

### 5.1.2 Impact Predictions

Environmental and social effects can be characterised as interactions between some feature of the project and some feature of the surrounding physical, biological, or human environment. The process is a repetition of the impact prediction undertaken in the scoping, but this time undertaken for a more detailed description of the subproject activities to increase the level of detail of the potential interactions between the subproject activities and the baseline environment. From these potential interactions, the potential impacts to the various resources/receptors are identified and elaborated.

The impact prediction identifies the negative or positive impacts of the subproject activities in the construction and operations phases on the resources and receptors where a negative impact is an adverse change to the baseline and a positive impact is an improvement of the baseline environment.

### 5.1.3 Impact Magnitude Evaluation

The impact evaluation determines the magnitude of impacts through analyses of the scale of the impact, the spatial extent of the impact, and the duration of the impact using the criteria presented in the **Table 5.1**.

**Table 5.1 Magnitude of Environmental Impacts**

Criteria	Ranking Description
<b>Scale</b>	<p>Whether or not the magnitude (intensity) of the impact would be high, medium, or low.</p> <ul style="list-style-type: none"> <li>➤ <b>Minor</b> - insignificant change to the receiving environment - where impact alters the affected environment in such a way that natural processes of functions are not affected in any significant way. Effect is within normal range of natural variation. No perceptible or readily measurable change from baseline conditions.</li> <li>➤ <b>Moderate</b> - moderate deterioration of the existing environment - where the affected environment is altered; however, function and process continue, albeit in a modified manner. Reversible damage to natural environment but likely to easily revert back to earlier stage with mitigation; Perceptible change from baseline conditions.</li> <li>➤ <b>High</b> – significant deterioration of the existing environment - where function or process of the environment is seriously altered and disturbed to the extent where it temporarily or permanently ceases. Irreversible damage to natural environment and/or likely difficult or may not to revert back to earlier stage with mitigation; Major changes in comparison to baseline conditions and / or likely to regularly or continually exceed the standard.</li> </ul>
<b>Spatial Extent</b>	<p>The physical and spatial size of the impact; a description of whether the impact would occur on a scale described as follows:</p> <ul style="list-style-type: none"> <li>➤ <b>Site/local</b> – project site and the immediate vicinity. The impact will affect the environment or communities along the border of the project area or in the extended area adjacent to the site or perhaps outside the immediate environment.</li> <li>➤ <b>Regional</b> - whether the impact extends beyond the project area affecting areas on a regional scale.</li> <li>➤ <b>National</b> - whether the impact extends beyond the study area affecting areas on a national scale.</li> </ul>
<b>Duration</b>	<p>The duration of the impact is expressed in the lifetime of the project. Whether the impact will be:</p> <ul style="list-style-type: none"> <li>➤ <b>Short term</b> – the impact will occur in a span shorter than the construction phase.</li> <li>➤ <b>Medium term</b> - the impact will last for the period of the construction phase.</li> <li>➤ <b>Long term</b> - the impact will continue, last for the operational life, or spread beyond the lifecycle of the Project</li> </ul>

The magnitude combines the impact characteristics of scale, extent, and duration to provide the intensity of the change predicted to occur to the resource/receptor as a result of the impact. The **Table 5.2** below is used to determine the resulting magnitude on the basis of the assessment of the three parameters.

**Table 5.2 Assessing Magnitude of Impact**

Scale	Spatial Extent	Duration	Magnitude
High	National	Long term Medium term Short term	High High High
	Regional	Long term Medium term Short term	High High Medium
	Site-specific/local	Long term Medium term Short term	High Medium Medium
Moderate	National	Long term Medium term Short term	High High Medium
	Regional	Long term Medium term Short term	High Medium Low
	Site-specific/local	Long term Medium term Short term	Medium Low Low
Minor	Regional	Long term Medium term Short term	Medium Low Low
	Site-specific/local	Long term Medium term Short term	Low Low Negligible
	Site-specific/local	Long term Medium term Short term	Low Low Negligible

The result of the multicriteria analysis to evaluate the magnitude of the predicted impacts by considering the scale, spatial extent, and duration of impacts are combined with the receptor sensitivity/value to determine impact significance.

The sensitivity, value, importance and vulnerability of the impacted resource or receptor is analysed through application of key factors or criteria depending on the type of receptor, which includes the rarity, potential for substitution, sensitivity to changes and in particular those resulting from the project activities and impacts. The local, regional, national, and international importance of the receptor including rarity is an important aspect of the determining the sensitivity. The **Table 5.3** below presents the sensitivity ranking and corresponding contributing criteria.

**Table 5.3 Sensitivity Ranking and Contributing Criteria**

Sensitivity Ranking	Contributing Criteria
<b>High</b>	<ul style="list-style-type: none"> <li>Existing physical environment quality is already threatened and highly sensitive to change</li> <li>Ecologically sensitive/protected area, provides habitat for internationally protected species</li> <li>Multiple levels of vulnerability that reduces the ability of the environment to bounce back from the Project's expected impacts</li> <li>Human receptor/vulnerable groups are present within the Project areas and directly affected</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>Existing physical environment quality is prone to be stressed, and sensitive to changes in quality or physical instabilities</li> <li>Natural habitat provides habitat for species protected under National regulations</li> <li>Some, but few areas of vulnerability; still retaining a limited ability to adapt partly to change brought by the Project.</li> <li>Human receptors/ vulnerable community are located adjacent the project site and likely to be affected by the project</li> </ul>
<b>Low</b>	<ul style="list-style-type: none"> <li>Existing physical environment quality is good</li> <li>Modified habitat provides habitat for common species</li> <li>Human receptors are located away and are not likely to be affected due to the Project related activities</li> </ul>

Where impacts of the same type are accumulated by the subproject activities and impacting the same receptor or increasing the footprint these are considered as cumulative impacts. The impacts on the same receptors accumulates and may increase the scale of the impact, the spatial extent, or the duration.

#### 5.1.4 Evaluating Significance of Impacts

Knowing the sensitivity and value of the receptor or resource and the magnitude of the impact, the significance of the impact can be assessed using the two-dimensional matrix below. On the horizontal axis the sensitivity and value of the receptor or resource is shown, while on the vertical axis is the magnitude of impact. Using these two values the significance of impact can be ascribed.

**Table 5.4 Assessing Significance of Impact**

Magnitude of Environmental Impact	Low	Moderate	Substantial	High
Corresponding Environmental Category	Green	Yellow	Orange	Red
Environmental Assessment (Please put Yes/No in the appropriate cell)	N/A	IEE	IEE	EIA
Does the sub-project activities require details IEE/ EIA including EMP as per ECR'23				EIA

An impact of negligible significance is one where there is no perceptible or readily measurable effect on the resource or receptor. An impact of minor significance is one where the effect on the resource or receptor is noticeable, but the sensitivity or value of the receptor is low, or the variation is within the normal range of background variation and within applicable standards. An impact of moderate significance is one where the environment is altered and a perceptible change of the baseline, but any damage is reversible or there is great potential for substitution. An impact of high significance is a considerable change to the baseline conditions or exceeding accepted limits or standards and the sensitivity or value of the receptor is high or moderate.

#### 5.1.5 Identification of Mitigation and Enhancement Measures

Mitigation measures are identified for negative impacts and enhancement measures are identified as opportunities to enhance the positive impacts. The identification of mitigation options should follow the mitigation hierarchy where avoidance is the preferred option. Avoidance allows the impact assessment to influence the design by integrating measures to avoid an impact in the design. Secondly, options may include minimization, mitigation, or management measures and thirdly compensation. The priority in mitigation is to avoid or reduce the magnitude of the impact at the source and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets.

In determining the appropriate mitigation measures, the following mitigation hierarchy will be applied in order of priority:

- a. **Avoid at Source:** Anticipate and avoid risk or impact through the design or design change.
- b. **Abate on site:** Include measure in the design to abate the impact completely or to acceptable level.
- c. **Abate at receptor:** If the impact cannot be abated on-site then control measures can be implemented at the receptor to remove or to reduce to acceptable level.
- d. **Repair or Remedy:** Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels through repair, restoration, or reinstatement measures.
- e. **Compensate:** Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible and in accordance with the principles of leaving no one worse-off after the project and to achieve no net loss of biodiversity.

Avoidance and mitigation measures might include:

- Use of different strategies e.g. to manage demand or reduce losses rather than develop a new resource;
- Use of different sites or routes for all or part of the project;
- Use of different technologies and raw materials associated with lower impact;
- Altered layouts or designs e.g. locating noisy activities away from sensitive receptors;
- Environmental measures incorporated into the project design e.g. construction of wildlife corridors.

### 5.1.6 Residual Impact Evaluation

Following application of the mitigation hierarchy and avoidance and mitigation are defined, residual impacts is analysed following the impact assessment approach. Where residual impacts are significant offsetting or compensation should be identified.

### 5.1.7 Management and Monitoring

The impact assessment will conclude with the preparation of an Environmental Management Plan (EMP), which will contain all measures for avoidance, mitigation, minimization, offsetting and compensation as identified in the impact assessment.

The EMP will outline the management measures required to execute the project in conformance with standards and the monitoring required to document that avoidance, mitigation, and compensation is effectively addressing impacts and reducing effects to the extent predicted. The EMP will establish the framework for the EMP processes, organizational requirements and likely resources required for its implementation. The detailing of the EMP will reflect the stage of the design and be updated at detailed design prior to bidding to ensure resources required for its implementation are allocated.

## 5.2 Impact Assessment

The likely environmental risks and potential impacts of the project and nine subprojects have been identified through an interaction matrix. A detailing of likely and planned subproject activities has been obtained from the engineering team of the Feasibility Study assignment. On that basis subproject activities have been listed in an interaction matrix with the resources and receptors identified as relevant at the scoping stage on the other axis of the matrix. The activities have been analysed with respect to their potential to impact and interact with the resources and receptors in the interaction matrix.

The identification and assessment of risks and impacts involves a detailing of activities of each subproject and an analysis to determine impact of these activities using the interaction matrix (**Table 5.5**).

The impact assessment process builds on the results of the scoping phase where the potential impacts of subprojects with respect to a longlist of resources and receptors were analysed. On that basis, the relevant resources and receptors were identified, and a preliminary impact identification and assessment was carried out. In the impact assessment stage, the activities of the subprojects have been further detailed in close cooperation with the feasibility study team. A similar process of impact prediction and evaluation has been completed at the level of the subprojects.

**Table 5.5 Subproject Activity and Impact Interaction Matrix**

Sub-Project and Relevant Activities		Environmental Resources	Topography and drainage	Soil Quality	Surface & groundwater resources	Land use and land cover	Air quality	Noise levels	Traffic	Solid waste	Biodiversity	Floral Diversity	Faunal Diversity	Socio-Economic Resources	Livelihood and jobs	Infrastructure and services	Resettlement - physical & economic displacement	Community health and safety	Occupational health & safety	Landscape, visual & aesthetic	Cultural resources	
<b>Subproject 1: Embankment at Daulatpur (726m) and Maheshwar Pasha (119m)</b>																						
1	Clearance of site and demolishing of existing structures (existing Ghats) and disposal of waste																					
2	Dump granual fill to form even sloping shoreline (from barge)																					
3	Place geotextile																					
4	Place concrete blockwork above and below waterline																					
5	Dump concrete blocks for rubble mound toe																					
6	Reinstate Ghats																					
7	Built new jetties																					
8	Built waiting sheds																					
<b>Sub-project 2: Rupsha Riverfront Park (Phase 1)</b>																						
1	Clearance of site and disposal of waste																					
2	Raise the land to above recommended flood level																					
3	Development of river bank for tourist																					
4	Construct jetty in front of shore																					
5	Construct amphitheater																					
6	Install seating/shading																					
7	Install septic tank & piped water supply & power supply																					
8	Construction of foot paths																					
9	Landscaping																					
<b>Sub-project 3: Drainage Improvement in Sub-Catchment 17 and 21 (Nobinagar area) and Sonadanga bypass road</b>																						
<b>A</b>	<b>Rehabilitation of Sonadanga Bypass Road</b>																					
1	Site clearance of Sonadanga bypass road area																					
2	Clear solid waste from road area and dispose																					
3	Earthworks to form road cross section																					

Sub-Project and Relevant Activities		Environmental Resources	Topography and drainage	Soil Quality	Surface & groundwater resources	Land use and land cover	Air quality	Noise levels	Traffic	Solid waste	Biodiversity	Floral Diversity	Faunal Diversity	Socio-Economic Resources	Livelihood and jobs	Infrastructure and services	Resettlement - physical & economic displacement	Community health and safety	Occupational health & safety	Landscape, visual & aesthetic	Cultural resources	
		4	Pavement work to develop the bypass road																			
5	Construction of box drain																					
<b>B</b>	<b>Drainage Improvements in Sub-Catchments 17 and 21 (Nobinagar Area)</b>																					
1	Site clearance of existing drains and disposal of waste																					
2	Breaking up road surface, and additional excavation to widen drains and disposal of waste																					
3	Diversion of existing services (water supply & power) where required																					
4	Provide temporary access across construction site to buildings																					
5	Construct new box drain and culverts																					
6	Construct gross pollutant and sediment traps																					
7	Pumping out of drainage water entering the construction site																					
8	Backfilling and road reinstatement where required																					
<b>Sub-project 4: Drainage Improvement at Bastuhara Sub-Catchment 11 and Deana Chowdhury Khal Upgrading</b>																						
<b>A</b>	<b>Rehabilitation of Bastuhara &amp; D. Chowdhury Khal</b>																					
1	Clear water hyacinth, and solid waste from Khal and dispose																					
2	Re-excavate sediment from Khal and dispose																					
3	Earthworks to form Khal cross section																					
4	Lining of banks of the Khal																					
5	Construction of box drain at upstream end																					
6	Construction of gross pollutant and silt trap at outlet to Khal																					
7	Construction of public path and boardwalk along Khal																					
8	Installation of seats/benches, solar lights and pavilions, kiosks along banks																					
9	Landscaping																					
<b>B</b>	<b>Drainage system upgrading</b>																					
1	Site clearance and demolition of existing drains and disposal of waste																					
2	Breaking up road surface, and additional excavation to widen drains and disposal of waste																					
3	Diversion of existing services (water supply & power) where required																					
4	Provide temporary access across construction site to buildings																					

Sub-Project and Relevant Activities		Environmental Resources	Topography and drainage	Soil Quality	Surface & groundwater resources	Land use and land cover	Air quality	Noise levels	Traffic	Solid waste	Biodiversity	Floral Diversity	Faunal Diversity	Socio-Economic Resources	Livelihood and jobs	Infrastructure and services	Resettlement - physical & economic displacement	Community health and safety	Occupational health & safety	Landscape, visual & aesthetic	Cultural resources	
5	Construct new box drain and culverts																					
6	Construct gross pollutant and sediment traps																					
7	Pumping out of drainage water entering the construction site																					
8	Backfilling and road reinstatement where required																					
<b>Sub-project 5: Upgrade of Labonchara Khal Outlet Gate and Construction of Labonchara Pumping Station</b>																						
1	Site clearance and removal of obstacles																					
2	Install sheet pile as anti-seepage screen																					
3	Excavation pit for pumping station/gate structure and disposal of waste																					
4	Dewatering of pit to allow construction																					
5	Piling of foundation																					
6	Construction of reinforced concrete PS/gate structure																					
7	Backfilling and reinstatement around structures																					
8	Install screens, stop logs, gates																					
9	Install pumps with controls																					
10	Install lifting crane for maintenance of pumps																					
11	Install transformers																					
12	Install power supply cables from tap off point to site																					
13	Install back-up generators																					
14	Construct operator room and house for operator																					
15	Site reinstatement and landscaping																					
16	Excavate approach and discharge channel and dispose of waste																					
17	Placing of geotextile																					
18	Placing of concrete blocks for erosion protection up and downstream																					
19	Provide temporary road crossing across construction site																					
20	Remove temporary road crossing																					
<b>Sub-project 6: Upgrade of Alutola Outlet Gates</b>																						
1	Site clearance and removal of obstacles																					

Sub-Project and Relevant Activities		Environmental Resources	Topography and drainage	Soil Quality	Surface & groundwater resources	Land use and land cover	Air quality	Noise levels	Traffic	Solid waste	Biodiversity	Floral Diversity	Faunal Diversity	Socio-Economic Resources	Livelihood and jobs	Infrastructure and services	Resettlement - physical & economic displacement	Community health and safety	Occupational health & safety	Landscape, visual & aesthetic	Cultural resources	
2	Provide temporary road crossing across construction site																					
3	Install sheet pile as anti-seepage screen																					
4	Excavation pit for gate structure and disposal of waste																					
5	Dewatering of pit to allow construction																					
6	Piling of foundation																					
7	Construction of reinforced concrete PS/gate structure																					
8	Backfilling and reinstatement around structures																					
9	Install, stop logs, gates																					
10	Install transformer																					
11	Install power supply cables from tap off point to site																					
12	Install back-up generator																					
13	Construct operator room and house for operator																					
14	Site reinstatement and landscaping																					
15	Excavate approach and discharge channel and dispose of waste																					
16	Placing of geotextile																					
17	Placing of concrete blocks for erosion protection up and downstream																					
<b>Sub-project 7: Nirala Khal Revitalization and Link Park</b>																						
1	Demolition of temporary obstacles in drainage reserve																					
2	Clear water hyacinth, and solid waste from Khal and dispose																					
3	Re-excavate sediment from Khal and dispose																					
4	Earthworks to reinstate Khal cross section																					
5	Lining of banks of the Khal																					
7	Construction of gross pollutant and silt trap at outlet to Khal																					
8	Installation of seats/benches, solar lights and pavilions, kiosks along banks																					
9	Construction of bridges																					
10	Landscaping																					
<b>Sub-project 8: Rehabilitation of Approximately 18 Ponds</b>																						

Sub-Project and Relevant Activities		Environmental Resources	Topography and drainage	Soil Quality	Surface & groundwater resources	Land use and land cover	Air quality	Noise levels	Traffic	Solid waste	Biodiversity	Floral Diversity	Faunal Diversity	Socio-Economic Resources	Livelihood and jobs	Infrastructure and services	Resettlement - physical & economic displacement	Community health and safety	Occupational health & safety	Landscape, visual & aesthetic	Cultural resources	
1	Removal of water hyacinth and solid waste and dispose																					
2	Re-excavate sediment from ponds and dispose																					
3	Lining of banks of the ponds																					
4	Site clearance of land adjacent to ponds (where necessary)																					
5	Construction of public paths/semi paved areas and boardwalks																					
6	Isolate/divert drainage outlet away from ponds																					
7	Construction of Ghats and hand rails																					
8	Installation of seats/benches, solar lights and pavilions, along banks																					
9	Installation of public toilets/changing rooms/including septic tank & water supply																					
10	Construction of kiosks/shops																					
11	New planting and landscaping																					
<b>Operation Phase: Benefits of Implementation of 8 Sub-Projects</b>																						
1	Sub-project 1: Daulatpur Embankment																					
2	Sub-project 2 Rupsha Riverfront Park																					
3	Sub-project 3 - Nobinagar and Sonadanga sub-catchment drainage improvement																					
4	Sub-project 4 - Bastuhara sub-catchment drainage improvement																					
5	Sub-project 5- Labonchara Pumping Station and Outlet Gate																					
6	Sub-project 6 - Alutola Outlet Gate																					
7	Sub-project 7 - Nirala Khal Upgrading																					
8	Sub-project 8 - Rehabilitation of ponds																					

The interaction matrix identified potential for significant impacts on physical, environmental, and social resources. The **Table 5.6** below elaborates the potential impact of these interactions.

**Table 5.6 Interactions and Potential impact**

Interaction	Description of Potential Impact
Alteration of topography and drainage	<ul style="list-style-type: none"> <li>Excavating and raising land and construction work may lead to changes in local topography and drainage patterns.</li> <li>Work on the existing drainage system and infrastructure will influence the drainage capacity in the construction period.</li> </ul>
Impact on Soil Quality	<ul style="list-style-type: none"> <li>Excavations and earthworks may impact soil properties and stability, through compaction, erosion, and contamination.</li> <li>Vehicle movement may lead to compaction and erosion.</li> <li>Disposal of construction solid and liquid wastes may lead to contamination of soil.</li> </ul>
Impact on Surface and groundwater resources	<ul style="list-style-type: none"> <li>Impacts to surface water and groundwater may occur through construction works in and near water bodies, earthworks, and disposal of construction solid and liquid wastes.</li> <li>Leaks, spills, and runoffs may also lead to impact.</li> </ul>
Changes in land use and land cover	<ul style="list-style-type: none"> <li>Impacts to land use and land cover may occur primarily through clearance of sites to prepare for construction and at sites used temporarily during construction.</li> </ul>
Impact on Air quality	<ul style="list-style-type: none"> <li>Vehicle movement, operation of vehicles and machinery, construction works, excavation, and transportation of materials and waste will lead to emission of dust and emission of pollutants such as NO<sub>x</sub> and SO<sub>2</sub>.</li> </ul>
Impact on Noise levels	<ul style="list-style-type: none"> <li>Construction works, excavation, piling, vehicle movement, operation of vehicle and machinery will emit noise that will impact ambient noise levels.</li> </ul>
Disturbance of Traffic flows	<ul style="list-style-type: none"> <li>Construction work is associated with increased traffic flows and temporary disturbance of traffic at construction sites.</li> </ul>
Solid waste	<ul style="list-style-type: none"> <li>Construction waste and excavated material, including sediments and water hyacinths from the Khals and ponds will need to be managed and deposited appropriately.</li> </ul>
Biodiversity/Water quality?	<ul style="list-style-type: none"> <li>Construction will take place near and in water bodies and may impact water quality and thus impact dependent flora and fauna.</li> <li>Clearance of sites may clear vegetation that supports fauna.</li> <li>Excavation in Khals may disturb existing aquatic vegetation in the Khals.</li> </ul>
Impact on livelihood and jobs	<ul style="list-style-type: none"> <li>Livelihoods of workers/staff at businesses located at project sites and displaced by the construction or subproject may be impacted.</li> <li>The subprojects will also have a positive impact through job creation especially in construction and to a smaller degree in operation.</li> </ul>
Infrastructure and services	<ul style="list-style-type: none"> <li>Impact to infrastructure and services may include impact to roads and transportation network, including water ways during construction as well as potential impact to utilities during work on the drainage system, which involves trench work.</li> <li>The drainage system and infrastructure may potentially be impacted temporarily during construction.</li> </ul>
Resettlement - physical & economic displacement	<ul style="list-style-type: none"> <li>Clearance of sites for construction will impact structures and assets, including residential and businesses at these sites.</li> <li>There is limited land purchase for the pumping station and the Rupsha riverfront development, but otherwise subprojects are located on public, state-owned land.</li> </ul>
Community health and safety	<ul style="list-style-type: none"> <li>Hazards to community health and safety includes increased traffic loads and disturbance of traffic flows, and noise and dust emissions.</li> <li>Open trenches constitute a safety risk for the communities.</li> <li>Work on the drainage system will influence drainage capacity during construction, and thus potentially cause flooding.</li> </ul>
Occupational health and safety	<ul style="list-style-type: none"> <li>Hazards to occupational health and safety includes use of construction machinery, excavation and trench work, working in the drainage system and canals that receives wastewater, work in a noisy and dusty environment, working with electrical equipment.</li> </ul>

Interaction	Description of Potential Impact
Landscape, visual and aesthetic impact	<ul style="list-style-type: none"> <li>Natural or culturally significant landscapes may potentially be modified through the construction work</li> </ul>
Impact on cultural resources	<ul style="list-style-type: none"> <li>Heritage, cultural, and religious sites located in the vicinity of the construction sites may be temporarily disturbed during construction by noise or dust emissions. Chance finds during construction may occur.</li> </ul>

### 5.3 Potential Impacts in The Construction Phase

#### 5.3.1 Impact of Topography and Drainage

Changes to topography and drainage patterns may occur through changes to topographical characteristics by excavating or raising land or changes to the existing drainage infrastructure. The sensitivity will depend on the current topography – whether flat or undulating – and presence of water bodies. The impact scale or intensity of changes to topography and drainage will depend on the degree to which the topographical character of the landscape changes, e.g. height, depth, slope direction, spatial extent of changes, and resulting impact on drainage patterns. An impact of minor scale is a subtle change over a wider area or a noticeable change over a small area, and an impact of high scale is a clearly evident change of topography over a larger area. Impact to drainage patterns may also result from construction work on the drainage system, where the scale would depend on the extent to which the drainage capacity is impacted. Benefits and positive impact to the drainage system are assessed separately.

#### **Sources of Impact**

Changes to topography and drainage patterns in the subprojects can result from the following activities:

**Subproject 1:** Raising of land in front of the current embankment to construct embankment

through dumping of granual fill, placing concrete blocks above and below waterline, dumping of concrete blocks for rubble mound toe, and reinstatement of Ghats.

**Subproject 2:** Raising of land at embankment to above flood level and landscaping.

**Subproject 3:** Earthworks to form Khal cross section, lining of banks of the Khal, construction of box drains at upstream end, landscaping, site clearance and demolition of existing drains and disposal of waste, construct new box drain and culverts, backfilling and road reinstatement where required.

**Subproject 4:** Earthworks to form Khal cross section, lining of banks of the Khal, construction of box drains at upstream end, landscaping, site clearance and demolition of existing drains and disposal of waste, construct new box drain and culverts, backfilling and road reinstatement where required.

**Subproject 5:** Backfilling and reinstatement around structures, site reinstatement and landscaping, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste, construction of new bridge and reinstate road, and removal of temporary road crossing.

**Subproject 6:** Provide temporary road crossing across construction site, backfilling and reinstatement around structures, site reinstatement and landscaping.

**Subproject 7:** Earthworks to reinstate Khal cross section, lining of banks of the Khal, and landscaping.

**Subproject 8:** Lining of banks of the ponds, construction of public paths/semi paved areas, isolate/divert drainage outlet away from ponds, and landscaping.

#### **Assessment of Impact**

The impact magnitude is a function of the impact scale, spatial extent, and duration. The impact scale of changes to topography and drainage patterns resulting from the construction activities is assessed to be a moderate deterioration of the existing environment where the affected environment is altered, however, function and process continue. There is a perceptible change from the baseline conditions as land is raised or excavated and existing drainage infrastructure is changed, but any damage is reversible and likely to easily revert back to earlier stage with mitigation.

The spatial extent of the negative impact of changes to topography and drainage patterns resulting from the construction activities occur at the subproject sites and the immediate vicinity of the subproject sites. On that basis these are assessed to be site/local. Where the construction activities involve changes and modification to existing drainage infrastructure, these have the potential to affect a wider area of the catchment of these.

The changes to topography and drainage patterns of the land raising at the embankments and Daulatpur and Rupsha (subprojects 1 and 2) are long term and lasts beyond the duration of the construction phase. For other subprojects, the negative impacts to topography and drainage patterns are associated with the construction phase of the subprojects and therefore of a medium duration of the same length as the construction phase (or shorter).

The receptor sensitivity is assessed to be moderate as the topography is relatively flat, but the subprojects' construction sites are located in close vicinity of water bodies.

Based on the assessment of impact magnitude as medium and the receptor sensitivity as moderate, the resulting impact significance is assessed to be moderate.

Based on the assessment the scale and intensity of the impact to topography and drainage will be moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be long term at the embankments and medium at the other subprojects. On that basis the impact magnitude is medium. The receptor sensitivity is assessed to be moderate as construction is near water bodies and the topography is relatively flat. The impact significance is thus assessed to be moderate before mitigation.

**Table 5.7 Assessment of Impact of Topography and Drainage Pattern**

Impact	Changes to topography and drainage pattern		
Scale/intensity	Minor	Moderate	High
Spatial extent	Site/local	Regional	National
Duration	Short term	Medium term	Long term
Magnitude	Low	Medium	High
Receptor sensitivity	Low	Moderate	High
Impact significance	Minor	Moderate	High

### **Mitigation Measures**

The mitigation measures differ for the long term impacts to the topography and drainage patterns associated with the raising of land at the embankments at Daulatpur and Rupsha and the medium term negative impacts associated with the construction activities of other subprojects.

The embankment to be constructed in front of the existing embankment at Daulatpur will be raised to a level of +4.05m SOB with the existing land level at +2.50m at the lowest level and closer to 3-3.5m and up to 4m in most places. Raising of land in front of the existing embankment at Daulatpur will potentially cause ponding behind the new embankment and concrete wall. Therefore, drainage channels through the embankment and the wall at intervals are included in the design.

Similarly, raising the embankment at Rupsha will potentially cause ponding behind the raised embankment. The existing flood wall has an elevation of +2.55m, it is proposed to raise the site to at least +3.1m to provide resilience against SLR until 2050. Appropriate drainage of the area behind the raised embankment is required included in the subproject design.

Other subprojects' construction activities have the potential to impact local topography and drainage patterns through excavation work or through directly working on the drainage systems. These impacts will be mitigated through the following means:

- ❖ Timing construction activities in the dry season to minimize disruption and changes of drainage pattern.
- ❖ Start construction from the downstream to the upstream.
- ❖ Affected areas will unless the level change is part of the improvement to the drainage systems, be restored to their original levels to prevent permanent impact to topography and drainage. Levelling and grading will unless the change is specified in the design to improve the drainage system, be undertaken with minimal disturbance to the existing contour and thereby maintaining the general slope of site.
- ❖ Applying standard mitigation measures to ensure drainage capacity at construction site is maintained including bypass dewatering to pump flow around the worksite by using dewatering pumps upstream of the work section and temporary piping to the downstream.

### ***Residual Impact***

With appropriate drainage established at Daulatpur and Rusha the residual impact on the drainage patterns will be insignificant although changes to the topography remains through the raising of land. With the mitigation measures outlined including timing construction in the dry season, constructing from downstream to upstream, generally maintaining original levels and contours, and utilizing bypass dewatering at construction sites, the residual impact is assessed to be minor. In combination with the benefits and positive impacts of the subprojects on the drainage system, the overall impact is positive.

### **5.3.2 Impact of Soil Quality of Khulna**

Impacts to soil quality may include soil compaction, erosion of soil, and soil contamination and occur through earthworks and storage and disposal of construction solid and liquid wastes. Soil quality may be impacted from the storage of waste materials at temporary storage areas. Bored waste material will be generated during piling and the soil quality at the storage site and the adjacent area may be disturbed. A large volume of water hyacinth, excavated soil, waste from dismantled drains and pumped water will be generated during the cleaning, excavation, demolition of drains and dewatering. The soil quality of the storage site and discharge point and its adjacent area may be contaminated or polluted. During backfilling and reinstatement around structures, the topsoil of that area might be impacted. The sensitivity factors include whether the soil supports biodiversity and/or agriculture and the extent to which these are dependent on the quality of the soil. The impact scale or intensity of changes to soil quality will depend on the degree to which the quality parameters related to compaction, erosion, and contamination changes compared with baseline and can revert back with mitigation and the spatial extent of changes, and resulting impact on the use of the soil. An impact of minor scale is a subtle change over a wider area or a noticeable change over a small area, and an impact of high scale is a clearly evident negative change of soil quality over a larger area. An impact of minor scale may cause insignificant change to the soil quality, where the effect is within normal range of natural variation, and an impact of high scale is significant deterioration of the soil quality, where the quality standards are exceeded continually.

### ***Sources of Impact***

Impact to soil quality in the subprojects can result from the following activities:

**Subproject 3 and 4:** Clear water hyacinth, and solid waste from Khal and dispose, re- excavate sediment from Khal and dispose, earthworks to form Khal cross section, site clearance and demolition of existing drains and disposal of waste, and pumping out of drainage water entering the construction site.

**Subproject 5 and 6:** Excavation pit for pumping station/gate structure and disposal of waste, dewatering of pit to allow construction, piling of foundation, backfilling and reinstatement around structures, and excavate approach and discharge channel and dispose of waste.

**Subproject 7:** Clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to form Khal cross section, and construction of bridges.

**Subproject 8:** Removal of water hyacinth and solid waste and dispose, re-excavate sediment from ponds and dispose.

### **Assessment of Impact**

The scale and intensity of potential compaction/erosion and contamination of soil resulting from the construction activities is assessed to be a moderate deterioration of the existing environment where the affected environment is altered, however, function and process continue. Soil quality may be impacted from storage of waste materials in the storage areas and constituting a perceptible change from the baseline conditions, but the damage is assessed to be reversible, rather than a permanent damage to soil quality in the subproject areas. Risk of permanent soil contamination is assessed to be low as the duration of the temporary storage of waste materials is expected to be low. The analyses of heavy metals in sediments conducted as part of this EIA found that concentration of heavy metals in the sediments were well within levels that would permit application on fields according to the EU Sludge Directive (86/278/EEC). On that basis the risk of pollution of the soil quality at the temporary storage sites is not considered to be significant.

The spatial extent of the negative impact to soil quality resulting from the construction activities occur at the subproject sites and the immediate vicinity of the subproject sites where the storage areas will be located. On that basis these are assessed to be site/local.

The potential impact to soil quality at temporary storage sites during construction is assessed to be medium term and during the construction phase. The construction wastes (sediments, water hyacinth, bored materials, construction debris etc.) will be stored at temporary storage sites established during the construction phase for an estimated 10-15 days for drying to reduce water content and then the waste will be disposed of in line with waste management plan. However, the construction activities have the potential to create long term impacts to soil quality through compaction and contamination of soil. Compaction of soil may last beyond the construction phase and contamination may be a long-term impact.

The overall receptor sensitivity is assessed to be low as the subprojects are located in urban or peri-urban areas that are not supporting biodiversity or agriculture dependent on the quality of soil. Some subprojects are located adjacent to agricultural areas and storage of waste material on agricultural land should be avoided. The sensitivity of agricultural land is considered moderate as it could be negatively impacted by the temporary storage of waste materials.

Based on the assessment the scale and intensity of the impact to soil will be minor to moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be medium to long term as some construction activities have the potential to create long term impacts to soil quality through compaction and contamination of soil. On that basis the impact magnitude is medium. The receptor sensitivity is assessed to be low in most cases, but the adjacent agricultural land at some subprojects is assessed to be of moderate sensitivity. The impact significance is thus assessed to be moderate, before mitigation.

**Table 5.8 Assessment of Impact of Soil Quality**

<b>Impact</b>	<b>Impact of Soil Quality</b>		
<b>Scale/intensity</b>	Minor	Moderate	High
<b>Spatial extent</b>	Site/local	Regional	National
<b>Duration</b>	Short term	Medium term	Long term
<b>Magnitude</b>	Low	Medium	High
<b>Receptor sensitivity</b>	Low	Moderate	High
<b>Impact significance</b>	Minor	Moderate	High

### ***Mitigation Measures***

These impacts will be mitigated through the following means:

- Timing construction activities in the dry season to minimize erosion and wash out.
- Only strip topsoil when required.
- Avoid stripping of topsoil, excavation and access road construction to be carried out in dry season to minimize erosion and run-off.
- Store topsoil appropriately for reapplication.
- Store fuel and any hazardous materials appropriately to minimize risk of spills.
- Refuel on non-permeable surfaces and have spill containment material at the ready to minimize risk of pollution.
- Avoid storage of waste materials on agricultural land.
- During dewatering of construction site, discharge to the downstream of the drainage system and avoid discharge to adjacent agricultural land.
- Limit duration of storage of waste material at construction sites to reduce impact to soil at temporary storage site.

### ***Residual Impact***

With appropriate mitigation the impact can be reduced to minor. Avoiding storage of waste materials on agricultural land will reduce the receptor sensitivity to low. Ensuring that duration of storage of waste materials is reduced before final disposal, will reduce significantly the risk of long-term impacts to soil at the temporary storage sites. Timing construction to the dry season will minimize erosion risk during heavy rainfalls and risk of wash outs of pollutants. Storing and reapplication of topsoil will reduce the duration of impacts to topsoil.

### **5.3.3 Impact of Surface Water and Groundwater**

Impacts to surface water and groundwater may occur through construction works in and near water bodies, earthworks, and disposal of construction solid and liquid wastes. Construction activity in the river such as concrete block dumping, reinstate Ghats, build new jetties, piling for bridges, dewatering, excavation for approach and discharge channel may cause accidental spills, waste disposal into the river, and may increase the water turbidity. Consequently, these will degrade the water quality of the river. During heavy rainfall, surface runoff from the stockpiles of excavated sediments and waste material can pollute adjacent waterbodies. During the excavation of ponds, lack of accessibility to the ponds may limit the local communities in their water use.

The sensitivity factors include the extent to which the water resource plays a role in the ecosystem and supports biodiversity and the extent to which the water resource provides a use for the local communities (e.g. for drinking water, agriculture, washing/bathing, or as water way). The impact scale or intensity related to impacts to surface water and groundwater depend on the degree to which the quality changes compared with baseline and can revert back with mitigation. An impact of minor scale may cause insignificant change to the surface water and groundwater quality, where the effect is within normal range of natural variation, and

an impact of high scale is significant deterioration of the surface water and groundwater, where the quality standards are exceeded continually.

### **Sources of Impact**

Impact to surface water and groundwater in the subprojects can result from the following activities:

- **Subproject 1:** Clearance of site and demolish existing structures (existing Ghats) and disposal of waste, dump granular fill to form even sloping shoreline, place concrete blockwork above and below waterline, dump concrete blocks for rubble mound toe, reinstate Ghats, built new jetties.
- **Subproject 2:** Construct jetty in front of shore.
- **Subproject 3:** Clear water hyacinth, and solid waste from Khal and dispose, re- excavate sediment from Khal and dispose, earthworks to form Khal cross section, lining of banks of the Khal, construction of box drain at upstream end, construction of gross pollutant and silt trap upstream of Khal, site clearance and demolition of existing drains and disposal of waste, breaking up road surface, and additional excavation to widen drains and disposal of waste, and pumping out of drainage water entering the construction site.
- **Subproject 4:** Clear water hyacinth, and solid waste from Khal and dispose, re- excavate sediment from Khal and dispose, earthworks to form Khal cross section, lining of banks of the Khal, construction of box drain at upstream end, construction of gross pollutant and silt trap upstream of Khal, site clearance and demolition of existing drains and disposal of waste, breaking up road surface, and additional excavation to widen drains and disposal of waste, and pumping out of drainage water entering the construction site.
- **Subproject 5:** Excavation pit for pumping station/gate structure and disposal of waste, dewatering of pit to allow construction, piling of foundation, construction of reinforced concrete PS/gate structure, backfilling and reinstatement around structures, excavate approach and discharge channel and dispose of waste, placing of concrete blocks for erosion protection up and downstream, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste.
- **Subproject 6:** Excavation pit for pumping station/gate structure and disposal of waste, dewatering of pit to allow construction, piling of foundation, construction of reinforced concrete PS/gate structure, backfilling and reinstatement around structures, excavate approach and discharge channel and dispose of waste, placing of concrete blocks for erosion protection up and downstream, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste
- **Subproject 7:** Clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to form Khal cross section, lining of banks of the Khal, construction of piled box drain and boardwalk/path, and construction of bridges.
- **Subproject 8:** Removal of water hyacinth and solid waste and dispose, re-excavate sediment from ponds and dispose, lining of banks of the ponds, Construction of Ghats and handrails.

### **Assessment of Impact**

The scale/intensity of impacts to surface and groundwater resulting from sedimentation from work in and near water bodies, accidental spills and waste disposal, and surface runoffs from the construction sites is assessed to be a moderate deterioration of the existing environment where the affected environment is altered, however, function and process continue. Surface water quality be impacted constituting a perceptible change from the baseline conditions, but any damage is reversible and likely to easily revert back to earlier stage with mitigation.

The spatial extent of the negative impact to surface and groundwater quality resulting from the construction activities occur at the subproject sites and the immediate vicinity of the subproject sites including the water bodies near the construction sites and the where the storage areas will be located. On that basis these are assessed to be site/local.

The potential impact to surface and groundwater during construction is assessed to be medium term during the construction phase.

The receptor sensitivity is assessed to be low for the Khals and moderate for the ponds and Rupsha river. The ponds provide use for the local communities for washing/bathing and aquaculture and supports biodiversity. The Rupsha river provides use as water way and supports biodiversity, but the impact zone is limited in extent and in already highly modified areas along the embankments. The Khals primarily provides use as drainage and only supports highly modified habitats with very low biodiversity value.

Based on the assessment the scale and intensity of the impact to surface water and groundwater will be moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be medium during construction. On that basis the impact magnitude is low. The receptor sensitivity is assessed to be moderate in case of the ponds and the Rupsha river, while the Khals are assessed to be low. The impact Significance is thus assessed to be minor before mitigation.

**Table 5.9 Assessment of Impact of Surface Water and Ground Water Quality**

Impact	Impact to Surface Water and Ground Water Quality		
Scale/intensity	Minor	Moderate	High
Spatial extent	Site/local	Regional	National
Duration	Short term	Medium term	Long term
Magnitude	Low	Medium	High
Receptor sensitivity	Low	Moderate	High
Impact significance	Minor	Moderate	High

### ***Mitigation Measures***

These impacts will be mitigated through the following means:

- Timing construction activities in the dry season to minimize wash out.
- Store fuel and any hazardous materials appropriately to minimize risk of spills.
- Refuel on non-permeable surface and have spill containment material at the ready to minimize risk of pollution.
- Waste disposal in the rivers or other water bodies should be prohibited.
- Sand stockpiles stored on construction sites should be completely covered with tarpaulins when not in use to avoid material eroding during a rain event causing siltation of the drainage system.
- For the subprojects constructing in the water, use of silt screens hanging from floats in the water column will contain stirred up sediment and prevent it from traveling downstream.

### ***Residual Impact***

With appropriate mitigation the impact will be minor. Avoiding construction and excavation works in the rainy season will reduce surface runoff from construction sites significantly. Use of silt screens and coverage of sand stockpile will reduce sedimentation. Prohibiting construction waste disposal in water bodies will reduce risk of contamination of water bodies.

### 5.3.4 Impact of Land Use and Land Cover of Khulna

Impacts to land use and land cover may occur primarily through clearance of sites to prepare for construction, at sites used temporarily during construction, and at the proposed relocation site. Clearance of sites and demolishing existing structures may reduce vegetation cover and restrict current land use. The relocation of businesses to temporary stalls or to permanent relocation sites will create pressure on the existing land use of the proposed relocation sites. Various subproject activities such as walkway construction will reduce earth surface. In general, due to subproject implementation activities, there will be land use conversion of minor areas where land use will be converted from current use to drainage, flood and erosion protection infrastructure use. Changes to land use and land cover may be temporary or permanent.

The sensitivity factors include whether the current land use or land cover is of importance to the communities, businesses, or other users, their degree of dependence on land use or land cover, and whether the changes would impact land use classification. Where current land use is not of relevant use to communities, businesses, or other users it is of low sensitivity, where land use is of local use, but there is no major dependence it is of medium sensitivity, where it is of use and major dependence of local people or the change require land use reclassification the sensitivity is high. An impact of minor scale is a subtle change over a wider area or a noticeable change over a small area, and impact of medium scale is a noticeable change over a wide area or a clearly evident negative change over a small area, and an impact of high scale is a clearly evident negative change of land cover or land use over a larger area.

#### **Sources of Impact**

Impacts to land use and land cover of the subprojects may result from the following activities:

- Subproject 1: Clearance of site and demolish existing structures (existing Ghats) and disposal of waste.
- Subproject 2: Clearance of site and demolish existing structures and disposal of waste.
- Subproject 3: Clearance of site and disposal of waste.
- Subproject 4: Clearance of site and disposal of waste
- Subproject 5: Clearance of site and disposal of waste.
- Subproject 6: Site Clearance of site and disposal of waste.
- Subproject 7: Site Clearance of site and disposal of waste.
- Subproject 8: Site clearance of land adjacent to ponds (where necessary) and isolate/divert drainage outlet away from ponds

#### **Assessment of Impact**

The impact scale/intensity of land use and land cover impacts resulting from the construction activities is assessed to be minor to moderate as the land use and land cover changes resulting from the subproject

implementation represents a noticeable change in character of land use, which may be reversible or clearly evident changes over minor areas.

The spatial extent of the negative impact to land use and land cover quality resulting from the construction activities occur at the subproject sites during clearance of site for construction and in the immediate vicinity of the subproject sites. On that basis these are assessed to be site/local.

The potential impact to land use and land cover is medium term for temporary impacts during the construction phase and long term for impacts that last beyond the construction phase.

