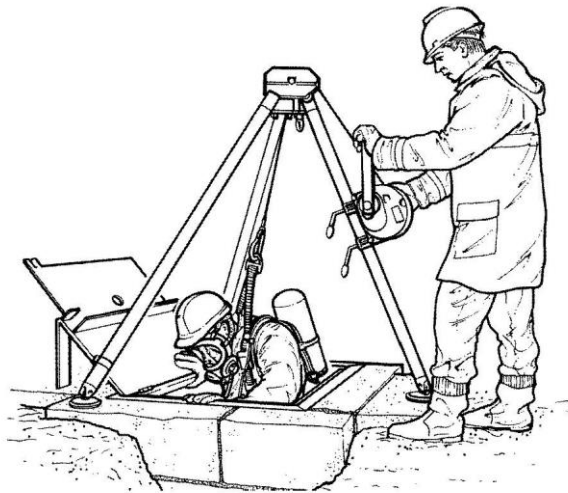
- gas build-up in sewers and in manholes and pits connected to them;
- gases leaking into trenches and pits in contaminated land such as old refuse tips and old gas works;
- rust inside tanks and vessels, which eats up the oxygen;
- liquids and slurries, which can suddenly fill the space or release gases into it when disturbed;
- chemical reaction between some soils and air causing oxygen depletion, or the action of ground water on chalk and limestone producing carbon dioxide.

How Contractor shall work safely in confined place?

There shall be a safe system of work for operations inside confined spaces. Everyone shall know and follow the system. A permit-to-work system shall be required.

For safe working, first try to find a way of doing the job without going into the confined space. If entry is essential:

- identify what work shall be done in the confined space and the hazards involved;
- consider if the space could be altered to make it permanently safe or if the work could be changed to make entry to the dangerous area unnecessary;
- make sure workers have been trained in the dangers and precautions, including rescue procedures;
- make sure the entrance to the space is big enough to allow workers wearing all the necessary equipment to climb in and out easily;
- before entry, ventilate the space as much as possible, test the air inside the space and only enter if the test shows it is safe;
- after entry, continue to ventilate the space and test the air for toxic substances, flammable gases and oxygen deficiency as necessary;
- if there is a flammable risk, the space shall be ventilated until it is safe. When selecting equipment, remember heat or sparks from electrical or other equipment could ignite flammable vapors, so air-powered tools shall be required.
- The risk from flammable vapors is very high when work is carried out on the tanks of petrol service stations and similar sites.
- disturbing deposits and slurries in pipes and tanks shall produce extra vapors, resulting in a greater risk, so clear deposits before entry where possible;
- if the air inside the space cannot be made fit to breathe because of a toxic risk or lack of oxygen, workers shall wear breathing apparatus;
- never try to 'sweeten' the air in a confined space with oxygen as this can produce a fire and explosion risk;
- workers inside the confined space shall wear rescue harnesses with lifelines attached, which run back to a point outside the confined space.



A worker wearing full breathing apparatus is also wearing a harness and lanyard connected to a winch so that he can be hauled to the surface in a emergency without others having to enter the manhole to rescue him.

For further information on working in confined spaces, read Safe work in confined spaces.

M.5.16 Prevention of drowning

There shall be a risk of drowning when people work beside or above water or have to pass near or across it on their way to or from their workplace. If people have to work over or in the vicinity of water, there shall be a safe system of work, and they shall be properly trained.

The most immediate danger following a fall into water is drowning. Causes or contributory factors include:

- shock of sudden immersion in cold water;
- weight of waterlogged clothing;
- incapacity following injury caused by striking an object during the fall or while in the water;
- Fatigue or hypothermia where rescue is not immediate.

M.5.17 Preventing a fall into water

Erect barriers to stop people from falling into the water or other liquid. In most cases guard rails and toe boards or a similar barrier will be put at open edges to ensure people cannot fall. A safe system of work ensured by diverting or reducing rates of flow in channels and the arrangements for training and supervision of employee shall be executed..

M.5.18 Raising the alarm

When working over or near to water there shall be means to raise the alarm if anyone has fallen into the water. It could be to make system to whistles and lights to help locate people in the water.

M.5.19 Keeping afloat

To provide life jackets to those at risk. Life jackets shall ideally be auto-inflating and shall always be worn.

M.5.20 Rescue boats

Suitable rescue boat or boats with a competent operator shall be deployed. The type of rescue boat shall be determined on the circumstances of the work and type of water and any currents. In fast-flowing water, two people shall be engaged to carry out a rescue, one to maneuver the boat and the other to pull the casualty from the water.

M.5.21 Personal Protective equipment(PPE)

This illustrates about general personal protective equipment (PPE), which shall be required to protect against injury.

M.5.22 Hard hats

On almost all sites there is a risk of injury from falling materials. Contractor shall minimize these risks by providing suitable barriers and toe boards at the edge of work platforms to prevent materials from falling. Deal with the remaining risks by providing suitable head protection. Hard hats are required where anybody shall be struck by falling materials or where people shall hit their heads.

The hazards shall identify as:

- loose material being kicked into an excavation;
- material falling from a scaffold platform;
- material falling off a load being lifted by a crane or goods hoist or carried on a site dumper or truck;
- a scaffold dropping a fitting while erecting or dismantling a scaffold.

To identify on which areas of the site hats have to be worn. Train everyone in the area & necessary site rules shall be introduced. Contractor shall provide employees with hard hats. It shall be ensured that hats are worn and worn correctly.

M.5.23 Footwear

Risk of injury to identify as:

- materials being dropped on workers' feet; or
- Nails, or other sharp objects, penetrating the sole?

For protection, boots with steel toecaps and mid-soles shall be introduced to wear by Contractor peoples. Proper and suitable boots shall procured for all employees working in project areas in preventing burns from wet cement or concrete as the cement content, when mixed with water, becomes highly corrosive and can cause severe burns to the skin.

M.5.24 Goggles and safety spectacles

These shall supplied by the Contractor for peoples to protect against:

- Flying objects, such as when using a nail gun. To provide adequate protection goggles shall be shatter-proof which needs to be checked with the manufacturer's specification;
- sparks, such as when disc-cutting;
- ultraviolet radiation from welding – specialist goggles or shields are required;
- Chemical splashes.

Eye protection shall be readily available in sufficient numbers so that any that are lost, destroyed or become defective shall be replaced. For protection against corrosive splashes visors shall be supplied to protect whole face.

M.5.25 Outdoor clothing

In general employees regularly work outdoors and they cannot be sheltered from the weather, wind and waterproof clothing will be needed. There shall be facilities for storing clothing not worn on site and protective clothing as well as for drying wet clothing.

A major hazard to the skin is exposure to ultraviolet rays from the sun. The effects can vary from sunburn (blistering and peeling of the skin) to permanent damage and increased risk of skin cancer. Construction workers who shall be working in outdoors for long periods of time are at the greatest risk and Contractor shall take steps to protect their skin by:

- wearing a long-sleeved top and covering their legs;
- Carrying out periodic checks for any visible changes in skin, such as changed or newly formed moles or any skin discoloration.

M.5.26 High-visibility clothing

Many accidents happen when people in hazardous positions cannot be seen. Contractor shall plan to work to avoid placing people in such positions. Where this is not possible, Contractor shall provide high-visibility clothing. Contractor shall make arrangements to keep this clothing clean. Badly soiled garments shall be replaced.

High-visibility clothing will be provided wherever workers:

- could be run down by vehicles, such as signalers assisting with vehicles being maneuvered and anyone engaged in road works;
- Need to be seen by others to allow them to work safely, such as signalers assisting in lifting operations need to be clearly visible to the crane driver?

M.5.27 Gloves

Suitable gloves can protect against dusts (such as cement), wet concrete and solvents, which can cause dermatitis. They can also protect against cuts and splinters when handling bricks, steel and wood. Contractor shall supply a range of different gloves shall be available to suit different jobs and different workers.

M.5.28 Keeping the public out

Contractor shall protect members of the public is to keep them out of the area where Contractor is working. This shall be done by erecting a 2 m high perimeter fence or hoarding. Lock the site gates and any other doors and windows at night.

If the site is near a school, or on or near a housing estate, Contractor shall contact the head teacher or residents' association to seek their help to discourage children from trespassing. Tendency of many children to see construction sites as adventure playgrounds. Even though they shall be entering the site without authority or shall be trespassing, they shall be protected from site dangers.

Contractor shall take the following steps to reduce the chance of children injuring themselves if they do get onto the site. At the end of the working day:

- barrier off or cover over excavations, pits etc;
- isolate and immobilize vehicles and plant; & to lock them in a compound;
- store building materials (such as pipes, manhole rings, cement bags etc) so that they cannot topple or roll over;
- remove access ladders from excavations and scaffolds; and
- Lock away hazardous substances.

Security measures shall also be needed. These can often strengthen safety measures.