The receptor sensitivity is assessed to be moderate as the current land use and land cover are of local use to communities, businesses, and other users, but without major dependencies on current land use and land cover.

Based on the assessment the scale and intensity of the impact to land use and land cover will be minor to moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be long term for subprojects that convert current land use permanently and medium at other subprojects where impacts are limited to the construction phase. On that basis the impact magnitude is medium. The receptor sensitivity is assessed to be moderate as the current land use and land cover are of local use to communities, businesses, etc. The impact significance is thus assessed to be minor to moderate before mitigation.

**Table 5.10 Assessment of Impact of Land Use and Land Cover**

Impact	Impact to Land Use and Land Cover		
	Minor	Moderate	High
Scale/intensity	Minor	Moderate	High
Spatial extent	Site/local	Regional	National
Duration	Short term	Medium term	Long term
Magnitude	Low	Medium	High
Receptor sensitivity	Low	Moderate	High
Impact significance	Minor	Moderate	High

### ***Mitigation Measures***

These impacts will be mitigated through the following means:

- Restrict construction activities to take place only on allotted land.
- Negotiate and agree any temporary use of land outside construction area with current users.
- Only strip topsoil when required.
- Store topsoil appropriately for reapplication.
- Avoid storage of waste materials on agricultural land.
- Restore land used temporarily during construction to previous or better state.
- Landscaping, as included in a number of subprojects, to reestablish and improve land cover following construction.
- Compensate land users that are adversely impacted by land use change by offering comparable or better relocation site (included in the RFP and under the assessment of physical and economic displacement).

### ***Residual Impact***

With appropriate mitigation land use and land cover changes can be restricted to areas where it is necessary and part of the subproject scope. Restoration and landscaping will ensure that land use and land cover can return to their previous state or better. For most subprojects it may be possible to reduce the impact significance of some subprojects to minor. However, there is still cases where there is dependency on current land use, which should be appropriately compensated through the resettlement/compensation mechanism to mitigate any adverse impacts of land use changes to current users.

### **5.3.5 Impact of Air Quality of Khulna**

Impacts to air quality will result from the introduction of fine particles, dust, and particulate matter to the ambient air and emissions of SO<sub>x</sub> and NO<sub>x</sub> due to the use of combustible fuel in construction. Significant earthworks will be undertaken to implement the subprojects such as the construction of public paths/semi-paved areas and boardwalks, reinstate Khal cross-section, temporary road crossing construction site, reinstatement of road, and raising of land above flood level. These activities will constitute a perceptible change of the ambient air quality, mainly as particulate matter or dust particles may increase in the air. Also due to the frequent movement

of construction vehicles and use of various construction equipment to construct bridges, piling of foundation, demolition of the old gate structure, construction of the market building will increase the gaseous substances in the ambient air quality.

The sensitivity factors include presence of human and ecological receptors in close vicinity of the subproject, the density of the settlements, and the biodiversity value of ecological receptors. Presence of particular sensitive receptors such as hospitals and schools in the immediate vicinity of the subproject will also contribute to the sensitivity. The impact scale or intensity related to impacts on air quality depends on the degree to which the quality parameters related to the level of concentration of dust and gaseous substances changes compared with baseline and can revert back with mitigation. An impact of minor scale may cause insignificant change to the air quality, where the effect is within normal range of natural variation, whereas an impact of moderate scale may cause moderate deterioration where the affected environment is altered but likely to easily revert back to earlier stage with mitigation. And an impact of high scale is significant deterioration of the air quality, where the quality standards are exceeded continually.

### **Sources of Impact**

Impact to air quality in the subprojects can result from the following activities:

- **Subproject 1:** Clearance of site and demolish existing structures (existing Ghats) and disposal of waste, reinstate Ghats, built new jetties, and built waiting sheds.
- **Subproject 2:** Clearance of site and demolish existing structures and disposal of waste, raise the land to above recommended flood level, construct 2 storied terminal building (incl. piling) for tourist related business, construct jetty in front of shore, construct amphitheater, install seating/shading, install septic tank & piped water supply & power supply, and construction of foot paths.
- **Subproject 3:** Clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to form Khal cross section, construction of public path and boardwalk along Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, pumping out of drainage water entering the construction site, backfilling and road reinstatement where required.
- **Subproject 4:** Clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to form Khal cross section, construction of public path and boardwalk along Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, pumping out of drainage water entering the construction site, backfilling and road reinstatement where required.
- **Subproject 5:** Site clearance and dewatering of pit to allow construction, piling of foundation, construction of reinforced concrete PS/gate structure, backfilling and reinstatement around structures, construct operator room and house for operator, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste, construction of new bridge and reinstate road, and remove temporary road crossing.
- **Subproject 6:** Site clearance and demolition of houses, dewatering of pit to allow construction, piling of foundation, construction of reinforced concrete PS/gate structure, backfilling and reinstatement around structures, construct operator room and house for operator, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste, construction of new bridge and reinstate road, and remove temporary road crossing.
- **Subproject 7:** Clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to reinstate Khal cross section, construction of piled box drain and boardwalk/path, installation of seats/benches, solar lights and pavilions, kiosks along banks, and construction of bridges.
- **Subproject 8:** Removal of water hyacinth and solid waste and dispose, re-excavate sediment from ponds and dispose, site clearance of land adjacent to ponds (where necessary), construction of public

paths/semi paved areas and boardwalks, construction of Ghats and handrails, installation of seats/benches, solar lights and pavilions, along banks, installation of public toilets/changing rooms/including septic tank & water supply, and construction of kiosks/shops.

### **Assessment of Impact**

The scale and intensity of emission of dust and pollutants and their introduction into ambient air resulting from the construction activities is assessed to be a moderate deterioration of the existing environment where the affected environment is altered, however, function and process continue. Air quality may be impacted due to frequent vehicle movement, operation of vehicles and machinery, and associated construction works and constituting a perceptible change from the baseline conditions, but the damage is assessed to be reversible, rather than pollution of air quality in the subproject areas. The risk of air pollution impacting receptors is higher for subprojects where residences are located near the construction sites. The CAMS-9 data of DoE reveals that the air quality of the city for parameters PM<sub>10</sub> and PM<sub>2.5</sub> exceed the standards during the dry season.

The spatial extent of the negative impact to air quality resulting from the construction activities occurs at the subproject sites and the immediate vicinity of the subproject sites. On that basis these are assessed to be site/local.

The potential impact on air quality at the construction sites during construction is assessed to be medium-term and during the construction phase. The emissions of dust particles and pollutants could be high enough if the appropriate measures cannot be adopted such as regular water spraying at construction sites and stockpiles of earth materials and the use of new and updated machinery.

The overall receptor sensitivity is assessed to be moderate to high as the subprojects are located in urban or peri-urban areas where the existing air quality is prone to be stressed, and sensitive to changes in quality.

Based on the assessment the scale and intensity of the impact to air will be moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be medium. On that basis the impact magnitude is low. The receptor sensitivity is assessed to be moderate to high depending on the distance to human receptors of the construction sites. The impact significance is thus assessed to be minor, before mitigation.

**Table 5.11 Assessment of Impact of Air Quality**

<b>Impact</b>	<b>Impact of Air Quality</b>		
<b>Scale/intensity</b>	Minor	Moderate	High
<b>Spatial extent</b>	Site/local	Regional	National
<b>Duration</b>	Short term	Medium term	Long term
<b>Magnitude</b>	Low	Medium	High
<b>Receptor sensitivity</b>	Low	Moderate	High
<b>Impact significance</b>	Minor	Moderate	High

### **Mitigation Measures**

These impacts will be mitigated through the following means:

- Provide water spray vehicles to regularly water the unpaved ground, storage piles and other areas where airborne dust may originate.
- Trucks/vehicles carrying dry construction material to be covered with tarpaulins or other suitable cover. Open load carrying dry construction material / potentially dust producing materials shall have properly fitting side and tailboards.
- Clean and maintain access roads.

- Plan sites to keep stockpiling of soils and sand, plant and machinery away from the densely populated residential areas and sensitive receptors.
- All excavated soil should be transported as soon as possible to the sites for reuse or disposal.
- Use temporary barriers / dust screens to control dust around the construction sites near residential areas.
- Minimize time that excavations and exposed soil are left open/exposed, backfill asap, and transport excavated soil as soon as possible to the sites for reuse or disposal.
- Use new/properly maintained machinery and vehicles to reduce air emissions.
- Use grid electricity as power source and to the extent possible restrict use of diesel generators to emergencies and power back-up.
- No burning of debris, construction waste, vegetation or other materials should be allowed at the sites.

### **Residual Impact**

With the implementation of the above mitigation measures the residual impacts to air quality is assessed to be minor.

### **5.3.6 Impact of Ambient Noise of Khulna**

Impacts to ambient noise levels may occur due to the various construction activities such as the reinstatement of Ghats, construction of new jetties, piling activities, bridge construction, installation of sheet piles, construction of the multi-story buildings, demolition of existing structures, excavations, gross pollutant, and sediment traps construction, etc. Due to the frequent movement of construction vehicles and use of construction machinery and equipment will increase noise levels. Ambient noise levels are assessed with respect to the GoB ambient noise standards (ECR, Schedule 4) which specifies the standard in dBA for daytime and night time in different types of areas including silent, residential, commercial, industrial, or mixed zones.

The sensitivity factors include the presence of human and faunal receptors in close vicinity of the subprojects. As the subprojects are located in urban or peri-urban areas, the sensitivity is mainly determined through the use of the area and the associated noise standards as determined in the GoB ambient noise standards with industrial area as the least sensitive area and Government designated silent zones as the most sensitive. Presence of particularly sensitive receptors such as hospitals and schools in the immediate vicinity of the subproject will contribute to the sensitivity. The criteria for determining impact scale/intensity are whether the predicted noise level will exceed the relevant limit/threshold, the change compared with baseline and the duration of the exposure to elevated noise levels. An impact of minor scale may cause no or only limited exceedance of the standard and the noise levels are within the normal range of variation, whereas an impact of moderate scale may cause moderate exceedance of the standard in the medium term. And an impact of high scale is significant increase of the noise level, where the noise standards are exceeded continually.

### **Sources of Impact**

Impacts to the noise level of the subprojects may result from the following activities:

- **Subproject 1:** Clearance of site and demolish existing structures (existing Ghats) and disposal of waste, reinstate Ghats, built new jetties, and built waiting sheds.
- **Subproject 2:** Clearance of site and demolish existing structures and disposal of waste, raise the land to above recommended flood level, construct 2-storey terminal building (incl. piling) for tourist related business, construct jetty in front of shore, construct amphitheater, install seating/shading, install septic tank & piped water supply & power supply, and construction of foot paths.
- **Subproject 3:** Drainage reserve, clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, construction of box drain at upstream end, construction

of gross pollutant and silt trap upstream of Khal, construction of public path and boardwalk along Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, construct gross pollutant and sediment traps, pumping out of drainage water entering the construction site, and backfilling and road reinstatement where required.

- **Subproject 4:** Clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to form Khal cross section, construction of box drain at upstream end, construction of gross pollutant and silt trap upstream of Khal, construction of public path and boardwalk along Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, construct gross pollutant and sediment traps, pumping out of drainage water entering the construction site, and backfilling and road reinstatement where required.
- **Subproject 5:** Removal of temporary obstacles in drainage reserve, clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to form Khal cross section, construction of box drain at upstream end, construction of gross pollutant and silt trap upstream of Khal, construction of public path and boardwalk along Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, construct gross pollutant and sediment traps, pumping out of drainage water entering the construction site, and backfilling and road reinstatement where required.
- **Subproject 6:** Site clearance and demolition of houses, install sheet pile as anti-seepage screen, excavation pit for pumping station/gate structure and disposal of waste, dewatering of pit to allow construction, piling of foundation, construction of reinforced concrete PS/gate structure, backfilling and reinstatement around structures, construct operator room and house for operator, excavate approach and discharge channel and dispose of waste, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste, construction of new bridge and reinstate road, and Remove temporary road crossing.
- **Subproject 7:** Removal of temporary obstacles in drainage reserve, clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to reinstate Khal cross section, construction of piled box drain and boardwalk/path, construction of gross pollutant and silt trap at outlet to Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, and construction of bridges.
- **Subproject 8:** Removal of water hyacinth and solid waste and dispose, re-excavate sediment from ponds and dispose, site clearance of land adjacent to ponds (where necessary), construction of public paths/semi paved areas and boardwalks, construction of Ghats and handrails, installation of seats/benches, solar lights and pavilions, along banks, installation of public toilets/changing rooms/including septic tank & water supply, and construction of kiosks/shops.

### **Assessment of Impact**

The scale and intensity of noise pollution or increased noise levels resulting from the construction activities is assessed to be a moderate deterioration of the existing environment where the affected environment is altered, however, function and process continue. Ambient noise levels may be impacted due to frequent vehicle movement, operation of vehicles and machinery, and associated construction works and constituting a perceptible change from the baseline conditions. The exceedance of noise levels or noise pollution could be high especially during activities such as piling and demolition of existing structures. The risk of increased noise levels impacting receptors is higher for subprojects where residences are located near the construction sites. The study on “*Status of Noise Pollution in Khulna City*” shows that the existing noise level varies from morning to night and the existing ambient noise levels are higher than the levels specified in ECR 1997.

The spatial extent of the negative impact to noise levels resulting from the construction activities occurs at the subproject sites and the immediate vicinity of the subproject sites. On that basis these are assessed

to be site/local. The potential impact on noise levels at the construction sites during construction is assessed to be medium-term and during the construction phase.

The overall receptor sensitivity is assessed to be moderate to high as the subprojects are located in urban or peri-urban areas where the existing noise quality is prone to be stressed, and sensitive to changes in quality. The receptors of this impact are mainly the adjacent community including Ghat, market and road users, and the workers. A few sensitive receptors (Mosque, Crematorium, School, Orphanage, etc.) are also identified which might be impacted due to the exceedance of noise levels in comparison with the baseline conditions. Based on the assessment the scale and intensity of the impact to noise will be moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be medium. On that basis the impact magnitude is low. The receptor sensitivity is assessed to be moderate to high depending on the distance to human receptors of the construction sites. The impact significance is thus assessed to be minor before mitigation.

**Table 5.12 Assessment of Impact of Noise Level**

Impact	Impact of Noise Level		
	Minor	Moderate	High
Scale/intensity	Minor	Moderate	High
Spatial extent	Site/local	Regional	National
Duration	Short term	Medium term	Long term
Magnitude	Low	Medium	High
Receptor sensitivity	Low	Moderate	High
Impact significance	Minor	Moderate	High

### ***Mitigation Measures Suggested***

These impacts will be mitigated through the following means:

- Construction activity near residential areas should be scheduled in daytime only, and noisy equipment should be prohibited from night operation.
- Where possible, site noisy activities away from residences and sensitive receptors.
- Provide advance warning to the community on timing of noisy activities.
- All powered mechanical equipment used in the works should be effectively sound reduced.
- Select equipment with consideration of having lowest noise levels and ensure equipment are regularly maintained to keep such levels during its operation.
- Ensure mobile/temporary noise barriers, acoustic screens, enclosures are available for construction sites and excavations in populated areas.
- The use of ear plugs, or ear muffs should be ensured for the construction workers, supervisors & engineers.

### ***Residual Impact***

With the implementation of the above mitigation measures the residual impacts to noise level is assessed to be minor. Avoiding construction activities at night-time will reduce the impacts to noise quality significantly. Use of new & modern machinery will reduce noise pollution. Use of temporary noise barriers, or acoustic screens surrounding the construction sites will reduce risk of noise pollution.

### **5.3.7 Traffic Congestion in Construction Sites**

The construction activities will lead to an increase in traffic loads. Transport of construction materials and construction waste will increase vehicular traffic and thus congestion. Construction activities will take place along existing roads during construction of the drainage system. At present, traffic congestion is a common

phenomenon in Khulna and traffic volumes are increasing. The sensitivity factors for the impacts associated with traffic include the significance of the thoroughfare for local traffic, presence of detour roads, current traffic volumes and types where pedestrian traffic is more susceptible to construction traffic, and the density of settlements in close vicinity of the subproject. The presence of particularly sensitive receptors such as hospitals, religious facilities, and schools near the subproject will also contribute to the sensitivity. The impact scale or intensity related to traffic depends on the degree of increased traffic congestions through increased volumes and blockage of road lanes. An impact of minor scale may cause insignificant change to the traffic volumes and not block any thoroughfares, whereas an impact of moderate scale may cause moderate alteration by increasing volumes or blocking lanes for a period. An impact of high scale significantly increases traffic volumes and block thoroughfares for longer periods.

### **Sources of Impacts**

Impacts to the traffic of the subprojects may result from the following activities:

- **Subproject 1:** Clearance of site and demolish existing structures (existing Ghats) and disposal of waste, reinstate Ghats, built new jetties, and built waiting sheds.
- **Subproject 2:** Clearance of site and demolish existing structures and disposal of waste, raise the land to above recommended flood level, construct 2-storey terminal building (incl. piling) for tourist related business, construct jetty in front of shore, construct amphitheater, install seating/shading, install septic tank & piped water supply & power supply, construction of foot paths.
- **Subproject 3 :** Clear water hyacinth, re-excavate sediment from drain and dispose, earthworks, construction of box drain at upstream end, construction of gross pollutant and silt trap upstream of drain, installation of seats/benches, solar lights and pavilions, kiosks along banks, site clearance and demolition of existing drains and disposal of waste, breaking up road surface, and additional excavation to widen drains and disposal of waste, diversion of existing services (water supply & power) where required, provide temporary access across construction site to buildings, construct new box drain and culverts, construct gross pollutant and sediment traps, and backfilling and road reinstatement where required.
- **Subproject 4:** Demolition of temporary buildings in drainage reserve, clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to form Khal cross section, lining of banks of the Khal, construction of box drain at upstream end, construction of gross pollutant and silt trap upstream of Khal, construction of public path and boardwalk along Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, site clearance and demolition of existing drains and disposal of waste, breaking up road surface, and additional excavation to widen drains and disposal of waste, diversion of existing services (water supply & power) where required, provide temporary access across construction site to buildings, construct new box drain and culverts, construct gross pollutant and sediment traps, and backfilling and road reinstatement where required.
- **Subproject 5:** Site clearance and demolition of houses, install sheet pile as anti- seepage screen, excavation pit for pumping station/gate structure and disposal of waste, piling of foundation, construction of reinforced concrete PS/gate structure, backfilling and reinstatement around structures, install screens, stop logs, gates, install pumps with controls, install lifting crane for maintenance of pumps, excavate approach and discharge channel and dispose of waste, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste, construction of new bridge and reinstate road, and remove temporary road crossing.
- **Subproject 6 :** Site clearance and demolition of houses, install sheet pile as anti- seepage screen, excavation pit for pumping station/gate structure and disposal of waste, piling of foundation, construction of reinforced concrete PS/gate structure, backfilling and reinstatement around structures, install screens, stop logs, gates, install pumps with controls, install lifting crane for maintenance of

pumps, excavate approach and discharge channel and dispose of waste, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste, construction of new bridge and reinstate road, and remove temporary road crossing.

- **Subproject 7:** Demolition of temporary buildings in drainage reserve, clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to reinstate Khal cross section, lining of banks of the Khal, construction of piled box drain and boardwalk/path, construction of gross pollutant and silt trap at outlet to Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, and construction of bridges.
- **Subproject 8:** Removal of water hyacinth and solid waste and dispose, re-excavate sediment from ponds and dispose, lining of banks of the ponds, site clearance of land adjacent to ponds (where necessary), construction of public paths/semi paved areas and boardwalks, isolate/divert drainage outlet away from ponds, construction of Ghats and handrails, installation of seats/benches, solar lights and pavilions, along banks, installation of public toilets/changing rooms/including septic tank & water supply, and construction of kiosks/shops.

### **Assessment of Potential Traffic Impact**

The scale and intensity of potential traffic impacts resulting from the construction activities is assessed to be a moderate alteration of the existing traffic systems, where function and process continue. Traffic system may be impacted due to increased traffic flows and temporary disturbance of traffic at construction sites and at temporary relocation sites. The change constitutes a perceptible change from the baseline conditions, but the alteration is reversible, rather than a permanent change to traffic systems. The disturbance of traffic is limited to the construction phase, and thus there is no permanent alteration of the traffic system.

The spatial extent of the traffic disturbance resulting from the construction activities occur at the subproject sites and the immediate vicinity of the subproject sites where the storage areas, final disposal sites and construction camps will be located. On that basis these are assessed to be site/local.

The potential disturbance of traffic flows during the construction is assessed to be medium term and last during the construction phase. The construction activities do not have the potential to create long term impacts to the traffic system as the disturbance is temporary during the construction phase.

The overall receptor sensitivity is assessed to be moderate as the subprojects are located in urban or peri-urban areas and where the traffic system is prone to be stressed due to increasing trends of vehicles in the city area and sensitive to alterations such as sudden traffic congestion. The sensitivity of the traffic system is considered to be high in the Rupsha area where the road is the main access to Rupsha Ghat.

Based on the assessment the scale and intensity of the impact to traffic will be minor to moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be medium as the disturbance of traffic will be limited to the construction phase. On that basis the impact magnitude is medium. The receptor sensitivity is assessed to be medium in most cases. The impact significance is thus assessed to be minor to moderate before mitigation.

**Table 5.13 Assessment of Disturbance of Traffic**

Impact	Impact of Disturbance of Traffic		
Scale/intensity	Minor	Moderate	High
Spatial extent	Site/local	Regional	National
Duration	Short term	Medium term	Long term
Magnitude	Low	Medium	High
Receptor sensitivity	Low	Moderate	High
Impact significance	Minor	Moderate	High

### ***Mitigation Measures***

These impacts will be mitigated through the following means:

- Develop a traffic management plan to improve traffic flow and ensure routes for vehicles are not blocked and signage is provided to reduce speeds and show drivers in advance of any changes to road surface or traffic direction and detour directions.
- Plan construction program to minimize interference especially at busy sites such as markets, e.g. contractor to open trench equivalent to one-day's work at any one time and cover the trenches at night for safety and to provide access to properties.
- Plan construction to minimize the area and period of road occupation/ closure, minimize haul distances, and avoid concentration of construction vehicles.
- Provide prior notices to local residents on the road occupation / closure through sign boards and mass media.
- Where risks occur given changes to traffic lanes or lane closure, provide additional lighting to allow visibility of the changes at night.
- Adequate pedestrian and vehicular access to enter buildings and properties across any open trenches ensured, particularly commercial premises during open hours.
- Maintain uninterrupted traffic access by keeping at least one lane open.
- Ensure daily access to properties along the construction sites.
- Ensure that all construction vehicles follow speed limits on the construction sites and on public roads
- Provide adequate signage, barriers, and flag persons for traffic control and detours and avoid vehicles mistakenly entering the sites.
- Fit audible warning devices in all vehicles to alert during reversing.
- Maintain all existing roads in traffic worthy condition ensuring maintenance of uninterrupted movement of traffic.
- Temporary crossings (e.g. subproject 6, 7, and 8) to be constructed and maintained (including dust control) during the construction period.
- Repair the damaged local roads to their original condition after project completion.

### ***Residual Impact***

With the implementation of the above mitigation measures the residual impacts of traffic is assessed to be minor. Minimizing haul distances will reduce the disturbance of traffic significantly. Also ensuring adequate signage, barriers, and flag persons will reduce the impact of traffic systems.

### **5.3.8 Solid Waste Generation at KCC Construction Area**

Waste generated from cleaning, excavation and demolition works, construction camps, and various construction activities may have impacts on soil or adjacent agricultural land, waterbodies, create odour or nuisance and constitute a health risk of the adjacent community. The solid waste will be generated from clearance of sites and demolishing of existing structures, clearing of water hyacinth, and associated waste from Khals, including excavated sediment, as construction waste from construction activities. The receptors are adjacent communities including residences, market and Ghat users, the Rupsha and Mayur river, and adjacent agricultural lands and soil. The soil quality of the storage site and discharge point and its adjacent area may be contaminated or polluted due to the improper or haphazard handling and disposal of waste. During heavy rainfall, surface runoff from the stockpiles of excavated sediments and waste material can pollute adjacent waterbodies.

The sensitivity factors include whether the impacted soil and water supports biodiversity and/or agriculture and the extent to which these are dependent on the quality of the soil and water. The sensitivity factors include presence of human and ecological receptors in close vicinity of the temporary and final disposal sites, the density of the population prone to be stressed, and the biodiversity value of ecological receptors. The impact scale/intensity are determined by the quantity and quality of the solid waste generated.

### **Sources of Impacts of Solid Waste**

Impacts of solid waste to the adjacent environment may result from the following activities:

- **Subproject 1:** Clearance of site and demolish existing structures (existing Ghats) and disposal of waste, reinstate Ghats, and built new jetties.
- **Subproject 2:** Clearance of site and disposal of waste, construct 2-storey terminal building (incl. piling) for tourist related business, construct jetty in front of shore, construct amphitheater, install septic tank & piped water supply & power supply, and construction of foot paths.
- **Subproject 3 and 4 :** Clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to form Khal cross section, lining of banks of the Khal, construction of box drain at upstream end, construction of gross pollutant and silt trap upstream of Khal, construction of public path and boardwalk along Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, site clearance and demolition of existing drains and disposal of waste, breaking up road surface, and additional excavation to widen drains and disposal of waste, construct new box drain and culverts, construct gross pollutant and sediment traps, backfilling and road reinstatement where required.
- **Subproject 5 and 6:** Site clearance and excavation pit for pumping station/gate structure and disposal of waste, piling of foundation, construction of reinforced concrete PS/gate structure, backfilling and reinstatement around structures, construct operator room and house for operator, excavate approach and discharge channel and dispose of waste, provide temporary road crossing across construction site, demolition of old gate structure and disposal of waste, construction of new bridge and reinstate road, and remove temporary road crossing.
- **Subproject 7:** Clear water hyacinth, and solid waste from Khal and dispose, re-excavate sediment from Khal and dispose, earthworks to reinstate Khal cross section, lining of banks of the Khal, construction of piled box drain and boardwalk/path, construction of gross pollutant and silt trap at outlet to Khal, installation of seats/benches, solar lights and pavilions, kiosks along banks, and construction of bridges.
- **Subproject 8:** Removal of water hyacinth and solid waste and dispose, re-excavate sediment from ponds and dispose, lining of banks of the ponds, site clearance of land adjacent to ponds (where necessary), construction of public paths/semi paved areas and boardwalks, isolate/divert drainage outlet away from ponds, construction of Ghats and hand rails, and installation of public toilets/changing rooms/including septic tank & water supply.

### **Assessment of Impacts of Solid Waste**

The scale and intensity of potential impacts on environmental quality due to solid waste resulting from the construction activities is assessed to be a moderate deterioration of the existing environment where the affected environment is altered, however, function and process continue. Solid waste may affect the environmental quality through the improper or haphazard storage of waste materials in the storage areas and constituting a perceptible change from the baseline conditions, but the damage is assessed to be reversible, rather than a permanent damage to environmental quality in the subproject areas. Risk of permanent contamination of soil and water is assessed to be low as the duration of the temporary storage of waste materials is expected to be low.

The following main types of waste will be generated by the subprojects:

- Demolition waste generated from clearance of site
- Removed existing road surfaces
- Construction wastes
- Dredged and excavated sediments from Khals
- Removed water hyacinths from Khals
- Hazardous waste including used oil, hydraulic fluids, waste fuel, lubricants and grease, paints, etc.
- Municipal solid waste produced by the construction workers and dumped municipal solid waste excavated from drains and Khals.

Of the above types of waste, the sediments and water hyacinths are anticipated to be generated in significant quantities and be associated with potential quality issues and are therefore assessed in more detail. Where existing road surface is removed it should not be dumped or landfilled but be prepared and re-used where appropriate. Demolished concrete can be crushed and reused e.g. as aggregate for blinding of concrete structure, in base layer, or as gravel substitute. The estimated amounts of concrete, bricks, ferrous metals, and other wastes are summarized in the **Table 5.14** below.

**Table 5.14 Estimated amounts of Concrete, Bricks, Ferrous Metals and Other Waste**

Subproject	Type of Waste	Estimated Quantity	Reuse / recycling option	Disposal option
Subproject 1	Concrete from jetty Volume of Jetty= (Area*Thickness)=(34m <sup>3</sup> *0.45m)	15.3m <sup>3</sup>	Crushed concrete can be reused as fill material Crushed concrete can be reused as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.	Can be disposed of at a designated site by KCC
	Other waste such as wood, bamboo, and tin etc. from demolition of 6 temporary jetties and 60 m <sup>2</sup> katcha structures	Negligible, not identified	Can be reused by the shop owner/ jetty owners for construction Used as firewood (bamboo)	Not required
Subproject 2	Concrete and bricks from demolition of 30 m <sup>2</sup> toilet structure with concrete floor and roof	39.25m <sup>3</sup>	Bricks can be cleaned and reused in construction Crushed bricks and concrete can be reused as fill material Crushed concrete can be reused as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.	Can be disposed of at a designated site by KCC
	Other waste such as wood, bamboo, and tin etc. from demolition of 4 temporary jetties and 60 m <sup>2</sup> semi- pucca structures	Negligible, not identified	Can be reused by the business operators or can be used as firewood (bamboo)	Not required
Subproject 3	Concrete and bricks from existing drains and 120 m <sup>2</sup> of pucca structure	190 m <sup>3</sup> from pucca structure 710 m <sup>3</sup> from existing drainage pipes	Crushed bricks and concrete can be reused as fill material Crushed concrete can be reused as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.	Can be disposed of at a designated site by KCC
	Other waste such as wood, plastic, tin, bamboo, etc. from demolition of 270 m <sup>2</sup> of katcha and 90 m <sup>2</sup> of jhupri structures.	Not identified	Can be reused by the shop owners or HHs Tin can be sold to the	Not required

Subproject	Type of Waste	Estimated Quantity	Reuse / recycling option	Disposal option
			local vendors for recycling of metals	
Subproject 4	Concrete and bricks from existing drains	3825 m <sup>3</sup> from existing drainage pipes	Crushed bricks and concrete can be reused as fill material Crushed concrete can be reused as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.	Can be disposed of at a designated site by KCC
	Other waste such as wood, plastic, tin, bamboo, etc. from demolition of 32 m <sup>2</sup> of semi-pucca and 107 m <sup>2</sup> of katcha structures.	Not identified	Can be reused by the affected businesses and HHs Tin can be sold to the local vendors for recycling of metals Plastic can be recycled in Khulna, requires segregation.	Not required
Subproject 5	Concrete from demolition of existing sluice gate Volume of Structures/ Concrete and Bricks= Wall Length*Width*Height= 3.3m*6m*3.5m=69.3m <sup>3</sup>	69.3 m <sup>3</sup>	Crushed concrete can be reused as fill material Crushed concrete can be reused as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.	Can be disposed of at a designated site by KCC, if necessary
	Other waste such as wood, plastic, tin, bamboo, etc. from demolition of 160 m <sup>2</sup> semi-pucca, 112 m <sup>2</sup> katcha, and 20 m <sup>2</sup> jhupri structures	Not identified	Can be reused by the affected businesses and HHs Tin can be sold to the local vendors for recycling of metals	Not required
Subproject 6	Concrete from demolition of existing sluice gate Volume of Structures/ Concrete and Bricks= Wall Length*Width*Height= 4.5*6*5=135m <sup>3</sup>	135 m <sup>3</sup>	Crushed concrete can be reused as fill material Crushed concrete can be reused as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.	Can be disposed of at a designated site by KCC, if necessary
	Other waste such as wood, plastic, tin, bamboo, etc. from demolition of 257 m <sup>2</sup> katcha and 12 m <sup>2</sup> of jhupri structures.	Not identified	Can be reused by the affected businesses and HHs	Not required
Subproject 7	Waste such as bricks, wood, tin, etc. from demolition of 25 m <sup>2</sup> of semi-pucca and 18 m <sup>2</sup> of katcha structures.	Negligible, not identified	Can be reused by the affected businesses and HHs Tin can be sold to the local vendors for recycling of metals	Not required
	Other waste such as Bamboo from demolition of 8 temporary jetties	Negligible, not identified	Can be reused by the locals or can be used as firewood	Not required
Subproject 8	Concrete and bricks from demolition of build-up banks (in bad condition) at ponds	820 m <sup>3</sup>	Bricks can be cleaned and reused in construction Crushed bricks and concrete can be reused as fill material Crushed concrete can be reused as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.	Can be disposed of at a designated site by KCC

Subproject	Type of Waste	Estimated Quantity	Reuse / recycling option	Disposal option
	Other waste such as wood, plastic, tin, bamboo, etc. from demolition of 1200 m <sup>2</sup> of semi-pucca, 10 m <sup>2</sup> of katcha and 90 m <sup>2</sup> of jhupri structures.	Not identified	Can be reused by the affected HHs Tin can be sold to the local vendors for recycling of metals Plastic can be recycled in Khulna, requires segregation.	Not required

Demolition waste generated from clearance of site will generate significant quantities of waste concrete and bricks with various reuse and recycling options by the owner, residents or the Contractor: Bricks can be cleaned and reused in construction, crushed bricks and concrete can be reused as fill material, and crushed concrete can be reused as aggregate for blinding of concrete structure, in base layer, or as gravel substitute. KCC informs that their disposal site at Mathabhanga is 22 Acres of which only 2 Acres are in use. It is expected that waste from existing drainage pipes in the ground will mostly be left in the ground reducing the quantity of waste generated from these subprojects. The rest of the area can be used as the final disposal site of waste concrete and bricks. Demolition of the permanent market building under subproject 3 will generate ferrous metal from existing rolling shutters having high recycling value and can be reused by the shop owners during temporary relocation or at the temporary market. Disposal options for such waste will not be required. In the case of other waste such as bamboo, wood, plastic, and tin, the specific generated amounts are insignificant and not identified during the EIA. Generated bamboo, wood, plastic, etc. can be reused by the affected HHs and businesses and those materials generally have low commercial recycling value except for the tin. Plastic is cleaned, sorted, and shredded and packaged in Khulna and typically distributed to Dhaka for recycling. If a final disposal site is required for these waste streams, KCC will ensure appropriate disposal options.

The quantities of sediments and water hyacinths generated from the Khal rehabilitation subprojects are significant. The estimated amounts of are summarized in the **Table 5.15** below. The estimates of water hyacinth are based on a thickness of 0.3 m multiplied by the area of the canals that will be dredged.

**Table 5.15 Estimated Amounts of Sediments and Water Hyacinth to be Excavated from Khals**

Canal (Khal)	Sediments (m <sup>3</sup> )	Water Hyacinth (m <sup>3</sup> )
Bastuhara Khal	58,500	6,360
D. Chowdhury Khal	28,300	2,100
Nobinagar Khal	15,200	1,410
Nirala Khal	51,300	19,400
<b>Total</b>	<b>153,300</b>	<b>29,270</b>

The dry mass of the total volume of water hyacinth has been estimated to about 370 tons as follows: Assuming a thickness of 0.3 m, the area covered by water hyacinth would be approximately 100,000 m<sup>2</sup> or 10 ha. From the literature (Lareo L. and Bressani R. 1982), densities of 300 tons to 442 tons per hectare have been found. Taking the average density, this would amount to about 3,700 tons of wet weight water hyacinth. Water hyacinth contains about 90% water so the dry mass would be about 370 tons.

Options for reuse of water hyacinth include primarily Composting and use as a fertilizer, Process into animal feed (only the leaves), Raw material for production of ethanol, Raw material for pulp production, Raw material for methane production, Use for handicraft production of baskets etc. (only the straw), raw material for production of floating gardens.

Composting of water hyacinth is a well-established method practiced in many countries where the water hyacinth invades lakes, ponds, canals and other water bodies. To control infestation of water hyacinth in the water bodies the plant is harvested and composted. As the water hyacinth absorbs most of the nutrients from

water for self-growth, it has a high nutrient content which makes it suitable for production of a good quality soil fertilizer. Use of water hyacinth as raw material for production of floating gardens in wetlands has historically been a common practice across Bangladesh and being reviewed as a climate resilient (climate-smart) agricultural approach.

The other use options seem to be on various stages of experimentation or small-scale niche production. Unless local entrepreneurial businesses are capable of and interested in developing some of these options, they are not likely to be practical for the project – also considering certain production issues (space for storage, production capacity, market, future availability of raw materials).

The composting capacity in Khulna includes a composting plant setup at Rajbandh Landfill by RUSTIC (Rural Unfortunates Safety Talisman Illumination Cottage), an NGO that mainly focuses on service delivery in Waste Management Sector. The RUSTIC composting plant recycles organic waste to produce compost which is mainly used in gardens. In 2018, the plant recycled 2,800 tons of organic waste to produce 480 tons of compost fertilizer per year ([www.rusticbd.org](http://www.rusticbd.org)). KCC has expanded compost processing capacity in Khulna to include two composting plants at Rajbandh Landfill with 20 tons capacity per day and another one is 475 tons capacity per day. KCC is currently using 47 Acres for the disposal site at Rajbandh and there is spare capacity of 92 Acres for a new disposal site. Following KCC, this site can be used for temporary storage and drying of sediments and water hyacinth and final disposal if required. In addition, KCC has a 22 Acres disposal site at Mathabhanga of which 2 Acres are in use (interview with ExEn-3 Mechanical, KCC, September 2021).

As highlighted in the scoping report, the dredging, (pre-treatment/dewatering) transport and disposal of sediments from the Khals are of particular concern. The content of heavy metals in the sediments has been investigated as part of the EIA studies to inform the most practicable methods with the least environmental and social effects including beneficial use of the sediments. Three samples from each of the four Khals included in the subprojects were collected, including from the upstream, mid-stream, and down-stream ends of the Deana Chowdhury Khal, Bastuhara Khal, Nobinagar Khal, and the Nirala Branch of the Mayur. A control sample from a Khal not anticipated to be contaminated was also taken. The sediment analyses showed that Pb, Cd, Cr, Cu, Ni, Zn, As, and Mn were present in all samples, while Hg was present in one sample from the downstream of Nobinagar Khal. The heavy metal content was in all cases significantly below the threshold amounts. On the basis of the parameters analysed of the sediments there is therefore not identified concentrations that would restrict reuse of the sediments. The results of the sediment quality sampling are presented in Baseline Section 4.1.8.4.

The spatial extent of the negative impact of solid waste resulting from the construction activities occur at the subproject sites and the immediate vicinity of the subproject sites where the temporary storage areas will be located. On that basis these are assessed to be site/local.

The potential impact of solid waste at temporary storage sites during construction is assessed to be medium term and during the construction phase. The construction wastes (sediments, water hyacinth, bored materials, construction debris etc.) will be stored at temporary storage sites established during the construction phase for an estimated 10-15 days and then the waste will be disposed of. However, the storage and deposit of solid waste have the potential to create long term impacts to water quality and soil quality through contamination, which will last beyond the construction phase and thus be a long-term impact.

Some subprojects are located adjacent to agricultural areas and within a very close proximity of Mayur and Rupsha River. Storage of waste material on agricultural land or disposal of waste into the waterbody or river should be avoided. The sensitivity of agricultural land and waterbody is considered moderate as it could be negatively impacted by the temporary storage or disposal of waste materials. The overall receptor sensitivity

is assessed to be moderate as the subprojects are located in urban or peri-urban areas where the existing environment is sensitive to changes in quality.

Based on the assessment the scale and intensity of the impact of solid waste will be minor to moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be medium. On that basis the impact magnitude is low. The receptor sensitivity is assessed to be low in most cases, but the adjacent agricultural land at some subprojects is assessed to be of moderate sensitivity. The impact significance is thus assessed to be minor before mitigation.

**Table 5.16 Assessment of Impact of Solid Waste**

Impact	Impact of Solid Waste		
Scale/intensity	Minor	Moderate	High
Spatial extent	Site/local	Regional	National
Duration	Short term	Medium term	Long term
Magnitude	Low	Medium	High
Receptor sensitivity	Low	Moderate	High
Impact significance	Minor	Moderate	High

### **Mitigation Measures**

These impacts will be mitigated through the following means:

- Prepare waste management plan including identification of types, estimated quantities, qualities, segregation, reduction, recycling, reuse, and disposal options.
- Where existing road surface is removed it should not be dumped or landfilled but be prepared and re-used where appropriate.
- Demolished concrete can be crushed and reused e.g. as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.
- Construction and demolition waste to be stored separately and periodically collected.
- Hazardous wastes to be properly labelled and stored at location with impermeable surface, cover, and secondary containment. Recycling options for waste oils to be explored locally.
- Provide waste bins at sites away from water bodies, properly covered and protected from wind, rain, storms.
- Processing of water hyacinth at local composting plant to be explored with operator including capacity and quality requirements of plant.
- Reuse options for sediments to be explored along with need for further quality analyses to confirm quality.
- Avoid temporary storage of waste on agricultural land.
- Transport hazardous wastes, which cannot be recycled, to a designated disposal site approved by DOE.
- Vehicles transporting solid waste should be covered with tarps or nets to prevent spilling waste along the route.
- Train and instruct all personnel in waste disposal practices and procedures as a component of the environmental induction process.
- Prohibit burning and dumping of solid waste by workers and at construction sites.

### **Residual Impact**

With the implementation of the above mitigation measures the residual impacts of solid waste is in most cases assessed to be minor. Significant quantities of sediments will be excavated and dredged and should be reused where feasible. The analyses of heavy metal content in sediments have not found concentrations that would

restrict reuse. Significant quantities of water hyacinth will be removed from the Khals and processing at the composting plant should be explored. Avoiding storage of waste materials on agricultural land and final disposal of waste into the waterbody will reduce the receptor sensitivity to low. Ensuring that duration of storage of waste materials is reduced before final disposal, will reduce significantly the risk of long-term impacts to soil, surface and underground water resource at the temporary storage sites.

### 5.3.9 Impact of Biodiversity of Khulna

Impacts to biodiversity may occur when construction will take place near and in water bodies. Construction activity in the river or water body, accidental spills, waste disposal, and washouts in the water body will degrade water quality and thus aquatic habitat. During clearing of the Khals for construction, aquatic floral habitat will be disrupted. Clearing of the banks of the Khals and the ponds for construction may disturb vegetation and habitats. Loss of vegetation directly impacts floral diversity and lead to loss of habitat for fauna. Sensitivity factors include the biodiversity value of the impacted habitat, including whether it is designated or recognized at regional, national, and international level and/or there is presence of red list species in the area. Impact scale/intensity criteria includes whether the effect is within normal variation and whether the share of the impact to the habitat is large enough to threaten the viability of the habitat or the viability of the populations/species in it.

#### **Sources of Impacts to Biodiversity**

Impacts to biodiversity of the subprojects may result from the following activities:

- Subproject 1: Clearance of site and demolish existing structures (existing Ghats) and disposal of waste, place concrete blockwork above and below waterline, dump concrete blocks for rubble mound toe, and built new jetties.
- Subproject 2: Construct jetty in front of the shore.
- Subproject 3: Placing of concrete blocks for erosion protection up and downstream.
- Subproject 7: Clear water hyacinth, and solid waste from Khal and dispose.
- Subproject 8: Removal of water hyacinth and solid waste and dispose, lining of banks of the ponds, and construction of Ghats and handrails.

#### **Assessment of Impact**

The impact magnitude is a function of the impact scale, spatial extent, and duration. The impact scale/intensity of biodiversity impacts resulting from the construction activities is assessed to be moderate as there is a clearly evident change of character from baseline conditions of minor areas that are not large enough to threaten the habitats. The damage to the natural environment is reversible and likely to easily revert back with mitigation.

The spatial extent of the negative impact to biodiversity resulting from the construction activities occur at the subproject sites during clearance of site for construction and construction in water bodies and in the immediate vicinity of the subproject sites. On that basis these are assessed to be site/local.

The potential impact to biodiversity is medium term as impacts occur during the construction phase and the impacts to habitats are not large enough to threaten any longer-term viability of the habitats and thus do not last beyond the construction phase.

The receptor sensitivity is assessed to be low as the impacted areas are modified habitat provides habitat for common species. There are no designated or protected sites among the impacted areas and no red listed species identified in the impacted areas.

Based on the assessment of impact magnitude as low and the receptor sensitivity as low, the resulting impact significance is assessed to be negligible.