M.5.29 Falling materials

- Contractor shall protect passers-by with toe boards, brick guards and/or netting on scaffolding, shall take care, most netting will only retain light material.
- Fans and/or covered walkways shall also be needed where the risk is particularly high. Contractor shall use plastic sheeting on scaffolds to retain dust, drips and splashes which shall occur when cleaning building/structures façades.
- Contractor shall make sure the sheets do not make the scaffold unstable.
- Tie down loose materials and remove debris from scaffold platforms. Contractor shall not stack material on scaffolds unless it is needed, and then not above the level of the toe board unless brick guards or another way of retaining material has been provided.
- Tie down scaffold boards to sustain against possible high winds.
- When using gin wheels or power-driven hoists, select a safe place where members of the public are not at risk.
- Use debris chutes when removing debris into a skip. Cover over the skip to stop flying debris and cut down dust.

A debris chute into a covered skip reduces the risk of flying debris.

M.5.30 Scaffolding

- Contractor shall ensure that scaffolding does not present a danger to members of the public after it has been erected & that there are no protruding components that can injure people as they walk past.
- Care shall be taken about the people with disabilities, such as visually impaired people shall require tapping boards at low level to ensure they follow the protected route.
- Take steps to stop people gaining access to the scaffold when Contractor peoples are not on site.

M.5.31 Dusty and hot work

Contractor shall fence off hot work, such as welding or the use of disc cutters, to contain dust and sparks. Fence off bitumen and similar boilers which have to be sited in a public space.

M.5.32 Site visitors

Contractor shall make sure site visitors report to the person in charge of the site and know where to go – notices shall be required at the site entrance. A waiting area shall be needed. Visitors shall not be allowed to wander around the site alone. A booking-in system shall be introduced on larger working sites.

In the event of construction works people not involved in the work who are unfamiliar with construction site hazards shall well want to look around the site. Contractor shall ensure that they are accompanied at all times and given any necessary protective equipment such as helmets or boots. Operations shall be planned so that work is not in progress on the parts of the site the public visit regularly. To arrange and sign access routes across the site to keep visitors away from site hazards.

M.5.33 Monitoring and reviewing

Refer to any activity, Contractor shall check to make sure that what shall be happening is actually being carried out in practice and that people are fulfilling their duties. Contractor shall fulfill the requirements of corporate health and safety responsibilities to its workers as an essential part of the construction work. Monitoring of corporate health & safety shall be complied by the following check list:

- It shall be determined that who is responsible for managing and monitoring while the workers t are working safely and to their method statement as agreed?
- Are Contractor expected to sign in and report to a named site contact so that their presence on site is always known?
- What is Contractor method of dealing with sub-contracting firms or individual employees who fail to work safely?

- Whether safety manager conduct site visit and review safety, do they report problems to the project site manager and to the Engineer?
- Are matters put right and how will Contractor receive confirmation of this?
- Do the same problems keep recurring?
- If there are problems, find out why?

Contractor shall act before there is an accident or someone's health is damaged. Record of accidents, illnesses and treatments shall be kept from the first aiders for identification of accident trends. If an accident happens, Contractor shall find out what happened and why. Care shall be taken about minor accidents and 'near misses' which can give an early warning of more serious problems. Contractor shall consider whether the accident would have happened if the work had been better planned or managed or employees had been better trained.

Annex N Environmental and Social Screening Checklist for SEZL

The purpose of this checklist is to identify potential environment and social issues related to project development, construction and operation. This is a generalized checklist (non- exhaustive) format for infrastructure projects. The user/ project proponent may complete the format, which will be reviewed by environmental and social professionals retained by the financial institution to help determine project eligibility for financing and initial E&S risk rating.

A. Project Back Ground

1. Name of Proposed Project	Sirajganj Economic Zone
2. Location	The project site is located under Soydabad and Rajapur Union of Sirajganj Sadar and Belkuchi Upazila respectively of Sirajganj Sadar District. Under the Soydabad union, the affected Mouzas are the Soydabad, Baro Shimul Panchashona, Khas Baro Shimul, Birhati and Chackboyra. In Rajapur union, the affected Mouzas are the Boyra Masum, Bera and Berakharua. In the west side of the project area Randhuni Bari and Bag Bomra mouza, in the north side Baro Shimul panchoshona, in the south side Choto Berakharua and in the East side Jamuna Bali and Phulbari mauza is situated. The Jamuna river is just east side of the project area (approximately 1 km far away). One branch of Jamuna River flows through the project area. The Dhaka Rangpur national highway is just about 2.5 km away from the project site.
3. Project objective	The Sirajganj Economic Zone is aimed to develop as a green economic zone following the international standards, with the support of local and international lenders. Previous approved EIA report has been studied covering all the perspective of environmental and social issues. The ESIA study has also been undertaken with the intent of integrating best environmental management practices as per the project design. The physical, economic, and social development of SEZL are based upon the following planning and development objectives. • To make the economic zone as environmentally friendly • To provide adequate light, air, and open space for all investors; • To ensure proper safety from fire, flood, panic, and other natural and man-made disasters; • Preservation, conservation and development of areas of natural scenery and landscape; • To ensure that development within EZ does not conflict with any development regulation; • To encourage energy efficient site designs; • Maintenance of highest standards of environmental planning;