**Table 5.17 Assessment of Impact of Biodiversity**

Impact	Impact of Biodiversity		
Scale/intensity	Minor	Moderate	High
Spatial extent	Site/local	Regional	National
Duration	Short term	Medium term	Long term
Magnitude	Low	Medium	High
Receptor sensitivity	Low	Moderate	High
Impact significance	Minor	Moderate	High

### **Mitigation Measures**

Impact to biodiversity can be mitigated through the mitigation measures listed under soil quality and surface water to prevent impact to soil and water and the following measures:

- Avoid clearance of mature trees and continuous shrubs to the extent possible; safeguard trees in close proximity to construction work.
- Prohibit waste disposal in the rivers or other water bodies.
- For the subprojects constructing in the water, use silt screens hanging from floats in the water column to contain stirred up sediment and prevent it from traveling downstream.
- Time construction activities in the dry season to minimize erosion and wash out.

### **Residual Impact**

Residual impact to biodiversity is assessed to be negligible.

### **5.3.10 Impact of Infrastructure and Services**

Impact to infrastructure and services may include impact to roads and transportation networks, including waterways during construction as well as potential impact to utilities such as power, water supply, or drainage system. Drainage improvement under subprojects 4, 5, and 8, will require relocation of roadside electrical poles and water supply systems, and these activities may cause temporary disruption of infrastructure and services. Demolition of the old gates, new bridge construction and construction of temporary road crossing may have impacts on the power supply system during the relocation of adjacent electrical poles. Several residents of the southern bank of Nirala Branch of Mayur will lose their access during the bridge constructions, if any alternative temporary crossing will not be installed under subproject 8. The receptors of the impact are the adjacent communities or the users of different utilities.

The sensitivity factors are determined by how critical the impacted infrastructure and services are to the living conditions of the human receptors and the extent to which the receptors are dependent on those facilities. The impact scale or intensity of changes to infrastructure and services will depend on the degree to which the quality of life or living conditions of the adjacent communities' changes compared with baseline and can revert with mitigation. A minor impact to infrastructure and services may cause insignificant change to the living conditions, where the effect is within the normal range or disruption of facilities for a while, and whereas an impact of high scale is significant deterioration of the existing facilities such as repeated flooding during the construction phase of drains or due to newly constructed drainage facilities.

### **Sources of Impact of Infrastructure and Services**

Impacts to infrastructure and services in the subprojects can result from the following activities:

- Subproject 3: Install septic tank & piped water supply and power supply
- Subproject 4 and 5: Diversion of existing services (water supply & power) where needed.

- Subproject 6 and 7: Demolition of old gate structure and disposal of waste, and construction of new bridge and reinstatement of road.
- Subproject 8: Construction of bridges.

### **Assessment of Impact**

The scale and intensity of impacts to infrastructure and services resulting from the diversion of existing services, demolition of existing structures, construction of the new bridge, and reinstatement of the roads are assessed to be minor to moderate disruption of the existing facilities, where function and process continue. The impacts to infrastructure and services could be high if alternative temporary crossings and access are not installed before the demolition of old bridges and construction of the new ones. Drainage improvement activities may impact utilities or services, both temporarily, planned and coordinated and, given the excavation depths and size that will require use of excavation machinery, there will be risks of accidental cutting of utilities.

The spatial extent of the negative impact to infrastructure and services resulting from the construction activities occurs at the subproject sites and mostly within the immediate vicinity of the subproject sites. On that basis, these are assessed to be site/local.

The potential impact on infrastructure and services is assessed to be short to medium-term. The duration of impact is considered to be medium-term when the impact will remain during the whole construction phase, such as loss of accesses during the construction of new bridges. And the impact is considered to be short-term where the impact is temporary.

The overall receptor sensitivity is assessed to be low to moderate as determined by how critical the impacted infrastructure and services are to the living conditions of the human receptors and the extent to which the receptors are dependent on those facilities. For the subprojects 3, 4, and 5, the adjacent communities are considered to have low sensitivity to the potential short term temporary disruption of power supply or water supply during construction. The loss of access during the construction of new bridges will affect the infrastructure users and these users are assessed to have a moderate sensitivity towards these changes as they are dependent on the bridges and crossings to access the city.

Based on the assessment, the scale and intensity of the impact on infrastructure and services will be minor to moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration to be short to medium-term. On that basis, the impact magnitude is considered negligible to low. The receptor sensitivity is assessed to be low to moderate, depending on the probability of being affected. The impact significance is thus assessed to be minor before mitigation.

**Table 5.18 Assessment of Impact of Infrastructure and Services**

<b>Impact</b>	<b>Impact of infrastructure and services</b>		
<b>Scale/intensity</b>	Minor	Moderate	High
<b>Spatial extent</b>	Site/local	Regional	National
<b>Duration</b>	Short term	Medium term	Long term
<b>Magnitude</b>	Low	Medium	High
<b>Receptor sensitivity</b>	Low	Moderate	High
<b>Impact significance</b>	Minor	Moderate	High

### **Mitigation Measures**

These impacts will be mitigated through the following means,

- Carry out a thorough site investigation to ascertain the exact locations of the existing utility system within and around their project site and mark their locations and plot the information on the drawings.
- Submit plan and drawings for the relocation of the utilities and obtain permission from the agency concerned, employ suitable equipment and qualified personnel for utility relocation, make provision of water, electricity, or other utilities as necessary for the affected people in case of planned or accidental disruption.
- Contractor to work together with the utilities and relevant agencies/departments to ensure that any expected disruption to public assets will be communicated prior to construction and alternative supply/provision is available in case of planned or accidental disruption.
- Construction of alternative temporary crossing and access should be ensured prior to the demolition of old bridges.
- Construction activities such as demolition of existing drains and construction of the new ones should be completed within the dry season to minimize flooding.

### ***Residual Impact***

With appropriate mitigation, the impact is expected to be minor. Construction of alternative temporary crossing prior to the demolition of old bridges will ensure appropriate access is maintained.

### **5.3.11 Resettlement-Physical and Economic Displacement**

The implementation of the subprojects will result in temporary and permanent physical and economic displacement of businesses and households in the construction areas. The impacts are mainly to structures and assets located in the construction areas. There is a limited land purchase for the pumping station and the Rupsha riverfront development, but otherwise, subprojects are located on public, state- owned land. In the case of affected businesses, both the temporary and permanent relocation of businesses may in addition to impact on the business result in impact of the livelihood of formal and informal workers and employees. Based on the resettlement screening 48 households have structures in the construction area that will be impacted, but no titles to the land.

The sensitivity factors include the dependency of the users/owners on the impacted structures, assets, and land for their livelihood and dwellings. The sensitivity may further increase if the impacted assets support a wider group (e.g. a family). The impact scale or intensity of changes will depend on the degree to which the living conditions of affected persons changes compared with baseline and if these changes are temporary or permanent. An impact of minor scale may cause insignificant change to the living conditions, an impact of moderate scale may be a loss of an asset or land that is reversible with mitigation, whereas an impact of high scale is considered as permanent loss of structures and assets and consequently loss of livelihood and dwelling that cause significant deterioration of the living condition of the affected persons/household.

### ***Sources of Impact***

Impacts to resettlement due to the implementation of subprojects can result from the following activities:

- Subproject 1: Clearance of site and demolish existing structures (existing Ghats) and disposal of waste.
- Subproject 2: Clearance of site and demolish existing structures and disposal of waste.
- Subproject 3 and 4: Site clearance and demolition of temporary buildings in drainage reserve and existing drains, and disposal of waste.
- Subproject 5 and 6: Site clearance and demolition of affected HHs & businesses.
- Subproject 7: Demolition of temporary buildings in drainage reserve.
- Subproject 8: Site clearance of land adjacent to ponds (where necessary).

### Assessment of Impact

The losses and impacts associated with the subprojects were estimated based on the resettlement screening conducted as part of the EIA. These figures are based on the conceptual designs and will be updated at detailed engineering design and preparation of the resettlement action plan.

The table below provides the summary of impacts on businesses, formal/informal employees in these businesses, households, household members, structures in four types and private land associated with each subproject. A further detailing of these impacts and losses per subproject is provided in the Resettlement Policy Framework.

**Table 5.19 Impacted Businesses, Households, Structures, and Private Land of Subprojects**

Sub-project	Businesses		Households / residential		Affected structures per type								Land/ m <sup>2</sup>
	No.	Empl.	AH	AP	Pucca		Semi-pucca		Katcha		Jhupri		
					No.	m <sup>2</sup>	No.	m <sup>2</sup>	No.	m <sup>2</sup>	No.	m <sup>2</sup>	
1.	9	51	-	-	1	34	-	-	1	60	-	-	-
2.	7	127	-	-	1	30	1	60	-	-	4	110	55
3.	20	45	10	37	1	120	-	-	3	270	2	90	-
4.	1	4	4	14	-	-	1	32	3	107	-	-	-
5.	6	71	1	2	-	-	2	160	5	112	2	20	3679
6.	5	11	2	9	-	-	-	-	7	257	1	12	-
7.	1	2	2	6	-	-	1	25	1	18	-	-	-
8.	23	180	29	106	-	-	22	1200	1	10	2	90	-
Total	72	491	48	174	3	184	27	1477	21	834	11	322	3734

Source: Resettlement Screening, 2020-2021

The table below presents a breakdown of the impacts to businesses and households in a) permanent relocation and b) temporary relocation and partially impacted structures where the household or business can continue utilizing the remaining and major part of the structure during construction.

**Table 5.20 Permanent Relocation, Temporary Relocation and Partial Impact**

Sub-project	Permanent relocation				Temporary relocation / partial impact			
	Businesses		Households / residential		Businesses		Households / residential	
	No.	Empl.	AH	AP	No.	Empl.	AH	AP
1.	2	39	-	-	7	12	-	-
2.	7	127	-	-	-	-	-	-
3.	-	-	-	-	217	417	-	-
4.	20	45	10	37	-	-	-	-
5.	1	4	-	-	-	-	4	14
6.	6	71	1	2	-	-	-	-
7.	4	9	2	9	1	2	-	-
8.	1	2	2	6	-	-	-	-
9.	23	180	29	106	-	-	-	-
Total	64	477	44	160	225	431	4	14

Source: Resettlement Screening, 2020-2021

The scale and intensity of impacts associated with the physical and economic displacement resulting from the clearance of sites, demolition of existing structures, and relocation of stalls are assessed to be of high scale when considering the subprojects together. There are permanent relocations of businesses and households and there are different types of structures affected including permanent, semi-permanent, and temporary

structures. For a number of subprojects there are loss of access, which may increase impact, however provision of alternative access is included in the design and provided during construction. Loss of access for businesses and households would increase the impact.

The spatial extent of the negative impact of resettlement resulting from the construction activities occurs at the subproject sites and mostly within the immediate vicinity of the subproject sites. On that basis, these are assessed to be site/local.

The potential impacts resulting from the resettlement of businesses and households are assessed to be medium to long-term. The duration of the impact is long-term where the affected businesses and households are required relocated permanently from their present locations. While the impact is medium duration where the affected structures or assets will be impacted only temporarily during the construction phase, and the project-affected are able to return to their previous locations after construction.

The overall receptor sensitivity is assessed to be high because of the required physical and economical displacements of the affected businesses and households, either temporarily or permanently. The receptors of this impact are mainly the owners, employees or wage earners engaged with the affected businesses and the residents of the affected households. And these human receptors are likely to be directly affected due to the implementation of the project.

Based on the assessment, the scale and intensity of the impact for physical and economic displacement will be of high scale considering the subprojects together. In spatial extent the impact be limited to the immediate vicinity of the sites, and the duration is medium to long-term. On that basis, the impact magnitude is medium. The receptor sensitivity is assessed to be moderate based on the dependency of the human receptors on the affected structures and assets for their livelihood and dwellings. The impact significance is thus assessed to be moderate to high before mitigation.

**Table 5.21 Assessment of Impact of Resettlement**

<b>Impact</b>	<b>Impact of Resettlement</b>		
<b>Scale/intensity</b>	Minor	Moderate	High
<b>Spatial extent</b>	Site/local	Regional	National
<b>Duration</b>	Short term	Medium term	Long term
<b>Magnitude</b>	Low	Medium	High
<b>Receptor sensitivity</b>	Low	Moderate	High
<b>Impact significance</b>	Minor	Moderate	High

### **Mitigation Measures**

The physical and economic displacement that will result from the construction of the subprojects should be assessed based on detailed design, handled so impacts will be mitigated through the following means:

- Avoid or minimize impact as much as possible through alternative design options at detailed design stage.
- Prioritize intervention considering impacts, e.g. for subproject 9, the ponds, a prioritization system has been proposed where ponds which would require relocation are not prioritized for investment.
- Setup grievance redress mechanism and disclose it in subproject areas for handling of complaints/grievances from the start of the resettlement survey and planning process.
- Conduct detailed measurement survey (DMS), census, and socio-economic survey on basis of detailed design.
- Conduct replacement cost survey (RCS).

- Prepare Resettlement Plan (RP) in accordance with the Resettlement Policy Framework (RPF) and obtain approval.
- Implement RP prior to construction. Civil works contractors will not be issued notice of possession or notice to proceed for any section or segment of the subproject until a) compensation has been satisfactorily completed for that area, b) agreed relocation measures are in place.
- Conduct regular monitoring visits and consult with the communities in the project areas.
- Conduct impact screening of any new/accidental impacts, prepare corrective action plan, if required. Document, mitigate, and compensate unanticipated impacts following the principles provided in the RPF and RP.

### ***Residual Impact***

With the implementation of the proposed avoidance and mitigation measures it is expected that the impact scale can be reduced to moderate and with adequate compensation the impact duration can be reduced to medium term and not extend beyond the project implementation period. With that the magnitude is reduced to low and the impact significance reduced to minor. Impact mitigation will depend on the acceptance of the project-affected-persons of measures and adequacy of the compensation.

### **5.3.12 Impact of Livelihood and Jobs**

The potential impact on livelihood and job is mainly associated with the relocation of affected businesses for a few subprojects. During the relocation of businesses formal and informal workers of these are potentially affected until the business can resume operation at the relocation site. Relocating businesses may lose customers due to the relocation of the business. In the case of subprojects 2 & 6, the affected businesses will need to be relocated permanently from the present locations to a relocation site where a large group of wage earners is involved with the businesses. When the businesses will be relocated to the proposed relocation site outside of the city, some employees will leave their job permanently due to the distance to the new workplace, while it is expected that most will continue in their job, but face additional daily commute. There is also a positive impact on job creation in the construction phase as the construction work will employ workers.

The sensitivity factors include the dependence of the affected persons on the impacted livelihood activity and their ability to replace it with another livelihood activity. The sensitivity may further increase if the livelihood activity supports a wider group (e.g. a family) and their dependency on the income source. The impact scale or intensity of changes to livelihood and jobs will depend on the degree to which the living conditions of affected employees or wage earners change compared with baseline and the number of people impacted. A minor impact to livelihood and jobs may cause insignificant change to the living conditions, an impact of moderate scale may be a temporary loss of livelihood or income whereas an impact of high scale is permanent loss of livelihood or income and consequently loss of livelihood may cause significant deterioration of the living quality of affected persons/household.

### ***Sources of Impact***

Impacts to livelihood and jobs due to the implementation of subprojects can result from the following activities:

- Subproject 1: Clearance of site and demolish existing structures (existing Ghats) and disposal of waste.
- Subproject 2: Clearance of site and demolish existing structures (existing Ghats) and disposal of waste.
- Subproject 3: Site clearance and demolition of temporary buildings in drainage reserve and existing drains, and disposal of waste.
- Subproject 4: Site clearance and demolition of temporary buildings in drainage reserve and existing drains, and disposal of waste.
- Subproject 5: Site clearance and demolition of affected HHs & businesses.

- Subproject 6: Site clearance and demolition of affected HHs & businesses.
- Subproject 7: Demolition of temporary buildings in drainage reserve.
- Subproject 8: Site clearance of land adjacent to ponds (where necessary).

### **Assessment of Impact**

The scale and intensity of impacts to livelihood and jobs resulting from the clearance of sites, demolition of existing structures, and relocation of stalls are assessed to be of moderate scale. Permanent relocation has the potential to result in permanent loss of income for the business, e.g. if the new site is less advantageous, or for employees and workers that are not able to relocate to the new site.

The spatial extent of the negative impact to livelihood and jobs resulting from the construction activities occurs at the subproject sites and mostly within the immediate vicinity of the subproject sites. On that basis these are assessed to be site/local.

The potential impact on livelihood and jobs is assessed to be medium to long-term. The duration of impact is considered to be long-term where the affected businesses have to be relocated permanently from their present locations. In case of permanent relocation, the new place might be less attractive to customers, the lease/rent may be higher, or other factors or aspects may reduce the livelihood and income that can be derived from it and thus lead to long term impacts. The impact is considered to be medium-term where the livelihood will be impacted only during the construction phase.

The overall receptor sensitivity is assessed to be medium. The receptors of this impact are mainly the employees or wage earners engaged with the affected businesses that relocate temporarily or permanently due to the project.

Based on the assessment the scale and intensity of the impact to livelihood and jobs will be moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration be medium to long-term. On that basis the impact magnitude is medium. The receptor sensitivity is assessed to be medium depending on the distance to human receptors of the construction sites. The impact significance is thus assessed to be moderate to high before mitigation.

**Table 5.22 Assessment of Impact of Livelihood and Jobs**

Impact	Impact of Livelihood and Jobs		
<b>Scale/intensity</b>	Minor	Moderate	High
<b>Spatial extent</b>	Site/local	Regional	National
<b>Duration</b>	Short term	Medium term	Long term
<b>Magnitude</b>	Low	Medium	High
<b>Receptor sensitivity</b>	Low	Moderate	High
<b>Impact significance</b>	Minor	Moderate	High

### **Mitigation Measures**

The impacts to livelihood and jobs will be mitigated through the measures specified under resettlement – physical and economic displacement. Under the Resettlement Policy Framework allowances and entitlements are specified to compensate for livelihood losses, including loss of employment. Further avoidance measures may be identified during the detailed design. Through prioritisation of interventions impacts may be reduced further, e.g. for subproject 9, the ponds, a prioritization system has been proposed where ponds which would require relocation are not prioritized for investment.

### **Residual Impact**

With the implementation of avoidance and mitigation measures it is expected that the impact scale can be kept at moderate and with adequate compensation the impact duration can be reduced to medium term. With that the magnitude is reduced to low and the impact significance reduced to minor. Impact mitigation will depend on the acceptance of the project-affected-persons of measures and adequacy of the compensation.

### 5.3.13 Community Health and Safety

Hazards to community health and safety include increased traffic loads and disturbance of traffic flows, and noise and dust emissions. The increased vehicular traffic loads may cause blocking lanes for a period or causing traffic accidents. While ambient air quality and noise level may be affected and constituting a noticeable change from the baseline conditions due to various construction activities. And these may create discomfort among the adjacent communities. Open trenches constitute a safety risk for the communities. Work on the drainage system will influence drainage capacity during construction, and thus potentially cause flooding. The health and well-being of local communities may be affected by the spread of disease due to poor housekeeping and the accumulation of domestic waste within the construction site. Also, stagnant water may result in mosquito breeding. There will be a large construction work force during the construction for a considerable period, which will increase risk of spread of communicable diseases.

The sensitivity factors include the presence of human receptors in the close vicinity of the subproject comprising Ghat and market users and the density of the settlements prone to be stressed. As the subprojects are in urban or peri-urban areas, also the sensitivity is determined through the use of the area and the adopted standards as determined in the GoB for environmental qualities. Presence of sensitive receptors such as hospitals, religious facilities, and schools near to the subproject contribute to the sensitivity. The sensitive receptors located within 100m buffer zone of the proposed subprojects are summarized in the **Table 5.23**.

**Table 5.23 Sensitive Receptors within 100m Buffer Zone of Proposed Subprojects**

Subproject	Hospitals	Schools/ Colleges	Religious places	Community Club
Subproject1	Daulatpur Uposastho Kendra (Approx. Distance 100m)	BL College (Approx. Distance 50m)	Daulapur Bazar Jame Mosque (Approx. Distance 5m)	-
			KabirajGhat Jame Mosque (Approx. Distance 20m)	
			BL College Mandir/ Temple (Approx. Distance 30m)	
			Maheshwerpasha Daulatpur Mahashashan/ Crematorium (Adjacent to the proposed site)	
Subproject 2	-	-	Hozrot Abu Bokor Siddik Jame Mosque (Approx. Distance 100m)	-
Subproject 3	-	YUSEF KCC School (Approx. Distance 75m)	Hozrot Abu Bokor Siddik Jame Mosque (Approx. Distance 50m)	-
			Rupsha Shashan Kali Mandir/ Crematorium (Approx. Distance 40m)	
Subproject 4	-	Omar Farurk Shishu Sadan Madrasha/ Orphanage (Adjacent to the proposed site)	-	-

Subproject	Hospitals	Schools/ Colleges	Religious places	Community Club	
Subproject 5	-	-	Solaimania Jame Mosque (Approx. Distance 95m)	-	
Subproject 6	-	-	Nur Jame Mosque (Approx. Distance 40m)	Community Policing Club (Approx. Distance 45m)	
Subproject 7	-	Jukhruful Ulum Madrasa/ Religious School (Approx. Distance 5m)	Buro Moulovir Darga/ Shrine (Approx. Distance 50m)	-	
Subproject 8	Urban Primary Health Care (Approx. Distance 15m)	Bastuhara Madrasa/ Religious School (Approx. Distance 15m)	Maheshwarpasha Graveyard (Pond is located within the graveyard)	-	
	Nargis Memorial Hospital (Approx. Distance 25m)	Khalishpur Madrasa/ Religious School (Adjacent to the proposed site)	Bastuhara Mosque (Approx. Distance 15m)		
	Taitola Hospital	Nurania Primary School	Babus Salam Jame Mosque		
	(Approx. Distance 30m)	(Adjacent to the proposed site)	(Adjacent to the proposed site)		(Adjacent to the proposed site)
		Public Library (Approx. Distance 100m)	Baitul Falah Jame Mosque (Approx. Distance 50m)		
		Darus Salam Madrasha (Approx. Distance 45m)	Darus Salam Jame Mosque (Approx. Distance 45m)		
		Boyra High School (Approx. Distance 20m)	PMG Colony Jame Mosque (Approx. Distance 50m)		
		Talimul Millat Madrasha (Approx. Distance 40m)	Baitun Nur Jame Mosque (Approx. Distance 80m)		
		Nurania Madrasha (Approx. Distance 15m)	Sonadanga Bus Terminal Mosque (Approx. Distance 25m)		
		Lions School & College (Approx. Distance 50m)	Talimul Millat Mosque (Approx. Distance 40m)		
Shaheed Suhrawardy College (Approx. Distance 20m)		Banargati Bot Tala Temple (Approx. Distance 10m)			
KoilaGhat Primary School (Approx. Distance 40m)	IIRO Jame Mosque (Approx. Distance 15m)				

Subproject	Hospitals	Schools/ Colleges	Religious places	Community Club
		Khulna Alia Madrasa (Approx. Distance 50m)	Khulna Alia Mosque (Approx. Distance 50m)	
			Taltola Hospital (Approx. Distance 30m)	
			Hazi Malek Jannatul Baki Jame Mosque & Graveyard (Approx. Distance 10m)	

The impact scale of community health and safety may depend on the degree to which the project implementation activities pose risks to the residents such as physical injury resulting from traffic accidents, exposure to hazardous materials or respiratory effects from air emissions, discomforts due to high noise level as well as indirectly via the spread of communicable diseases from worker influx. An impact of minor scale may cause insignificant threats to the health and safety of the adjacent community, where the effect is within the normal range. An impact of moderate scale may cause disturbance such as traffic congestion, discomforts due to presence of pollutants in the ambient environment, noise emission, or temporary disruption of the drainage system, but likely to revert to the earlier stage with mitigation.

### Sources of Impact

Impacts to community health and safety in the subprojects can result from the following activities:

- **Subproject 1:** Clearance of site and demolish existing structures (existing Ghats) and disposal of waste, and construction of new jetties.
- **Subproject 2:** Clearance of site and demolish existing structures and disposal of waste, construction of 2 story terminal building (incl. piling) for tourist related business, and construction of jetty in front of shore.
- **Subproject 3:** Demolition of temporary buildings in drainage reserve, clearance of water hyacinth, and solid waste from Khal and dispose, re-excavation of sediment from Khal and dispose, earthworks to form Khal cross section, construction of public path and boardwalk along Khal, site clearance and demolition of existing drains and disposal of waste, breaking up road surface, and additional excavation to widen drains and disposal of waste, diversion of existing services (water supply & power) where required, provide temporary access across construction site to buildings, construction of gross pollutant and sediment traps, and pumping out of drainage water entering the construction site.
- **Subproject 4:** Demolition of temporary buildings in drainage reserve, clearance of water hyacinth, and solid waste from Khal and dispose, re-excavation of sediment from Khal and dispose, earthworks to form Khal cross section, construction of public path and boardwalk along Khal, site clearance and demolition of existing drains and disposal of waste, breaking up road surface, and additional excavation to widen drains and disposal of waste, diversion of existing services (water supply & power) where required, provide temporary access across construction site to buildings, construction of gross pollutant and sediment traps, and pumping out of drainage water entering the construction site.
- **Subproject 5:** Site clearance and demolition of HHs & businesses, excavation pit for pumping station/gate structure and disposal of waste, dewatering of pit to allow construction, piling of foundation, construction of reinforced concrete PS/gate structure, installation of power supply Cables from tap off point to site, demolition of old gate structure and disposal of waste, construction of new bridge and reinstate road, and removal of temporary road crossing.

- **Subproject 6:** Site clearance and demolition of HHs and businesses, demolition of old gate structure and disposal of waste, excavation pit for gate structure and disposal of waste, dewatering of pit to allow construction, piling of foundation, construction of reinforced concrete PS/gate structure, and installation of power supply cables from tap off point to site.
- **Subproject 7:** Clearance of water hyacinth, and solid waste from Khal and dispose, re excavation of sediment from Khal and dispose, earthworks to reinstate Khal cross section, construction of piled box drain and boardwalk/path, and construction of bridges.
- **Subproject 8:** Removal of water hyacinth and solid waste and dispose, re-excavation of sediment from ponds and dispose, and site clearance of land adjacent to ponds (where necessary).

### **Assessment of Impact of Community Health**

The scale and intensity of impacts concerning community health and safety resulting from the various construction activities are assessed to be a moderate disturbance to the health and safety of the communities around the construction sites. The traffic congestion may increase risk of accidents and noise and dust will cause discomfort, the influx of workers will increase risk of communicable diseases.

The spatial extent of the negative impact to community health and safety resulting from the construction activities occurs at the subproject sites and mostly within the immediate vicinity of the subproject sites. On that basis, these are assessed to be site/local.

The potential impacts to community health and safety are assessed to be medium-term and last for the duration of the construction phase.

The receptors are the adjacent communities including Ghat users, employees, and wage earners of the nearby businesses, customers, etc. The receptor sensitivity is assessed to be moderate.

Based on the assessment, the scale and intensity of the impact to the community health and safety are assessed to be moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration is considered to be short to medium-term. On that basis, the impact magnitude is low. The receptor sensitivity is assessed to be moderate because the communities are likely to be affected due to the implementation of project activities. The impact significance is thus assessed to be minor before mitigation.

**Table 5.24 Assessment of Impact of Community Health and Safety**

<b>Impact</b>	<b>Impact of Community Health and Safety</b>		
<b>Scale/intensity</b>	Minor	Moderate	High
<b>Spatial extent</b>	Site/local	Regional	National
<b>Duration</b>	Short term	Medium term	Long term
<b>Magnitude</b>	Low	Medium	High
<b>Receptor sensitivity</b>	Low	Moderate	High
<b>Impact significance</b>	Minor	Moderate	High

### **Mitigation Measures Suggested**

The following measures should be taken by the Contractor during construction phase to mitigate impacts to health and well-being of local communities. Management measures with respect to traffic area included in the traffic section.

- Source expertise (local companies) and labour locally, wherever possible without comprising experience and training to minimize the impact of an influx of new people into the local community.

Source services and supplies locally to generate turnover and benefits for local businesses and communities.

- Ensure adequate living conditions with suitable services (water supply, sanitation, and power supplies) at housing for labour coming from outside.
- Contractor to prepare and execute the health education plan for construction workers and document and report health education activities to prevent and control spread of communicable diseases.

### ***Residual Impact***

Implementation of proper mitigation measures will reduce the impact of identified potential hazards to the community.

### **5.3.14 Occupational Health and Safety**

Hazards to occupational health and safety includes use of construction machinery, excavation and trench work, working in the drainage system and canals that receives wastewater, work in a noisy and dusty environment, working with electrical equipment, etc. Health and safety in construction are particularly important because the industry is prone to hazardous situations. The sensitivity factors of occupational health and safety include the experience and training of workers and the safety culture of the work environment. If the experience and level of training of workers is low, they are inclined to have a poor safety culture, and this will lead to a high sensitivity. Experienced and trained workers normally have a developed safety culture, which will translate to a low degree of sensitivity. The impact scale for health and safety issues relevant to the occupation of the workers will depend on the degree to which the project implementation activities pose health and safety threats to the workers such as minor or major injuries due to lack of general safety requirements and precautions applicable while working at construction sites, and handling with machines and equipment, use of the equipment and driving vehicles and so on. A minor impact on occupational health and safety may cause minor injury of the worker where only first aid is required, and whereas an impact of high scale is considered as major injuries or fatality of the worker.

### ***Sources of Impact of Occupational Health***

Impacts to occupational health and safety in the subprojects can result from the following activities:

- **Subproject 1:** Work with heavy machinery, rigging, pilling, hot works, deep water working, concrete pouring, and electrical work.
- **Subproject 2:** Work with heavy machinery, lifting and rigging, pilling, hot works, deep water working, concrete pouring, works at height, works in confined space, earthworks, excavation and trenching, and electrical work.
- **Subproject 3:** Work with heavy machineries, pilling, concrete pouring, works at height, earthworks, excavation and trenching, electrical work, and asphaltting.
- **Subproject 4:** Work with heavy machineries, pilling, concrete pouring, works at height, earthworks, excavation and trenching, electrical work, and asphaltting.
- **Subproject 5:** Work with heavy machinery, lifting and rigging, pilling, hot works, steel works, concrete pouring, works at height, earthworks, excavation and trenching, electrical, and working around or near overhead power lines.
- **Subproject 6:** Work with heavy machinery, lifting and rigging, pilling, hot works, steel works, concrete pouring, works at height, earthworks, excavation and trenching, electrical, and working around or near overhead power lines.
- **Subproject 7:** Earthworks, excavation and trenching, pilling, culvert and bridge construction, hot works, working at height, concrete pouring, and electrical work.
- **Subproject 8:** Earthworks, excavation and trenching, pilling, concrete pouring, and electrical work.

### ***Assessment of Impact of Occupational Health***

The scale and intensity of impacts concerning occupational health and safety resulting from the various construction activities are assessed to be minor to moderate. The scale of impact is assessed to be moderate for many project implementation activities, including pilling, excavation, bridge and multi-story building constructions as those construction activities may introduce several health and safety risks for the construction workers. Implementation of appropriate Health and Safety Guidelines in the construction will reduce the health and safety hazards associated with these construction activities. The impact scale is assessed to be minor for the construction activities which have low or no health hazards, such as the construction of the walkway, installation of seats/ benches, solar lights, kiosks, etc. Although, health & safety guidelines are also needed to be ensured for these activities.

The spatial extent of the negative impact to occupational health and safety resulting from the construction activities occurs at the subproject sites and mostly within the immediate vicinity of the subproject sites. On that basis, these are assessed to be site/local. The potential impacts to occupational health and safety are assessed to be medium-term. The duration of impact is considered to be medium-term where the impact will remain during the construction phase. The receptors of this impact are the construction workers, and the overall receptor sensitivity is assessed to be moderate. The construction work is expected to be implemented by teams of workers with experience and training in construction work, but there is likely to be presence of inexperienced workers with low degree of safety culture, which is typical of the construction sector in Bangladesh. Based on the assessment, the scale and intensity of the impacts to occupational health and safety will be minor to moderate, in spatial extent be limited to the immediate vicinity of the sites, and the duration is medium. On that basis, the impact magnitude is low. The receptor sensitivity is assessed to be moderate because the workers are expected to be experienced and trained in construction work. The impact significance is thus assessed to be minor before mitigation.

**Table 5.25 Assessment of Impact of Occupational Health and Safety**

Impact	Impact of Occupational Health and Safety		
	Minor	Moderate	High
Scale/intensity	Minor	Moderate	High
Spatial extent	Site/local	Regional	National
Duration	Short term	Medium term	Long term
Magnitude	Low	Medium	High
Receptor sensitivity	Low	Moderate	High
Impact significance	Minor	Moderate	High

### ***Mitigation Measures Suggested***

These impacts will be mitigated through the following work-specific measures:

- **Demolition:** Personal Protective Equipment (PPE) must be worn; Monitor noise, vibration and dust; Regular housekeeping; Manage traffic movement; Manage waste disposal.
- **Work with heavy machinery:** Operators and drivers must be skilled and experienced; Stay out of the line-of-fire; Use effective communication signals; Identify and mark a danger zone; Identify entrances and exits of equipment zones; Perform routine maintenance.
- **Lifting and rigging:** Inspect all rigging prior to using it for a lift; All rigging should be properly stored after lifting operations are complete; Have a written lift plan; Plan the travel area and potential lines of fire prior to the lift; Keep away from the load. Always strive to use tag lines or push sticks to ensure space from the load.
- **Pilling:** Consider the type and size of rig(s) to be used, track bearing pressures and the requirements for adequate safe working space, exclusion zones and storage areas; Ensure working platform is designed, constructed and maintained in accordance with published guidance or other appropriate best practice; Enquiries with utility companies to establish presence of services; Avoid leaving pile bores open, implement suitable protection measures such as barriers and life-jackets; Ensure safe access to pile head.

- **Hot works:** Hot work shall be avoided where possible; Clear the area where hot work will be carried out; Carry out hot work in a designated or prepared area; Monitor gas or vapor in the area being used for hot work; Improve the overall fire safety of workplace.
- **Concrete pouring:** Hazard communication; Respiratory protection; Ear protection; Skin protection.
- **Work at height:** Safe working platform; Installation of proper railing; Use of appropriate ladder; Safe scaffolding; Arrangement of secure and acceptable Anchor Point; Sufficient protective gears.
- **Excavation and trenching:** HSP to specify measures for protection of excavation and trenches through sloping, shoring, shielding, and sheet piles; trench access and egress; trench inspection procedures after rainstorm and at start of shift; storage of heavy equipment and surcharge loads kept away from trench edges; All excavations in public places shall be suitably fenced off with suitable barricades established and appropriate signage; Excavated area should be supported by timbering and props with guard rails (omitted from left hand side for clarity) to prevent falls; Safe access should be provided by a tied ladder; Prevent vehicles from overrunning into the excavation by using properly secured stop-blocks;
- **Electrical work:** All potential contact with live electrical current should be prevented; de-energize equipment and maintain lockout/ tag out procedure; Safe use of electrical equipment should be ensured; Proper physical barriers around electrical hazards shall be installed; Use of extreme caution with flammable materials shall be ensured.

General or basic mitigation measures to address occupational safety of the workforce are given below:

- Conduct work site/ construction site risk assessment to identify particularly risky work areas.
- Develop corresponding Construction Health & Safety Plan (HSP).
- Establish Incident Reporting (fatal accidents, medical treatment cases; first aid cases; restricted work injuries; near misses; environmental events).
- Qualified Contractor Health and Safety Manager has to be engaged for the construction period.
- Qualified Contractor Health and Safety responsible to be appointed from experienced staff for each site and at all times.
- Selected or volunteer workers to be trained in first aid and first aiders to be available at each site and at all times.
- All workers (including of subcontractors) to receive induction and refresher training in health and safety policies, use of PPE, and relevant OHS procedures. Training to be documented.
- First aid box and personal protective equipment (PPE) such as ear plugs, helmets, hand gloves, safety shoes, goggles, masks, etc. have to be provided to the workers while working at construction site.
- In case of major accident, ambulance has to be made available to take the affected workers to the nearest hospital.
- Daily toolbox meetings (including safety briefings) to be held at start of shift among
  - construction teams on construction sites.
- Construction sites to be fenced off with appropriate signage and lighting for nighttime visibility.
- Proper health and safety signboards and appropriate information to the local people about the construction activities has to be provided.
- Workers operating the equipment and drivers driving the construction vehicles at construction site must be skilled and experienced.
- Quality food and safe drinking water that meets the national standards have to be provided to the workers.
- Separate accommodation and sanitary toilet facilities for male and female workers have to be available at labor camp.
- Incidents/accidents to be recorded and investigated to identify corrective actions.

- Regular health and safety audit to be conducted and results and follow-up measures documented.

### **Residual Impact**

With implementation of the above mitigation measures a proper health and safety plan will be in place, workers be trained, first aid and PPE available, qualified health and safety manager and responsible persons be in place, accidents and incidents reporting and acted upon, and the sites be audited. It is expected that this is sufficient to keep the impact significance as minor. Considering the construction industry in Bangladesh there will be a residual risk although it can be reduced through appropriate mitigation.

## **5.4 Potential Impacts and Benefits in The Operations Phase**

The potential impacts and benefits of the subprojects in the operations phase have been analysed using the interaction matrix as a basis with the resources and receptors identified as relevant at the scoping stage on the other axis of the matrix. The subprojects have been analysed with respect to their potential to impact and interact with the resources and receptors in the interaction matrix.

The subprojects are anticipated to realise positive impacts and benefits in the operations phase primarily in three areas:

- Erosion reducing measures (1a. Embankment at Daulatpur & 1b. Erosion control at Hindu Crematorium)
- Amenity and income generating measures (2. Rupsha, Riverfront Development/park, 8. Nirala Khal Link Park, & 9. Ponds)
- Drainage measures (4. Nobinagar+ Sonadanga sub-catchment (Khal + drains), 5. Bastuhara sub-catchment (Khals + drains), 6. Labonchara PS and outlet gate, & 7. Alutola outlet gate upgrading)

### **5.4.1 Subproject 1: Embankment at Daulatpur (726m) and Maheshwarpasha (119m)**

The subproject will protect the embankment at the Daulatpur Bazar and the Moheshwarpasha Crematorium from erosion. The subproject and its associated facilities such as lighting facilities, new jetties, waiting sheds, stairs, etc. under the subproject will add value to the existing land use and land cover, create livelihood and jobs facilities, upgrade the infrastructure and services, increase the landscape and aesthetic values, and protect two important cultural resources. The identified positive impacts and enhancement measures to realize benefits are described below.

#### **Positive Impacts**

- 1) Land use and land cover:** Riverbank erosion will be reduced due to the implementation of the subproject and protect the current land use at the embankment. The newly constructed embankment, waiting sheds, new jetties and stairs will change or improve the land use. The current land use or land cover adjacent to the proposed embankment area has importance to the communities, businesses, or Ghat users, and they are highly dependent on it. The subproject will protect the existing land use and land cover significantly and add value to it through erosion protection and improved facilities including waiting sheds, new jetties and stairs.
- 2) Livelihood and jobs:** Riverbank protection work will have significant local positive impacts by protecting infrastructures, businesses, and livelihoods. The newly constructed embankment, waiting

sheds, new jetties and stairs will create the proposed embankment site as a public amenity and will create business options, at least small or floating businesses for hawkers.

- 3) **Infrastructure and services:** The newly implemented lighting facilities along the embankments will ensure better facilities for the communities, businesses, or Ghat users. Such arrangements will also increase scenic beauty at night and social security in the subproject area. Also, the subproject will protect the groundwater sources from erosion located on the bank and support the adjacent communities to get services from those.
- 4) **Landscape, visual and aesthetic impact:** The embankment will create public amenity or riverfront facilities instead of eroded riverbank in the subproject area.
- 5) **Cultural resources:** Riverbank protection work under the subproject will significantly protect two sensitive receptors; Daulatpur Market Jame Mosque and Moheshwarpasha Crematorium. Both sensitive receptors are prone to be eroded and large groups of individuals are highly dependent on those for their worship.

### **Enhancement Measures**

- 1) **Land use and land cover:** Regular monitoring (crack & damage identification) and maintenance (when & where required) of the embankment should be ensured. Appoint appropriate authority for the O&M of the newly constructed structures. Housekeeping should get priority.
- 2) **Livelihood and jobs:** The new opportunities for small businesses should run under appropriate authority. Project-affected persons should be given preference to access new opportunities.
- 3) **Infrastructure and services:** Regular monitoring (problem identification) and maintenance (when & where required) should be ensured. A minimum charge could be collected from the beneficiaries (businesspeople or adjacent communities) to maintain the facilities.
- 4) **Landscape, visual and aesthetic impact:** Regular monitoring and maintenance (when & where required) should be ensured. Housekeeping should get priority. Appoint appropriate authority for the O&M of the newly constructed structures.
- 5) **Cultural resources:** Regular monitoring (crack & damage identification) and maintenance (when & where required) of the embankment should be ensured. The appointed authority for the O&M of the embankment should engage with the Mosque and Crematorium.

#### **5.4.2 Subproject 2: Rupsha Riverfront Park (Phase 1)**

The riverfront development at Rupsha Ghat is an amenity and income generating measure, which will change current land use at the riverfront to higher value multipurpose use. The new facilities including: a 2-Storey terminal building for tourist related business, jetty in front of the shore, amphitheater, installation of seating/shading arrangement, footpaths, and install septic tank, and piped water supply, power supply, etc. will improve land use, create jobs and improve livelihoods upgrade infrastructure and services, increase the landscape and aesthetic value, and improve the ambient air quality of surroundings. The identified positive impacts and enhancement measures to realize benefits are described below.

### **Positive Impacts**

- 1) **Land use and land cover:** The subproject will change the existing land use and land cover, which is occupied by informal sand and coal businesses and sawmills, and their stockyards into higher value multipurpose use with public amenities including park, 2-Storey terminal building, jetty, amphitheater, seating arrangement, lighting, walkway, and shop facility. The existing informal sand and coal businesses and sawmills, and their stockyards are degrading the ambient environmental quality with frequent movement of vehicles with dusty products within the city area, and encroachment of the riverfront.
- 2) **Air quality:** The current informal sand and coal businesses and sawmills, and their stockyards have uncovered stockpiles of sand and coal, operate sawmills, and vehicles to transport their products that contribute dust particles and emissions to the ambient air. Implementation of the riverfront park will change the land use of the sub-project area and create a pleasant environment for the users and visitors.
- 3) **Livelihood and jobs:** The Rupsha Ghat is an important starting point for tourist travels south to the large mangrove forests of the Sundarbans by both national and international tourists. Proposed terminal building, amphitheater, shops and other facilities will create opportunities for small businesses catering to the tourists.
- 4) **Infrastructure and services:** Proposed septic tank, piped water and power supply will improve the public amenity for visitors and users. Such arrangements will also improve the hygiene and sanitation in the subproject area. Lighting facilities along the boundary of the riverfront will enhance the scenic beauty at night and increase social security for the community, and Ghat users.
- 5) **Landscape, visual and aesthetic impact:** The embankment will create public amenity and riverfront park in replacement of the current informally operating sand, stone, and coal businesses.

### **Enhancement Measures**

- 1) **Land use and land cover:** Regular monitoring (problem identification) and maintenance (when & where required) of the embankment should be ensured. Appoint appropriate authority for the O&M of the newly constructed structures. Housekeeping should get priority.
- 2) **Air quality:** Housekeeping and tree planting should get priority, no burning of waste should be allowed.
- 3) **Livelihood and jobs:** The new opportunities should run under appropriate authority. The Park should not be leased out to individuals (as was the model chosen by KCC for the KCC Café at Rupsha Ghat) as this will limit the scope of benefit and not extend this to all the stakeholders and interested parties. Rather, KCC can lease the park, even partially, to certain e.g. tourism related organizations, which serves broader stakeholders and interested parties. Project-affected persons should be given preference to access new opportunities.

- 4) **Infrastructure and services:** Regular monitoring (problem identification) and maintenance (when & where required) should be ensured. A minimum charge could be collected from the visitors to maintain the facilities. Appointed authority will monitor the issues.
- 5) **Landscape, visual and aesthetic impact:** Regular monitoring and maintenance (when & where required) should be ensured. Housekeeping, including solid waste management should get priority. KCC should appoint appropriate authority for the riverfront.

#### 5.4.3 Subproject 3: Drainage improvements in sub-catchments 17 and 21 including Sonadanga Bypass Road

The Khal and drainage improvement at Nobinagar and Sonadanga bypass road sub-catchment will be based on the flood modelling carried out to reduce the area flooded in the scenarios, which will benefit the population in the sub-catchment. The rehabilitation of the Nobinagar Khal includes the creation of blue-green public space by reinstatement of the water way, excavating the sediment and solid waste and restoring the conveyance, installing bank protection and incorporating a public path along the banks and over the Khal in the form of a boardwalk at section with space constraints. The path provides connectivity from MA Bari Street to the Mayur River and maintenance access for KCC. Seating in the form of benches will enhance this public space, solar lighting will be provided along the path for safe access in the evening. A gross pollutant and sediment trap will be incorporated upstream in the box drain section near MA Bari Street to collect floating debris and sediments, so these do not pollute the Khal. The identified positive impacts and enhancement measures to realize benefits are described below.

##### **Positive Impacts**

- 1) **Topography and drainage:** Based on the flood modelling the subproject will reduce the area flooded in the sub-catchment in the scenarios. The rehabilitation and construction of new drainage system will improve drainage and the re-excavation of the Khal will increase the drainage capacity.
- 2) **Surface water resources:** Water quality of the Khal will be improved due to the removal of existing water hyacinth and waste from the Khal and installation of gross pollutant and silt trap at the upstream.
- 3) **Land use and land cover:** Bank protection, seating arrangement, lighting, walkway, pavilion, and shop facility will improve the facilities and land use.
- 4) **Community health and safety:** Improved drainage will protect the adjacent residences or city residential area from flooding. A clean Khal with improved flow will reduce the stagnant water and thus reduce the chance of mosquito breeding. Improved flow/reduction in stagnant water will reduce odors. The path alongside the Khal will create open space for recreation.
- 5) **Landscape, visual and aesthetic impact:** The subproject, in particular the path along the Khal, will create public amenity and open space for recreation.

##### **Enhancement Measures**

- 1) **Topography and drainage:** Regular monitoring (bank erosion & damage identification) and maintenance (when & where required) should be ensured and given priority. Gross pollutant and silt trap at the upstream of Khal will reduce the silt load in the canal and should be cleaned and maintained regularly to maintain the drainage system and its discharge capacity.
- 2) **Surface water resources:** Gross pollutant and silt trap at the upstream of Khal should be cleaned and maintained. Water hyacinth and waste should be removed regularly from the Khal.
- 3) **Land use and land cover:** Regular monitoring (problem identification) and maintenance (when & where required) should be ensured and given priority in KCC's operation.

- 4) **Community health and safety:** Khal should be cleaned on a regular basis to prevent stagnant water, mosquito breeding, odor and nuisance and to maintain the discharge capacity of the Khal.
- 5) **Landscape, visual and aesthetic impact:** Waste management especially along the Khal will prevent disposal of solid waste into the Khal to maintain the environmental quality of the area.

#### 5.4.4 Subproject 4: Drainage improvement at Bastuhara sub-catchment 11 and Deana Chowdhury Khal upgrading

The drainage upgrading in the Bastuhara sub-catchment will be based on the flood modelling carried out by the Consultant, reduce the area flooded in the scenarios, which will benefit the population in the sub-catchment. The identified positive impacts and enhancement measures to realize benefits are described below.

##### *Positive Impacts*

- 1) **Topography and drainage:** Based on the flood modelling the subproject will reduce the area flooded in the sub-catchment in the scenarios. The rehabilitation and construction of new drainage system will improve drainage and the re-excavation of the Khals will increase the drainage capacity.
- 2) **Surface and groundwater resources:** Water quality of the Khals will be improved due to the removal of existing water hyacinth and waste from the Khals and installation of gross pollutant and silt trap at the upstream.
- 3) **Land use and land cover:** Bank protection, seating arrangement, lighting, walkway, pavilion, and shop facility will improve the facilities and land use.
- 4) **Community health and safety:** Improved drainage will protect the adjacent residences or city residential area from flooding. Clean Khals with improved flow will reduce the stagnant water and thus reduce the chance of mosquito breeding. Improved flow/reduction in stagnant water will reduce odors. The path alongside the Khal will create open space for recreation.
- 5) **Landscape, visual and aesthetic impact:** The subproject, in particular the paths along the Khals, will create public amenity and open space for recreation.

##### *Enhancement Measures*

- 1) **Topography and drainage:** Regular monitoring (bank erosion & damage identification) and maintenance (when & where required) should be ensured and given priority. Gross pollutant and silt trap at the upstream of Khal will reduce the silt load in the canal and should be clean and maintain regularly to maintain the drainage system and its discharge capacity. Extend the reserve marked by boundary bollards along the Khals with space for a maintenance track/public access. By demarcating the reserve prior to urban development encroachment of the Khal reserve will be avoided.
- 2) **Surface water resources:** Gross pollutant and silt trap at the upstream of Khal should be clean and maintain regularly to improve the drainage water quality. Water hyacinth and waste should be removed regularly from the Khals.
- 3) **Land use and land cover:** Regular monitoring (problem identification) and maintenance (when & where required) should be ensured and given priority in KCC's operation.
- 4) **Community health and safety:** Khal should be cleaned on a regular basis to prevent stagnant water, mosquito breeding, odor and nuisance and to increase the discharge capacity of the Khals.
- 5) **Landscape, visual and aesthetic impact:** Waste management especially along the Khal will prevent disposal of solid waste into the Khal to maintain the environmental quality of the area.

### 5.4.5 Subproject 5: Upgrade of Labonchara Khal Outlet Gate and Construction of Labonchara Pumping Station

The Labonchara outlet gates upgrading and pumping station will as a drainage measure and based on the flood on the flood modelling carried out reduce the area flooded in the scenarios, which will benefit the population in the catchment. The subproject is the most cost-effective in flood and water logging reduction in terms of investment costs, but O&M is critical to ensure the pumping station continues to be operational. The identified positive impacts and enhancement measures to realise benefits are described below.

#### **Positive Impacts**

- 1) **Topography and drainage:** Based on the flood modelling the subproject will reduce the area flooded in the catchment in the scenarios. Upgraded gate facility will increase the capacity of the gate and the pumping station will ensure necessary discharge of the storm water to reduce flooding in the catchment.
- 2) **Surface water resources:** Salinity will be reduced at the upstream of the gate.
- 3) **Community health and safety:** Regular discharge of water will reduce the chance of mosquito breeding and upgraded gates and newly installed pumping station will reduce flooding in the catchment.

#### **Enhancement Measures**

- 1) **Topography and drainage:** Regular monitoring (problem identification) and maintenance (when & where required) should be ensured. Approach and discharge channel should maintain regularly to ensure discharge capacity. Appropriately qualified O&M staff should be employed. Water level measuring at the fate will improve basis for predicting occurrence of flooding.
- 2) **Surface water resources:** Waste to be collected at the gate. Controlled flooding may be used (sluice gates could be opened intentionally to let water in and later drained out to clean up clogged drain using the force of water).
- 3) **Community health and safety:** Increase capacity of O&M organization at KCC to manage clogged drains leading to flooding. Stakeholders suggested that there is a need to build awareness among people against waste dumping into drains. Regular monitoring (problem identification) and maintenance (when & where required) should be ensured.

### 5.4.6 Subproject 6: Upgrade of Alutola Outlet Gates

The Alutola outlet gates upgrading and widening will as a drainage measure and based on the flood on the flood modelling carried out reduce the area flooded in the scenarios, which will benefit the population in the catchment. The subproject is among the most cost-effective in flood and water logging reduction in terms of investment costs. The identified positive impacts and enhancement measures to realize benefits are described below.

#### **Positive Impacts**

- 1) **Topography and drainage:** Upgraded gate facility will increase the capacity of the gate and ensure necessary discharge of the storm water.
- 2) **Surface water resources:** Salinity will be reduced at the upstream of the gate.
- 3) **Community health and safety:** Regular discharge of water will reduce flooding in the catchment. Erosion protection measures (bank protection facilities) will protect the mosque.

#### **Enhancement Measures**

- 1) **Topography and drainage:** Regular monitoring (problem identification) and maintenance (when & where required) should be ensured. Approach and discharge channel should maintain regularly to ensure discharge capacity. Appropriately qualified O&M staff should be employed. Water level measuring at the fate will improve basis for predicting occurrence of flooding.
- 2) **Surface and groundwater resources:** Waste to be collected at the gate. Controlled flooding may be used (sluice gates could be opened intentionally to let water in and later drained out to clean up clogged drain using the force of water).
- 3) **Community health and safety:** The number of cleaners could be increased to overcome clogged situations leading to flooding. Awareness programs could be arranged among the people to prevent waste dumping into Khal. Regular monitoring (problem identification) and maintenance (when & where required) should be ensured

#### 5.4.7 Subproject 7: Nirala Khal Revitalization and Link Park

The Nirala branch link park and revitalization is an amenity and income generating measure that includes development of a park connector along the Nirala Khal. The public foot paths will create connectivity along the bank of the Nirala branch comprising public access paths, board walks and foot bridges and access to the branch for maintenance. The western part of the branch flows towards the Mayur while the eastern section flows east towards Labonchara and a weir will be constructed at the catchment boundary to separate the flows. An interceptor will be incorporated along the banks of the branch to collect polluted drainage water which currently contains diluted sewage and divert this to the Mayur. This will create a clean water section to enhance the amenity of the park. The identified positive impacts and enhancement measures to realize benefits are described below.

##### *Positive Impacts*

- 1) **Topography and drainage:** Based on the flood modelling the subproject will reduce the area flooded in the sub-catchment in the scenarios. The rehabilitation of the Nirala Branch will improve drainage and the re-excavation of the Khal will increase the drainage capacity.
- 2) **Surface and groundwater resources:** Water quality will be improved due to the removal of dumped waste from the Khal and the gross pollutant and silt trap at the Khal inlet. The interceptor along the banks of the branch will collect polluted drainage water (currently containing diluted sewage) and divert this to the Mayur to create a cleaner section along the Nirala Branch.
- 3) **Land use and land cover:** Bank protection, seating arrangement, lighting, walkway, pavilion and shop facility will improve the facilities and land use.
- 4) **Livelihood and jobs:** The newly constructed park, boardwalk/ path, seats/benches, solar lights and pavilions, kiosks along banks will create the subproject area as a public amenity and will create business options.
- 5) **Community health and safety:** Improved drainage will protect the adjacent residences or city residential area from flooding. A clean Khal with improved flow will reduce the stagnant water and thus reduce the chance of mosquito breeding. Improved flow/reduction in stagnant water will reduce odors. The path alongside the Khal, pavilion, and shops will create open space for recreation.
- 6) **Landscape, visual and aesthetic impact:** The subproject, in particular the path along the Khal, will create public amenity and open space for recreation.

##### *Enhancement Measures*

- 1) **Topography and drainage:** Regular monitoring (bank erosion & damage identification) and maintenance (when & where required) including cleaning of the Khal from water hyacinth, dumped solid waste, and sediments should be ensured and given priority. Gross pollutant and silt trap at outlet to Khal should be cleaned regularly to maintain the drainage system and its discharge capacity. Dumping of construction waste into drains should be fined.

- 2) **Surface and groundwater resources:** Gross pollutant and silt trap at outlet to Khal should clean and maintain regularly to improve the drainage water quality. Water hyacinth and waste should be removed regularly from the Khal. Septic tank connections to Khal to be removed.
- 3) **Land use and land cover:** Regular monitoring (problem identification) and maintenance (when & where required) should be ensured and given priority in KCC's operation.
- 4) **Livelihood and jobs:** The new opportunities for small businesses should run under appropriate authority. Project-affected persons should be given preference to access new opportunities.
- 5) **Community health and safety:** Khal should be cleaned on a regular basis to prevent stagnant water, mosquito breeding, odor nuisance and to maintain the discharge capacity of the Khal.
6. **Landscape, visual and aesthetic impact:** Waste management especially along the Khal will prevent disposal of solid waste into the Khal to maintain the environmental quality of the area.

#### 5.4.8 Subproject 8: Rehabilitation of Approximately 18 Ponds

The rehabilitation of ponds is an amenity and income generating measure that includes the creation of blue-green public spaces. The subproject and its associated facilities such as lining of banks of the ponds, public paths/semi paved areas and boardwalks, diversion of drainage outlet away from ponds, Ghats and handrails, seats/benches, solar lights and pavilions, public toilets/changing rooms/including septic tank & water supply, kiosks and shops, etc. will improve the drainage facilities, protect the water resources from pollution, add value to the existing land use and land cover, create livelihood and jobs facilities, upgrade the infrastructure and services, and increase the landscape and aesthetic values. The identified positive impacts and enhancement measures to realize benefits are described below.

##### **Positive Impacts**

- 1) **Topography and drainage:** The subproject will reduce the area flooded next to the ponds because the rehabilitation and the re-excavation of the ponds will increase their storage capacity.
- 2) **Surface and groundwater resources:** Water quality will be improved due to the removal of water hyacinth and dumped solid waste from the ponds and diversion of drainage outlets away from ponds.
- 3) **Land use and land cover:** Lining of banks of the ponds, public paths/semi paved areas and boardwalks, diversion of drainage outlet away from ponds, Ghats and handrails, seats/benches, solar lights and pavilions, public toilets/changing rooms/including septic tank & water supply, kiosks and shops, etc. will change or improve the existing land use.
- 4) **Solid waste:** Developed land use and the new and rehabilitated facilities will discourage dumping of waste near the ponds.
- 5) **Livelihood and jobs:** Newly constructed public paths/semi paved areas and boardwalks, Ghats and handrails, seats/benches, solar lights and pavilions, public toilets/changing rooms/including septic tank & water supply, kiosks and shops, and other facilities will create more business spaces and options.
- 6) **Community health and safety:** Increased water storage capacity of the ponds will protect the adjacent residences or city residential areas from flooding. A clean pond with improved water quality will reduce the water scarcity felt by the locals and the chance of mosquito breeding and other environmental nuisances such as odors generated due to stagnant water. The seating and lighting arrangements, walkway, sanitation facility will create open space for recreation.
- 7) **Landscape, visual and aesthetic impact:** The subproject, in particular the boardwalks, Ghats and handrails, seats/benches, solar lights and pavilions, public toilets/changing rooms/including septic tank & water supply, kiosks and shops, will create public amenities and open space for recreation.

##### **Enhancement Measures**

- 1) **Topography and drainage:** Regular monitoring (bank erosion & damage identification) and maintenance (when & where required) should be ensured and give preference. The ponds should be cleaned and maintained regularly to maintain water quality and storage capacity.
- 2) **Surface and groundwater resources:** Water hyacinth and waste should be removed regularly from the ponds. Septic tank connections to Khal must be removed to enhance the public amenity of the ponds. Conduct regular monitoring and raise awareness to prevent waste dumping into the ponds and their surroundings.
- 3) **Land use and land cover:** Regular monitoring (problem identification) and maintenance (when & where required) should be ensured and given priority in KCC's operation.
- 4) **Solid waste:** Install solid waste management facilities at the ponds to avoid dumping.
- 5) **Livelihood and jobs:** Support livelihood activities that are compatible with the pond operation at the pond sites, which could include swimming coaching/training, small food carts, urban agriculture etc. The new opportunities or small businesses should run under appropriate authority. Project-affected persons should be given preference to access new opportunities. Possibility of integrating fish farmers in the subproject and creating opportunities for them to be further investigated by KCC.
- 6) **Community health and safety:** Ponds should be cleaned on a regular basis to prevent mosquito breeding, odor and nuisance, and to maintain their storage capacity.
- 7) **Landscape, visual and aesthetic impact:** Regular monitoring and maintenance (when & where required) should be ensured. Housekeeping, including solid waste management should get priority, which will maintain the environmental quality of the area.

#### 5.4.9 Impacts of Climate Change on 18 Ponds

Regardless of how we got here, climate change is a global crisis that affects ecosystems worldwide. While much attention has been given to its impact on large bodies of water like oceans and rivers, it is essential to recognize the profound effects climate change will have on smaller ecosystems, such as small ponds and water gardens. These seemingly insignificant bodies of water are teeming with life and can provide critical habitats for a diverse range of species. Though somewhat gloomy, this post will explore how climate change is poised to disrupt the delicate balance of small ponds and how that change will imperil their inhabitants.

##### 5.4.9.1 Temperature Fluctuations in Khulna

Climate change leads to rising temperatures globally, and small ponds are not immune to this warming trend. As temperatures rise, small ponds become more susceptible to extreme heat events and prolonged droughts. These fluctuations in temperature can have negative effects on the delicate ecosystem within a pond. Increased water temperatures can alter the growth patterns of algae, disrupt the life cycles of aquatic organisms, and even cause mass die-offs of fish and amphibians that are unable to adapt quickly enough. Small waterbodies are highly susceptible to temperature change. Ponds warm up (and cool down) quickly, this can be very stressful for the fish and other organisms that we care most about.

##### 5.4.9.2 Changes in Precipitation in Khulna

Climate change also affects precipitation patterns, leading to more frequent and intense rainfall events and/or prolonged droughts in different regions. Both scenarios pose significant challenges for small ponds. Heavy rainfall can cause runoff and erosion, carrying pollutants and excess nutrients from surrounding areas into ponds. These large slugs of water can lead to harmful algal blooms and oxygen depletion. Conversely, extended droughts can cause ponds to shrink and water levels to drop precipitously. Long stretches of sunny weather is, however, very good for my farmer's ponds. For landscape ponds, this can lead to displacing organisms that rely on these habitats for breeding, feeding, and survival. For species that can't move to another pond (i.e. fish), this concentrates them in an ever shrinking habitat that positively benefits no one. For water gardens and koi ponds, it forces us to artificially maintain water levels. This relates directly to temperature fluctuation as a smaller water volume heats up faster than when the pond is "full".

##### 5.4.9.3 Altered Hydrological Cycles in The KCC Area

Landscape ponds are interconnected with surrounding groundwater systems, and climate change disrupts these hydrological cycles. Rising temperatures and changes in precipitation patterns can affect the balance of water inputs and outputs in ponds. Reduced groundwater recharge during droughts can lower water levels in ponds, impacting the availability of essential resources for aquatic life. Additionally, increased evaporation rates due to higher temperatures can further exacerbate water scarcity, jeopardizing the existence of numerous species that depend on these water bodies. Reduced groundwater levels are a long-term consequence of a changing climate. It will not be just our ponds that lament the disappearing subterranean aquifers, all of us will shoulder this particular burden.

#### 5.4.9.4 Biodiversity Loss in Subproject Area

Climate change-induced alterations in small ponds can lead to a loss of biodiversity. This is truly important, as diversity = balance, and balance = low maintenance, beautiful ponds. Changes in water temperature, quality, and availability disrupt the delicate balance required for the survival of numerous plant and animal species. Amphibians, such as frogs and salamanders, are particularly vulnerable, as their life cycles rely on suitable

breeding and hatching conditions in ponds. In turn, the decline in amphibian populations can have cascading effects on the larger food web, impacting predators (big fish), prey (small fish & insects), and the overall ecological functioning of the ecosystem (water quality). Warming water generally leads to less diversity and an increase in undesirable species due to decreased dissolved oxygen levels. For us on the ground, this means less trout and dragonflies and more mosquitos, algae, and warm water fish species.

#### 5.4.9.5 Increased Invasive Species in Subproject Area

Climate change can create favorable conditions for the establishment and spread of vile invasive species in small ponds. Rising temperatures and altered precipitation patterns provide a more hospitable environment for non-native species to thrive. Wherever there is a weakness in the pond ecosystem, an invasive can sneak in and take hold (Kind of like teenagers, they seem to just show up one day and wreck all my, everybody's fun). Invasive species can outcompete native species for resources, disrupt ecological processes, and negatively impact the overall biodiversity and stability of the pond ecosystem.

Investing in a good aeration system or pond filter for water gardens while keeping a lookout for invasive species is more important than ever. Conserving, maintaining, and rehabbing your local habitat are vital practices in order to maintain a beautiful pond. Plus, keeping a great open water resource in your backyard will benefit all of the local wildlife. This good, clean water that you are keeping for its aesthetic beauty will function as an oasis in a landscape of degrading resources.

Be observant, note the small changes that can affect your aquatic critters, and take an active role as a steward of your increasingly valuable aquatic habitats. By recognizing the importance of these seemingly inconspicuous bodies of water, we can take steps to maintain and enhance their quality and the well-being of the ecosystems they support in the face of a changing planet.

## 6 ANALYSIS OF ALTERNATIVES

This section summarizes the outcome of the process that concluded with the selection of subprojects for the study and presents the various within subproject alternatives that are analysed in the study. Alternatives are essentially, different ways in which the project can feasibly meet its objectives, for example by carrying out a different type of action, choosing an alternative location or adopting a different technology or design for the project. The process that led to the selection of subprojects was primarily carried out to select between different subprojects that were included in a long list of measures. Following the preparation of a shortlist the measures were organised into subprojects and an analysis of within subproject alternatives carried out.

### 6.1 Selection of Subprojects

The subprojects were selected following a Baseline Scenario, Climate Risk Assessment, which established a longlist of measures. A 'longlist' of subprojects was established considering recommendations of

previous studies as well as a technical assessment by the consultant. The longlist of potential subprojects was analysed through a multi-criteria assessment (MCA) to establish a shortlist of subprojects for the feasibility study and EIA.

The selected subprojects include comprehensive drainage solutions for two Mayur sub-catchments, preservation of existing hydrology combined with public space, public inclusive river fronts. The selected subprojects, the intervention strategy component, and the rationale behind the selection of subprojects selected for EIA are presented in the **Table 6.1** below.

**Table 6.1 Intervention Strategy Component and Rational for Selected Subprojects**

Sl. No.	Subproject	Intervention/component	Strategy/ Rationale
1	Embankment at Daulatpur (726m) and Maheshwarpasha (119m)	<ul style="list-style-type: none"> <li>• River erosion control</li> <li>• Provides public amenity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Medium climate risk category</li> <li>▪ Protects a large number of businesses at Daulatpur Bazar from bank erosion.</li> </ul>
2	Rupsha Riverfront Park (Phase 1)	<ul style="list-style-type: none"> <li>• River flood control</li> <li>• Provides public amenity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Medium to high climate risk category,</li> <li>▪ Complements earlier KfW investment (Bus terminal under CRDP)</li> <li>▪ Provides much needed public amenity,</li> <li>▪ Land will be raised to improve resilience to sea level rise until 2050.</li> <li>▪ Complements adjacent land use, creates business opportunities.</li> </ul>
3	Drainage improvements in sub-catchments 17 and 21, (in the Nobinagar area) including Sonadanga Bypass Road	<ul style="list-style-type: none"> <li>• Conventional drainage improvement</li> <li>• Improves conveyance</li> <li>• Preserves natural hydrology</li> <li>• Improves environmental &amp; public health</li> </ul>	<ul style="list-style-type: none"> <li>▪ Direct impacts on water logging/flood reduction.</li> <li>▪ Urban drainage network improvement pilot project, which is replicable in other sub- catchments.</li> <li>▪ The poor benefit (Precondition: Rehabilitation of Mayur to improve conveyance under KCC drainage project 2019)</li> </ul>
4	Drainage improvement at Bastuhara sub-catchment 11 and Deana Chowdhury Khal upgrading	<ul style="list-style-type: none"> <li>• Conventional drainage improvement</li> <li>• Improves conveyance</li> <li>• Preserves natural hydrology</li> <li>• Improves environmental &amp; public health</li> </ul>	<ul style="list-style-type: none"> <li>• High climate risk category</li> <li>• Direct impacts on water logging/flood reduction.</li> <li>• Will allow comprehensive urban drainage improvement</li> <li>• Pilot project, which is replicable in other sub catchments.</li> <li>• The poor benefit.</li> <li>• Residents will directly experience improvement. (Precondition: Rehabilitation of Khunde Khal to improve conveyance under KCC drainage project 2019)</li> </ul>
5	Upgrade of Labonchara Khal outlet gate and construction of Labonchara pumping station	<ul style="list-style-type: none"> <li>• Conventional drainage improvement</li> <li>• Reduces flooding by improving discharge capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Will stop high tides entering the Khal and flood low lying areas,</li> <li>• Will increase discharge capacity during low tide.</li> </ul>

SI. No.	Subproject	Intervention/component	Strategy/ Rationale
		<ul style="list-style-type: none"> <li>Improves environmental &amp; public health</li> </ul>	<ul style="list-style-type: none"> <li>Will improve living conditions, many extremely poor including climate migrants in this sub- catchment will benefit.</li> <li>The catchment (5) is prone to water logging and includes many extremely poor communities.</li> <li>Operation will require advanced M&amp;E skill, additional operational budgets required. (Precondition: Rehabilitation of Khals in this catchment to improve conveyance to be carried under KCC drainage project 2019.)</li> </ul>
6	Upgrade of Alutola outlet gates	<ul style="list-style-type: none"> <li>Conventional drainage improvement</li> <li>Reduces flooding by improving discharge capacity</li> <li>Improves environmental &amp; public health</li> </ul>	<ul style="list-style-type: none"> <li>Will increase discharge capacity during low tide.</li> <li>Will reduce flooding along the Mayur to some extent.</li> <li>Will improve living conditions of the poor along the river. (Precondition: Rehabilitation of the Mayur River is part of KCC drainage project 2019.)</li> </ul>
7	Nirala Khal Revitalization and link park	<ul style="list-style-type: none"> <li>Preservation natural hydrology</li> <li>Improves water quality</li> <li>Provides public amenity</li> </ul>	<ul style="list-style-type: none"> <li>A blue-green pilot opportunity.</li> <li>Reduces heat island affect</li> <li>Can be replicated later along the Mayur River.</li> <li>Will improve water quality.</li> <li>Creates public amenities, and business opportunities.</li> </ul> <p>(Precondition: Improvement of conveyance along this branch is part of the KCC drainage project 2019)</p>
8	Rehabilitation of approximately 18 ponds	<ul style="list-style-type: none"> <li>Preserves natural hydrology</li> <li>Runoff reduction</li> <li>Provides public amenity</li> </ul>	<ul style="list-style-type: none"> <li>Good opportunity to create public blue-green spaces</li> <li>Reduces heat island affect</li> <li>Has co-benefits such as business opportunities</li> <li>Within KCC's jurisdiction.</li> </ul>

The subprojects recommended for investment proposals include two drainage pumping stations and a flood storage basin. Drainage pumping stations are considered a priority in Khulna's drainage system but will require complex operation and maintenance capability and have significant capital and operational costs. Thus, only the Labonchara pumping station is included in the Feasibility Study. A suitable location was not identified for the flood storage basin, so although the measure was recommended it has been postponed to a later stage following identification of a suitable location and included as an investment proposal.

## 6.2 Subproject Alternatives

Following selection of the subprojects various within subproject alternatives were identified and analysed with respect to key environmental and social parameters in order to inform the conceptual design and to avoid,

minimise, and mitigate risks and impacts. The **Table 6.2** below presents the main alternatives considered for the various subprojects along with the key environmental and social issues associated with these alternatives. The advantages and disadvantages in respect of these environmental and social issues and the considerations and implications adopted in the conceptual design as a result hereof.

**Table 6.2 Subproject Alternatives Analysis**

SI.	Sub-project	Alternative Design Options	Advantages	Considerations and Implications
1	<p><b>Embankment Daulatpur Bazar</b> to protect against bend scour erosion</p> <p>Protection of businesses on the embankment against erosion / resettlement of businesses on the embankment during construction</p>	Rip rap, rubble mound or concrete block revetment built approximately 10 meters into the river with concrete wall to reduce impacts built from land using small plant and hand placement.	<ul style="list-style-type: none"> <li>• Minimum resettlement will be required</li> <li>• Limited impact on existing infrastructures</li> <li>• Likely to be dumped concrete blocks no rocks available in the delta.</li> <li>• Installation from barges</li> <li>• Access Ghats and jetties can be incorporated</li> </ul>	Recommended solution to minimize displacement
		Rip rap, rubble mound or concrete block revetment built directly on the existing shoreline.	<ul style="list-style-type: none"> <li>• Requires minor resettlement of existing business and residents.</li> </ul>	
		Bio-engineering methods, fascines, installed on reinstated embankment in front of the existing shoreline.	<ul style="list-style-type: none"> <li>• Few resettlements required</li> <li>• limited impact on existing buildings</li> <li>• More natural embankment.</li> <li>• Will require more maintenance</li> <li>• Will not meet 25-year design life</li> </ul>	
2	<p><b>Riverfront development at Rupsha Ghat</b></p> <p>Public space with seats, shelters and tourist related kiosks for boating. This will improve public accessibility to the riverfront.</p> <p>Land to be raised from +2.55m to +3.1m SOB (climate proof until 2050)</p> <p>Social development, business opportunities and public amenity</p>	Terminal building, with space for kiosks for tourist related businesses and food, jetty for boating tours to Sundarbans, more than 50% green public space with benches and trees to provide shade, Amphitheatre for public performances	<ul style="list-style-type: none"> <li>▪ Encourages tourism in Khulna, provide much needed public space, satisfies public cultural needs</li> <li>▪ Save riverfront lands from future encroachments</li> <li>▪ Provide revenue opportunity for KCC, increasing financial resilience</li> </ul>	Recommended solution to create social development, business opportunities and public amenity
		Public park only with seating, food related kiosks, amphitheater like above	<ul style="list-style-type: none"> <li>▪ Focus only on public space</li> <li>▪ No income generation for KCC</li> </ul>	
3	<b>Drainage network upgrading and extension</b>	Open drainage system	<ul style="list-style-type: none"> <li>▪ Easier to monitor and maintain</li> </ul>	

Sl.	Sub-project	Alternative Design Options	Advantages	Considerations and Implications
	<b>in Nobinagar area and Sonadanga</b> sub- catchment Drainage improvement and reduction of water logging and flooding by improving conveyance and preserving natural hydrology to improve environmental and public health		<ul style="list-style-type: none"> <li>▪ Cheaper to construct</li> <li>▪ Prone to solid waste dumping</li> </ul>	
		Closed drainage system	<ul style="list-style-type: none"> <li>▪ Provide multiple use option, foot path on top.</li> <li>▪ Prevents waste dumping in drains</li> </ul>	Recommended solution to prevent solid waste dumping in the Khal
4a	<b>Bastuhara k Khal upgrading</b> Blue-green space creation, access path along banks, seating, pavilions - shade provision Drainage improvement and reduction of water logging and flooding by improving conveyance and preserving natural hydrology to improve environmental and public health	Khal: Open drain with link park + footpath Bio-engineered embankment options	<ul style="list-style-type: none"> <li>• Creates blue-green space amenity</li> <li>• Higher maintenance requirement</li> </ul>	Recommended solution to create public amenity along Khal
		Khal: Open drain with link park + footpath With concrete block embankments	<ul style="list-style-type: none"> <li>• Creates amenity</li> <li>• Less maintenance</li> <li>• Amenities not as green because of the concrete lining of the banks</li> </ul>	
4b	<b>Deana Chowdhury Khal upgrading</b> Blue-green space creation, access path along banks, seating, pavilions - shade provision Drainage improvement and reduction of water logging and flooding by improving conveyance and preserving natural hydrology to improve environmental and public health	Open drain with link park + footpath Bio-engineered embankment options	<ul style="list-style-type: none"> <li>• Creates blue-green space amenity</li> <li>• Higher maintenance requirement</li> </ul>	Recommended solution to create public amenity along Khal
		Open drain with link park + footpath With concrete block embankments	<ul style="list-style-type: none"> <li>• Creates amenity</li> <li>• Less maintenance</li> <li>• Amenities not as green because of the concrete lining of the banks</li> </ul>	
4c	<b>Drainage network upgrading and extension in Bastuhara sub- catchment</b> Drainage improvement and reduction of water logging and flooding by improving conveyance and preserving natural hydrology to improve environmental and public health	Open drainage system	<ul style="list-style-type: none"> <li>• Easier to monitor and maintain</li> <li>• Cheaper to construct</li> </ul>	
		Closed drainage system	<ul style="list-style-type: none"> <li>• Provide multiple use option, foot path or road on top.</li> <li>• Prevents waste dumping in drains</li> <li>• More expensive</li> </ul>	Recommended solution to prevent solid waste dumping in the Khal
5	<b>Labonchara Khal outlet gate upgrading and pumping station</b> New gate structure, operator facility and housing, and pumping station Drainage improvement, reduction of flooding by improving discharge capacity to improve environmental and public health	Manual gates	<ul style="list-style-type: none"> <li>▪ Smaller facility footprint</li> <li>▪ Slow opening and closing of gates</li> <li>▪ Requires full time attendance</li> </ul>	
		Motorised gates	<ul style="list-style-type: none"> <li>▪ Can be automated based on water level</li> <li>▪ Requires standby generators in case of power failure</li> <li>▪ Facility requires larger footprint.</li> </ul>	Recommended solution to allow for larger gate size and automation

Sl.	Sub-project	Alternative Design Options	Advantages	Considerations and Implications
		Location on the inside of existing gate		
		Location on the outside of existing gate		Recommended solution to minimize displacement
6	<b>Alutola gate upgrading</b>  Drainage improvement, reduction of flooding by improving discharge capacity to improve environmental and public health	Manual gates	<ul style="list-style-type: none"> <li>Gate size needs to be smaller to be able to operate manually</li> <li>Smaller footprint</li> <li>Requires full time attendance</li> <li>Slow opening and closing of gates</li> </ul>	
		Motorised gates	<ul style="list-style-type: none"> <li>Larger gate size can be adopted</li> <li>Can be automated based on water level</li> <li>Requires standby generators in case of power failure</li> <li>Larger foot print</li> </ul>	Recommended solution to allow for larger gate size and automation
7	<b>Nirala branch revitalization/ regeneration</b>  Blue greenspace / amenity creation Seating, pavilions, kiosks, exercise tracks Diversion of dry weather flow (sewage) via interceptor to locally improve water quality in Khal Preserves natural hydrology, improves water quality, provides public amenity	Link park and access path on bank only	<ul style="list-style-type: none"> <li>No houses will be affected and there is no resettlement</li> </ul>	Park area is available and ready for development
		Create access path within the river boundary either on the banks or over water using a boardwalk	<ul style="list-style-type: none"> <li>Use a flexible access path approach with paths on the banks where land is available and boardwalks along section where no land is available and avoiding existing buildings.</li> <li>No resettlement required.</li> </ul>	Recommended solution to minimize displacement
		Concrete block lining or bio- engineered green banks	<ul style="list-style-type: none"> <li>Concrete lining requires less maintenance</li> <li>Will include less green solution</li> <li>Green banks require more maintenance</li> </ul>	
		Without interceptor diversion of dry weather flow	<ul style="list-style-type: none"> <li>Water quality will not improve</li> <li>Amenity will be less enjoyable</li> </ul>	Interceptor included in conceptual design to improve water quality
		Provide kiosks/stalls space at the Khals + Jetties for boating	<ul style="list-style-type: none"> <li>Income generation for KCC</li> </ul>	Recommended solution to provide economic opportunity
8	Creation of blue-green space and amenity Seating, pavilions, kiosks, exercise tracks	Create access path around ponds as part of amenity creation	<ul style="list-style-type: none"> <li>Potentially a large number of houses/ buildings affected where these have</li> </ul>	

Sl.	Sub-project	Alternative Design Options	Advantages	Considerations and Implications
	Preserves natural hydrology, runoff reduction, provides public amenity		encroached into the pond land and will require extensive resettlement	
Access path around ponds will use boardwalks where pond banks are not accessible		<ul style="list-style-type: none"> <li>▪ Avoids resettlement and land acquisition</li> </ul>	Recommended solution to minimize displacement	
Provide public toilet/bathing facilities at the ponds		<ul style="list-style-type: none"> <li>▪ Avoid people washing in the ponds</li> </ul>	Recommended solution to improve public health	
Provide kiosks/stalls space at the ponds		<ul style="list-style-type: none"> <li>▪ Income generation for KCC</li> </ul>	Recommended solution to provide economic opportunity	

## 7 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

### 7.4 Occupational Health and Safety Management Sub-Plan

#### 7.4.9 Health and Safety Measures During Construction

##### 7.1.1.1 General Safety for the Workers

The Contractor independently of any liability arising from the legislation shall undertake all measures, as required, to prevent accidents during construction works, as well as for the health protection and provision of first aid to employees on site. The Contractor will also comply with all the relevant local regulations and provisions for ensuring health and safety during the construction phase. The works will be carried out safely and in accordance with the Laws, Directives and other provisions relating to health and safety of the staff.

During the construction all measures will be taken to prevent accidents to personnel and all third parties and to provide first aid to them. More specifically:

- All working positions will be equipped with drinking water and sanitation facilities (showers, toilets etc.)
- First aid stations must be available
- Positioning of signs and glowing signs which inform, warn or forbid certain actions regarding dangers in the site
- Dispensation to all staff working in the site of appropriate Personal Protection Equipment (PPE) such as helmets, goggles, masks etc.
- In case of works taking place during night, adequate lighting must be ensured in the relevant areas.

##### 7.1.1.2 Fire Protection

For fire protection and effective response at the construction site installations and other working places, the following provisions are to be made:

- Installation of appropriate fire-fighting equipment
- Regular cleaning of sites from potentially flammable materials and proper disposal.
- No welding or other open fire activities near areas for fuel or other flammable materials storage (belonging to the worksite or other neighbouring activities).
- Safe storage of explosive materials, in accordance with relevant permits from local authorities.
- In case the use of explosives is permitted during excavation, measures are to be taken to avoid damage and accidents from the use of explosives, such as controlled blasts, explosion alarms, protective measures for adjacent installations / properties etc.

##### 7.1.1.3 Safety Signage of Transport

Signage will be provided for works in public spaces, bearing reflecting signs. During night there will also be light signals, which will be noticeable from a distance equal to the maximum breaking distance of vehicles at the public place where the site is located. Appropriate first aid materials will be available on site.

#### 7.1.2 Health and Safety Measures During Operation

Health and safety of workers is essential and a crucial parameter of proper operation. Workers will wear special clothing during work; shoes, galoshes, raincoats, helmets, gloves, masks etc., which will be washed and ironed at the site. A fully equipped first aid kit and a stretcher will be available at the locker rooms.

During construction or maintenance machinery operators must take the following measures:

- Wear a safety belt.
- Avoid excessive speed.
- Keep machinery clean.
- Do not crush sealed containers.
- Do not leave machinery unattended.
- Keep the steps of the machinery clean.
- Use steps and handles of the machinery.
- Avoid driving on the side surfaces of the landfill.
- Never get on or off the machine during movement.
- Not moving over get the machinery to get off it
- Clean machinery before repair and maintenance.
- Keep a daily record of the machinery's operation.
- Always inspect machinery before the commencement of works.
- Inspect the place of works before the commencement of works.
- Keep the buckets and blades of machinery close to the ground.
- Lower buckets and blades of machinery to the ground during parking.
- Begin to operate machinery only after they are seated at the driver's seat.

## 7.2 Waste Management Sub-Plan

### 7.2.1 General

Solid Waste Management (SWM) planning refers to the entire process chain comprising seven steps. All seven steps are equally important and should be harmonized. Khulna City Corporation authorities need to consider specialized strategies for different waste generators (households, shops and commercial establishments, industries, hospitals, and so forth) and appropriate measures for the different levels in the SWM chain. The plan will also coordinate with the different actors in the management of waste throughout the waste management levels.

It is important to note that City Corporation authorities have the overall responsibility for SWM and therefore, need to collect useful information on the quantity and quality of waste generated in their project areas also ascertain the physical and chemical composition of various categories of waste, such as that generated by households, shops and establishments, hotels and restaurants, vegetable and fruit markets, meat and fish markets, hospitals and nursing homes. Doing so, it will facilitate the micro-planning of waste management. It will help authorities to determine the scope of retrieval of recyclable material and define appropriate technology for treating waste. It also allows them to determine the ultimate requirement of land for final disposal of inert material.

### 7.2.2 Waste Management Strategy

The overall management strategy of the City Corporation consists of following 7 (seven) steps:

#### Step 1: Segregation, Reduction and Reuse of Waste at Source

The most preferred option for waste management in the SWM hierarchy is to prevent the generation of waste at various stages including the design of products, production, packaging, use and reuse of a product. Waste prevention helps to reduce handling, treatment, and disposal costs and reduces various environmental impacts such as leachate, air emissions and generation of greenhouse gases. Minimization of waste generation at source and reuse of products are the most preferred waste prevention strategy.

It is important to address the solid waste issue from the generation of waste. Citizens, as the producers of waste, need to cooperate with SWM. No municipal effort can make a city clean unless its citizens cooperate and take an active part in waste management. Citizens must be informed, educated, and motivated not to litter on the streets so they develop the habit of storing their waste at its source in at least two separate bins (one for biodegradable waste and one for recyclable waste). Citizens also need to be educated about risks to human

health and the environment and taught to separate domestic hazardous waste and infectious waste from the other two types of waste. The citizen will be taught how to prevent waste by using reusable materials and avoid unnecessary food. For example, using glass bottle instead of plastic for beverages, purchase jute bag instead of plastic bag etc.

Municipal authorities must, therefore, make concerted efforts to convince all classes of citizens to store their waste properly:

- Placement of two types of bins for biodegradable waste and recyclable waste
- Placement of bins for shops and establishments for preventing indiscriminate littering

### **Step 2: Primary Collection of Wastes from the Point Step of Waste Generator**

Step 2 aims at preventing litter on the streets. Waste that is stored and segregated at households or other establishments needs to be collected following a fixed schedule. Point-to-point collection also requires cooperation and participation of citizens, who must bring their waste to the doorstep near the subprojects when waste collectors arrive. It is important not to mix waste that was segregated by the households. Otherwise, efforts to segregate waste at source will have no effect.

In Bangladesh, which has a hot and humid climate, organic biodegradable waste degrades easily, thereby producing odors and attracting vermin and disease vectors. Therefore, biodegradable waste needs to be collected every day. Dry waste (inorganic recyclables) can be collected less frequently; however, collection at least once per week is advisable.

#### ***Point-to-point collection carried out along with street sweeping***

With this option, street sweepers are given containerized handcarts or containerized tricycles. While sweeping the street, sweepers are also expected to point-to-point collection of waste from the 150 to 250 houses situated on both sides of the street they are allotted to sweep. They ring the bell or use the whistle to announce their arrival, and citizens are expected to bring out their waste, bio-degradable as well as recyclable waste separately and put the same in separate containers of handcarts /tricycles design for collection of both types of wastes.

#### ***Point-to-point collection by community-based organizations (CBOs)***

Another option for point-to-point collection is to entrust the work to resident welfare associations (RWAs) or CBOs. Those organizations could be allowed to levy user fees (such as Tk. 50 to 100 per house per month) to assist them in appointing and financing the waste collectors for the point-to-point collection service. RWAs or CBOs can be invited to submit applications, and the agreement can be established through a memorandum of understanding. Waste collectors can be given a containerized tricycle with a bell or whistle to facilitate collection of waste from the doorstep.

#### ***Point-to-point collection by private waste collectors***

A third option for providing door-to-door collection is to contract with the private sector. Khulna City Corporation authority may prepare reasonably sized packages to make such contracts viable. These contractors may be allowed to recover user fees as may be prescribed by the KCC Authority or may be paid for the service by the City Corporation. The contracts could be only for point-to-point collection or could also include transport of waste.

### **Step 3: Sweeping of Streets on a Day to Day Basis**

The street sweepers are equipped with three-wheeler hackney carriage and brooms. They sweep the streets and collect the wastes in the hackney carriage and hip it by the side of the road, from where a motorized vehicle will carry it to the land fill site. This will be run by the Khulna City Corporation authorities. The sweeping schedule will be made as follows:

- A schedule of street cleaning that indicates which roads require daily cleaning and which ones need to be cleaned periodically.
- A program for their cleaning both street sweeping and drains cleaning, keeping in view the norms of

work prescribed

- A timetable for cleaning of open public spaces daily or periodically
- Regular monitoring and supervision of the cleanliness work

#### **Step 4: Secondary Storage in Covered Containers or Making the Town Bin Less**

Solid waste collected from the doorstep through the primary collection system has to be stored in a convenient place for its onward transport in a cost-effective manner. KCC authorities need to arrange open waste storage points for placing mobile covered containers replacing the cement/masonry bins, which are inefficient and unhygienic. In order to place containers in many places, some mini transfer stations can be constructed which can reduce multiple handling and manual loading of wastes. It should be reminding that, if the treatment and disposal site is located at a longer distance (more than 5 km from core area), transfer station may be appropriate. In that case, waste has to be transferred from small vehicles into larger trucks so that waste can be transported more efficiently over long distances. Transfer station in the City Corporation can facilitate optimum use of the fleet of small vehicles and can take optimum advantage of large hauling vehicles for bulk transport of waste. The timings of the transfer station should match with the timings of waste transport from the city so that direct transfer of waste from a small vehicle to a large vehicle is possible. This arrangement can be facilitated by a split-level transfer station, where a larger vehicle can go down to a ramp and directly tip into a smaller tri-cycle van on a level ground.