	Protection of natural resources and environmental assets through land use and development regulations. For satisfying these destinations, a progression of key core values has been studied for SEZL.
4. Capacity or size of the Project	The project are will be initially developed over 415 acres. This green economic zone will facilitate different types of industries like textile manufacturing, electronics manufacturing, manufacturing of wood products, pharmaceuticals, plastic products, food and beverage, tanning and leather etc. In the future, there is a scope to expand the project area from 415 acres to 1041 acres of land.
5. Proposed date of commencement of work	The date of commencement work is October 2019
6. Proposed construction period	The project construction period will be 36 months which is September 2022. The operational activity of the project is likely to be started from November 2022.
7. Sector	The activities of the proposed Sirajganj Economic Zone project fall under the 'Red' category according to the Bangladesh Environment Conservation Rules (ECR) 1997 and therefore, need to conduct EIA studies to obtain site and Environmental Clearance from the DoE. The project is categorized as Category B as per the World Bank's categorization.
8. Executing Agency	Bangladesh Economic Zones Authority (BEZA) is the executive agency for this project. SEZL will implement the project.

B. Activities on E&S List of Excluded Activities

Sl.	Screening Questions	Yes	No	Comments
1.	Is there a possibility of activities under the project that constitute excluded activities?		✓	None of the project activities fall under WBG exclusion list.
2.	If yes, can they be eliminated through adequate application of the provisions of the World Bank Performance Standards?			Not applicable

C. International Waterways and Disputed Territories

Sl.	Screening Questions	Yes	No	Comments
1.	Is there a possibility of activities supported by the project that have impacts on international waterways?	✓		Impacts on international waterways is not anticipated by this project as the adjacent Jamuna River is not considered as international waterways.
2.	Is the project site located in disputed territory?	✓		The project site is not located in disputed territory.

D. Environmental and Social Screening of Sub-Project

Sl.	Screening Questions	Yes	No	Comments
Potential Environmental Impacts				
1.	Will the renovation work disturb other commercial/community/residential activities?	✓		Currently an unpaved local road crossing the project boundary is used by local community for communication activity which is likely to be affected by the project. The construction activities are likely to disturb the resident the adjacent community.
2.	Project's siting: Is the project site adjacent to or within any of the following sensitive receptors?			
i.	Cultural heritage site	✓		The project site is not located in near/within any cultural heritage site
ii.	Natural habitats and/ or legally protected areas (wetlands, forests, estuary, buffer zones, nature reserves); if yes, is there possibility of a critical habitat present?	✓		There is no ecological sensitive area within 5 km of the study area. However, Jamuna river is just beside of the project. Also Bongobondhu Eco park is just around 2km away of the project area though it is not gazette by the Bangladesh government as an Eco-park area.
iii.	Fragmentation of habitat of flora and fauna?	✓		The project is not expected to fragment habitat of flora and fauna.

Sl.	Screening Questions	Yes	No	Comments
iv.	Are rivers and reservoirs present in direct proximity to project site?	✓		Jamuna river flows adjacent (≈1.km) to the project site. However, Branch of Jamuna river flows just beside the project (Phase I) boundary.
v.	Are canals and irrigation systems present in direct proximity to project site?	✓		Local farmers mainly use ground water for irrigation purpose. However, farmers adjacent to the branch of Jamuna river use surface water for irrigation as well.
vi.	Is the proposed site located on agricultural land?	✓		The proposed project site is located on agricultural land. Land use of the proposed site (5 km AOI) is dominated by agricultural land.
3.	Will the project potentially cause?			If select " yes", please describe and briefly assess impact's level
i.	Encroachment on historical/cultural areas		✓	There is no historical and cultural areas within or near the project areas. So no possibility of any encroachment.
ii.	Impacts on natural resources that constitute livelihoods of community (e.g. water resources, fishing or hunting		✓	Small scale of fishing activity is conducted in the branch of Jamuna River which is likely to be impacted during construction of the project. It is envisaged a minor impact on natural resources that constitute livelihood.
iii.	Disfiguration of landscape?		✓	Due to implementation of the project, landscape of 415 acres of land is likely to be disfigured. As the existing landscape of the project is not very diverse, the impact is likely to be minor.
iv.	Change of surface water quality or water flows?	✓		It is anticipated that, during construction work the water flow and water quality of surface water is likely to be impacted. It is envisaged to dredge nearby sandbar of the river and use it for land filling. Plausibly surface water flow will