In case, where final disposal site i.e., sanitary land and treatment facility (compost plant/incinerator) are located less than 5km from core area, it is advisable to introduce motorize vehicle to collect waste from household and directly transferred the waste to the landfill site or treatment plant. This line up will minimize the cost for building transfer station.

#### **Step 5: Transportation of Waste in Covered Vehicle/Containers**

The transportation of waste consumes significant amount of budget. So, transportation system should be efficient and economic. Vehicles should be selected based on capital costs, carrying capacity, lifetime, loading, local spare part availability, speed, fuel consumption, and maintenance costs. Covered vehicles are best suited for environmental point of view. This will prevent the split of littering. The transport system must be harmonized with the secondary storage system of waste to prevent manual and multiple handling of waste. Proper maintenance of fleet of vehicles is necessary to ensure that transport of waste is carried out without interruption.

#### **Step 6: Processing of Waste Adopting Composting**

The municipal authority must treat the organic fraction of waste before disposal. Municipal authorities need to set up a plant for treating waste. Currently, private entrepreneurs are advocating several technologies for the processing and treatment of organic solid waste. Some of the technologies have proven record such as composting, anaerobic digestion etc. Some are based on applications used in foreign countries that have yet to be tried successfully in Bangladesh. Such applications include incineration for power generation. Quite often, city corporation authorities fail to assess the suitability of new technology to local conditions. They may be attracted to technology that is successfully used in industrial countries without evaluating its applicability in local conditions. As a result, they may meet failure later. It is important to avoid this mistake and to properly address the issue of suitability to local conditions, including local technical knowledge, operational capacity and cost of maintenance. In Bangladesh waste has a low calorific value- between 700 and 1,000 kilocalories. Therefore, it is not suitable for incineration. Any technology for incineration requires a high calorific value input. Municipal authorities should, therefore, be very careful in assessing this option for disposal of waste. Before choosing a particular waste management option, different conventional and current practices all over the world are explored to find out most likely options suited for this country.

#### **Step 7: Improve Final Disposal of Waste by Constructing Sanitary Landfills**

Open dumping of waste can cause irreparable damage to the environment by polluting land, water, and air; adversely affecting human health; and lowering people's quality of life. There is a need to prohibit open dumps and direct municipal authorities to safely dispose of residues of solid waste in sanitary landfills after the treatment of the organic fraction of solid waste.

### 7.2.3 Planning for Primary Collection

Initially, City Corporation may select one pilot ward under door-to-door waste collection system, including the introduction of source segregation at the household level. This requires massive awareness campaign and citizen motivation program. The Khulna City Corporation has a plan to introduce plastic bin (Mobile) in the roadside or in the important public places. NGOs will be deployed for public awareness to motivational programs to success these initiatives. Initially source segregation may be started at ward no-8 according to the waste recycling and reuse plan. At least 1000 household will be included under this program. Lesson learns from ward no-8 may be gradually disseminated to other wards, before that SWM at other wards will be done by usual practice.

Generally, 75%-85% (source: PPTA) of solid waste is generated in the household level. As stated above, an improved waste management system will be developed under ISWMIP intervention by selecting the ward no-8 on pilot basis. The waste will be segregated at the source (household level) for its organic and inorganic constituents and will be collected separately so that the potential value of recyclable materials could be achieved and also to satisfy the concepts of National 3R strategy. For the purpose of separate collection, two different colors coded HDPE plastic bins with lids will be provided in each household by the City Corporation. One green bin for organic (compostable) material and other is a blue bin for inorganic (Recycling) material.

The urban dweller will have to pay a little amount as a service charge for the improved door-to-door solid waste collection. The Tricycle rickshaw van/Motorize van with two separate compartments will be procured to carry organic and inorganic waste from household and transfer to the temporary transfer station/secondary depot or directly to the landfill site for unloading to the dump truck. Litter bins shall be provided along main roads, bus stand, other public places to avoid littering.

### 7.2.4 Planning for Secondary Collection

The segregated organic waste shall be emptied manually from tri-cycle rickshaw van into a dump truck at secondary transfer station located in the town. Once filled up to its full capacity, the required amount it shall be transported to a composting plant (if available) and residual to the landfill site for final disposal. If transfer station is not available with the Khulna City Corporation, the segregated organic waste will be allowed dump on the sanitary landfill and saleable recycling material will be sold to the secondary buyers by van driver.

Secondary collection from market areas and temporary storage points is proposed to carry out by the existing vehicles underuse and procured vehicle. During the transitional period, commingled waste from other wards will be collected from secondary collection points and transported by dump truck to the waste segregated plant, situated at the sanitary landfill site. The commingled wastes will be segregated in the plant for its bio-degradable and non-bio-degradable parts and dispose accordingly to the landfill. It is proposed to sweep all the roads and lanes with dense habitation or commercial activities on a day to day basis, alternate day sweeping in medium dense wards and once in 3 days/once in a week sweeping in the remaining wards. Pushcarts are proposed for road sweeping and drain cleaning. The sweepers shall transfer waste from pushcarts to the dump truck that is located within a reasonable distance.

The solid waste management intervention in Khulna will satisfy the “National 3R Strategy for Waste Management”. The objective of the SWM is to develop a cost-effective and environmentally sound solid waste management system that is applicable for the secondary town. This system includes waste management planning, waste prevention, waste recycling, waste reuse, waste storage, waste collection, waste transportation, waste treatment and disposal as per plan and pre-selected procedure prepared by Khulna City Corporation.

Experiences reveal that proper storage and disposal are the first steps to achieve the desired goal of solid waste management. Motivation of house owners and the door-to-door collection are proven to be very useful. Nevertheless, the KCC authority has the deficiency of resources (e.g., manpower and budget) to provide the door-to-door collection system for each house. A flow chart briefly given below **Figure 7.1**.

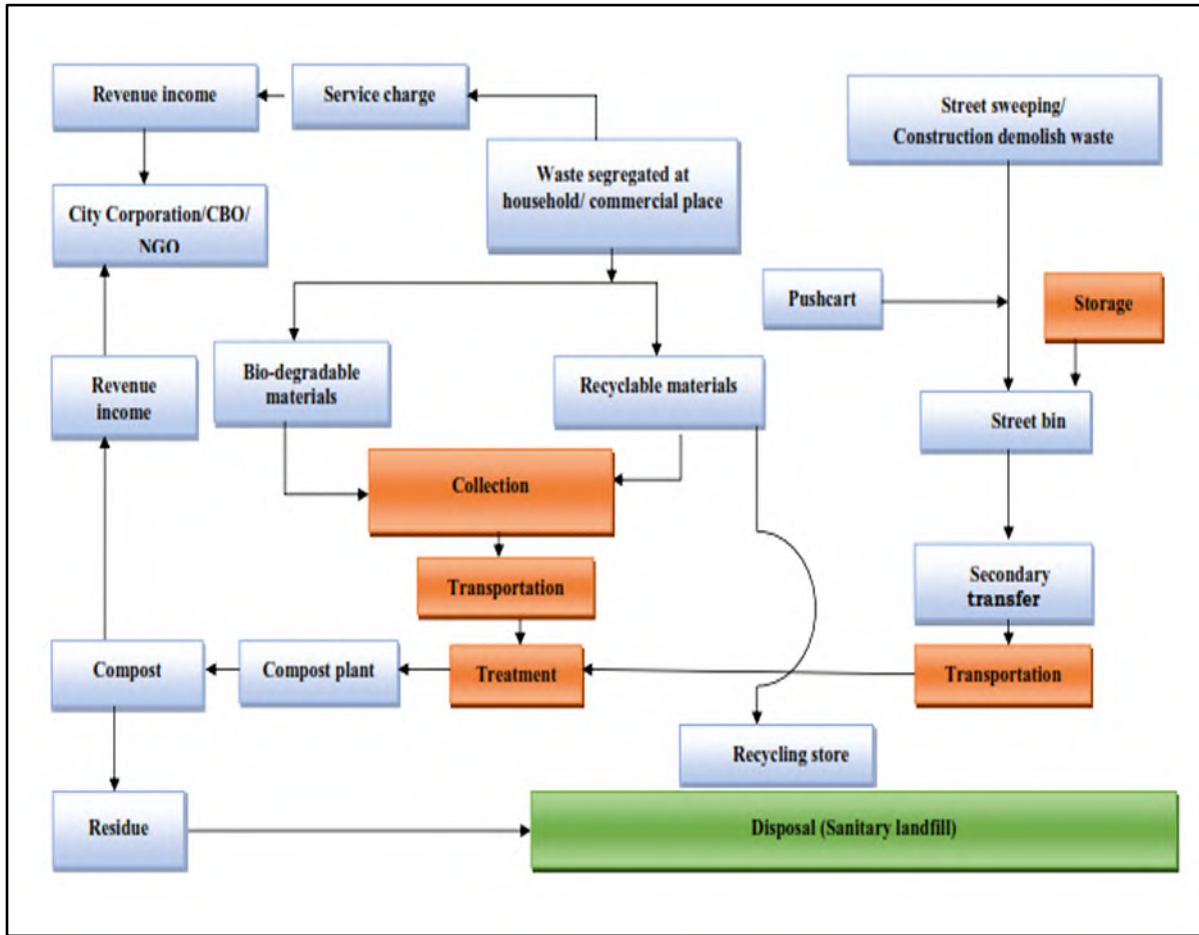
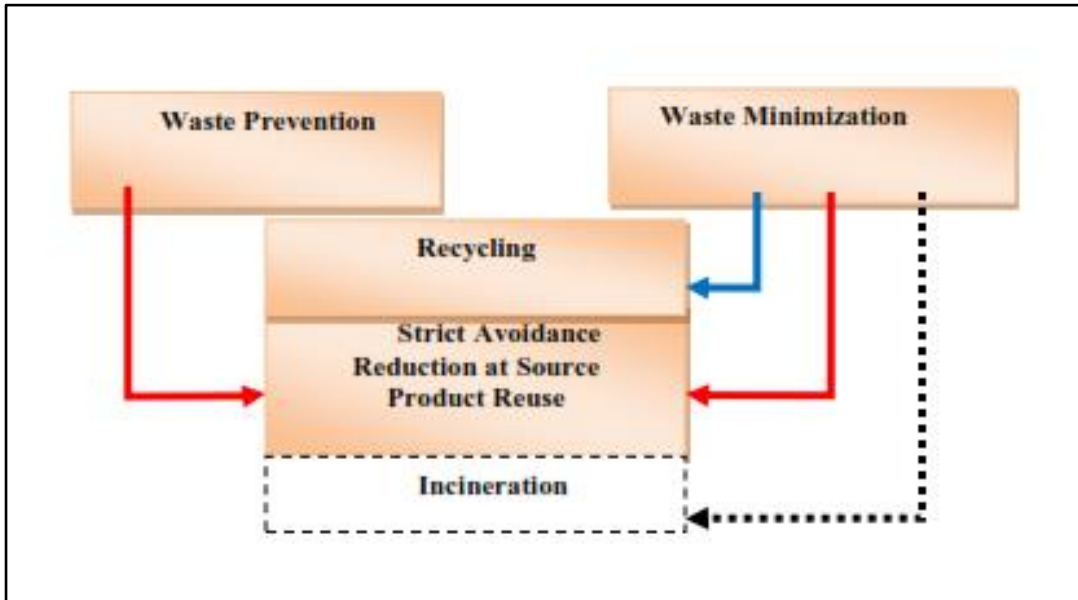


Figure 7.1 Typical Flow Chart Showing of Solid Waste Management Procedures

7.2.5 Strategy for Waste Prevention

Currently City Corporation have no program of the waste prevention at any stage of the waste management hierarchy. A National 3R (Reduce, Reuse and Recycle) Strategy for Waste Management has been formulated in the year 2010. It sets the goal as higher levels of waste reduction, reuse and recycling and minimizing waste disposal in open dumps, rivers, flood plains and landfills. It has focused on linkage with waste prevention (Strict Avoidance) with 3R goals.

Waste recycling and waste prevention are those two solid waste management strategies which often confused with each other. Most of City Corporation citizens, waste collector worker and scavengers are not well known with the term waste recycling and waste prevention. Recycling is an effective way to manage waste materials once they have been generated; waste prevention actually reduces the amount of material used and therefore the amount discarded. The difference between waste prevention and waste minimization is shown in Figure 7.2.



**Figure 7.2 Showing the Difference of Waste Prevention and Waste Minimization**

Waste prevention (also known as source reduction) is the design, purchase, manufacture, or use of products and materials to reduce the amount or toxicity of solid waste generated. Waste prevention has not been separately focused on a National 3R (Reduce, Reuse and Recycle) strategy for waste management instead combined with waste reduction strategy.

Waste prevention often results in substantial savings through reduced purchasing costs and more efficient practices. It also can reduce waste disposal costs. In addition, waste prevention has environmental benefits, including reduced energy consumption and pollution, conservation of natural resources, and extension of valuable landfill capacity. Practicing waste prevention can improve customer relations by demonstrating a company's concern about the environment. It can also enhance employee relations by involving employees in the company's waste reduction program.

The CCAUD project will take initiative from various training programs and guidance to motivate City Corporation officials to prepare a plan for waste prevention according to the national 3R strategy.

### 7.2.6 Elements of Waste Prevention Program

The following elements in the waste prevention program to be implemented at the Khulna City Corporation areas.

- Strict Avoidance: Avoid unnecessary food and packages etc.
- Reduce: Reduce waste as much as possible,
- Reuse: Using or manufacturing minimal or reusable packaging.

Waste prevention program would be implemented in Khulna City Corporation through the support of the Government. Khulna City Corporation Chief Executive Officer and Councilor are the focal persons who can lead this initiative.

### 7.2.7 Waste Prevention Implementation Procedure

Waste prevention includes a wide variety of activities to reduce the amount of waste generated. Along with the implementation of national 3R goals, City Corporation may take the initiative for the implementation of the waste prevention program. A new legislation like Container Deposit Legislation (CDL) should be developed by the Government under draft solid waste management and handling rule 2010 for waste minimization. According to this legislation, the waste management cost from City Corporation will shift to the product manufacturers, so

that they can internalize solid waste management disposal cost. This legislation typically requires a deposit to be paid for the purchase of products, such as beverages, with certain exemption granted by regulation. A refund is eventually given when the container is returned at the point of sale or collection depots, where the container is collected for reuse or reprocessing (Figure 7.3)

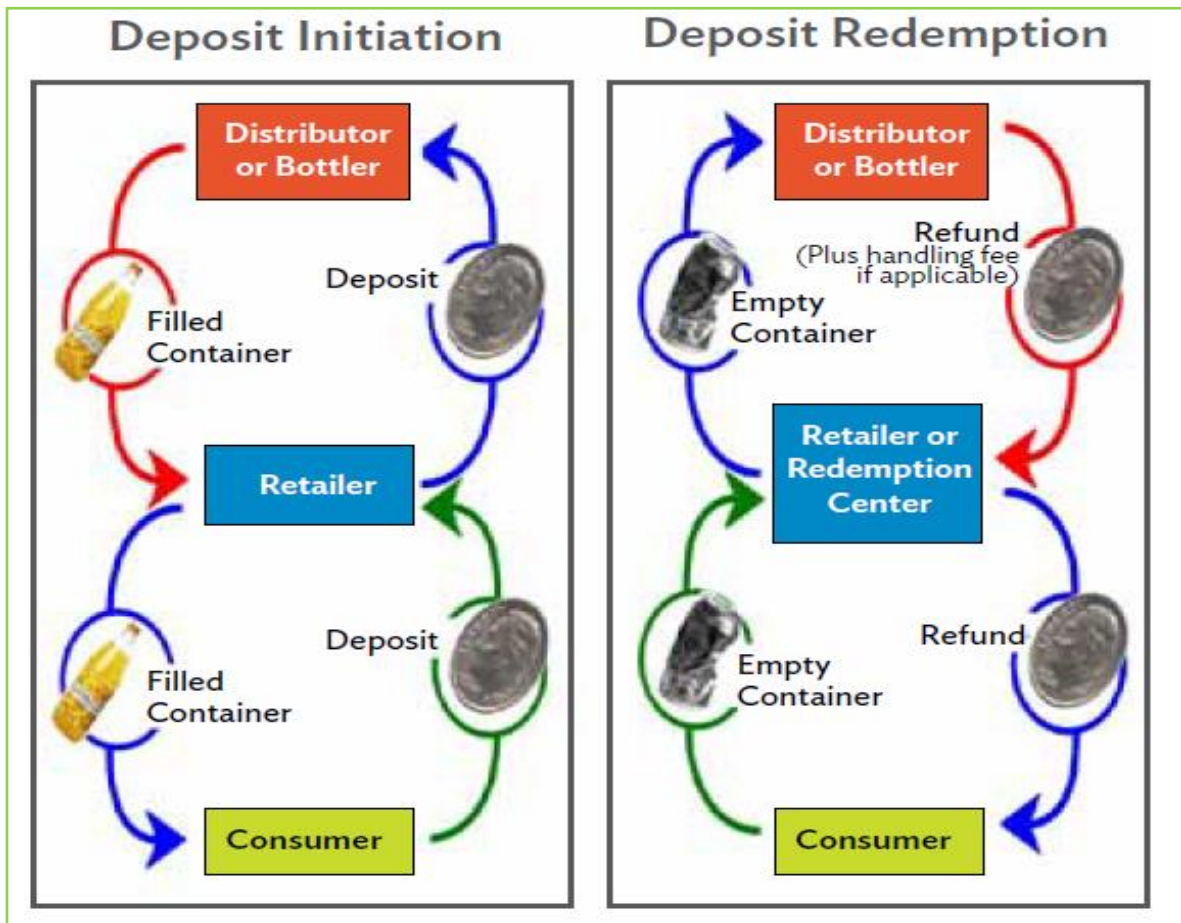


Figure 7.3 Container Deposit Flow Chart

The following waste prevention techniques that could be applied by the KCC for waste prevention program:

#### i) Using or manufacturing minimal or reusable packaging

Manufacturing companies in the City Corporation area could be motivated to reduce unnecessary use of packaging material and try to reuse the cartons for packaging purpose. City Corporation would apply 3R rule and work with suppliers to minimize the amount of packaging used and to return shipping materials such as crates, cartons, and pallets for reuse. To reduce waste in shipping departments, reusing packing material, use less packaging, and ship merchandise in returnable/reusable containers. The necessary awareness campaign could be run for the owners of restaurants and cafeterias, using bulk food and beverage dispensers instead of individual serving containers cuts down on waste.

#### ii) Using and maintaining durable equipment and supplies

High quality, long-lasting supplies and equipment that can be repaired easily mean fewer discards. These items will stay out of the waste stream longer. In addition, the higher initial costs are often justified by lower maintenance and disposal costs. Since these items are replaced less frequently, further cost savings can be realized. Renting or leasing needed equipment might be another option. Through the awareness campaign, City Corporation authority will motivate residence to purchase highly durable material and instead of discarding it, try to repair it, so that waste reducing technique could be achieved.

#### iii) Reusing products and supplies

Using durable, reusable products rather than single-use materials is one of the most effective waste prevention strategies. A one-time investment for reusable items ends the frequently expensive cycle of discarding and reordering. Consider adopting simple, cost-effective measures such as washing and reusing ceramic mugs in place of disposable cups. Encourage employees to reuse common items such as file folders and interoffice envelopes. City Corporation can achieve this waste prevention through massive awareness campaign.

#### iv) Using supplies and materials more efficiently

Changing company policies and operations to increase efficiency, reduce waste, and conserve materials is an important way to achieve waste prevention. For example, switching to double-sided photocopying can cut paper costs by 10 to 40 percent. Exchanging, selling, or giving away unneeded goods for reuse. Donate excess food, used furniture, and other materials to local organizations such as homeless shelters or charities. Check to see if a local materials exchange exists that can accept and distribute these items to non-profit groups. A growing number of companies are also successfully selling or exchanging unneeded materials directly with other companies that can use them in their manufacturing processes. Changing company policy, applying regulation and awareness campaign can success this program.

#### v) Reducing the use of hazardous constituents

Find out which products in graphics and maintenance departments (such as ink, solvent, paint, glue, and other materials) are available with fewer or no hazardous constituents. Suppliers should ask for water-based (rather than oil- or solvent-based) products.

### 7.2.8 Budget and Manpower need for Waste Prevention Program (Yearly)

Waste prevention resources are available in the Khulna City Corporation. The government and donor agency should come forward to support Khulna City Corporation to implement the waste prevention program. To implement these types of programs, Khulna City Corporation not need involve any direct investment, so available manpower and financial resources are sufficient to meet the waste prevention program. The typical manpower and resources for awareness buildup are shown in the **Table 7.1**.

**Table 7.1 Manpower and Resources Needed for Waste Prevention Program**

Activities	Materials/ goods	Unit	Quantity	Cost /Unit (BDT)	Total Cost (BDT)	Manpower
Awareness campaigns	Advertisement on newspapers	Number	25	4000	100,000	Officer-1 Supervisor-2 Worker-5
	Posters and leaflets	Number	5000	50	250,000	
	Courtyard meeting.	Number	80	2500	200,000	
	Transport and other	-			30,000	
	<b>Total</b>				<b>580,000</b>	

Waste prevention program would be implemented in Khulna City Corporation through the support of the Government. Khulna City Corporation Chief Executive Officer and Councilor are the focal persons who can lead this initiative.

### 7.2.9 Strategy for Waste Recycle and Reuse

In current practices of the waste management stream, the Khulna City Corporation have no program of waste recycling and reuse. Virtually wastes are not segregated at household level. However, newspaper and used materials such as cans/bottles are kept segregated for selling directly to the itinerant buyers. During the collection from households and from the street bins recyclable materials are collected by waste pickers. There are several recyclable shops in the Khulna City Corporation areas. These facilities are run by the informal sector.

The informal recycling of wastes is around 15 to 20 percent.

### 7.2.9.1 Components of Recycling/reuse Program

The following are components of recycling/reuse program.

- Source Segregation
- Composting
- Incineration
- Centralized Recycling Waste Collection Depot.

The Chief Executive Officer/Secretary of Khulna City Corporation will lead the activities relate to the Recycling/Reuse Program for Khulna City Corporation. The mayor will be focal persons for any Recycling/Reuse Program.

### 7.2.9.2 Implementation of Recycling Program

The process of recycling at Khulna City Corporation is very much in practice informally without control of any statutory body. Recycling provides jobs for waste pickers, business for traders and commercial activities for the owners of certain mills and factories who use wastes as raw materials for producing saleable items. In many cases the recycling saves foreign exchange from importing the things that can be produced locally from wastes. Source-separation is an environmentally and technically better way of getting a higher selling price of recyclable materials, requiring less time for sorting out waste materials in the compost facility and finally improving compost quality.

To encourage source segregation of wastes at households, awareness program, training of barrel composting at the household level and distribution of compost free of cost to the households for home gardening should be initiated.

The recycle sector is low profile, but well established. Large numbers of waste buyers purchase recyclable waste from the doorstep and pass it on to a sub-dealer or a dealer with a good margin, who, in turn, passes in the material to the recycling industry in bulk.

Other people are known as rag pickers. Rag pickers are generally poor women and children who pick up discarded recyclables from the streets, bins, and dump-yards; segregate various components; and sell them to a dealer for a small price to earn a living. Those recyclables are often soiled with food waste, human excreta, and biomedical waste. Accordingly, the price of such waste is much lower than the dry and clean recyclable material that is picked up directly from households or shops. Furthermore, because rag pickers are very poor, they have little bargaining power to negotiate a higher price.

A sizable amount of recyclable dry waste such as waste paper, broken glass, and packaging material is not picked up, because it is soiled substantially or is directly buried under a huge pile of waste in the bin or at the disposal site. Quite often, rag pickers focus their search and recovery on a few varieties of recyclables that have good returns such as plastic bottle, plastic and metal. Other materials are discarded. Hence, much potentially recyclable waste from streets and bins ends up at the disposal site, along with other domestic waste and street sweepings. Rag pickers, who search disposal sites as well as streets, nevertheless, recover some of those materials; however, most of the waste gets buried.

The current practice of material recovery and recycling often leads to additional littering in streets when rag pickers are rummaging the waste bags and bins. A denial to rag pickers in the streets forces them to collect recyclables from landfill sites as well. This practice leads to even higher health threats and environmental pollution. In most cases, rag pickers are women and children from low-income groups, which compose the weakest group in the society. They are often exploited by waste merchants because of their status.

In the past 10 years, an increasing number of non-governmental organizations (NGOs) have become active in improving the working and living conditions of rag pickers. Because the municipal waste service was until recently limited to, waste collection from public bins, NGOs recognize the service gap and have started offering

point-to-point collection services to households. Recognizing that recyclable waste should be collected at the source of its generation to maintain its value. The Khulna City Corporation will have to introduced door-to-door waste collection in some ward partially. This works involve in door-to-door collection is recovering some salable discarded recycle material from mixed household waste and carrying with their van in a separate plastic bag.

The Khulna City Corporation should search private or non-governmental organization to become successful its recycling program, because most of these efforts are done by a private or non-governmental organization. The NGO/Private Organization can minimize the gap which will have a positive effect for the whole sector. Waste recycling in Bangladesh has many untapped potential opportunities that could benefit the entire society.

Given the current situation, needs to upgrade and reorganize its recycling system, to increase the effectiveness of its waste collection and recycling system, and to improve the working conditions of rag pickers. The key stakeholders to lead this process are the City Corporation authorities, because they are ultimately responsible for waste management. Another major challenge is to obtain public participation and the involvement of the private sector. Currently, recycling at City Corporation is being done in the above chain and reuse of waste in the form compost.

**Plastic Bag Recycling and Processing:** There is very little opportunity for recycling plastic bags apart from burning as a fuel source or bringing in shredding equipment and molds to make plastic items such as posts, decking, chairs, and seats. However, given that most plastic bags are sold in terms of either inorganic soil or organic material attachment, the overall environmental cost associated with having to clean and dry these bags, not to mention the higher labor content, would make such a scheme generally unattractive at the present time.

The plastic bags can be used as a fuel source in refuse-derived fuels or waste-to-energy facilities and hospital incinerators or laundries, cement kilns, and charcoal production where partial processing is sometimes required. Beverage containers can be recycled and are often chipped or crushed to increase their density, thereby making transport more efficient. Polyethylene containers, polyethylene and bottles may be reprocessed into outdoor furniture, roadside markers, and rot-proof planks for waterside uses, and they burn cleanly (as do the polyethylene shopping bags) with a fuel value equal to diesel or natural gas. In some locations, free plastic chair molds are provided by beverage manufacturers for nongovernment organizations to reuse their scrap bottles to make extruded plastic products

**Recycling Mechanization:** There are three stages of development for centralized recycling. The most appropriate stage typically depends on community wealth, which impacts the waste characteristics and the level of segregation.

1) **The first stage is fully manual (scavengers).** It is possible to improve conditions with personal protective equipment, weather covers, forming collectives to get better prices, and so on. Larger municipalities with significant distances to the landfill may profitably operate a transfer station, allowing segregation at the gatehouse, plus potentially scavenging in a large open concrete pit before dozer track roll compacting and pushing into transfer trailers parked below the pit chute to cart to disposal. This retains the advantages of scavenger sorting in a safer and more controlled environment.

2) **The second stage is partially mechanical** with selected mixed waste such as for refuse-derived fuels or composting.

3) **The final stage is mechanically** separating and packaging segregated waste. These fully mechanized recycling facilities or materials recovery facilities will only work sustainably on fully segregated waste.

### 7.2.9.3 Role of Khulna City Corporation in Recycling Programs

It is important for the Khulna City Corporation to take a supporting role rather than the leading role in recycling programs. There are many cases of market distortion when the City Corporation establish their own facilities in direct competition with private sector recyclers. Almost always, the City Corporation reduces its direct involvement in running materials recovery facilities over the long term, meaning that the suppressed private sector then has to return to the recycling sector. A suitable potential role for the City Corporation is to provide the equipment such as mobile chippers or the land area for stockpiling of recyclables prior to baling and sale. They should leave the primary role of recycling with the private sector (or may lease the sites). The other

potential key role of the City Corporation is implementing an information, education, and communication campaign to encourage community awareness on the need for recycling which would then support the private sector endeavors. The only need for intervention is if scavengers are paid an unfairly low price by agents.

**a) Public Information and Education:** Khulna City Corporation communicates with residents and businesses at least once per year on the requirements of local recycling programs through newsletter, mailings, cable TV, newspaper column, inserts in tax bills, etc. City Corporation advertises about who, what, where and how of recycling is made in local newspaper. City Corporation has an active recycling coordinator and/or committee who assist with public information. New residents receive information on the local recycling program when they move in. City Corporation prominently features local recycling program on its website. City Corporation website recycling information City Corporation sponsors annual or ongoing collection program for some recyclables such as tires, electronics, leaves, yard waste, etc. Community events such as annual parades, festivals, etc. are planned as “green” or zero-waste events.

**b) Purchasing:** Khulna City Corporation contracts with a hauler to collect recyclables from all town properties and/or town employees deliver all recyclables to the local recycling center. City Corporation look after the school system contracts with a hauler to collect recyclables from all school properties and/or school employees deliver all recyclables to the local recycling center. Khulna City Corporation has and uses an environmentally preferable purchasing (EPP) policy and is aware of and takes advantage of state EPP contracts open to purchase by municipalities and other political subdivisions. City Corporation uses only recycled paper with 30% post-consumer content or greater.

**c) Regulations:** Khulna City Corporation enforces its national recycling ordinance (3R) to assure that all generators within the borders of the City Corporation, including residents, businesses, institutions, government offices, etc. comply with recycling requirements. National Building Code regulations require adequate space for recycling containers and collection along with MSW in all new projects built in the City Corporation, e.g. multi-family housing, shopping centers, office buildings, schools, etc. Demolition and building regulations require contractors to recycle C&D waste and require a waste management plan which emphasizes source separation and source reduction and recycling for all construction and demolition projects beyond a certain size. City Corporation shall collect C & D waste for soil cover on a landfill cell.

**d) Human resources, employees, including school employees:** City Corporation has an official written recycling policy with the context of 3R in place that is communicated to all employees. New hires receive a copy of and training on the recycling policy/program and recycling is written into the job descriptions of relevant City Corporation positions (i.e. Conservancy employees, facilities management, etc.). Mayor/Councilors, official and/or Chief Executive Officer communicate regularly with employees on the importance of recycling. Employees are trained in what to recycle, how and where. Conservancy employees are trained to keep recyclables separate from MSW and where to deposit recyclables for collection. Department heads are trained on what to recycle, how and where. Employees are evaluated annually on their compliance with the recycling policy (3R). City Corporation tracks and records tonnage of all recycled items for City Corporation data base. City Corporation tracks final destination of all recyclables collected through municipal contracts. City Corporation provides warning stickers/tags to haulers for use with customers who don't recycle. City Corporation has enforcement personnel who have been given authority to issue fines similar to animal control officers for residents and businesses who don't recycle. City Corporation requires all haulers who collect recyclables within its borders to register with the City Corporation annually. City Corporation requires all haulers registered with the community to report to the town or to local ward councilor where they haul MSW and recyclables.

**e) Local recycling center:** City Corporation provides curbside recycling collection paid for through the tax base. City Corporation provides a local recycling center for items not collected at curbside and for residents who don't use a hauler who collects recyclables. The City Corporation's local recycling center is open to small businesses as well as residents. Local recycling center does not charge residents or small businesses for drop-off of mandated recyclable. Local recycling center fees are based on a pay-as-you-throw (PAYT), i.e. those residents and businesses who drop off greater amounts of MSW pay more than those who drop off lesser amounts of Municipal Solid Waste (MSW).

## 7.2.10 Pond waste Management Sub-Plan

### 7.2.10.1 Waste Pond

A **waste pond** or **chemical pond** is a small impounded water body used for the disposal of water pollutants, and sometimes utilized as a method of recycling or decomposing toxic substances. Such waste ponds may be used for regular disposal of pollutant materials or may be used as upset receivers for special pollution events. Often, chemical ponds themselves are addressed for cleanup action after their useful life is over or when a risk of groundwater contamination arises. Contamination of waterways and groundwater can be damaging to human, animal and environmental health. These health effects bring into question the best engineering solutions to mitigate waste ponds' environmental impact.

### 7.2.10.2 Waste stabilization pond

Waste stabilization ponds (WSPs or stabilization ponds or waste stabilization lagoons) are ponds designed and built for wastewater treatment to reduce the organic content and remove pathogens from wastewater. They are man-made depressions confined by earthen structures. Wastewater or "influent" enters on one side of the waste stabilization pond and exits on the other side as "effluent", after spending several days in the pond, during which treatment processes take place.

### 7.2.10.3 Types of Ponds Considering Waste

Waste stabilization ponds consist of man-made basins comprising a single or several series of anaerobic, facultative or maturation ponds. The presence or absence of oxygen varies with the three different types of ponds, used in sequence. Anaerobic waste stabilization ponds have very little dissolved oxygen, thus anaerobic conditions prevail. The second type of pond, facultative stabilization ponds, sustain an aerobic surface habitat above an anaerobic benthic habitat. Maturation ponds offer aerobic conditions throughout, from the surface to the bottom.

### 7.2.10.4 Costs

In the selection of a wastewater treatment process, besides the technical aspects that are relevant to each alternative, also cost factors play a very important role. The latter can be basically divided into (i) construction costs and (ii) operation and maintenance costs. Waste stabilization ponds are usually considered a cheap alternative in terms of construction costs. However, the final costs will depend essentially on the size of ponds, presence of maturation ponds in the process configuration, topography, soil conditions, groundwater level and land cost.

## 7.3 Contractor Management Sub-Plan

This CMP is intended to outline the relationship between KCC and the Contractors, and to describe how the overall contract will be managed (i.e. describe the Contractor management processes that will be implemented by KCC).

In further detail, the purpose of the CMP is to:

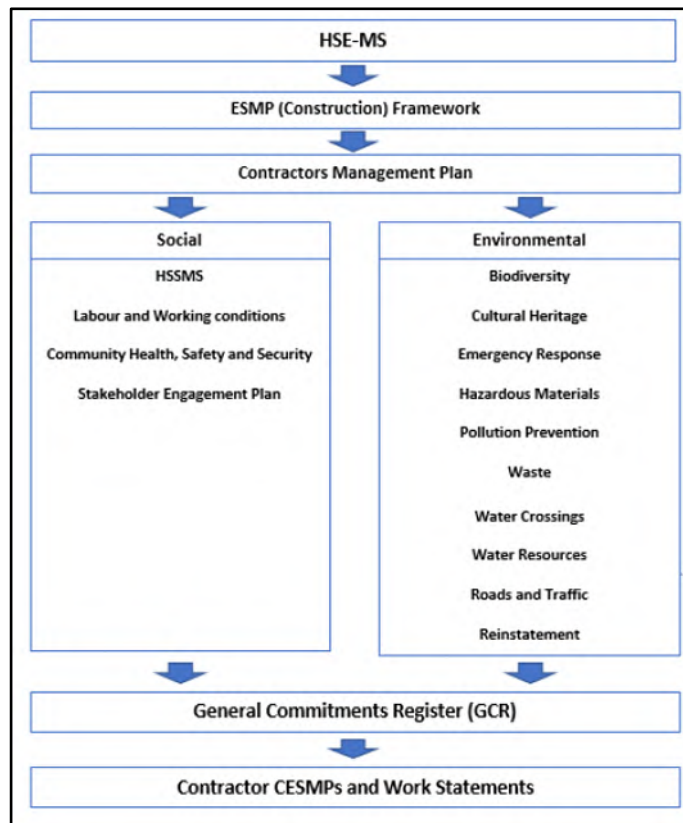
- Summarize the Contractors' and Subcontractors' engagement and management processes, procedures and systems used;
- Define roles and responsibilities for the Beneficiary and the Contractors and its Subcontractors, as well as the relationship and cooperation between all parties, with regards to all subproject activities;
- Outline the applicable subproject Standards relevant to the Contractors and its Subcontractors;

- Set out the processes to ensure the implementation, by the Contractors and its Subcontractors, of all requirements, project commitments, conditions, methods (work statement for the construction phases), and procedures applicable to them, intended to assure the execution of the Project;
- Define training requirements;
- Establish a Grievance Mechanism about other Construction Environmental Management Plans (CEMPs);
- Define monitoring and reporting procedures, including Key Performance Indicators (KPIs), to monitor the performance of the Contractors and its Subcontractors; and
- Define intervention procedures, i. e. the way KCC will liaise with the Contractors to sort out any issues, namely related with non-compliance and/or environmental and social performance.
- Contractors’ environmental, social, cultural heritage management of contractors.

Any subsequent changes to the Contractor Engagement processes may result in changes to this CMP.

**7.3.1 Links to Khulna Subproject’s HSE Management System**

The Contractors will be required to align their own HSE-MS with the subproject’s one, and to develop their own detailed Contractor’s Environmental Management Plan (CEMP), including detailed topic and/or activity-specific CEMPs, based on the ESMF and reminder Management Plans provided by KCC. This will be done through “Work statement documents”, which will be agreed with all Contractor, for each site, where will define the special conditions.



**Figure 7.4 Linkage between subproject HSE-MS**

**7.3.2 Policies and Standards**

All Contractors and its Subcontractors are subject to the conditions and obligation set out in the national legislative framework, KfW regulations, the Environmental and Social Safeguards (ESS), and country’s norms and procedures.

### 7.3.3 Application to the project contractors

Successful projects that involve contractors all exhibit similar characteristics. They all have clear and unambiguous contracts established that include a Statement of Work. The efforts of all contractors integrated into a cohesive project plan with all contractors understanding where their efforts fit into the overall picture. The formal and informal interfaces between the beneficiary and the contractors are documented. Before starting specific work, the contractors are granted authorization to proceed. This authorization is received, in writing, via a Work Authorization form. A formal team building process is established and implemented. These practices all contribute to reducing the risk of misunderstandings or isolationism. Each contractor will have a legally binding, written contract that defines the following items. The legal names of the parties involved in the contract will be specified.

The scope of the contracted work (contained in an attached Statement of Work), will be described on terms of:

- ❖ a clear definition of the services to be provided by the Contractor;
- ❖ responsibilities and authority limits of each party to the contract;
- ❖ a clear definition of the deliverables and minimum content to be provided by the contractor;
- ❖ any and all constraints imposed on the Contractor by KCC., such as schedule constraints; budget constraints, specific tools to be used; and
- ❖ a clear statement of requirements for quality of deliverables and services including the requirement to allow independent quality inspections of materials and processes.

Appropriate terms and conditions, which will be imposed on both KCC and the contractor, will be identified. The acceptance process will be clearly identified.

Each CEMP outlines tasks to be undertaken by both KCC and its Contractors. The Contractors themselves will be required to develop their own detailed management plans/action plans, which will reflect the commitments in this CMP and which demonstrate how they will meet these commitments. The Beneficiary will nominate the obligation of Contractor to draw the Plan and indicate models for CEMPs on "Work statement document" which will be closed with all Contractor for each site, where will define the special conditions and procedures.

### 7.3.4 Document Management

The KCC will provide the Contractors Management Plan with attributes for all parts, requirements for Contractors and also a Work Statement for construction phases, including models for standard documents. Contractors enter into a business partnership with Khulna City Corporation after bidding procedures, and will provide in legal time the integrated solution for execution phases, including the economic, environmental and social approach. Contractors will present the information for all subcontractors and the procedures for verification and validation services.

### 7.3.5 Contractors Engagement and Management

The CMP will highlight all responsibilities, requirements and work statements that are expected of the contractors and how they will be delivered to the beneficiary. The Parties will establish contact points to monitor actions and to correct any non-conformances. All the proposed solutions will be reported to Project Management Unit, management of change structure. This structure is responsible for decisions, under Project management services approval, for drawing procedures able to be applied on all sites or on specific sites, and for updating the CEMP documents.

The approach to managing the subproject will be based on the following guiding principles:

KCC will establish on the bidding documents the conditions and obligation for Contractors;

- a Statement of Work will be drawn by the team, jointly with each Contractor taking responsibility for the services outlined in its areas of responsibility;
- effective channels of communications will be clearly defined and established within the Statement of Work document;
- each Contractor/Subcontractor will have its responsibilities and authority limits clearly defined in the Statement of Work;

- each Contractor will have its deliverables and execution time identified in the Statement of Work;
- each Contractor will have the services it is responsible for providing clearly identified and described in the Statement of Work;
- all constraints imposed on the Contractor will be clearly identify in the Statement of Work, including schedule and budget constraints;
- all environmental, social, health and safety and cultural heritage constraints imposed on the Contractor will be clearly identify in the Statement of Work;
- each Contractor will have requirements for quality clearly identified within the Statement of Work, including the requirement to allow independent quality inspections of materials and work processes;
- all products and services provided by the subcontractor (partners of Contractor) will be subject to the acceptance of KCC;
- each subcontract will contain appropriate terms and conditions;
- adequate facilities will be provided to meet the needs of the Contractors, and the Contractors will support subcontractors in processing invoices and payments, subject to the invoices being delivered to KCC in an acceptable format. To this end, KCC will establish format requirements for invoices in list of Standard Documents;
- the Contractors will be directly responsible for their part of the contract in relation with the subproject, even for the subcontracted parts;
- the Contractors will be obliged to contract only with solvable and reliable subcontractors, and only with the written approval issued by KCC, and
- ESU is responsible, for project management, for control and monitoring activities regarding constructors' actions and has overall responsibility for environmental, social, health and safety, and cultural heritage aspects of the project.

### 7.3.6 Roles and Responsibilities

Delivery of the project commitments referenced in this CMP is the responsibility of both KCC and its Contractors. The specific responsibilities for implementation of the specific actions identified in the individual CEMPs are clearly distinguished between KCC and relevant Contractors in the Appendices to the CEMPs.

**Table 7.2 Mapping of Functional Elements Between KCC and Contractors**

Functional Element	KCC	Contractors	Subcontractors
Project Management	X		
HSSE management	X	X	
Management of change	X	X	
Technical monitoring	X	X	
Quality assurance	X	X	
Human resources ((HR) and training	X	X	X
Economic	X	X	X
Legal	X	X	
Information technology	X	X	
Communication and Public relations	X	X	
Audit	X	X	

### 7.3.7 Contractors' Roles and Responsibilities

Contractor's predominant responsibility will be to ensure that all their work and staff activity is compliant with the legal provision for environment, social, safety, health and the permits provided by Khulna City Corporation. Their responsibilities include the management of specific activities and for the surveillance of all activities on the site.

The Contractors will prepare work plans in compliance with the Project's requirements.

CEMPs to be produced by the appointed Contractor-

- ❖ Waste Management Plan (Include Hazardous Management Plan)
- ❖ Road and Traffic Management Plan
- ❖ Pollution Prevention Management Plan
- ❖ Labour and Working Conditions Management Plan
- ❖ Emergency Response Management Plan
- ❖ Community Health and Safety Management Plan
- ❖ Reinstatement Management Plan

The Contractors will be responsible for the Health and Safety Plan and Measures, regarding their own employees and sites conditions, as well workers' accommodation, under a risk analyze procedure, in accordance with legal provisions, advised by City Corporation.

Contractors shall nominate the following employees:

- representative for site coordination;
- representatives for HSSE responsibilities;
- representatives for technical execution, budget, Project phases;
- first aid competent person;
- representative for waste management;
- team for guarding the site; and
- team responsible for intervention on accidental pollution events

Other details about Contractor's obligations related standard documents, which have to be drawn, will be nominate on bidding documentation.

Organizational Design/Human Resources. Contractors are also responsible for developing organizational and human resource elements of the solution recommended by the subproject.

### 7.3.8 Methods for Successful Contractor Management

#### 7.3.8.1 Management Practices

Successful projects that involve contractors all exhibit similar characteristics. They all have clear and unambiguous contracts established that include a Statement of Work.

The efforts of all Contractors are integrated into a cohesive project plan with all Contractors understanding where their efforts fit into the overall picture.

The formal and informal interfaces between the beneficiary and the contractors will be documented.

Before starting specific work, the contractors will receive an "authorization to proceed". This authorization will be provided in writing, via a Work Authorization form. Authorization will be dependent on the completion of all necessary pre-construction surveys, the approval by KCC of Contractor CEMPs, all associated method statements relevant to the respective section and any further works KCC deem necessary prior to construction. Auditing requirements will be detailed and addressed in the plans listed in the Framework Management Plan.

A formal team building process is established and implemented.

These practices all contribute to reducing the risk of misunderstandings or isolationism.

#### 7.3.8.2 Environmental and Social and Health and Safety Reporting

Each week, the Contractors will prepare and deliver to the ESU weekly progress reports on environmental, social and health and safety performance. The report is to be delivery by noon on Thursday. The report will identify:

- (i) performance against KPIs
- (ii) incidents within the period and investigation findings
- (iii) planned activities

- (iv) a textual description of progress,
- (v) a list of internal milestones attained,
- (vi) a brief description of any problems encountered

## 7.4 Labor Management Sub-Plan

### 7.4.1 Overview of Labour Use on the Subproject

Under the World Bank Environmental and Social Standards (ESSs), on Labor and Working Conditions Labor Management Procedures (LMP) are required to be produced. The purpose of the LMP is to facilitate planning and implementation of the project. The LMP identify the main labor requirements and risks associated with the project, and help determine the resources necessary to address project labor issues. The LMP is a living document, which is initiated early in project preparation, and is reviewed and updated throughout development and implementation of the project. The project aims at responding to urgent and critical environmental issues and minimizing/mitigating public health and environmental risks. The interventions, more specifically designed towards the management and disposal of demolition waste generated from the damaged buildings and asbestos contaminated waste, rehabilitation of damaged solid waste infrastructure and technical assistance measures for their sustainable operation. In addition to the KCC Project Management Unit (PMU) staff who will be recruited on a part-time or full-time basis throughout the Project duration, it is estimated that around 70 workers (contracted through third parties) will be employed for implementing various Project subprojects. These workers will be local and international migrants above the age of 18. As for Primary supply workers, defined as those suppliers who, on an ongoing basis, provide directly to the project goods or materials essential for the core functions of the project, none have been identified at this stage. However, should any be identified at a later stage during Project implementation, this LMP should be updated accordingly.

### 7.4.2 Subproject Construction Related Activities

**Waste Collection and Transportation.** This will help improve and optimize solid waste collection and transport services in Khulna City Corporation, including collection containers and fleet, mechanical cleaning equipment, and transfer stations etc.

**Waste Processing and Disposal Systems.** This will finance prioritized waste processing and disposal infrastructure, including closure of polluted landfill sites, management of legacy waste, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), and provision of facilities related to composting, resource recovery, and waste-to-energy.

### 7.4.3 Potential Labour to be Used in the Subproject

Direct workers, contracted workers and community workers will be employed for the project. Two contractors may be engaged for the implementation of the project. One contractor will be engaged for construction of substations and another contractor for the construction of transmission lines. It is assumed that contractors will not start all the construction activities at the same time. Rather contractor will start work in a site and after completing each site he will start another site. Moreover, due to the linear type of project, it is not expected that there will be high concentrate of workers at the same place and at the same time. So, no severe labor influx is expected. It is assumed that 20 labors will be required during normal operations and 30 labors will be required during peak operations. The nationality of labors during construction phase comprises of Foreign (maximum 4) and remaining from domestic. During operation phase, maximum 16 nos. of manpower would be of local (PGCB). So, it is expected that the total number of labors may not exceed 50 at any sub-project areas due to the phase wise activities. As the unskilled labors will be hired locally, no severe labor influx is expected at any time of the construction. It is assumed that about 50% of the labor will be migrant, for which accommodation will be required. The migrant workers and staff will be accommodated on-site at temporary labor camps or in rented houses in surrounding villages of the Project. Local workers will be employed for carrying out civil works and other masonry works. Setting up of labor camps is not envisaged during the construction phase of the Project. Moreover, temporary tent would be made near the towers and substations area to provide the security of construction machineries.

#### 7.4.4 Key Labour Risk

The main labor risks identified in this subproject are associated with the Rehabilitation of Damaged Solid Waste Management Infrastructure and Management of contaminated Debris. These include:

- Disturbance of asbestos contaminated waste such as demolition work, rubble moving operations and heavy vehicular movements over contaminated waste is likely to expose operatives undertaking this work, and those in close proximity (within 20m) to the management site. Inhalation of dust, gaseous substance or aerosols from removal and transportation of asbestos material can cause serious health risks to workers.
- Occupational accidents and injuries to workers from several management activities (use of crushers and other machinery and equipment)
- Working conditions, such as excessive work hours, delayed or inadequate payment of wages and insufficient insurance coverage
- Health risks related to exposure to waste for collection, sorting, recycling and composting workers
- Accidents during removal, transportation and disposal of asbestos-contaminated waste.
- Discrimination of unequal employment opportunities likely incidents of child labour or forced labor
- Risks of labour influx and potential occurrence of gender-based violence and sexual exploitation and abuse/sexual harassment (SEA/SH) incidents
- General understanding and implementation of occupation health and safety requirements
- Inadequate Grievance Mechanism (GM) to handle complaints and concerns for all the Subproject Workers.

#### 7.5 Traffic Management Sub-Plan

When working on roadside construction, it is important to have a traffic management plan in place to ensure the safety of both the workers and drivers in the area. A traffic management plan template can help us create a safe work zone and manage traffic flow around our construction site.

According to Safety, Health, and Welfare at Work (Construction) Regulation, to carry out any construction/maintenance work on any public roads, a contractor shall develop a traffic management plan to ensure the safety and health of the road workers and road users. A traffic management plan/temporary traffic management plan (often shortened to a "TMP" or "TTMP") is essentially a suite of documents that give details on the proposed measures which are to be implemented to ensure the safety and integrity of the road workers and road users whilst the construction work is being carried out. These documents shall be prepared by an experienced Temporary Traffic Management Designer with a valid certificate and knowledge of the current legislation.

To ensure compliance, the Traffic Management Designer must carefully consider the characteristics of the site and develop a traffic management plan which best addresses the site constraints in a safe manner in so far as is reasonably practicable by the application of the following:

- The Traffic Signs Manual.
- Temporary Traffic Management Design Guidance.
- Temporary Traffic Management Operations.

A traffic management plan aims to promote safety and efficiency during construction activities. Having a plan can avoid potential hazards and disruptions to traffic flow. The traffic management plan should be submitted to the relevant Local Authority for approval prior to carrying out any roadworks on public roads.

##### 7.5.1 Elements of the traffic management plan

A traffic management plan is a document that outlines the steps that a construction site needs to follow to manage the flow of traffic around a construction site safely. The plan should consider the type and location of the construction, as well as the expected traffic volume.

The traffic management plan needs to cover the design, implementation, maintenance, and removal of the temporary traffic management (often shortened to “TTM”) measures to minimize the risk of accidents while the roadworks activity is carried out. At a minimum, the traffic management plan shall address the following:

- Duration of Works
- Hours of Work
- Subproject Details
- Traffic Management System
- Traffic Management Layout/Drawing
- Phasing of Works
- Traffic Management Signage
- Speed Limits
- Road Level
- Design Parameters
- Site Access & Egress
- Communication and Emergency Procedure

The key elements of a traffic management plan template:

- **The type of construction work that will take place:** This is important information for drivers as it will help them know what to expect when traveling through the work zone.
- **The construction site’s location:** This will help drivers plan their route and avoid the construction area if possible.
- **The expected traffic volume:** This will help us determine the necessary traffic control measures.
- **A diagram of the construction site and proposed traffic flow:** This will help drivers understand the traffic control measures that are in place.
- **The contact information for the project manager:** This is important in case there are any questions or concerns about the traffic management plan.
- **The traffic control measures that will be in place:** This includes things like road closures, detours, and lane closures.
- **Proposed measures to control traffic around the construction site:**
  - **Road closures:** We may need to close a section of the road to construction traffic. This will help ensure the safety of both drivers and workers.
  - **Detours:** We may need to set up a detour around the construction site. This will help reduce traffic congestion and allow drivers to avoid construction.
  - **Lane closures:** We may need to close a traffic lane to construction vehicles. This will help reduce the risk of accidents and ensure the safety of both drivers and workers.
  - **Traffic signs:** We will need to place traffic signs around the construction site. These signs will help drivers understand the traffic control measures that are in place.
  - **Traffic cones:** We will need to place traffic cones around the construction site. These cones will help drivers understand the traffic control measures that are in place.
  - **Barricades:** We will need to place barricades around the construction site. These barricades will help drivers understand the traffic control measures that are in place.

- **The appropriate signatures that indicate approval of the plan:** This shows that the traffic management plan has been reviewed and approved by the relevant authorities.

The traffic management plan shall be prepared according to the latest legislation and shall be included in the Safety and Health Plan of the project.

### 7.5.2 The Traffic Management System

A traffic management system (traffic control method) is essentially the type of traffic control measure which is to be implemented to direct vehicles and pedestrians around the works whilst ensuring the safety of road workers. Some methods of traffic control are:

- Priority
- Stop & Go
- Two-Way Traffic
- Give & Take
- Temporary Traffic Signals
- All Stop & Convoy
- Road Closure
- Lane Closures
- Semi-Static Operations
- Mobile Lane Closures

### 7.5.3 Layout of a temporary traffic management layout

A temporary traffic management layout (TTML) is a drawing that outlines the traffic control measures which are to be implemented and gives details on the type of control which should be implemented, safe movement of pedestrians, type of delineation device, safety barriers, etc. Contractor should produce the highest quality traffic management layouts/drawings which come with the traffic management plans and would have a guaranteed success rate of approval from the Local Authority. All temporary traffic management layouts/drawings will be easy to read by the construction workers and can be completed at any scale required by the subproject (e.g., 1:500), and with a fast turnaround time.

### 7.5.4 Purpose of a Traffic Management Plan

A traffic management plan aims to promote safety and efficiency during construction activities. Having a plan can avoid potential hazards and disruptions to traffic flow. A traffic management plan should consider the construction type, location, and expected traffic volume. The plan should also outline the steps to safely manage traffic flow around the construction site.

### 7.5.5 Benefits of Having a Traffic Management Plan Template

The construction contractors won't realize the importance of having a traffic management plan template until they need it. A traffic management plan can promote many benefits and convenience for the construction subproject.

### 7.5.6 Staying Organized and on Track

A traffic management plan template ensures that the construction subproject stays organized and on track. A traffic management plan can help keep track of the different elements of the construction subproject, including the construction site's location, the expected traffic volume, and the traffic control measures in place. All this information will be readily available in one place, making it easier for contractor to ensure that the construction subproject is proceeding as planned without much traffic hindrance.

### 7.5.7 Avoidance of Delays

Without a clear traffic management plan, the construction project will likely experience delays. This is because it will need to take the time to develop a traffic management plan on the fly, which can take away from other

aspects of the construction subproject. With a traffic management plan template, contractor can develop a traffic management plan ahead of time, which will help contractor avoid any potential delays down the road.

### 7.5.8 Ensuring the Safety of Drivers and Workers

One of the most important benefits of having a traffic management plan is that it can help ensure the safety of the both drivers and workers. With a traffic management plan in place, we can be sure that the appropriate traffic control measures will be in place to protect both drivers and workers from accidents. This is especially important as the construction project located on a busy road. A traffic management plan can also help workers know the traffic control measures in place, which will help them stay safe while working on the construction site.

### 7.5.9 Reduction of Traffic Congestion

Another benefit of having a traffic management plan is that it can help reduce traffic congestion. This is because we will be able to develop a plan that includes detours and lane closures, which can help reduce the amount of traffic going through the construction site. This will help minimize the construction project's impact on the surrounding area and make it easier for drivers to get around. As we can see, a number of benefits come with having a traffic management plan template. If we are planning a construction subproject, be sure to develop a traffic management plan to help ensure the safety of both drivers and workers and to keep our project on track.

### 7.5.10 Construction Traffic Control Measures

A construction traffic control measures might look like the following:

- Construction work will be taking place on main street between the hours of -
- Traffic will be diverted to side streets during construction hours.
- Drivers will be advised to use caution when driving in the area and to obey all traffic laws.
- Pedestrians will be advised to use caution when walking in the area and to obey all traffic laws.
- The construction site will be marked with signs and cones.
- Traffic control measures will be in place to ensure the safety of both drivers and workers.
- These measures will be in place until the construction subproject is completed.

## 7.6 Biodiversity Management Sub-Plan

Biodiversity or biological diversity, is the variety of living organisms, from genetic diversity through species, to higher taxonomic levels, which is the classification of plants and animals according to their presumed natural relationships, and includes the variety of habitats, ecosystems, and landscapes in which the species are found. The definition also includes "the interactions that sustain each species, such as predator-prey relationships, and the physical processes on which life depends, including chemical and nutrient cycling, water filtration, and climate regulation."

Biodiversity is composed of species, the genes they contain, the communities and ecosystems they form, and the processes that connect them.

A Biodiversity Management Plan (BMP) is an implementation plan for conserving, restoration, and enhancement of biodiversity value. The BMP establishes the objectives and defines the management measures required to achieve the intended results.

Project construction activities have the potential to generate a wide range of environmental impacts on ecologically valuable receptors including designated sites, sensitive habitats and protected species. Examples of such impacts include (but are not limited to)

- Vegetation loss and conversion including impacts to habitats supporting notable species;
- Felling of trees and effects on roosting bats and nesting birds;
- Loss of ponds and impacts to watercourses with associated amphibians and fish; and
- Disruption of large mammal movements.

The subproject seeks to proactively address such impacts and proposes to use an adaptive management approach (plan-do-check-act-replan) to reduce their potential severity, based around the use of 'Biodiversity Specialists' to clear the route prior to removal of any vegetation.

### 7.6.1 Objectives of Biodiversity Management Plan

The objective of this BMP is to reduce the impact of the Project activities on biodiversity at and surrounding the Project through,

- Identifying the key biodiversity issues that require control measures
- To study the existing anthropogenic stresses on the prevailing ecosystem
- Developing strategies to manage impacts on biodiversity and implementing those strategies
- Assigning responsibilities for impact monitoring and management
- Providing sufficient information to assist with auditing the implementation of the BMP; and
- Establishing a biodiversity monitoring program and management measures

### 7.6.2 Purpose of Biodiversity Management Plan

Subproject activities can create negative outcomes on the ecological environment through which some of the areas as highly sensitive and highly valued ecological sites exhibiting a wide range of biodiversity. This BMP therefore,

- Covers identified impacts upon biodiversity
- Details specific control measures to be implemented
- Outlines actions and measures necessary for the effective management of biodiversity along the route
- Incorporates the requirements of the study findings, international standards, legislation, and Project-specific permits conditions

### 7.6.3 Scope of the Biodiversity Management Plan

This EMP covers all construction activities and is applicable to all CCAUD staff, Contractors and Sub-contractors. Whilst this EMP will act as a 'framework' to determine what the Contractors will be expected to produce, Contractors are required to ensure that all the EMP requirements are adopted within their own management plans.

### 7.6.4 Methodology of Biodiversity Management Plan

- The impact due to construction phase and operation phase of the subproject and its activities on the ecological parameters like natural vegetation, fisheries and aquatic life, forests and species diversity. Ecological Impact Assessment considered the following stages:
- Identification of the likely zone of influence arising from the whole lifespan of the subproject; assessment of the ecological impacts of the subproject and definition of the significance of these impacts.
- Identification and evaluation of ecological resources and features likely to be affected. Identification of the biophysical changes likely to affect valued ecological resources and features;
- Assessment of whether these biophysical changes are likely to give rise to a significant ecological impact, defined as an impact on the integrity of a defined site or ecosystem.
- The conservation status of habitats or species within a given geographical area, including cumulative impacts.
- Refinement of the project to incorporate ecological enhancement measures, mitigation measures to avoid or reduce negative impacts, and compensation measures for any residual significant negative impacts.

- Provision for monitoring and following up the implementation and success of mitigation measures and ecological outcomes, including feedback in relation to predicted outcomes.

When describing changes/activities and impacts on ecosystem structure and function, reference will be made to the following parameters

- (i) Magnitude of Impact
- (ii) Extent
- (iii) Duration
- (iv) Reversibility
- (v) Timing and frequency

## 7.7 Nirala Khal and Pond Water Hyacinth Management Sub-Plan

### 7.7.1 Controlling of Water hyacinth

There are several popular control mechanisms for preventing the spread of, or eradication of, water hyacinth. The 4 main mechanisms used are biological, chemical, physical control and Run-off control. Each has its benefits and drawbacks. Chemical control is the least favoured due the unknown long-term effects on the environment and the communities with which it comes into contact. Physical control, using mechanical mowers, dredgers or manual extraction methods, is used widely but is costly and cannot deal with very large infestations. It is not suitable for large infestations and is generally regarded as a short-term solution. Biological control is the most widely favoured long-term control method, being relatively easy to use, and arguably providing the only economic and sustainable control. Below we will briefly discuss each of these methods.

#### 7.7.1.1 Biological Control

Biological control is the use of host specific natural enemies to reduce the population density of a pest. Several insects and fungi have been identified as control agents for water hyacinth. These include a variety of weevils, moth and fungi. Biological control of water hyacinth is said to be environmentally benign as the control agents tend to be self-regulating. Control programmes are usually inexpensive due to the fact that the control agents are known and only a small number of staffs are required to run such programmes. One major drawback is that it can take a long time to initiate such projects because it can take several years for the insect population to reach a population density sufficient to tackle the pest problem.

#### 7.7.1.2 Chemical Control

The application of herbicides for controlling water hyacinth has been carried out for many years. The common herbicides are 2,4-d, Diquat and Glyphosate. It has been found that there is a good success rate when dealing with small infestations but less success with larger areas. Application can be from the ground or from the air and requires skilled operators. As mentioned earlier the main concern when using herbicides is the environmental and health related effects, especially where people collect water for drinking and washing.

#### 7.7.1.3 Physical Control

Mechanical removal of water hyacinth is seen as the best short-term solution to the proliferation of the plant. It is however costly, using either land-based 'clamshell' bucket cranes, draglines or booms or, alternatively, water-based machinery such as mowers, dredges, barges or specially designed aquatic weed harvesters. Such methods are suitable for only relatively small areas. Many of these techniques require the support of a fleet of water and land-based vehicles for transporting the large quantities of water hyacinth which is removed. Mats of water hyacinth can be enormous and can have a density of up to 200 tonnes per acre (Harley, Julien and Wright, 1997).

Manual removal of water hyacinth is suitable only for extremely small areas. It is difficult, labour intensive work and in some areas, there are serious health risks associated with the work (snake for example).

Transportation of the harvested weed is also costly, because it has such a high-water content. Chopping can reduce the volume and the water content.

#### 7.7.1.4 Reduction of Nutrient Run-off into the Water

Besides these three mainstream forms of control Harley, Julien and Wright suggest another method, namely the reduction of nutrient inputs to the water. Although strictly speaking this is a preventative method, it can be argued that a reduction in nutrients in the water body will result in a reduction in the proliferation of water hyacinth. In recent decades there has been a significant increase in the level of nutrients dumped into waterways from industrial and domestic sources as well as from land where fertilisers are used or where clearance has caused an increase in run-off. It seems that the systematic use of successive vetiver hedges along the river and lake beds, beside the positive impact on the bank protection, shows positive results in retaining nutrients, pollutants and sediments from the run-off to flow in the water.

### 7.8 Pond Restoration and Management Sub-Plan

Ponds support about two thirds of all freshwater species, while also providing non-aquatic animals such as mammals and reptiles with food and water. Like many forms of habitat, the UK's ponds have come under increasing pressure from agriculture and development. An estimated 50% of ponds vanished in the 20th century and many of those that remain are in a poor or neglected state. Suffolk Wildlife Trust hopes to improve the health of the region's ponds to create a spectrum of aquatic zones in which a myriad of creatures can find the right kinds of spaces to flourish. We hope the resources below will help you understand, restore and appropriately manage or create your pond

A Suffolk pond in good health is an incredibly rich and varied habitat for wildlife. When the environmental conditions are right, an array of different plant species grow in abundance, creating a spectrum of aquatic zones in which a myriad of different creatures manage to find the right kinds of spaces to flourish.

Managed in the right way, a pond will quickly respond. But before you set about attempting to restore a pond to its natural state and allow it to become a refuge for wildlife, it is vital to establish what factors are affecting it.

#### 7.8.1 Identification of Problems

Ponds in different situations vary enormously in the wildlife they support and even weather conditions can affect the dominance of certain pond plants in a given year, and therefore its appearance and associated wildlife.

The condition or health of a pond can be affected by a number of factors. Water can become murky or smell foul, become shaded by surrounding trees or shrubs, or get taken over by invasive emergent vegetation, which effectively dries out the open water. These changes will inevitably lead to a reduction in the wildlife – both in terms of population size and diversity of species.

The primary indicator of pond health is an abundance of underwater vegetation composed of several different plant species. The most important single factor contributing to a pond's health is an abundance of varied plant cover, both underwater and growing out of it, but particularly under water. It is the plants that attract animal life and create favorable conditions for it.

#### 7.8.2 Sources of Problems and Nutrient Build-up

Try and avoid the temptation of tackling the symptom and ignoring the cause. Although in some cases you will want or need to remove excess algae, duckweed or blanketweed, it is useful to establish how the nutrients that caused the problem built up in the first place to prevent a reoccurrence.

The source of the nutrients may be close to the pond (as in a septic tank overflow) or far away (as in agricultural rainwater run-off carried to the pond via a ditch). If you can, investigate where the water that fills the pond comes from, to see whether the water is picking up nutrients before it gets to the pond.

### 7.8.3 Pond Restoration

Manage trees and shrubs to maintain an open and sunny pond. Pond size will influence how many trees and shrubs can be left around a pond. Aim to keep 70% of the pond edges open and sunny to allow plenty of sun into the pond and for emergent plants such as water mint to grow in the shallow margins of the pond.

Avoid felling or removing old, historically important or landscape feature trees to open up a pond. It may be better to concentrate efforts on another nearby pond than to harm an ancient tree. Alternatively consider pruning just a few lower branches that cast the most shade and accept that regular leaf removal may be required to avoid the buildup of leaf litter if the tree remains.

Coppicing pond margins in late winter could be done on a rotation of several years (say, one third every two years) on a large pond to ensure there is always some shrub growth, but on a small pond the edges may need flailing every other year to keep the pond open and minimise leaf litter. To reduce the amount of coppicing required, yet provide some standing dead wood and useful system of tree roots next to the pond, consider treating stumps with a herbicide to prevent regrowth. Elsewhere, for young trees and shrubs only, consider removing stumps when de-silting the pond.

## 7.9 Stakeholder Engagement Sub-Plan

According to KfW, this stakeholder engagement plan will apply to all components of the proposed programme and all third parties are expected to adhere to this as they execute their assigned activities.

### 7.9.1 Objectives of SESP

The objectives of this stakeholder engagement plan are;

- To identify all project stakeholders including their priorities and concerns
- Identify strategies for information sharing and communication to stakeholders as well as consultation of stakeholders in ways that are meaningful and accessible throughout the project cycle
- To specify procedures and methodologies for stakeholder consultations, documentation of the proceedings and strategies for feedback
- To establish an accessible, culturally appropriate, transparent and responsive grievance mechanism for the project
- To develop a strategy for stakeholder participation in the monitoring of project impacts and reporting or sharing of results among the different stakeholder groups
- To offer opportunities for stakeholders to raise their concerns and submit their opinions.
- To create avenues for complaints handling and grievance management.
- To create opportunities for information sharing and disclosure
- To create a mechanism for giving feedback to the stakeholders
- To create an avenue for participatory project impacts monitoring
- To foster strong project community relationships
- To promote social acceptability of the programme
- To ensure meaningful consultation and the consideration of expectations and concerns into the implementation arrangements for the programme

### 7.9.2 Regulations and Requirements

The Stakeholder Engagement Plan is developed as a result of the need to comply with the EIA and Audit Regulations (2005), Land Act (1999), Village Land Act (1999), Land Disputes Courts Act (2002), Land (Compensation Claims) Regulations (2001), Graves Removal Act (1969) and the KfW/IFC/GCF safeguard policies. All these instruments unanimously advocate meaningful involvement of project stakeholders in decisions that affect them, participatory planning and transparent grievance management mechanisms.

### 7.9.3 Stakeholder Involvement in Project Management

Key stakeholders will be invited to form part of the planned programme steering committee. The SC will be responsible for the strategic direction of the programme, oversight of the PMU as well as approval of the Operations and Financial Manual, the Annual Work and Procurement Plans and financial and technical reporting. For a government run programme it is mandatory to involve all institutional stakeholders, according to their responsibilities, in the programme preparation and implementation.

### 7.9.4 Stakeholder Involvement During Implementation

During the implementation of the programme, non-governmental organizations, citizens groups, faith-based organizations like churches, traditional authorities, farmer associations, irrigation organizations shall be consulted. Since all programme activities take place on urban level and require the active participation of the beneficiary stakeholder involvement has to take place in all communities involved in programme activities.

### 7.9.5 Previous Stakeholder Engagement

At various stages during the preparation of the feasibility study a variety of stakeholders were consulted in order to discuss the design and scope of the programme and to hear the opinions of stakeholders. During the various consultations the following topics were addressed and findings incorporated into the feasibility study:

### 7.9.6 Stakeholder Engagement Strategy

The proposed stakeholder engagement program focusses on the time period beyond the Feasibility study of the program all the way through implementation phase. The SEP should be read together with the Feasibility study and the ESMF which elaborate the interaction between the different institutions during the implementation phase. The SEP will mainly focus on project engagement with lower level stakeholders that are not part of the project organization. Envisaged activities include the following:

- Mobilization benefitting communities for project start and implementation (information, sensitization, mobilizing participation)
- Identification of critical issues (land, proper involvement of vulnerable groups)
- Grievance management
- Implementation phase related supervision and monitoring
- Implementation of the Environmental and Social Management Framework

### 7.9.7 Stakeholder Engagement Process

The value additional stakeholder engagement brings forth in terms of better decision outcomes depends to a significant extent on how well the consultation process has been planned, organized and executed. Under the aegis of the PMU (ESM-officer) the following steps will be followed in the planning and implementation of specific stakeholder engagement or consultation plans:

**a.** Defining the objective of the consultation: This is the why aspect which needs to be answered a priori. This means the facilitators (LGA officers) need to be very clear about the programme, and the key messages and promises to the stakeholders. It's also important to define the specific results which are expected out of the consultation (consent, buy-in).

**b.** The PMU needs to identify and create a database of possible stakeholders: that might have a stake in the project or issue under consideration. The process needs to be refined by characterizing and ranking them in terms of their relevance, interest, influence etc. Short list participants for invitation on that basis of the screening exercise. This addresses the "who aspect" (who will take part).

c. It's necessary to define the issues to be discussed: This is the crux of the consultation. Stakeholders have been invited and come to the meeting to learn (and influence) about what is going to happen, why it is happening, how it is going to affect them, to voice their fears, concerns, and contributions etc. The principles outlined in the above section need to be taken into consideration i.e. inclusiveness, transparency, integrity, etc. This address "the what aspect". Also, here it is important to clearly work out ahead of time and prepare the information requirements for the consultation.

d. It's further important for the PMU to work out the communication and dissemination arrangements: Stakeholder consultation is in many ways about sharing accurate information - about providing information and receiving feedback and disseminating and reporting results. Here decision has to be made about the type of medium to be used is appropriate for the stakeholders - Forums, bill- boards, local TV, radio, web related low barrier formats, written communication materials, etc. This aspect also includes a monitoring exercise to follow and report what happened to or with the stakeholder inputs.

e. Facilitators (LGA officers) also need to arrange the appropriate venue and time: This is about logistics, how long and where the consultation is to take (limiting transaction costs for participating beneficiaries), including determining the required resources, human as well as financial - budgeting, identifying the right persons to organize the consultation. This takes care of the "when" and "where" aspects.

f. The PMU in collaboration with the facilitators (LGA officers) also needs to keep in mind how the consultation is to happen: Who is going to do the facilitation? Does the consultation require expert persons and resources? Does the consultation require third party participation? How records are to be kept? How is the consultation to be documented? These and related questions need to be answered very concretely. This will take care of the "how" aspect of the consultation.

### 7.9.8 Stakeholder Analysis

As per KfW's Project Implementation Agency Analysis Guideline the following framework is used for stakeholder analysis (Figure 7.5)

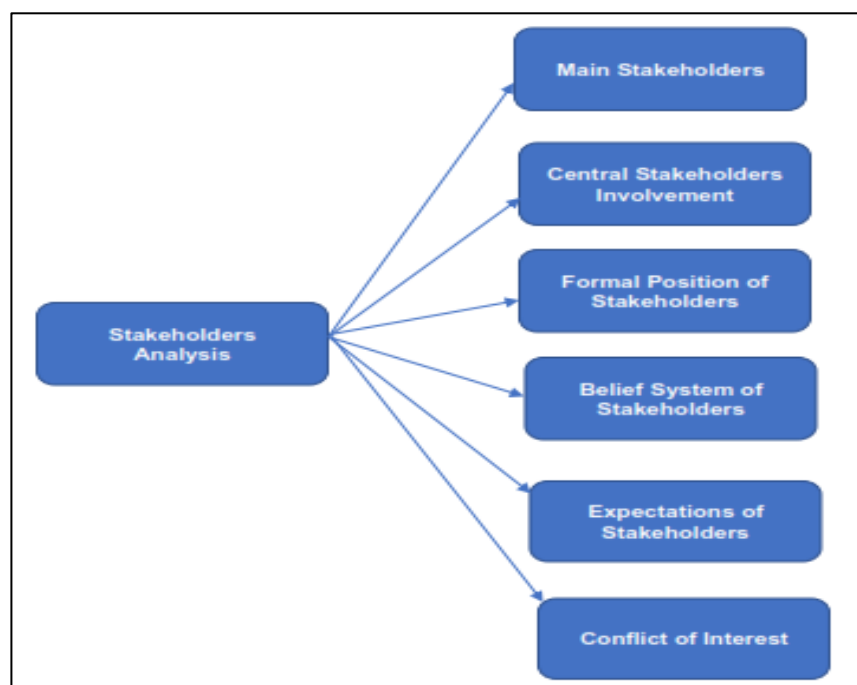


Figure 7.5 Stakeholder Analysis Framework

### 7.9.9 Main Stakeholders

The stakeholders of the project are categorized in three tiers. Stakeholders identified in Tier 1 and Tier 2 are the main stakeholders implementing and influencing project implementation.

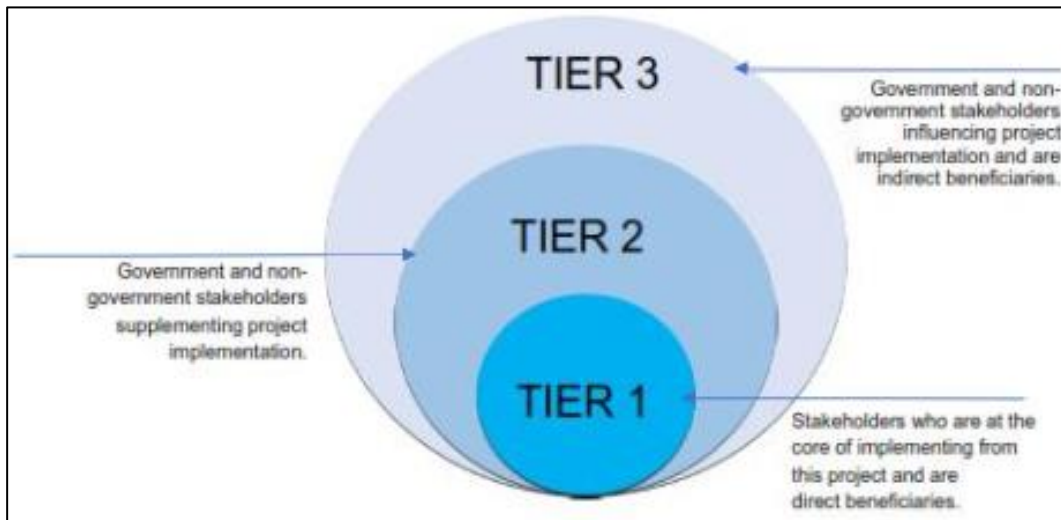


Figure 7.6 Three Tiers of Stakeholders

Table 7.3 Stakeholders Relevant to the Project by Tier

Tier 1	Tier 2	Tier 3
<p><b>1. Khulna City Corporation (KCC)</b>  - Main project implementing organization in Khulna  - Office of Mayor and CEO are main internal departments responsible for management and supervision.  - Engineering is main internal department responsible for infrastructure construction, O&amp;M mainly drainage repair.  - Conservancy is main internal department plays critical role in SWM, O&amp;M mainly drainage cleaning.</p> <p><b>2. Local Government Division (LGD), Ministry of LGRDC</b>  LGD division in LGRDC is the main central department that plays critical administrative role supervisory body over Khulna city corporation.</p> <p><b>3. KfW, German government</b>  - KfW through central Germany and country office in Bangladesh is the main financier of the project.</p> <p><b>4. Khulna city inhabitants</b>  - Individuals, small businesses, entrepreneurs and local groups are main beneficiary of this project.</p>	<p><b>1. Khulna Development Authority (KDA)</b>  - Autonomous institution under Ministry of Housing and Public Works responsible for urban development of Khulna.</p> <p><b>2. Khulna WASA (KWASA)</b>  - Independent government institution responsible for water and sewage in Khulna.</p> <p><b>3. Deputy Commissioner (DC)</b>  - Institution under Ministry of Public Administration responsible for land acquisition processes in Khulna.</p> <p><b>4. Khulna Zilla Parishad</b>  - Local government agency responsible for rural development in Khulna.</p> <p><b>5. Bangladesh Water Development Board (BWDB)</b>  - Central government agency involved in protection embankment system of Khulna.</p> <p><b>6. Bangladesh Inland Water Transport Authority, BITWA</b>  - Government agency owning and operating all riverfront land in Khulna.</p> <p><b>7. Department of Environment, Khulna</b>  - Local government agency responsible for enforcing environmental laws in Khulna.</p>	<p><b>1. Local Government Engineering Department (LGED)</b>  - Government agency responsible for development rural, urban and small-scale water infrastructure in Khulna.</p> <p><b>2. Department of Disaster Management (DDM)</b>  - Central government agency responsible for disaster risk management.</p> <p><b>3. Department of Agricultural Extension (DAE)</b>  - Government agency responsible for expansion of agriculture for e.g. climate resilient farming policy support to farmers.</p> <p><b>4. Khulna University (KU) and Khulna University of Engineering and Technology (KUET)</b>  - Regional public universities with specific departments containing specialists on urban planning and infrastructure.</p> <p><b>5. Khulna Agricultural University (KAU)</b>  - Regional public university with specific departments containing specialists on climate change affected agriculture.</p>

#### 7.9.10 Central Stakeholders' Involvement at National and International Level

KCC being the most important central stakeholder are administratively subordinate to Local Government Division (LGD), Ministry of LGRDC. To develop and implement projects and seeking funding, KCC has to take administrative permission from LGD, MoLGRDC. KCC Mayor and CEO are authorized to issue instructions to department heads of vital Engineering and Conservancy departments as well as the Ward Councilors, responsible for each ward in Khulna city. KCC does not have any competition at national or sectoral level. However, there are other government agencies who supplements and cooperates with KCC on common work agenda. These stakeholders are listed in Tier 2 and Tier 3. KCC has experience in working with DFID, World Bank, ADB and KfW funded projects. KCC did not have any direct cooperation with KfW and no prior experience in using KfW standards/guidelines for project implementation. However, precedence of donor adopted guidelines by KCC has happened in ADB and World Bank funded projects.

#### 7.9.11 Formal Position of the Central Stakeholders

Ministry of LGRDC through their Local Government Division and through KCC has the formal mandate to lead initiatives such as climate change adaption and urban infrastructures in Bangladesh and specifically Khulna. The government over the last 2 decades through Ministry of LGRDC and LGD has taken initiatives to implement

climate change adaptation projects throughout the country. To set targets, develop projects as such as well as the funding, LGRDC have partner up with international donors to supplement the local knowledge and mitigate the capacity gap within the government on climate change adaption measures.

### 7.9.12 Belief System of the Central Stakeholders

Given the limited capacity, knowledge and funding for climate change adaptation, government institutions at central and local level rely on the guidance and expertise international donors bring to the table. Sustainable capacity building related to developing and managing climate change adaptation projects at central level seems to have been given priority, but at local level there appears to be a lack of technical knowledge of local government staff to deal with these types of projects. Among other factors, the perception that such knowledge and skills can only be acquired and provided through donors has led to poor management of infrastructure post donor affiliation when a project ends. In designing such projects in the future, this belief system needs to be scrutinized to ensure sustainability of infrastructure and fund effectiveness.

### 7.9.13 Expectations of Central Stakeholders from the Project

At central ministry level the expectations from such projects are: a) that the mitigate the overall and specific challenges faced due to climate change in Bangladesh, b) contribute to the overall socio-economic development plan of the government.

For any infrastructure projects, there is a certain risk of corruption present at the local level organizations. Having a strong political figure as city representative, will reduce the risk of political corruption to certain extent. To reduce organizational risk, executing agency can benefit from project preparation and implementation support from donors to design a holistic project implementation and management system that can be integrated at the local level organizations. To bring organizational behavioral change, the current government is developing a better talent attraction system and better employee benefit system for government jobs. Such initiatives taken now, will reduce the propensity of corruption in longer run.

### 7.9.14 Conflict of Interest

The two major types of conflicts identified are organizational and political. In Khulna, there are multiple agencies working towards similar goals. Absence of coordination among these organizations may create confusion and project implementation delays. Further, at local level, there is influence of local political leaders over organizations and inhabitants. Intentions of financial gains from political leaders may delay project implementation and operation.

**Table 7.4 Types of Conflicts Associated with Project Components**

Types of conflict	Stages of the project and subcomponents			Type of Stakeholder	Needed Corrective measures
	Formulation	Implementation	Operation		
Organizational	Multiple government organization involvement (e.g. River boundary pillar located within property line at some points along Moyur river).	No mechanism regarding the maintaining communication during the implementation of activities among government agencies.	The process of decision making is not clear, and locals perceive it was corruption (e.g. committee for gate operation)	1 <sup>st</sup> priority KDA, KWASA, DC Khulna. 2 <sup>nd</sup> priority LGED, KU, KUET, Khulna Zilla Parishad BIWTA, BWDA, DoE. 3 <sup>rd</sup> priority DDM, KSL, DAE	Coordination mechanism between agencies through central ministries and local agencies such as District Commissioner office is present. Reducing communication gap among the authorities is a must.
Certain degree of influence of local politicians over	Involvement of local political leaders	Multiple local political leaders seeking to	Influencing operations by offering illegal	Ward Councilor, Political leader, local	Strong involvement of mayor in tackling different local pressure groups. Transparent decision

Types of conflict	Stages of the project and subcomponents			Type of Stakeholder	Needed Corrective measures
	Formulation	Implementation	Operation		
institutions and citizens		ensure financial gain.	financial incentives – as claimed by members of the community	representative groups	making and resource allocation process for project implementation and operation. Effective mechanism for land allotment process and avoidance of disputes

**KCC and KDA relationship.** Previously the relationship between KCC and KDA has had some tensions. However, the tension in this relationship has lessened in recent times. As informed by KCC, for project implementation, both KCC and KDA inform each other about their projects in their monthly General Meeting and bi-monthly Board Meeting respectively. Both send their representatives (either a Planner or a senior Engineer) to these meetings regularly. And despite the historical stained relation between both, their administrators, planners from both organizations regularly share each other's ideas and concerns for both formally and informally. Presently, following the appointment of new KDA Chairman, the number of meetings and joint site visits have visibly increased. However, no additional formal mechanisms apart from these meetings have been visible from either side.

**CCAUD Stakeholder Coordination.** Given CCAUD project implementation will require coordination among the stakeholders, a Project Coordination Committee (PCC) has been formed in January 2020 to provide advisory supervision/guidance in this feasibility phase. However, the adaption of this PCC into a full-fledged Stakeholder Coordination Committee (SCC) with representatives from key stakeholder organizations will be needed. Details of formation of such a SCC is proposed in Chapter 7 of this report.

## 7.10 Grievance Redress Mechanism (GRM)

### 7.10.1 General

Grievance Redress Committees (GRC) will be an instrument where the communities will exercise their basic rights of participation in the project cycle through suggestions and complaints. GRCs also be a para legal court of the sub-project at the Ward level to address local problems and complains related to social and environmental impacts as well as procurement and construction quality issues. Based on consensus, the procedure will help to resolve issues/conflicts amicably and quickly without resorting to any expensive, time-consuming legal actions.

Project-affected-people for the KfW funded construction activities in the CCAUD project and any other stakeholder may submit comments or complaints at any time by using the project's Grievance Redress Mechanism (GRM).

### 7.10.2 Objectives of the GRM

The GRM will be accessible to all Internal, external, regional and international stakeholders, including affected people, community members, civil society, media, vulnerable people and other interested parties. External stakeholders can use the GRM to submit complaints, feedback, queries, suggestions, or even compliments related to the overall management and implementation of the CCAUD-KfW project. The GRM is intended to address issues and complaints in an efficient, timely, and cost-effective manner.

The overall objectives of the GRM are:

- To create a mechanism through which affected people can communicate their dissatisfaction or grievances;
- To create a mechanism through which the project will be able to pick-up all the complaints;

- To create a mechanism through which the project will systematically, promptly and exhaustively respond to peoples' complaints;
- To create avenues through which affected people and the program can come together in order to solve problems and handle issues arising.
- To provide a transparent process for timely identification and resolution of issues affecting the project and people, including issues related to the environmental impact, resettlement and compensation program.
- To strengthen accountability to beneficiaries, including project affected people.
- To compensation payment,
- To failure to fulfill commitments,
- To poor management of construction activities,
- To accidents due to inappropriate planning of sub-project implementation
- To cultural conflicts between migrant workers and local communities,
- To disturbance due to excessive noise or other nuisance during construction or operation to unfair treatment of workers or unsafe working conditions.
- To gender Based Violence and gender issues
- To complain on labor influx
- To complain or comment from different public, private and international stakeholders
- To complain, comments or suggestions from various stakeholders, labors, contractor.

Given the low impact of the program it is not very probable that people will become negatively impacted by the program. Any negative impact, however, needs to be mitigated promptly in order to avoid unnecessary tensions and conflicts. The strategy to be adopted will promote involvement of the lowest level authorities since they are easily accessible to the people. The strategy will also include a combination of the legal requirements and socially/customarily acceptable practices. Handling of grievances will be the joint responsibility of PMU or its authorized representative and the KCC.

The objectives of the grievance resolution mechanism will be:

- Grievances which are not specific to the program like land disputes. For this kind of grievances mechanisms are already in place. (Grievance Redress System)
- Complaints and grievances directly related to program implementation which can directly be addressed by the program management. (Complaints handling)

A designated person in the PMU should be assigned as the grievance manager. All grievances need to be recorded properly. If problems cannot be solved at the project level the grievance manager must ensure that appropriate follow-up takes place and is also documented.

Websites and printed material produced to enhance the program's visibility should also present the grievance mechanism and contact details (phone number, address, responsible person).

In order to keep track of stakeholder involvement, questions related to this topic should be part of the annual E&S reporting of the program and each related project. In order to obtain a clear and realistic picture it is recommended to follow a participatory monitoring approach.

### 7.10.3 Existing Grievance Redress Mechanism at KCC

Based on information from KCC, the existing grievance and complaints handling at KCC are described as follows. There is a complaint box under the office of the Mayor and the Chief Executive. Complaints can only be submitted via the complaint box and not via other means. A log of complaints received are kept at the office of the Mayor and the Chief Executive. There is no publicly advertised procedures of the complaints

mechanism and there is no appeal process. KCC provides mediation in cases where the Mayor deploys the concerned department or the Chief Executive to investigate the complaint. In such cases KCC act as a mediator.