Sl.	Screening Questions	Yes	No	Comments
				increase in the area. Surface water quality is likely not be changed significantly as waste water will be discharged after proper treatment. The discharged water will be monitored regularly before discharge.
	v. Increase in waste generation?			
	Increase water turbidity due to run-off and erosion?	✓		The economic zone will implement zero discharge policy. Only the storm water will be passed away from the project site to the branch of Jamuna river which will be totally separated from the wastewater. Also before passing out of the storm water, proper sedimentation will be ensured. So, no possibility of turbid water due to run-off. Again, there will be embankment around the project area which will prevent erosion also.
	Waste water from camping sites to be directly discharged to the surface water resources or not?	✓		The economic zone will implement zero discharge policy. So no wastewater will come outside of the project area.
	Construction waste directly discharged to the surface water?	✓		There is also no possibility of such activities as there will be proper management of the construction waste.
Potential Community and Occupational Health and Safety Impacts				
4.	Will the project create major noise/vibration?	✓		Noise and vibration will be generated due to different construction activities. In operation phase, installed machineries (few) will create noise and vibration.
5.	Will it create dust problem around the sites?	✓		It is envisaged that land filling and construction activity plausibly will create dust problem. However, in

Sl.	Screening Questions	Yes	No	Comments
				the operation phase the project is likely not to create significant dust problem.
6.	Will it temporarily stop the water supply and sanitation system?	✓		The village people is not dependent on the river water for the drinking water and sanitation system. So, the project activity will not hamper such activity of the community people.
7.	Will any refrigeration/air conditioning units be removed/ disposed?	✓		No refrigeration/air conditioning units are to be removed/ disposed. The project will start on a dedicated space earmarked for the activity.
8.	Will any liquid waste, or an item containing liquids (including oils), need to be transported off-site for reuse, recycle or disposal?	✓		Only waste oil arising out from the mechanical workshop during the construction and operation phase will be disposed to authorized vendors who will dispose as per regulatory requirements.
9.	Are explosive and hazardous chemicals used within the project?	✓		In construction phase, no hazardous chemicals will be used. However, in the operation phase different industries (garments, leather) may use various hazardous chemicals as per requirement.
10.	Will equipment containing polychlorinated biphenyls (PCB's) be removed (i.e. transformers, capacitors, hydraulic and heat transfer systems, etc.)?	✓		No such activities are expected from the project. Dredge material will be tested for heavy metals and other organic pollutant prior to use for landfilling in the remaining area of the site. Though there are no national standards for testing the quality of sediments/dredged material, some international guidelines suggest that the sediments should be tested for metals and metalloids (Cr, Cu, Hg, Ni, Pb, As, etc.), PAH, PCB, TBT, etc. The project has plan in place to test quality of dredge material before disposal which will be covered in waste management plan.

Sl.	Screening Questions	Yes	No	Comments
11.	In the past, there was any accident incurred due to landmines or explosive materials remaining from the war?			Not applicable
12.	Will project's construction cause disturbance to the transportation in the project's site?	✓		Currently, there is no transportation in the project site. A new approach road is under construction. However, transportation of the construction material likely to cause minor disturbance in the adjacent transportation system.
13.	Will building materials containing asbestos be removed/disposed?		✓	The project will be developed in a greenfield area. There are some village households, most of them are made of tinshed. So, there will be no such asbestos related issues.
14.	Will any building materials be removed/disposed that are coated with lead-based paint?		✓	Not applicable in the construction and operation period as the new building will be made for the industrialization.
15.	Will any building materials be removed/disposed that contain lead, silver or chrome?		✓	Not applicable in the construction and operation period
16.	Will batteries be removed/disposed (lead-acid or nickel-cadmium batteries from emergency lights and other battery-powered or battery-backup items?		✓	Not applicable in the construction and operation period
17.	Will mercury-containing devices (switches, gauges, thermostats) be removed/disposed?		✓	Not applicable in the construction and operation period
18.	Will an emergency generator set or other aboveground storage tank (AST) be installed or removed?	✓		There will be a provision to use generator in the construction period only. However, AST will not be installed.
19.	Will the workers be provided protective equipment, devices and clothing and be ensured those are used?	✓		Yes, the workers will be provided with appropriate personal protective equipment (PPE) like, safety jackets, helmets, gloves, fall protection, googles, face mask, apron, splash

Sl.	Screening Questions	Yes	No	Comments
				suits, etc. depending upon the work they are assigned. SEZL and contractors will ensure that the workers wear PPEs at all time during working hours.
20.	Will there be substantial migrant labor required? If so, what are the potential impacts on local communities?	✓		Non skilled labor will be recruited from local area. However, based on requirement, skilled labor may be required to recruit from outside of the project area. During operation phase, potentials impacts includes but not limited to residential accommodation, burden on local civic facilities, local economy structure, social norms etc.
21.	Is there any risk of disease dissemination from construction workers to the local peoples (and vice versa)?	✓		As it is envisaged to engage local worker in the construction period there is no risk of disease dissemination. However, in the operation phase some workers outside of the project area may be required to recruit. There is minor risk of disease dissemination from outside worker to local people and vice versa.
22.	Is there any potential for conflict between construction workers and local peoples (and vice versa)?	✓		As the workers and staff will stay with the local people so there will be a possibility of such occurrence.
Potential Social Impacts				
23.	Permanent land acquisition	✓		Land acquisition requirement is 415 acres. BEZA identified the land and requested for acquisition 21-03-2016. Prime Minister office approved the acquisition dated 24-03-2016. Furthermore, district land allocation committee approved the land requirement proposal of SEZL dated 13-04-2016. After completing all internal procedures, the Deputy

Sl.	Screening Questions	Yes	No	Comments
				Commissioner declared acquisition notice U/s : 3 on 21- 08-2016. The land selected for the project categorized as public land. The Bangladesh Economic Zones Authority (BEZA) has awarded the final license for setting up the Sirajganj Economic Zone to a consortium of 11 companies on 3 October 2018
24.	Temporary land acquisition		✓	There will be no temporarily land acquisition process.
25.	Impacts on livelihoods/ economic displacement?	✓		As per list of affected households provided by DC Office, 439 Nos of households are likely to be displaced due to implementation of the project. Impact on livelihood and income may be anticipated for the affected people. However, resettlement plan and a resettlement site are likely to be prepared.
26.	Is there any household need to be relocated?	✓		As per list of affected households provided by DC Office, 439 households will need to be relocated or resettled elsewhere.
27.	Would the resettlement site be environmentally and/or culturally sensitive?	✓		The resettlement site will be prepared within the acquired portion of the SEZL. The site is not sensitive in perspective of environmental and cultural as the area is greenfield area.
28.	Project's construction will cause any damage to the existing local roads system?	✓		The project area is covered by the river. So the village people need to cross the river by boat to go to the maintown. As the project construction activity will barricade a certain area so there is a possibility to disrupt the local roads system.

Sl.	Screening Questions	Yes	No	Comments
29.	Will soil excavation during project's construction cause soil erosion?	✓		As it is planned to collect soil from sand bar during the construction phase, it is most likely that it will not cause soil erosion.
30.	Will project need to open new access roads?	✓		4.8 KM new access road need to be constructed which will connect the project with national highway N405. The approach road is already under construction.
31.	Will project cause impact on air transportation?	✓		There is no airport adjacent to the project site. So no possibility of impact on air transportation.

E. List of Environmentally and Socially Sensitive Activities

Sl.	Screening Questions	Yes	No	Comments (In the case select "yes", provide detailed information)
1.	Activities involving large-scale physical and/or economic displacement resulting from land-related transactions defined in World Bank PS 5 (paragraph 5)?	✓		A total 753 will be for total project area (Phase I & II) However, 439 households (as per affected household list provided by DC Office for phase I).
2.	Activities in/or near critical habitats and/or legally protected areas?	✓		There is no critical habitats or legally protected areas in or around the project site.
3.	Activities involving adverse impacts on tribal peoples and/or small ethnic communities?	✓		There is no indigenous people in or around the project site.
4.	Activities involving significant adverse impacts on critical cultural heritage areas?	✓		There is no critical cultural heritage areas in or around the project site.