#### 7.10.4 Public Grievance Mechanism During Construction Phase

KCC will establish a Grievance Redress Mechanism (GRM) supported by PMU and PIU for the construction phase to address complaints and grievances and to ensure these are handled in a systematic way.

During the construction phase, all communication on grievances from the public will be channeled through PMU and PIU. KCC should ensure that sufficient staff resources are available to manage the GRM. It is suggested that a dedicated team is appointed to ensure that problems and complaints arising during the construction period as well as concerns or complaints over services are handled by the same team. Complaints in construction may for example be related to noise, dust, local flooding due to construction, traffic, access issues, and working conditions for contractor workers. Grievances may also relate to resettlement issues arising in the pre-construction or during construction, including assets missed during the resettlement survey, valuation of the affected assets, delay in compensation payment, etc.

The grievance mechanism is described in the figure below. All grievances should be registered along with status of investigation into the issue and status of resolution, as applicable. The timeframes are important as they provide the complainant assurance of the complaints handling process and procedure and offers the general public transparency and accountability. The ability of the GRM to keep timeframes will be a key element in evaluation of the implementation of the GRM. KCC should appoint sufficient staff resources to ensure timeframes can be kept.

For each case a record sheet shall be filled in either by the complainant or by the PMU and PIU that receives the complaint. It should be possible to lodge grievances by phone, email, post, or through the KCC website. In addition, it may be considered to use an app, where people can lodge their complaints in order to make these more easily processable and directly link with location data. KCC should review the below suggested public grievance form before implementation.

#### 7.10.5 Public Grievance Mechanism During Operation

It is suggested to strengthen KCC's public grievance and complaint mechanism in operation by making the existing complaints handling similar to the GRM described above. During operation grievances will typically relate to the quality of the services and can be an opportunity for KCC to collect information about maintenance needs.

#### 7.10.6 GRM Contact Information of KCC

Information on the project and future stakeholder engagement programs will be available on the KCC's website and will be posted on information boards at KCC and at the construction sites. Information can be obtained from KCC's office.

#### 7.10.7 Participatory Monitoring and Evaluation

Assessing what has worked and what didn't help communities, agencies and civil society leaders to reflect on these experiences while designing future activities. Inclusive and participatory monitoring and evaluation is also necessary to minimise misconceptions and misunderstandings about the programme and maintain a positive perception about the program and project. Monitoring will be a joint effort from the PMU and the beneficiaries of the programme to assess to what extent impacts have incurred as planned and the effectiveness of mitigation measures. The monitoring of stakeholder engagement and the related successes and failures are also part of this exercise.

Field monitoring will verify:

- i) the biophysical and socio-economic impacts of the program;
- ii) implementation of the mitigation measures on the project;
- iii) positive and negative environmental and social impacts (if any) taking place in the project area including unplanned and unpredicted impacts; and
- iv) compliance and effectiveness of the SEP and the ESMF (which relate to each other) and application of the recommended standards including stakeholder engagement and implementation of the grievances/complaint's mechanism

Independent reviews of the project and the implementation of the ESMF will be conducted at the end of each year. The compliance assessment and performance review reports will be produced independently from the PMU and will be used as a monitoring and review tool to track ESMF results. In the review process, the PMU and district authorities will play the lead role in co-ordinating the process with key stakeholders.

The CCAUDP of KCC will establish a two-tier Grievance Redress Committee (GRC) for project implementation at the PMU Level and the Subproject Level. The primary goal of the GRCs will be to resolve grievances amicably and efficiently to ensure smooth implementation of civil works.

#### 7.10.8 GRC at PMU Level

If decisions made at the subproject level are deemed unacceptable by the complainants or aggrieved persons, the cases will be referred to the PMU. The GRC at this level will review the complaints and hearing details and decide the Project Director. If the decision at the PMU level remains unsatisfactory to the complainant, the case will be escalated to the Local Government Division (LGD) of the relevant ministry for further review and a final decision. Any decision accepted by an aggrieved person at any stage of the grievance process will be binding on KCC. It is important to note that the GRM does not override an individual's right to seek legal recourse in a court of law.

A PMU-level GRC has been adopted in the project and duly concurred by the KFW/World Bank. The committee will play a pivotal role in addressing and resolving grievances raised by affected persons. If any grievance remains unresolved at the subproject level, the case will be sent to the PMU level GRC where the Project Director will lead the committee and resolve the case. Among others, the committee includes the Social Offer (Member Secretary), the Environmental Officer of PMU CCAUDP as a member, and the Executive Engineer of PMU as a member (see **Table 7.5**).

**Table 7.5 Formation of Grievance Redress Committee at PMU Level**

S.N.	Designated Officer	Designation
1	Project Director	Convener
2	Executive Engineer in Charge of Work/Contract Package	Member
3	Social Officer of CCAUDP, PMU	Member Secretary
4	Environmental Officer of CCAUDP of PMU	Member
5	Social Safeguard Specialist of CCAUDP	Member

#### 7.10.9 GRC at Subproject Level

The subproject-level GRM will address grievances related to:

- 1) **Project-Affected Persons (PAPs)** – Those impacted by land acquisition and displacement from private or public lands.

- 2) **Workers' Issues** – Concerns of workers employed by construction contractors.
- 3) **Gender-Based Violence (GBV)** – Incidents occurring at construction sites.

The CCAUDP of KCC will establish multiple Grievance Redress Committees (GRCs) under the subproject-level GRM at locations that are easily accessible to affected individuals and workers. These GRCs will handle complaints regarding any irregularities in the application of provisions outlined in the Environmental and Social Management Framework (ESMF) and other project-related concerns. The GRCs at the subproject levels will have the following memberships (**Table 7.6**).

**Table 7.6 Formation of GRC at Sub-project Level**

S.N.	Designated Officer	Designation
1	Executive Engineer in charge of the Work/Contract Package	Convener (Non-voter)
2	An Elected Member of KCC (or Union Parishad/Upazila Parishad) / Nominated Officials by the KCC	Voting Member
3	An Elected Female Member of KCC (or Union Parishad/Upazila Parishad)/ Nominated Officials by the KCC	Voting Member
4	A female teacher at a local High School/College	Voting Member
5	A Representative of the affected persons	Voting Member
6	A Representative of any CSO working in the area	Voting Member
7	Social/Environmental Specialist of CCAUDP Consultant	Member Secretary & non-voter

**8 SUMMARY OF ENVIRONMENTAL MANAGEMENT PLAN INCLUDING IMPACT MITIGATION MEASURES**

The **Table 8.1** below sets out the environmental and social commitments that are to be fulfilled in the Pre-Construction Phase, by the Contractor - supported by the PEA and the Consultant-during the Construction Phase, and in the Operations Phase. The table includes 4 columns (Topic/Potential Impact, Mitigation, Management and Enhancement Measure, Responsibility, and Verification/Monitoring Provisions).

**Table 8.1 Mitigation, Management, and Enhancement Measures During Different Project Phases**

Topic/Potential Impact	Mitigation, Management and Enhancement Measure	Responsibility	Verification/Monitoring Procedure
<b>Pre-Construction / Design Phase</b>			
Permits and approvals	<ul style="list-style-type: none"> <li>Ensure Environmental Clearance Certificate (ECC) is applied for and in place.</li> </ul>	PEA supported by the Consultant	ECC obtained
EMP update for Bidding Document	<ul style="list-style-type: none"> <li>Prepare package-wise and updated EMPs that reflect final detailed design and integrate any further environmental and social measures identified in the detailed design phase.</li> <li>Include updated EMPs in Bidding Documents (BD).</li> </ul>	PEA supported by the Consultant	Package-wise EMPs updated EMPs included in BD
Resettlement, relocation, and compensation	<ul style="list-style-type: none"> <li>Setup grievance redress mechanism and disclose it in subproject areas for handling of complaints/grievances from the start of the resettlement survey and planning process.</li> <li>Conduct detailed measurement survey (DMS), census, and socio-economic survey on basis of detailed design.</li> <li>Conduct replacement cost survey (RCS).</li> <li>Prepare Resettlement Plan (RP) in accordance with the Resettlement Policy Framework (RPF) and obtain approval.</li> <li>Implement RP prior to construction. Civil works contractors will not be issued notice of possession or notice to proceed for any section or segment of the subproject until a) compensation has been satisfactorily completed for that area, b) agreed relocation measures are in place.</li> </ul>	PEA supported by the Consultant	<ul style="list-style-type: none"> <li>RP approved</li> <li>Monitoring and compensation payment reports</li> </ul>
Grievance Redress Mechanism	<ul style="list-style-type: none"> <li>Contractor to nominate key contact point(s) for grievances and complaints.</li> <li>Contract to develop complaints register and complaints form.</li> <li>PEA to provide contractor with GRM contact details for signboards and contact cards.</li> <li>Erect sign boards with project details and GRM procedures/contact details at the entrance to each construction site/camp.</li> <li>Contractor to raise awareness of all workers on how to respond when an affected person or member of the public has a complaint i.e. direct the person to the most senior site manager present at the time and provide contact card.</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>GRM key contact appointed, complaints register and form in place, key PEA GRM contacts provided to contractor, signboard erected with key contacts, GRM and grievance record in place / Review of grievance record and GRM</li> </ul>
Occupational Health and Safety	<ul style="list-style-type: none"> <li>Establish Incident Reporting (fatal accidents, medical treatment cases; first aid cases; restricted work injuries; near misses; environmental events)</li> <li>Conduct work site/ construction site risk assessment to identify particularly risky work areas such as excavation and trench work, use of construction machinery, working in the drainage system and canals that receives wastewater, work in a noisy and dusty environment, working with electrical equipment, and identify appropriate procedures.</li> <li>Develop corresponding Construction Health &amp; Safety Plan</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>Incident reporting system, results of risk assessment, and Construction Health &amp; Safety Plan submitted to the Supervisor/Engineer.</li> </ul>
<b>Construction Phase</b>			
Topography and Drainage	<ul style="list-style-type: none"> <li>Timing construction activities in the dry season to minimize disruption and changes of drainage pattern.</li> <li>Start construction from the downstream to the upstream.</li> <li>Affected areas will unless the level change is part of the improvement to the drainage systems, be restored to their original levels to prevent permanent impact to topography and drainage. Levelling and grading will unless the change is</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>Contractor's work schedule submitted to the Supervisor/Engineer.</li> </ul>

Topic/Potential Impact	Mitigation, Management and Enhancement Measure	Responsibility	Verification/Monitoring Procedure
	<p>specified in the design to improve the drainage system, be undertaken with minimal disturbance to the existing contour and thereby maintaining the general slope of site.</p> <ul style="list-style-type: none"> <li>Applying standard mitigation measures to ensure drainage capacity at construction site is maintained including bypass dewatering to pump flow around the worksite by using dewatering pumps upstream of the work section and temporary piping to the downstream.</li> </ul>		<ul style="list-style-type: none"> <li>Monitoring of construction sites by supervisor.</li> </ul>
<p><b>Soil Quality</b></p>	<ul style="list-style-type: none"> <li>Timing construction activities in the dry season to minimize erosion and wash out.</li> <li>Only strip topsoil when required.</li> <li>Avoid stripping of topsoil, excavation and access road construction to be carried out in dry season to minimize erosion and run-off.</li> <li>Store topsoil appropriately for reapplication.</li> <li>Store fuel and any hazardous materials appropriately to minimize risk of spills.</li> <li>Refuel on non-permeable surfaces and have spill containment material at the ready to minimize risk of pollution.</li> <li>Avoid storage of waste materials on agricultural land.</li> <li>During dewatering of construction site, discharge to the downstream of the drainage system and avoid discharge to adjacent agricultural land.</li> <li>Limit duration of storage of waste material at construction sites to reduce impact to soil at temporary storage site.</li> </ul>	<p>Contractor</p>	<ul style="list-style-type: none"> <li>Contractor's work schedule submitted to the Supervisor/Engineer.</li> <li>Monitoring of construction sites by supervisor.</li> </ul>
<p><b>Surface Water and Groundwater</b></p>	<ul style="list-style-type: none"> <li>Timing construction activities in the dry season to minimize wash out.</li> <li>Store fuel and any hazardous materials appropriately to minimize risk of spills.</li> <li>Refuel on non-permeable surface and have spill containment material at the ready to minimize risk of pollution.</li> <li>Waste disposal in the rivers or other water bodies should be prohibited.</li> <li>For the subprojects constructing in the water, use of silt screens hanging from floats in the water column will contain stirred up sediment and prevent it from traveling downstream.</li> <li>Sand stockpiles stored on construction sites should be completely covered with tarpaulins when not in use to avoid material eroding during a rain event causing siltation of the drainage system.</li> </ul>	<p>Contractor</p>	<ul style="list-style-type: none"> <li>Contractor's work schedule submitted to the Supervisor/Engineer.</li> <li>Monitoring of construction sites by supervisor.</li> </ul>
<p><b>Land Use and Land Cover</b></p>	<ul style="list-style-type: none"> <li>Restrict construction activities to take place only on allotted land.</li> <li>Negotiate and agree any temporary use of land outside construction area with current users.</li> <li>Only strip topsoil when required.</li> <li>Store topsoil appropriately for reapplication.</li> <li>Avoid storage of waste materials on agricultural land.</li> <li>Restore land used temporarily during construction to previous or better state.</li> <li>Landscaping, as included in a number of subprojects, to reestablish and improve land cover following construction.</li> </ul>	<p>Contractor</p>	<ul style="list-style-type: none"> <li>Monitoring of construction sites by supervisor.</li> </ul>
<p><b>Air Quality</b></p>	<ul style="list-style-type: none"> <li>Provide water spray vehicles to regularly water the unpaved ground, storage piles and other areas where airborne dust may originate.</li> <li>Trucks/vehicles carrying dry construction material to be covered with tarpaulins or other suitable cover. Open load carrying dry construction material / potentially dust producing materials shall have properly fitting side and tailboards.</li> <li>Clean and maintain access roads.</li> <li>Plan sites to keep stockpiling of soils and sand, plant and machinery away from the densely populated residential areas and sensitive receptors.</li> <li>Use temporary barriers to control dust around the construction sites near residential areas.</li> <li>Minimize time that excavations and exposed soil are left open/exposed, backfill asap, and transport excavated soil as soon as possible to the sites for reuse or disposal.</li> </ul>	<p>Contractor</p>	<ul style="list-style-type: none"> <li>Monitoring of construction sites by supervisor.</li> </ul>

Topic/Potential Impact	Mitigation, Management and Enhancement Measure	Responsibility	Verification/Monitoring Procedure
	<ul style="list-style-type: none"> <li>• Use new/properly maintained machinery and vehicles to reduce air emissions.</li> <li>• Use grid electricity as power source and to the extent possible restrict use of diesel generators to emergencies and power back-up.</li> <li>• No burning of debris, construction waste, vegetation or other materials should be allowed at the sites.</li> </ul>		
<b>Noise</b>	<ul style="list-style-type: none"> <li>• Construction activity near residential areas should be scheduled in daytime only, and noisy equipment should be prohibited from night operation.</li> <li>• Where possible, site noisy activities away from residences and sensitive receptors.</li> <li>• Provide advance warning to the community on timing of noisy activities.</li> <li>• All powered mechanical equipment used in the works should be effectively sound reduced. Select equipment with consideration of having lowest noise levels and ensure equipment are regularly maintained to keep such levels during its operation.</li> <li>• Ensure mobile/temporary noise barriers, acoustic screens, enclosures are available for construction sites and excavations in populated areas.</li> <li>• The use of ear plugs, or ear muffs should be ensured for the construction workers, supervisors &amp; engineers.</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>• Monitoring of construction sites by supervisor.</li> </ul>
<b>Traffic</b>	<ul style="list-style-type: none"> <li>• Develop a traffic management plan to improve traffic flow and ensure routes for vehicles are not blocked and signage is provided to reduce speeds and show drivers in advance of any changes to road surface or traffic direction and detour directions.</li> <li>• Plan construction program to minimize interference especially at busy sites such as markets, e.g. contractor to open trench equivalent to one-day's work at any one time and cover the trenches at night for safety and to provide access to properties.</li> <li>• Plan construction to minimize the area and period of road occupation/ closure, minimize haul distances, and avoid concentration of construction vehicles.</li> <li>• Provide prior notices to local residents on the road occupation / closure through sign boards and mass media.</li> <li>• Where risks occur given changes to traffic lanes or lane closure, provide additional lighting to allow visibility of the changes at night. • Adequate pedestrian and vehicular access to enter buildings and properties across any open trenches ensured, particularly commercial premises during open hours.</li> <li>• Maintain uninterrupted traffic access by keeping at least one lane open.</li> <li>• Ensure daily access to properties along the construction sites.</li> <li>• Ensure that all construction vehicles follow speed limits on the construction sites and on public roads</li> <li>• Provide adequate signage, barriers, and flag persons for traffic control and detours and avoid vehicles mistakenly entering the sites.</li> <li>• Fit audible warning devices in all vehicles to alert during reversing.</li> <li>• Maintain all existing roads in traffic worthy condition ensuring maintenance of uninterrupted movement of traffic.</li> <li>• Temporary crossings (e.g. subproject 6, 7, and 8) to be constructed and maintained (including dust control) during the construction period.</li> <li>• Repair the damaged local roads to their original condition after project completion.</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>• Monitoring of construction sites by supervisor.</li> </ul>
<b>Solid Waste</b>	<ul style="list-style-type: none"> <li>• Prepare waste management plan including identification of types, estimated quantities, qualities, segregation, reduction, recycling, reuse, and disposal options.</li> <li>• Where existing road surface is removed it should not be dumped or landfilled but be prepared and re-used where appropriate.</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>• Monitoring of construction sites by supervisor.</li> </ul>

Topic/Potential Impact	Mitigation, Management and Enhancement Measure	Responsibility	Verification/Monitoring Procedure
	<ul style="list-style-type: none"> <li>• Demolished concrete can be crushed and reused e.g. as aggregate for blinding of concrete structure, in base layer, or as gravel substitute.</li> <li>• Should focus on the generated non-metallic waste and need to ensure their appropriate reuse and recycling options. Construction and demolition waste to be stored separately and periodically collected.</li> <li>• Hazardous wastes to be properly labelled and stored at location with impermeable surface, cover, and secondary containment. Recycling options for waste oils to be explored locally.</li> <li>• Provide waste bins at sites away from water bodies, properly covered and protected from wind, rain, storms.</li> <li>• Processing of water hyacinth at local composting plants to be explored with operators including capacity and quality requirements of plant.</li> <li>• Reuse options for sediments to be explored along with need for further quality analyses to confirm quality.</li> <li>• Avoid temporary storage of waste on agricultural land.</li> <li>• Transport hazardous wastes, which cannot be recycled, to a designated disposal site approved by DOE.</li> <li>• Vehicles transporting solid waste should be covered with tarps or nets to prevent spilling waste along the route.</li> <li>• Train and instruct all personnel in waste disposal practices and procedures as a component of the environmental induction process.</li> <li>• Prohibit burning and dumping of solid waste by workers and at construction sites.</li> </ul>		
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>• Avoid clearance of mature trees and continuous shrubs to the extent possible; safeguard trees in close proximity to construction work.</li> <li>• Prohibit waste disposal in the rivers or other water bodies.</li> <li>• For the subprojects constructing in the water, use silt screens hanging from floats in the water column to contain stirred up sediment and prevent it from traveling downstream.</li> <li>• Time construction activities in the dry season to minimize erosion and wash out.</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>• Monitoring of construction sites by supervisor.</li> </ul>
<b>Infrastructure and Services</b>	<ul style="list-style-type: none"> <li>• Carry out a thorough site investigation to ascertain the exact locations of the existing utility system within and around their project site and mark their locations and plot the information on the drawings.</li> <li>• Submit plan and drawings for the relocation of the utilities and obtain permission from the agency concerned, employ suitable equipment and qualified personnel for utility relocation, make provision of water, electricity, or other utilities as necessary for the affected people in case of planned or accidental disruption.</li> <li>• Contractor to work together with the utilities and relevant agencies/departments to ensure that any expected disruption to public assets will be communicated prior to construction and alternative supply/provision is available in case of planned or accidental disruption.</li> <li>• Construction of alternative temporary crossing and access should be ensured prior to the demolition of old bridges.</li> <li>• Construction activities such as demolition of existing drains and construction of the new ones should be completed within the dry season to minimize flooding.</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>• Monitoring of construction sites by supervisor.</li> </ul>
<b>Physical and Economic Displacement (incl. Livelihood and Jobs)</b>	<ul style="list-style-type: none"> <li>• Conduct regular monitoring visits and consult with the communities in the project areas.</li> <li>• Conduct impact screening of any new/accidental impacts, prepare corrective action plan, if required. Document, mitigate, and compensate unanticipated impacts following the principles provided in the RPF and RP.</li> </ul>	PEA supported by Consultant	<ul style="list-style-type: none"> <li>• Monitoring reports</li> </ul>
<b>Community Health and Safety</b>	<ul style="list-style-type: none"> <li>• Source expertise (local companies) and labour locally, wherever possible without comprising experience and training to minimize the impact of an influx of new people into the local community. Source services and supplies locally to generate turnover and benefits for local businesses and communities.</li> </ul>	Contractor	<ul style="list-style-type: none"> <li>• Contractor's reporting and Monitoring by supervisor.</li> </ul>

Topic/Potential Impact	Mitigation, Management and Enhancement Measure	Responsibility	Verification/Monitoring Procedure
	<ul style="list-style-type: none"> <li>• Ensure adequate living conditions with suitable services (water supply, sanitation, and power supplies) at housing for labour coming from outside.</li> <li>• Contractor to prepare and execute the health education plan for construction workers and document and report health education activities to prevent and control spread of communicable diseases.</li> </ul>		
<p><b>Occupational Health and Safety</b></p>	<p><u>General OHS measures:</u></p> <ul style="list-style-type: none"> <li>• Qualified Contractor Health and Safety Manager has to be engaged for the construction period.</li> <li>• Qualified Contractor Health and Safety responsible to be appointed from experienced staff for each site and at all times.</li> <li>• Selected or volunteer workers to be trained in first aid and first aiders to be available at each site and at all times.</li> <li>• All workers (including of subcontractors) to receive induction and refresher training in health and safety policies, use of PPE, and relevant procedures. Training to be documented.</li> <li>• First aid box and personal protective equipment (PPE) such as ear plugs, helmets, hand gloves, safety shoes, goggles, masks, etc. have to be provided to the workers while working at construction site.</li> <li>• In case of major accident, ambulance has to be made available to take the affected workers to the nearest hospital.</li> <li>• Daily toolbox meetings (including safety briefings) to be held at start of shift among construction teams on construction sites.</li> <li>• Construction sites to be fenced off with appropriate signage and lighting for nighttime visibility.</li> <li>• Proper health and safety signboards and appropriate information to the local people about the construction activities has to be provided.</li> <li>• Workers operating the equipment and drivers driving the construction vehicles at construction site must be skilled and experienced.</li> <li>• Quality food and safe drinking water that meets the national standards have to be provided to the workers.</li> <li>• Separate accommodation and sanitary toilet facilities for male and female workers have to be available at labour camp.</li> <li>• Incidents/accidents to be recorded and investigated to identify corrective actions.</li> <li>• Regular health and safety audit to be conducted and results and follow-up measures documented.</li> </ul> <p><u>Specific OHS measures:</u></p> <ul style="list-style-type: none"> <li>• Demolition: Personal Protective Equipment (PPE) must be worn; Monitor noise, vibration and dust; Regular housekeeping; Manage traffic movement; Manage waste disposal.</li> <li>• Work with heavy machinery: Operators and drivers must be skilled and experienced; Stay out of the line-of-fire; Use effective communication signals; Identify and mark a danger zone; Identify entrances and exits of equipment zones; Perform routine maintenance.</li> <li>• Lifting and rigging: Inspect all rigging prior to using it for a lift; All rigging should be properly stored after lifting operations are complete; Have a written lift plan; Plan the travel area and potential lines of fire prior to the lift; Keep away from the load. Always strive to use tag lines or push sticks to ensure space from the load.</li> <li>• Concrete pouring: Hazard communication; Respiratory protection; Ear protection; Skin protection.</li> <li>• Work at height: Safe working platform; Installation of proper railing; Use of appropriate ladder; Safe scaffolding; Arrangement of secure and acceptable Anchor Point; Sufficient protective gears.</li> <li>• All excavations in public places shall be suitably fenced off with suitable barricades established and appropriate signage; Excavated area should be supported by timbering and props with guard rails (omitted from left hand side for clarity) to prevent falls; Safe access should be provided by a tied ladder;</li> </ul>	<p>Contractor</p>	<ul style="list-style-type: none"> <li>• Contractor's reporting and Monitoring by supervisor.</li> </ul>

Topic/Potential Impact	Mitigation, Management and Enhancement Measure	Responsibility	Verification/Monitoring Procedure
	<p>Prevent vehicles from overrunning into the excavation by using properly secured stop-blocks;</p> <ul style="list-style-type: none"> <li>Electrical work: All potential contact with live electrical current should be prevented; de-energize equipment and maintain lockout/ tag out procedure; Safe use of electrical equipment should be ensured; Proper physical barriers around electrical hazards shall be installed; Use of extreme caution with flammable materials shall be ensured.</li> </ul>		
<b>Operations Phase – Enhancement Measures</b>			
<p><b>Infrastructure and services</b></p> <p><b>Land use and land cover</b></p> <p><b>Drainage and surface water resources</b></p> <p><b>Landscape, visual and aesthetic impact</b></p>	<ul style="list-style-type: none"> <li>Establish appropriate O&amp;M organization for new facilities (Daulatpur embankment, Rupsha Ghat development &amp; market, Labonchara PS, Nirala Branch link park, ponds, etc.)</li> <li>Employ appropriately qualified O&amp;M staff, notably for the Labonchara pumping station.</li> <li>Increase capacity of O&amp;M organization at KCC to manage clogged drains.</li> <li>Conduct regular monitoring (crack, damage, bank erosion, or other problem identification) and maintenance (when &amp; where required) of the facilities.</li> <li>Maintain and clean gross pollutant and silt trap at the upstream of Khals (subproject 4 &amp; 5) and at outlet to Khal (subproject 8).</li> <li>Maintain the Khal reserve and consider extension for maintenance track/public access and to prevent encroachment.</li> <li>Approach and discharge channel should maintain regularly to ensure discharge capacity.</li> <li>Remove water hyacinth and dumped waste regularly from the Khals and ponds and at the sluice gates.</li> <li>Remove septic tank connections to Khals and ponds.</li> <li>Conduct regular monitoring and raise awareness to prevent waste dumping into the ponds and their surroundings.</li> </ul>	KCC	KCC reporting
<p><b>Solid waste</b></p> <p><b>Air quality</b></p>	<ul style="list-style-type: none"> <li>Establish waste management facilities at the facilities including the market building, the rehabilitated Khals and ponds.</li> <li>Waste segregation at the source will improve the waste management system, such as arrangement of separate bins for organic and inorganic waste.</li> <li>Waste collection frequency should be monitored.</li> <li>Ensure solid waste is collected (including garden waste) and prohibit burning of waste at the sites.</li> </ul>	KCC	KCC reporting
<b>Livelihood and jobs</b>	<ul style="list-style-type: none"> <li>The river front development at Rupsha should run under appropriate authority. Park should not be leased out to individuals (as was the model chosen by KCC for the KCC Café at Rupsha Ghat) as this will limit the scope of benefit and not extend this to all the stakeholders and interested parties. Rather, KCC can lease the park, even partially, to certain e.g. tourism-related organizations, which serve broader stakeholders and interested parties.</li> <li>At ponds, support compatible livelihood activities, which could include swimming coaching/training, small food carts, urban agriculture etc. The new opportunities or small businesses should run under appropriate authority. Project-affected persons should be given preference to access new opportunities. Possibility of integrating fish farmers in the subproject and creating opportunities for them to be further investigated by KCC.</li> </ul>	KCC	KCC reporting
<b>Community health and safety</b>	<ul style="list-style-type: none"> <li>Khals should be cleaned on a regular basis to prevent stagnant water, mosquito breeding, and odor nuisance.</li> <li>Ponds should be cleaned on a regular basis to prevent mosquito breeding, odor and nuisance, and to maintain their storage capacity.</li> </ul>	KCC	KCC reporting
<b>Cultural resources</b>	<ul style="list-style-type: none"> <li>The appointed authority for the O&amp;M of the Daulatpur embankment to engage with the Mosque and Crematorium.</li> </ul>	KCC	KCC reporting

## 8.1 Institutional Arrangements

The Environmental Management Plan (EMP) implementation requires an organization support structure in the form of organizational requirements, training needs and plan, and project management system. The following section captures these institutional arrangements for EMP implementation by concerned PMU and PIU, their consultants and working contractors.

The organizational structure of KCC is given in **Figure 8.1**. However, an organizational structure shall be developed at the corporate, regional and site level to aid effective implementation of the EMP document. Various departments will be involved during implementation of the project as shown in **Figure 8.1**. Contractor is responsible for implementation of EMP during works and Implementation Consultant (IC) is primarily responsible for supervision of monitoring of the implementation of the EMP. PIU will be supported by PMU and IC to advise and assist PIU in quality and capacity enhancement and independent quality monitoring. Contractor will be responsible for implementation of EMP during work activities stage. Relevant departments responsible for implementation and supervision of proposed mitigation and monitoring measures are given in the EMP.

## 8.2 Capacity Development Training

The environmental assessment process is established in Bangladesh, but environmental awareness and capability for implementation of EMP in infrastructure projects are still developing. The PMU safeguards team (environmental and social) with support from PIC Environment Specialist and Social Safeguard Specialist will be responsible for training PIU's safeguards officers (environmental and social). Training modules will need to cover safeguards awareness and management in accordance with both WB ESS and government requirements as specified below:

- Environmental Safeguards
  - a. sensitization on WB's safeguard policy on environment;
  - b. introduction to environment and environmental considerations in roads, drainage and solid waste management projects;
  - c. review of EIA and integration into the project detailed design;
  - d. improved coordination within nodal departments; and
  - e. monitoring and reporting system.
- Social Safeguards
  - a. sensitization on WB ESS on Involuntary Resettlement and Indigenous People;
  - b. introduction to social safeguards assessment and document requirements;
  - c. consultation and participations requirements;
  - d. project GRM and WB's Accountability Mechanism; and
  - e. monitoring and reporting system.

The most significant challenge for environmental management on this project is the lack of human and financial resources and necessary infrastructure in PIU. To enhance the capacity of the KCC's PIU for effective implementation of proposed mitigation measures and monitoring the resultant effect, some training programs and awareness workshop are proposed. The detailed training plan is provided at **Table 8.2**.

Table 8.2 Training Program for Environmental Management

Target Group	Training Subject	Methods	Timeframe
<b>Design and Construction Phase</b>			
All concerned PIU project staff	<b>Environmental Overview:</b> Environmental regulations, and national standards, process of impact assessment and identification of mitigation measures, importance of EMP and monitoring, and monitoring methodology.	Lectures or Presentation	Before beginning of the implementation of the project
Environmental engineers, field officers, contractors, PIC	<b>Implementation of EMPs:</b> Basic features of an EMP, Planning, designing and execution of environmental mitigation and enhancement measures, monitoring and evaluation of environmental conditions during construction and operation	Workshops and Seminars	Before the construction begins
Environmental Engineers, field officers, contractors, PIC	<b>Environmentally Sound Construction Practices:</b> Waste management and minimization in construction, pollution control devices and methods for construction sites and equipment, Environmental clauses in contract documents and their implications, Environmental monitoring during construction	Seminars, Lectures and Site visits	Before the construction begins
Project staff dealing in social/ lands matters	<b>Social awareness:</b> Monitoring consultants/organizations specializing in social management and monitoring can provide training on social awareness and land acquisition and resettlement issues	Seminars, Lectures and Site visits	Before the construction begins
Environmental engineers, field officers, contractors, PIC	<b>Monitoring Environmental Performance during Construction:</b> Monitoring of Air, Water, Noise, Solid Waste, Sediments and effect on biodiversity and fisheries. Evaluation and Review of results, Performance indicators and their applicability, possible corrective actions, reporting requirements and mechanisms.	Seminars, Lectures and Site visits	During initial phases of construction
Contractor's staff, construction labourers	<b>Occupational Safety and Health:</b> Monitoring consultants/ organizations specializing in occupational, health and safety issues can provide training on this issue.	Workshops and seminars	During initial phases of construction
Construction labourers	Waste handling and sanitation at construction sites/ construction camps	Workshops and presentation	During initial phases of construction
<b>During Operation Phase</b>			
Environmental engineers, field officers, contractors	<b>Long-term Environmental Issues in Project Management:</b> Designing and implementing environmental surveys for ambient air, sediments and water quality, data storage, retrieval and analysis, contract documents and environmental clauses, risk assessment and management, contingency planning and management and value addition	Workshops and seminars	During the operation phase or defect liability period

It would be essential to understand the legislative framework and enhance capacity of PIU for analysing the applicability of various environmental legislations and clearances, approvals and compliance monitoring requirements.

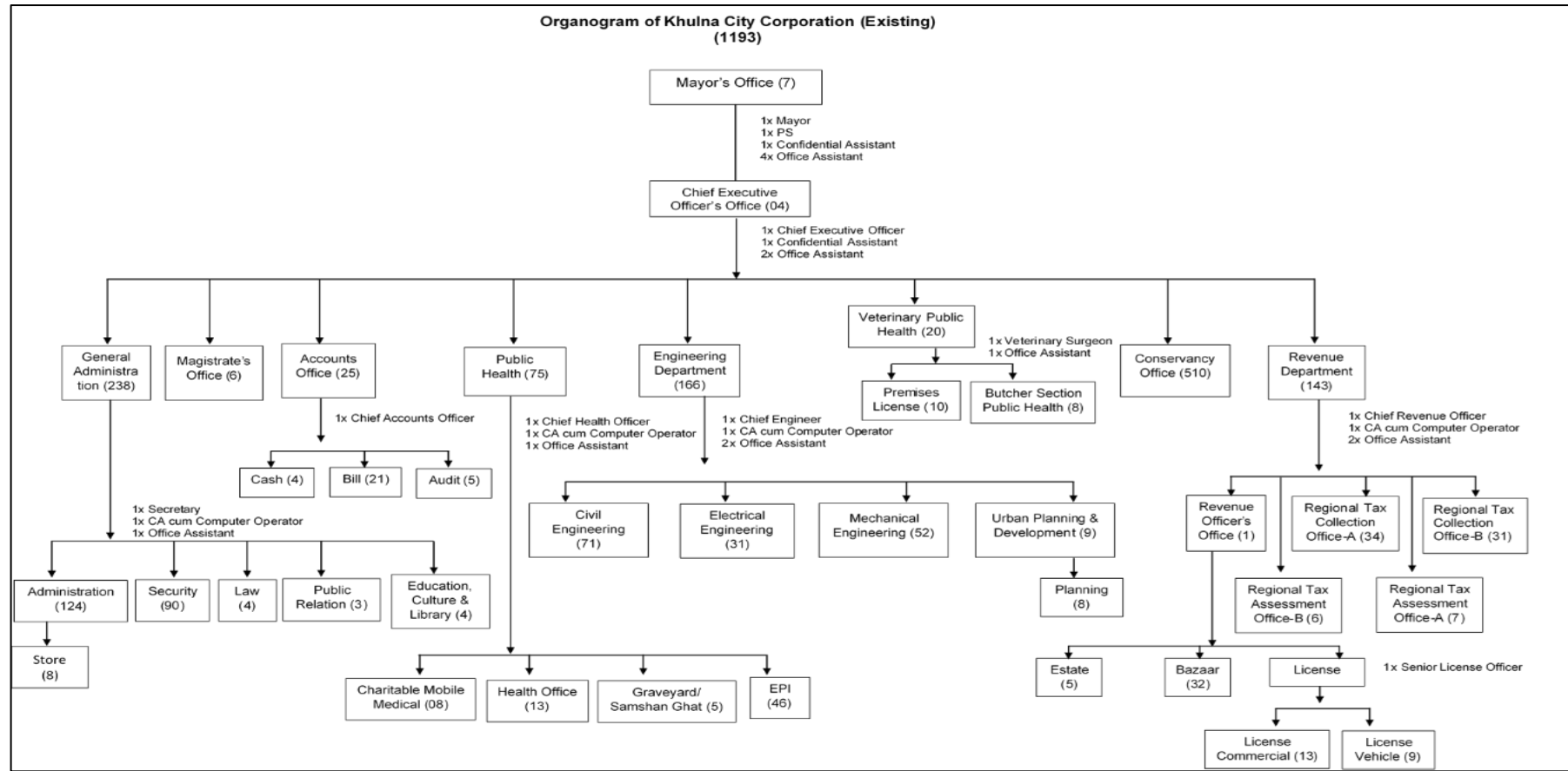


Figure 8.1 Organizational Structure of Khulna City Corporation (KCC)

## 9 PUBLIC CONSULTATION/STAKEHOLDER CONSULTATION

### 9.4 Scope of the Public Consultation

The Public consultation process included both qualitative and quantitative method. The qualitative method included focus group discussion (FGD) with subproject area people, stake holders and members of local government institutions and key informants' interview (KII) with relevant persons who are in decision making and information giving situation. Quantitative method includes baseline survey in the earmarked subproject area.

### 9.5 Objectives of Public Consultation

The public consultation as a means of integration of local people's concerns is considered very important by the government and the donor agencies. The Department of Environment also recognizes the importance of social and environmental factors for successful implementation of the proposed project. So, the safeguard team undertook comprehensive process of public consultation. Feedback from the consultation process is expected to play important role in the development of the social and environmental programs.

The broader objective of public consultation is to inform local inhabitants/stakeholders to make them aware of the project and to gather their opinion/suggestions about the proposed project, development and processing plan as well as to incorporate their suggestions during project planning and implementation stage.

The specific objectives of public consultation are to:

- ✚ Create awareness of stakeholders (local people) and provide them general information of the project as a part of the project awareness campaign
- ✚ Learn about problem faced by community living in subproject area
- ✚ Facilitate the local community (people) to participate in the project planning
- ✚ Learn from the community (people) and share with them their perception of the CAUD project
- ✚ Know people's suggestions from the local community (people) for solution of problems/ constraints of the project
- ✚ Assess project impacts both positive and negative in nature as envisaged by the community
- ✚ Collect additional information and ideas of the project from the local community
- ✚ Explore local community's ideas on mitigation/minimization of negative impacts, if any

### 9.6 Methodology of Public Consultation

The public consultation includes focus group discussion with local people and professionals including businessman, transport workers etc. as well as local government institute members like KCC Ward councilors. Focus group discussion was carried out by facilitators and consultants with the help of set of check list designed to obtain information from the participants. In discussion initially, all presents were introduced and all presents were informed of activities that have been going on under CCAUD.

## 9.7 Public Consultation Findings

### 9.7.9 Location of Public Consultations

Public consultations were organized and conducted at KCC, Khulna throughout the subproject locations area shown in the **Figure 9.1**. The environmental safeguard team conducted a series of discussions with local level people, inhabitants of KCC and people of different professions within the subproject area.

Focus group discussions at several locations were conducted to make the study more participatory and evincing opinions of the people for those the project is meant. The locations of holding FGDs are given in **following figures 9.1 to 9.5**.



Figure 9.1 Focus Group Discussion with Different Community and Professionals (2025)



Environmental FGD at Deana Khal



Social FGD at Deana Khal



FGD at Labonchara Khal Outlet Gate (Night time)



FGD at Alutola Outlet Gate (Night Time)



Environmental FGD at Nirala Khal



Social FGD at Nirala Khal

Figure 9.2 Focus Group Discussion with Different Community and Professionals (2025)



FGD at Moheshwarpasha Pond Site



FGD at Moheshwarpasha Graveyard Site



Environmental FGD at BL College Pond



Social FGD at BL College Pond



Environmental FGD at Pabla M.S.Puja Temple Pond



Social FGD at at Pabla M.S.Puja Temple Pond

Figure 9.3 Focus Group Discussion with Different Community and Professionals (2025)



Figure 9.4 Focus Group Discussion with Different Community and Professionals (2025)



Visit and discussion at Horijon Colony Pond



Visit and discussion at Horijon Colony Pond



Environmental FGD at Boyra High School Pond



Social FGD at Boyra High School Pond



FGD at Banorgati Bottola Mondir Pond



FGD at Haji Malek Jannatul Baki Graveyard Pond



FGD at Taltala Hospital Pond



FGD at Taltala Hospital Pond

Figure 9.5 Focus Group Discussion with Different Community and Professionals (2025)

### 9.4.2 Tools and Techniques used for Consultation

In conducting the public consultation meetings, a checklist was used by the consultants to enable the participants to comprehend the issues easily, so that they could participate in the discussions more effectively and expressed their opinions and views objectively. The Participants were shown the sketch map where different activities are proposed to be done. This participatory approach was well accepted by all participants. During consultations, social, environmental as well as cross-cutting issues were discussed in detail, including potential impacts of the subproject activities on environmental and social parameters, identification of sensitive issues, risks, potential threats, public concerns and expectations from the subproject. The list of participants with their occupation was prepared and their signature obtained. A meeting minutes information disclosure meeting through stakeholder's consultation has been developed after the meeting over ([Appendix IX](#)).

The checklist used for consultation includes the following issues:

- Importance of subproject implementation
- Probable measures which might alleviate the problems
- Problems will be faced by the subproject area community
- Importance of protection measures against social impacts
- Importance of protection measures against natural calamities
- Importance of protection measures against environmental impacts

### 9.4.3 Consultation with Community and Stakeholders

In line with the requirements of public consultation, the identified stakeholders of the subproject area, were consulted through participation and discussion for their views/ perceptions, needs, problems and suggestions.



Figure 9.6 Stakeholder Consultation Meeting with KDA (2025)



**Figure 9.7 Consultation with Community People During Field Visit**

#### 9.4.4 Opinions of Community About Problems

The subproject area is beset with various problems. Communication development is quite difficult and costly. Erosion of the inland rivers and offshore island are nagging problems. Water demands are being formed in another area but the subproject site requires significant time to be productive and productive agricultural fields, developed agricultural area and infrastructure are lost to erosion. The discussion with the subproject area people revealed that the problems of water are different from the other area though they have some common problems.

In addition to the local problems the participants discussed both positive and negative aspects of the interventions under CCAUD, the overall opinion of the stakeholders expressed during consultation was positive towards start-up of proposed infrastructure construction.

#### 9.4.5 Summary of Public Consultation and Disclosure

Since this subproject is considered under the Climate Change Adapted Urban Development (CCAUD) Project, consultations were carried out during the site visiting process starting in September 2024.

The stakeholders such as affected people, beneficiaries and other direct and indirect users of the subproject including women were consulted to obtain data and their concerns related to the proposed subproject. The discussions can be summaries as follow:

- There was also a request to develop a promised road at Sonadanga bypass.
- A compelling issue that was raised by the pond users was the need for the pond to be de-silted rehabilitation work.

- The issue was discussed in length and this was agreed as an important issue.
- It was claimed that the field canals here had not been repaired for a good number of years
- Agreement was that further consultations will be carried out during design of the proposed activities.

Besides these consultations, additional consultations will be carried out during implementation. This will involve:

- Focus group discussion with the pond community
- Discussions will be conducted with the residents who reside along the vicinity of the subproject site
- Residents will be briefed about the project, purpose and design and outcomes via a documented community consultation session
- The community consultation session will be organized immediately after the contractor is mobilized.
- The contractor will take note of all impacts, especially safety hazards that will be of concern to the residents and take necessary measures as stipulated in the EMP to mitigate them.
- The contractor will maintain a log of any grievances/complaints and actions taken to resolve them.
- A copy of the EMP will be available always at the project supervision office on site.

## 10 ENVIRONMENTAL MONITORING PLAN (EMoP)

### 10.4 Environmental Monitoring During Construction

In accordance with the Contract, Contractor must implement the activities in conformity with requirements stipulated in EIA and EMP and as a Customer must provide the Project Implementation Unit of Khulna City Corporation with reports.

There are a number of mechanisms of giving guarantee related to both general and site specific mitigation during construction described in EIA. One mechanism is to demand further from Contractor storage of fuel and oil, waste management and transport management and prevention of contamination through designing individual Management Plans (MPs). This approach serves the project as it creates condition for early assessment of these aspects by Contractor and prepares MPs that can be checked, approved and audited during the monitoring process in that area. The MP content to be prepared by Contractor is presented in **Table 10.1** and this activity will be supported by the environmental personnel of the KfW in Dhaka together with the environmental advisor of PIU, Khulna City Corporation.

**Table 10.1 List of Environmental Management Plans for CCAUD**

SL. No.	Environmental Plan	Summary of Content
1	Filtrate management	<ul style="list-style-type: none"> <li>• Control measures for prevention of contamination, collection, cleaning-up or recycling of filtrates from different sources.</li> </ul>
2	Control over air quality	<ul style="list-style-type: none"> <li>▪ Reduction of emissions to air from different sources and control measures.</li> <li>▪ Monitoring, requirements for inspection and reporting</li> </ul>
3	Dust control	<ul style="list-style-type: none"> <li>▪ Measures for reduction and removal of dust from roads, work places and construction activities.</li> <li>▪ Monitoring, requirements for inspection and reporting</li> </ul>

SL. No.	Environmental Plan	Summary of Content
4	Noise and vibration control	<ul style="list-style-type: none"> <li>▪ Reduction of noise and vibration from all equipment at work site and transportation activities and control measures.</li> <li>▪ Monitoring, requirements for inspection and reporting</li> </ul>
5	Responsibility for preventive measures	<ul style="list-style-type: none"> <li>▪ Procedures regarding the responsibility for grade of events and extraordinary situations.</li> <li>▪ Monitoring, requirements for inspection and reporting</li> </ul>
6	Transport management	Transport disorder and procedures for reduction of entry to public buildings, especially to hospitals and schools
7	Archeological and Cultural heritage	<ul style="list-style-type: none"> <li>▪ Measures for reduction of negative impacts on cultural heritage during construction work.</li> <li>▪ If further implementation of activities are required for any discoveries, in this case guarantee for “safe keeping” must be given according to legislation.</li> </ul>
8	Storage of oil and fuel and refueling	<ul style="list-style-type: none"> <li>• Specification for storage of oil and fuel for providing the environmental protection and procedures for refueling vehicles, installations and equipment.</li> </ul>
9	Site inspection	<ul style="list-style-type: none"> <li>• Site inspection and reporting procedures in case of no implementation warning.</li> </ul>
10	Processing of complaints and discontent	<ul style="list-style-type: none"> <li>• Procedures of complaints processing including answering to plaintiff and reporting</li> </ul>
11	Environmental training	<ul style="list-style-type: none"> <li>▪ Introduction to the project;</li> <li>▪ Talks before work</li> <li>▪ Content of training, checking-up and training purposes and procedures including certain target groups.</li> </ul>
12	Storage and utilization of hazardous products and substances	<ul style="list-style-type: none"> <li>• Registration, registration of information papers material safety and risk assessment of materials and chemical substances must be used in the project. Documenting requirements.</li> </ul>
13	Rehabilitation plan	<ul style="list-style-type: none"> <li>• Plan of removal of all equipment and materials from temporary working sites and rehabilitation of the areas in accordance with standards at least as initial construction conditions.</li> </ul>

Environmental monitoring must be implemented at the construction stage in order to ensure conformity to environmental and social requirements and standards.

At the construction stage:

- a) Dust monitoring;
- b) Noise monitoring;
- c) Solid waste monitoring;
- d) Leachate monitoring;
- e) Soil monitoring must be implemented.

Environmental monitoring reports included in the monthly report prepared by Contractor must be presented to the PIU. Also PIU must be immediately informed about any unimplemented activities. As a part of environmental management programme, Contractor has to keep the environmental reports. These reports must be made according to possible reports.

The reports must contain:

- (i) Environmental Monitoring reports;
- (ii) Any audit reports carried out for Contractor;
- (iii) Complaints;
- (iv) Registration of environmental events including prophylactic/preventive activities and photos;
- (v) Reports of meetings and corresponding conformity;
- (vi) Environmental permits and/or licenses.

Operational reports must be prepared by the City Corporation.

Monitoring must determine the failure of environmental protection measures time to time and must continue unless they follow the requirements of the Regulating body (DOE). Monitoring must cover the following issues:

- 1) Surface water;
- 2) Under ground water;
- 3) Filtrates (sewage water);
- 4) Surface settlement;

- 1) **Surface water:** Regular monitoring of surface water must be implemented in order to reveal any contamination in pond, Khal, river and take necessary measures to show conformity to any legal requirements. Monitoring points must be located at the construction sites. Sampling and test parameters, frequency and duration must be agreed upon with the authorised bodies.
- 2) **Underground water:** Regular representative sampling must be carried out in order to provide an early analysis of contamination with filtrates to show conformity to any legal requirements. Sampling and test parameters, frequency and duration must be agreed upon with the authorised bodies.
- 3) **Filtrates:** Regular monitoring must be implemented to determine the filtrate quality and evaluate relevant management variants. Monitoring must be located in the collecting precipitation points of sewage water and, if necessary at the points of upper and lower water flow direction at the drainage.
- 4) **Surface settlement:** Regular monitoring of soil sedimentation must be carried out.

### 10.5 Monitoring During Operation/Maintenance Phase

The subproject sites must be monitored both during operation and for many years after its closure. The monitoring is based on observation of the correct operation of all infrastructure and the possible effects on the surrounding areas and population. In terms of the monitoring, a minimum program of measurement of parameters (during operation and after closure) is determined. Monitoring ensures the effective protection of the environment by the subproject infrastructure and it can help prevent the spreading of pollution or contamination if an unexpected event happens.

The overall monitoring system of the subproject will consist of the following parts:

- 1) Atmosphere monitoring system
- 2) Groundwater monitoring system
- 3) Surface water monitoring system
- 4) Settlements monitoring system

### 10.3 Environmental Quality Parameter Monitoring and EMP Implementation Budget

The contractor's cost for site establishment, preliminary activities, construction, defect liability activities, and environmental mitigation measures related to EMP implementation before construction and during construction are to be incorporated into the contractual agreements and engineer's costs, which will be binding on him for implementation. The survey will be conducted by the contractor.

The operation phase mitigation measures are again of good operating practices, which will be the responsibility of the implementing agency (Khulna City Corporation). The activities identified in the EMP mainly include site inspections and informal discussions with workers and local community, and this will be the responsibility of ESU with the assistance of consultant, costs of which are part of project management. **Table 10.2** and **Table 10.3** present the estimated cost to implement the EMP.

Table 10.2 Environmental Quality Parameters of Ponds, Road, Khals, Sluice Gate and Rive Bank

Subproject	Component	Sampling Points	Air Quality	Noise Level	Surface Water	Ground Water
SP#1	Embankment at Daulatpur (726m)	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
	Maheshwarpasha (119m)	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
SP#2	Rupsha Riverfront Park (Phase 1)	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
SP#3	Drainage Improvement in Sub-Catchments 17 and 21 (Nobinagar Area)	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
	Including Sonadanga Bypass Road and outlet drain	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
SP#4	Drainage Improvement at Bastuhara Sub-Catchment 11	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
	Deana Chowdhury Khal Upgrading	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
SP#5	Upgrade of Labonchara Khal Outlet Gate and Construction of Labonchara Pumping Station	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
SP#6	Upgrade of Alutola Outlet Gates	2	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
SP#7	Nirala Khal Revitalization and Link Park	4	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
SP#8	Rehabilitation of 18 Ponds	17	PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub>	Noise Level (LAeq) dBA	pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub>	Fe, As, Cl-, Mn, FC, TC
Project Period	Number of Samples	39	39	39	39	39
	Frequency	3	3	3	3	3
	Total Number of Sample	117	117	117	117	117

Table 10.3 Cost Estimates for Implementation of the EMP for Eight Subprojects

Sl. No.	Particulars of Activity	Phase	Unit	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
<b>A. Capacity Building Activity (Scope of Consultants)</b>							
1.	Activity 1- Orientation Workshop Activity 2-Orientation program/workshop for contractors and supervisory staff Activity 3-Experiences and best practices sharing	Before construction	Three modules, 1day per module	Covered under consultancy			
2.	Training for contractor's staff and labour on Health, Safety and Environment and construction practice	During construction	Two modules, 1 day per module	2	1,00,000	200,000	Civil Works Contract
<b>Sub Total (A. Capacity building activity)</b>						<b>200,000 (BDT)</b>	
<b>B. Mitigation Measures/Enhancement (Scope of Contractor)</b>							
1.	Dust suppression measures at work sites twice per day over construction period	Construction	Eight Subprojects	16x26=416	5000	2,080,000	Civil works contract
2.	Worker health and safety (safety gears and first aid facility at work site, water quality at labour camp, solid waste management at labour camp etc.)	Construction	Eight Subprojects	LS	25000	200,000	Civil works contract
<b>Sub Total (B. Mitigation measures)</b>						<b>2,280,000 (BDT)</b>	
<b>C. Cost of Sampling of Environmental Quality Parameters for Establishing Baseline at Pre-construction (Scope of Contractor)</b>							
1.	Ambient air quality parameters monitoring at work site and nearby sensitive receptor; (PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> , CO, O <sub>3</sub> )	At the commencement of construction	Eight Subprojects including 18 ponds	39	20,000	780,000	Civil works contractor
2.	Noise level (LAeq in dBA during day at work site and nearby sensitive receptor)	At the commencement of construction	Eight Subprojects including 18 ponds	39	3,000	117,000	Civil works contractor
3.	Surface water quality parameters monitoring at work site water body (pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub> )	At the commencement of construction	Eight Subprojects including 18 ponds	39	20,000	780,000	Civil works contractor
4.	Ground water quality parameters monitoring at work site water body (pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub> )	At the commencement of construction	Eight Subprojects including 18 ponds	39	25,000	975,000	Civil works contractor
<b>Sub Total (C. Monitoring parameter during pre-construction)</b>						<b>26,52,000 (BDT)</b>	
<b>D. Cost of Environmental Quality Parameters Monitoring During Construction (Scope of Contractor)</b>							
1.	Ambient air quality parameters monitoring at work site and nearby sensitive receptor; (PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SO <sub>x</sub> ,	After construction	Eight Subprojects including 18 ponds	39	20,000	780,000	Civil works contractor

Sl. No.	Particulars of Activity	Phase	Unit	Total number	Rate (BDT)	Cost (BDT)	Costs covered by
	CO, O <sub>3</sub> )						
2.	Noise level (LAeq in dBA during day at work site and nearby sensitive receptor)	During construction	Eight Subprojects including 18 ponds	39	3,000	117,000	Civil works contractor
3.	Surface water quality parameters monitoring at work site water body (pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub> )	During construction	Eight Subprojects including 18 ponds	39	20,000	780,000	Civil works contractor
4.	Ground water quality parameters monitoring at work site water body (pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub> )	During construction	Eight Subprojects including 18 ponds	39	25,000	975,000	Civil works contractor
<b>Sub Total (D. Cost of Monitoring Parameters During Construction)</b>						<b>26,52,000 (BDT)</b>	
<b>E. Cost of Environmental Quality Parameters Monitoring After Construction (Scope of Contractor)</b>							
1.	Ambient air quality parameters monitoring at work site and nearby sensitive receptor; (PM <sub>10</sub> , PM <sub>2.5</sub> , Nox, SOx, CO, O <sub>3</sub> )	After construction	Eight Subprojects including 18 ponds	39	20,000	780,000	Civil works contractor
2.	Noise level (LAeq in dBA during day at work site and nearby sensitive receptor)	After construction	Eight Subprojects including 18 ponds	39	3,000	117,000	Civil works contractor
3.	Surface water quality parameters monitoring at work site water body (pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub> )	After construction	Eight Subprojects including 18 ponds	39	20,000	780,000	Civil works contractor
4.	Ground water quality parameters monitoring at work site water body (pH, Turbidity, EC, DO, BOD <sub>5</sub> , COD, TDS, TSS, PO <sub>4</sub> )	After construction	Eight Subprojects including 18 ponds	39	25,000	975,000	Civil works contractor
<b>Sub Total (E. Cost of Monitoring Parameters After Construction)</b>						<b>2,652,000 (BDT)</b>	
<b>Grand Total for EMP Implementation Cost (A+B+C+D+E)</b>						<b>10,436,000 (BDT)</b>	

The EMP implementation cost stands at BDT 10,436,000

#### 10.4. Reporting and Deliverables

The IC shall submit the reports and deliverables in the English language. If so indicated in the table, certain deliverables or parts thereof shall also be prepared in Bengali. All reports have to be prepared in A4 format. All reports have to be provided in digital format (e.g. Word, Excel etc.) and additionally converted into PDF-format. Time for comments and approval by the PEAs is fifteen (15) working days after submission of draft reports (not applicable for review of detailed designs and similar deliverables). Final reports shall be submitted two weeks after receiving comments on the draft.

In general, the reporting requirements are an essential part of proper and transparent contract and project monitoring and as such are to be elaborated and quality-assured in a way that both senior and executive

levels of the contracting parties are conveniently provided with concise, reliable, sound and relevant data and analysis. A qualified presentation with maps, tables, graphs and photographs is preferred over long-winded narrative elaborations.

### 10.5 Environmental Monitoring and Reporting

The IC will monitor the progress of EMP implementation in the different project unit jurisdictions. The IC and PIU will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome. The contractor will conduct day to day implementation of the EMP.

Three types of environmental reports will be prepared in English, containing air, noise, water quality, and sediment quality data, maps, diagrams, plans, tables, etc. The following reports have to be prepared and submitted by the Contractor and PIC.

- Monthly Environmental Monitoring Report (Contractor);
- Quarterly Environmental Monitoring Reports (IC and PIU);
- Quarterly Compliance Monitoring Checklists (Contractor and IC); and
- Semi-annual Monitoring Reports (IC and PMU).

#### 10.5.1 Monthly Environmental Monitoring Report

During the construction period, environmental reporting will be required monthly, which will be prepared by the contractor to IC. The monthly reports will consist of a completed environmental compliance checklist developed using the EMP and approved by the IC such that actions necessary for each relevant mitigative action are identified and a summary of all actions recorded. Where a monthly report is coincident with a quarterly and semi-annual report, such monthly report shall be required but may be included with the respective quarterly and semi-annual report.

#### 10.5.2 Quarterly Environmental Inspections and Reports

During the construction period, environmental inspections and reporting will be prepared quarterly by the IC to PIU. The quarterly report shall consist of a completed environmental compliance checklist developed using the EMP and approved by the IC together with a summary of significant items from the current and previous two monthly reports with an indication of trends, either positively or negatively. The EIA contains mandatory sampling specifications that the contractor will be required to adhere to. At the training workshop, the contractor will receive survey worksheets that will need to be completed for each sampling station and submitted to the IC.

Where a quarterly report is coincident with the semi-annual report, such quarterly report shall be required but may be included with the respective semi-annual report. The IC reserves the right to increase the frequency of sampling subject to a review, which may be carried out at any time during the Construction period, and which could result in additional work for the contractor. If the additional sampling indicates that the contractor's activities have caused the need for additional sampling, then there will be no additional payment to the contractor.

In addition, based on the submitted quarterly monitoring report by the IC and inspection conducted by the PIU, PIU will submit quarterly reports to PMU in an agreed format and as required by PMU.



## 11 CONCLUSION AND RECOMMENDATIONS

### 11.4 Conclusion

The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the Khulna City Corporation Climate Change Adapted Urban Development CCAUD Project. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure, but no impacts were identified as being due to either the sub-project design or location. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the outline designs for the infrastructure. This means that the number of impacts and their significance has already been reduced by amending the design.

This EIA report is prepared following the guidelines of DOE and the KfW approved ESMF. Regardless of these and various other actions taken during the EIA process and in developing the subproject, there will still be impacts on the environment when the infrastructure is built and when it is operating. This is mainly because of the invasive nature of excavation work; because the secondary storage facilities (waste bins) are located in the town, some parts of which are densely populated; and because Khulna is an area with a rich history, in which there is a high risk that ground disturbance may uncover important remains. Because of these factors the most significant impacts are on the physical environment, the human environment, and the cultural heritage.

During the construction phase, impacts mainly will arise from the need to dispose of large quantities of waste soil produced by excavation. These are common impacts of construction in and around urban areas, and there are well developed methods for their mitigation. One field in which impacts are much less is archaeology, and here the subproject site being vacant city corporation land with no historical use or habitation, there will be no case of chance finds. There were limited opportunities to provide environmental enhancements, but certain measures were included. For example, it is proposed that the project will employ among the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain; and plant trees on and around completed parts of the subproject site once it is operating, to improve the appearance and provide a small ecological gain.

Once the system is operating, it will be important that Khulna City Corporation maintains the facilities and the waste management system as a whole in proper working order, because the city environment will deteriorate rapidly from waste accumulation if the system begins to fail. The subproject will provide capacity building, public education and financial support to ensure continuation of the operating system. If waste is collected regularly from houses and city storage bins, transferred to the landfill and treated as intended, then there should be no significant negative impacts. Even the accumulation of waste to a design height of 6 m at the landfill should not be significant as waste will be compacted and covered with soil daily and when each waste cell is completed, thus limiting pests, odour and visual impacts. The residential areas nearby the subproject will not be affected by such impacts.

The main impacts of the operating waste management system will be beneficial as the general environment of the city will improve considerably as mounds of garbage are no longer evident and the appearance, smell and public health of the area improves as a result. Some people will also gain socio-economically from being employed in companies engaged to operate the system, or in the expanded City Corporation manpower.

Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the PMU. There will also be a longer-term survey to monitor the expected improvements in the city environment from the improved solid waste

management.

Finally, stakeholders were involved in developing the EIA through face-to-face discussions on site and a large public meeting held in the city corporation area, after which views expressed were incorporated into the EIA and the planning and development of the subproject. The EIA will be made available at public locations in the city and will be disclosed to a wider audience via the KfW website and KCC website. The consultation process will be continued and expanded during subproject implementation, when a nationally-recognized NGO will be appointed to handle this key element to ensure that stakeholders are fully engaged in the subproject and have the opportunity to participate in its development and implementation.

## 11.5 Recommendations

The Project Management Unit (PMU) and Management, Design and Supervision Consultant (MDSC) will be responsible for monitoring. The MDSC will submit monthly monitoring reports to PMU and the PMU will send quarterly monitoring reports to KfW. KfW will post the environmental monitoring reports on their website. Therefore, the proposed sub-project is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Khulna City Corporation will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

The EMP of this EIA should be site specific EMP (SSEMP) including monitoring plan. During construction, the contractor will prepare Contractor's Environmental Management Plan, which will include contractor's responsibility in implementing EMP. The plan should be reviewed and approved by the employer at least 10 days before commencement of construction.

A copy of the EMP shall be kept on-site during the construction period at all times. The EMP shall be made binding on the contractor operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

KCC has fully endorsed the EMP and is committed to implement all the mitigation measures. PMU of KCC will also ensure that the work is carried out in an environmentally acceptable manner and the monitoring and reporting are completed in a compliant and timely fashion, acceptable to DOE. As per Government of Bangladesh ECA, 1995 and ECR, 2023, the sub-project is categorized as "Red"; and ECC must be obtained from DoE.

## 12 REFERENCES

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## 13 APPENDICES

## Appendix I: NOC for Subproject#01 (Embankment at Daulatpur and Maheshwarpasha)



## খুলনা সিটি কর্পোরেশন KHULNA CITY CORPORATION KHULNA, BANGLADESH

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স্মারক নং- ৪৬.৩৬.০০০০.২০৮-০৭.৮৩৫.২৫-৩৬৬৪

তারিখ- ৩/৭/২৫

অবস্থানগত/ পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১।	আবেদনকারীর নাম	:	আবির উল জব্বার
২।	পিতা/স্বামী/প্রীর নাম	:	এস এ জব্বার
৩।	আবেদনকারীর ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৪।	প্রকল্পের অবস্থানগত ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৫।	প্রকল্পের তফসিল	:	

জেলার নাম	খানার নাম	মৌজার নাম	খতিয়ান নং	দাগ নং	জমির ধরণ	মোট জমির পরিমাণ (বর্গমিটার)
খুলনা	খুলনা সদর	দৌলতপুর	১, ১/১	৯৬২, ১৩৪১, ১৩৪৪, ১৩৪৫	খাস জমি	২৮৯১০.৮৯
		পাবলা	১	১৫৬৪.১৫৬৫		
	দৌলতপুর	মহেশ্বরপাশা	১	৭৫২৫, ৭৫২৬, ৭৫২৭, ৭৫২৮, ৭৫২৯	খাস জমি	২৮১১.৫৩

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : দৌলতপুর ও মহেশ্বরপাশা শ্মশানঘাট এলাকায় নদীর তীর বীধাই ও বীধ নির্মাণ।

উপরোক্ত তথ্যাদির আলোকে খুলনা সিটি কর্পোরেশন এর আওতাধীন Climate Change Adapted Urban Development Program, Phase- II (CCAUD) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

#### শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দদূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্প সংশ্লিষ্টদের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখঃ ৩/৭/২৫

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ  
মশিউজ্জামান খান  
প্রধান প্রকৌশলী (চঃ দাঃ)  
খুলনা সিটি কর্পোরেশন।

## Appendix II: NOC for Subproject#02 (Rupsha Riverfront Park)



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অবস্থানগত/ পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১।	আবেদনকারীর নাম	:	আবির উল জব্বার
২।	পিতা/স্বামী/স্ত্রীর নাম	:	এস এ জব্বার
৩।	আবেদনকারীর ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৪।	প্রকল্পের অবস্থানগত ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৫।	প্রকল্পের তফসিল	:	

জেলার নাম	থানার নাম	সৌজার নাম	খতিয়ান নং	দাগ নং	জমির ধরণ	মোট জমির পরিমাণ (বর্গমিটার)
খুলনা	রুপসা	টুট পাড়া		১৩৫৯৩,১৩৫৯৪	খাস জমি	১৪৪৩.৪৪

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : রুপসা রিভার ফ্রন্ট পার্ক উন্নয়ন।

উপরোক্ত তথ্যাদির আলোকে খুলনা সিটি কর্পোরেশন এর আওতাধীন Climate Change Adapted Urban Development Program, Phase- II (CCAUD) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

#### শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দদূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্প সংশ্লিষ্টদের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখঃ ০২/৭/২০২৫

২/৭/২৫  
স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ  
মুশিউজ্জামান খান  
প্রধান প্রকৌশলী (চঃ দাঃ)  
খুলনা সিটি কর্পোরেশন।

## Appendix III: NOC for Subproject#03 (Sub-Catchment 17&amp;21 and Sonadanga Bypass Road)



# খুলনা সিটি কর্পোরেশন

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অবস্থানগত/ পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১।	আবেদনকারীর নাম	:	আবির উল জব্বার
২।	পিতা/স্বামী/স্ত্রীর নাম	:	এস এ জব্বার
৩।	আবেদনকারীর ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৪।	প্রকল্পের অবস্থানগত ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৫।	প্রকল্পের তফসিল	:	

জেলা নাম	থানা নাম	মৌজার নাম	খতিয়ান নং	দাগ নং	জমির ধরণ	মোট জমির পরিমাণ (বর্গমিটার)
খুলনা	খুলনা সদর	বানিয়াখামার দেনারাবাদ	৪,২৫,৪৩,৪৪,	১২,১৩,১৪,১৬,১৭,২০, ২১,৬৬, ১৩৭১০, ১৩৭১১, ১৩৭১২, ১৩৭১৩, ১৪০০১, ১৪০০২, ১৪০০৩, ১৪০০৪, ১৪০০৫, ১৪০০৬, ১৪০০৭, ১৪০১৭, ১৪০২৩, ১৪০২৪, ১৪০২৫, ১৪০২৬, ১৪০৩৬, ১৪০৩৭, ১৪০৩৮, ১৪০৩৯, ১৪০৪০, ১৪০৪২, ১৪০৭১, ১৪০৭৬, ১৪০৭৭, ১৪০৭৯, ১৪০৮০	অকৃষি	৩৪১৭৯.৩৭

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : নবীনগর সাব-ক্যাচমেন্টের নং ১৭, ২১ এর ড্রেনেজ সিস্টেম আপগ্রেডিং।

উপরোক্ত তথ্যাদির আলোকে খুলনা সিটি কর্পোরেশন এর আওতাধীন Climate Change Adapted Urban Development Program, Phase- II (CCAUD) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

#### শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দদূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্প সংশ্লিষ্টদের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখঃ ১৭/১২

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ  
**মশিউজ্জামান খান**  
 প্রধান প্রকৌশলী (চঃ দাঃ)  
 খুলনা সিটি কর্পোরেশন।

খুলনা উন্নয়ন কর্তৃপক্ষ খুলনা।	খুলনা সিটি কর্পোরেশন (প্রশাসনিক বিভাগ) প্রশাসন ও প্রেরণ শাখা নং: ১৫৭ তারিখ: ২২/০৫/২৫
স্মারক নং-২৫.৪১.০০০০.০০২.০০৮৪.২০২০-২০২৫/ ২৪৬৩	তারিখ: ২২/০৫/২৫
বিষয় :	কেডিএ এম এ বারী সড়ক পার্শ্বস্থ বাণিজ্যিক-কাম-আবাসিক এলাকার ০১ নং প্লটের ৮.১৯৫ কাঠা জমির মধ্য হতে ০.৪২১ কাঠা জমি বরাদ্দ প্রসঙ্গে।
সূত্র :	খুলনা সিটি কর্পোরেশনের ৯/৩/২৫ তারিখের ১৩.০০০০.০০৮.০৭.০০৫.২৫-৫৪৯ নং স্মারক।
<p>উপর্যুক্ত বিষয় ও সূত্রে উল্লিখিত স্মারকের আবেদনের প্রেক্ষিতে জানানো যাচ্ছে যে, আপনাদের ২৭/০৪/২০২৫ তারিখে অনুষ্ঠিত কর্তৃপক্ষের ৫৬৭ তম (০১/২০২৫) (সাধারণ) বোর্ড সভার বিবিধ আলোচ্য সূচী-০১ এর সিদ্ধান্ত অনুযায়ী কেডিএ এম এ বারী সড়ক (আউটার বাইপাস সড়ক ২য় পর্যায়) পার্শ্বস্থ বাণিজ্যিক কাম আবাসিক এলাকার ১ নং প্লটের ৮.১৯৫ কাঠা জমির মধ্য ০.৪২১ কাঠা জমি মূল্য পরিশোধ সাপেক্ষে সোনাদালা মোড়ের টার্নিং সহজ করার জন্য (সংযুক্ত সে-আউট মোতাবেক) বরাদ্দ/ব্যবহারের অনুমতি প্রদান করা হলো।</p>	
প্রাপক মহরর/প্রশাসক খুলনা সিটি কর্পোরেশন খুলনা।	<p style="text-align: right;">২২/০৫/২৫ পরিচালক (এস্টেট) খুলনা উন্নয়ন কর্তৃপক্ষ খুলনা। ২২/০৫/২৫</p>
<p>অনুলিপি :</p> <ol style="list-style-type: none"> <li>১। প্রধান নির্বাহী কর্মকর্তা, খুলনা সিটি কর্পোরেশন, খুলনা।</li> <li>২। প্রধান রাজস্ব কর্মকর্তা, খুলনা সিটি কর্পোরেশন, খুলনা।</li> <li>৩। চীফ প্র্যানিং অফিসার ও প্রকল্প পরিচালক (CCAUD) খুলনা সিটি কর্পোরেশন, খুলনা।</li> </ol>	

## Appendix IV: NOC for Subject#04 (Bastuhara Khal and Deana Chowdhury Khal)



## খুলনা সিটি কর্পোরেশন

### KHULNA CITY CORPORATION

#### KHULNA, BANGLADESH

website: www.khulnacity.gov.bd | Fax: +88-02477-720946

স্মারক নং- ৪১/১৪, ০০০০-০০০৬-০৭, ০০০০-২৫-২৩৬৭

তারিখ- ১/৭/২৫

অবস্থানগত/ পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১।	আবেদনকারীর নাম	:	আবির উল জব্বার
২।	পিতা/স্বামী/পত্নীর নাম	:	এস এ জব্বার
৩।	আবেদনকারীর ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৪।	প্রকল্পের অবস্থানগত ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৫।	প্রকল্পের তফসিল	:	

জেলার নাম	থানার নাম	মোজার নাম	খতিয়ান নং	দাগ নং	জমির ধরণ	মোট জমির পরিমাণ
খুলনা	দৌলতপুর	বয়রা, পাবলা দিয়ানা		২৮৩৫, ২৮৩৬, ৬১৭৭, ৬২২৪, ৬৫১৯, ৬৫৫৭, ৬৮৩১, ৬৮৫৬, ৮০৩৪	খাস জমি (অকৃষি)	৪৩২৫৮.৬

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : বাস্তুহারা ও দিয়ানা চৌধুরী খাল আপগ্রেডিং।

উপরোক্ত তথ্যাদির আলোকে খুলনা সিটি কর্পোরেশন এর আওতাধীন Climate Change Adapted Urban Development Program, Phase- II (CCAUD) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

#### শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দদূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্প সংশ্লিষ্টদের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখঃ ১/৭/২৫

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ

মশিউজ্জামান খান  
প্রধান প্রকৌশলী (চঃ দাঃ)  
খুলনা সিটি কর্পোরেশন

## Appendix V: NOC Collected for Subproject#05 (Labonchara Khal outlet gate)



## খুলনা সিটি কর্পোরেশন KHULNA CITY CORPORATION KHULNA, BANGLADESH

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স্মারক নং- ৪৬.৩৬.০৮০০.৫০৬.০৭.৫০৬.২৫-৩৬৬৫ তারিখ- ২৭/১৫

অবস্থানগত/ পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১।	আবেদনকারীর নাম	:	আবির উল জব্বার
২।	পিতা/স্বামী/স্বামীর নাম	:	এস এ জব্বার
৩।	আবেদনকারীর ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৪।	প্রকল্পের অবস্থানগত ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৫।	প্রকল্পের তফসিল	:	

জেপার নাম	থানার নাম	মৌজার নাম	খতিয়ান নং	দাগ নং	জমির ধরণ	মোট জমির পরিমাণ (বর্গমিটার)
খুলনা	লবনচরা	লবনচরা		১০৫৩১, ১১০০৪, ১১০০৮, ১১০০০, ১১০০৯, ১১০০৭, ১১০০৩	খাস জমি ব্যক্তিমাগিকানাধীন	৩৫৮১৬.৪

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : লবনচরা পাম্পিং স্টেশন ও আউটলেট গেট আপগ্রেডিং।

উপরোক্ত তথ্যাদির আলোকে খুলনা সিটি কর্পোরেশন এর আওতাধীন Climate Change Adapted Urban Development Program, Phase- II (CCAUD) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

### শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দদূষণ করা যাবে না।
৬. প্রকল্প স্ট্রট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্প সংশ্লিষ্টদের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।


তারিখঃ ২৭/১৫

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ  
মহিউজ্জামান খান  
প্রধান প্রকৌশলী (চঃ দাঃ)  
খুলনা সিটি কর্পোরেশন।

৯৩১২

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**বাংলাদেশ পানি উন্নয়ন বোর্ড**



প্রধান প্রকৌশলীর দপ্তর  
দক্ষিণ-পশ্চিমাঞ্চল  
বাংলাদেশ পানি উন্নয়ন বোর্ড  
নুরনগর, খুলনা।  
ফোনঃ-অফিস ০৪১-৭৬০৪৬১  
বাসা-০৪১-৭৬০৪৬৭

স্মারক নং-কেসিসি/ ২৪২৯  
বরাবর

তারিখ- ২০/১১/২০১২ খ্রিঃ।

মাননীয় মেয়র  
খুলনা সিটি কর্পোরেশন  
খুলনা।

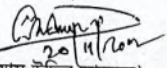
দৃষ্টি আকর্ষণঃ প্রধান রাজস্ব কর্মকর্তা, খুলনা সিটি কর্পোরেশন, খুলনা।

বিষয়ঃ খুলনা মহানগরী ও তৎসংলগ্ন এলাকার জলাবদ্ধতা নিরসনকল্পে "নগর অঞ্চল উন্নয়ন" শীর্ষক প্রকল্পের আওতায় লবনচরা ১নং ডুইসগেট, লবনচরা ২নং ডুইসগেট, আলুতলা ১০ ভেন্ট ডুইসগেট, রায়ের মহল ডুইসগেট সংস্কার ও সার্বিক রক্ষণাবেক্ষন এবং উপরোক্ত ডুইসগেট সংলগ্ন খাল খনন, দুইপাড় বাঁধাই ও দুই পাড়ে রাস্তা নির্মাণ এবং লবনচরা ভেড়ী বাঁধ কাম রোডের (শিপইয়ার্ড হতে মাথাভাঙ্গা ডুইসগেট পর্যন্ত) উন্নয়ন মূলক কার্যক্রম বাস্তবায়নের নিমিত্তে অনাপত্তি প্রদান প্রসংগে।

সূত্রঃ আপনার দপ্তর স্মারক নং-সম্পত্তি/১২-১৩/৯৫ তারিখ-১৩.০৯.২০১২ ইং।

মহোদয়

যথাযথ সম্মান সহকারে সূত্রস্থ স্মারক ও বিষয়ে চাহিদার প্রেক্ষিতে জানানো যাচ্ছে যে, তত্ত্বাবধায়ক প্রকৌশলী, খুলনা পওর সার্কেল, পাউবো, খুলনা ও নির্বাহী প্রকৌশলী, খুলনা পওর বিভাগ-২, পাউবো, খুলনার সুপারিশ অনুযায়ী আপনার দপ্তরের অধীনে বাস্তবায়িতব্য "নগর অঞ্চল উন্নয়ন" শীর্ষক প্রকল্পে খুলনা মহানগরী ও তৎসংলগ্ন এলাকার জলাবদ্ধতা নিরসন কল্পে আপনার প্রস্তাব মোতাবেক বাংলাদেশ পানি উন্নয়ন বোর্ডের আওতায় নির্মিত লবনচরা ১নং ডুইসগেট, লবনচরা ২নং ডুইসগেট, আলুতলা ১০ ভেন্ট ডুইসগেট, রায়ের মহল ডুইসগেট সংস্কার ও সার্বিক রক্ষণাবেক্ষন এবং উপরোক্ত ডুইসগেট সংলগ্ন খাল খনন, দুইপাড় বাঁধাই ও দুই পাড়ে রাস্তা নির্মাণ এবং লবনচরা ভেড়ী বাঁধ কাম রোডের (শিপইয়ার্ড হতে মাথাভাঙ্গা ডুইসগেট পর্যন্ত) উন্নয়ন মূলক কার্যক্রম বাস্তবায়নের নিমিত্তে অনাপত্তি প্রদান করা হলো। উল্লেখ্য যে, বর্ণিত কাজগুলো পাউবো'র ডিজাইন অনুযায়ী বাস্তবায়ন করা প্রয়োজন।

আপনার অনুগত  
  
(মোঃ গিয়াস উদ্দিন আহম্মদ)  
প্রধান প্রকৌশলী  
দক্ষিণ-পশ্চিমাঞ্চল  
পাউবো, খুলনা।

স্মারক নং-কেসিসি/ ২৪২৯ (৫) তারিখঃ ২০/১১/২০১২ খ্রিঃ।

অনুলিপি অবগতি ও প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য প্রেরণ করা হলোঃ

- ১) অতিরিক্ত মহাপরিচালক (পশ্চিম রিজিয়ন), পাউবো, ঢাকা।
- ২) বিভাগীয় কমিশনার, খুলনা।
- ৩) তত্ত্বাবধায়ক প্রকৌশলী, খুলনা পওর সার্কেল, পাউবো, খুলনা।
- ৪) তত্ত্বাবধায়ক প্রকৌশলী, যশোর পওর সার্কেল, পাউবো, খুলনা।
- ৫) সিএসও টু মহাপরিচালক, পাউবো, ঢাকা।

প্রধান প্রকৌশলী  
দক্ষিণ-পশ্চিমাঞ্চল

## Appendix VI: NOC Collected for Subproject#06



## খুলনা সিটি কর্পোরেশন KHULNA CITY CORPORATION KHULNA, BANGLADESH

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স্মারক নং-৪৬, খা. ০৪০০.০০৬.০৭.০০৩. ২৫ - ২৬/০৬

তারিখ- ২/৭/২৫

অবস্থানগত/ পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১।	আবেদনকারীর নাম	:	আবির উল জক্কার
২।	পিতা/স্বামী/স্বামীর নাম	:	এস এ জক্কার
৩।	আবেদনকারীর ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৪।	প্রকল্পের অবস্থানগত ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৫।	প্রকল্পের তফসিল	:	

জেতার নাম	থানার নাম	মৌজার নাম	খতিয়ান নং	দাগ নং	জমির ধরণ	মোট জমির পরিমাণ (বর্গমিটার)
খুলনা	বটিয়াঘাটা	ভেঁতুলতলা	১	১২৮৩,১১৮৫	খাস জমি (অকৃষি)	১৩০৫২৮.৩৭

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : আলুতলা আউটলেট গোট আগগ্রেডিং।

উপরোক্ত তথ্যাদির আলোকে খুলনা সিটি কর্পোরেশন এর আওতাধীন Climate Change Adapted Urban Development Program, Phase- II (CCAUD) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

#### শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দদূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্প সংশ্লিষ্টদের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।


তারিখঃ ২/৭/২৫

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ  
মশিউজ্জামান খান  
প্রধান প্রকৌশলী (চঃ দাঃ)  
খুলনা সিটি কর্পোরেশন।

৯/১১/২০১২

Office of the  
Chief Engineer  
South-Western-Zone  
BWDB, Noornagar, Khulna.  
Tel: Office-041-760461  
Resident 041-760467  
E-mail: ceswz.khulna@khulna.bangladesh.gov.bd

**বাংলাদেশ পানি উন্নয়ন বোর্ড**



প্রধান প্রকৌশলীর দপ্তর  
দক্ষিণ-পশ্চিমাঞ্চল  
বাংলাদেশ পানি উন্নয়ন বোর্ড  
নুরনগর, খুলনা।  
ফোনঃ-অফিস ০৪১-৭৬০৪৬১  
বাসা-০৪১-৭৬০৪৬৭

স্মারক নং-কেসিসি/ ২৪২৯  
তারিখ- ২০/১১/২০১২ খ্রিঃ।

বরাবর  
মাননীয় মেয়র  
খুলনা সিটি কর্পোরেশন  
খুলনা।

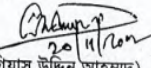
দৃষ্টি আকর্ষণ : প্রধান রাজস্ব কর্মকর্তা, খুলনা সিটি কর্পোরেশন, খুলনা।

বিষয় : খুলনা মহানগরী ও তৎসংলগ্ন এলাকার জলাবদ্ধতা নিরসনকল্পে "নগর অঞ্চল উন্নয়ন" শীর্ষক প্রকল্পের আওতায় লবনচরা ১নং ডুইসগেট, লবনচরা ২নং ডুইসগেট, আলুতলা ১০ ভেন্ট ডুইসগেট, রায়ের মহল ডুইসগেট সংস্কার ও সার্বিক রক্ষণাবেক্ষন এবং উপরোক্ত ডুইসগেট সংলগ্ন খাল খনন, দুইপাড় বাঁধাই ও দুই পাড়ে রাস্তা নির্মাণ এবং লবনচরা ভেড়ী বাঁধ কাম রোডের (শিপইয়ার্ড হতে মাথাভাঙ্গা ডুইসগেট পর্যন্ত) উন্নয়ন মূলক কার্যক্রম বাস্তবায়নের নিমিত্তে অনাপত্তি প্রদান প্রসঙ্গে।

সূত্র :- আপনার দপ্তর স্মারক নং-সম্পত্তি/১২-১৩/৯৫ তারিখ-১৩.০৯.২০১২ ইং।

মহোদয়

যথাযথ সম্মান সহকারে সূত্রস্থ স্মারক ও বিষয়ে চাহিদার প্রেক্ষিতে জানানো যাচ্ছে যে, তত্ত্বাবধায়ক প্রকৌশলী, খুলনা পওর সার্কেল, পাউবো, খুলনা ও নির্বাহী প্রকৌশলী, খুলনা পওর বিভাগ-২, পাউবো, খুলনার সুপারিশ অনুযায়ী আপনার দপ্তরের অধীনে বাস্তবায়িতব্য "নগর অঞ্চল উন্নয়ন" শীর্ষক প্রকল্পে খুলনা মহানগরী ও তৎসংলগ্ন এলাকার জলাবদ্ধতা নিরসন কল্পে আপনার প্রস্তাব মোতাবেক বাংলাদেশ পানি উন্নয়ন বোর্ডের আওতায় নির্মিত লবনচরা ১নং ডুইসগেট, লবনচরা ২নং ডুইসগেট, আলুতলা ১০ ভেন্ট ডুইসগেট, রায়ের মহল ডুইসগেট সংস্কার ও সার্বিক রক্ষণাবেক্ষন এবং উপরোক্ত ডুইসগেট সংলগ্ন খাল খনন, দুইপাড় বাঁধাই ও দুই পাড়ে রাস্তা নির্মাণ এবং লবনচরা ভেড়ী বাঁধ কাম রোডের (শিপইয়ার্ড হতে মাথাভাঙ্গা ডুইসগেট পর্যন্ত) উন্নয়ন মূলক কার্যক্রম বাস্তবায়নের নিমিত্তে অনাপত্তি প্রদান করা হলো। উল্লেখ্য যে, বর্ণিত কাজগুলো পাউবো'র ডিজাইন অনুযায়ী বাস্তবায়ন করা প্রয়োজন।

আপনার অনুগত  
  
(মোঃ গিয়াস উদ্দিন আহম্মদ)  
প্রধান প্রকৌশলী  
দক্ষিণ-পশ্চিমাঞ্চল  
পাউবো, খুলনা।

স্মারক নং কেসিসি/ ২৪২৯ (৫) তারিখ : ২০/১১/২০১২ খ্রিঃ।

অনুলিপি অবগতি ও প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য প্রেরণ করা হলো :

- ১) অতিরিক্ত মহাপরিচালক (পশ্চিম রিজিয়ন), পাউবো, ঢাকা।
- ২) বিভাগীয় কমিশনার, খুলনা।
- ৩) তত্ত্বাবধায়ক প্রকৌশলী, খুলনা পওর সার্কেল, পাউবো, খুলনা।
- ৪) তত্ত্বাবধায়ক প্রকৌশলী, যশোর পওর সার্কেল, পাউবো, খুলনা।
- ৫) সিএসও টু মহাপরিচালক, পাউবো, ঢাকা।

প্রধান প্রকৌশলী  
দক্ষিণ-পশ্চিমাঞ্চল

## Appendix VII: NOC Collected for Subproject#07



## খুলনা সিটি কর্পোরেশন

### KHULNA CITY CORPORATION

#### KHULNA, BANGLADESH

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স্মারক নং- ৪৮/৩৬, ৫৫৩৩-৫৬-৫৭, ৫০-৫, ২৫-৩৬৩৩ তারিখ- ২/৭/২৫

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১।	আবেদনকারীর নাম	:	আবির উল জব্বার
২।	পিতা/স্বামী/পত্নীর নাম	:	এস এ জব্বার
৩।	আবেদনকারীর ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৪।	প্রকল্পের অবস্থানগত ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৫।	প্রকল্পের তফসিল	:	

জেলার নাম	থানার নাম	মৌজার নাম	খতিয়ান নং	দাগ নং	জমির ধরন	মোট জমির পরিমাণ (বর্গমিটার)
খুলনা	বটিয়াঘাটা	হরিনটানা, আলুতলা, ডুবি	১	২২২,৪৮৪,২৭,৬৫	খাস জমি	৫৮৪২৫.৬

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : নিরালা খাল আপশ্রেডিং।

উপরোক্ত তথ্যাদির আলোকে খুলনা সিটি কর্পোরেশন এর আওতাধীন Climate Change Adapted Urban Development Program, Phase- II (CCAUD) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

#### শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দদূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্প সংশ্লিষ্টদের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখঃ ২/৭/২৫

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ

মশিউজ্জামান খান  
প্রধান প্রকৌশলী (চঃ দঃ)  
খুলনা সিটি কর্পোরেশন।

## Appendix VIII: NOC Collected for Subproject#08 (18 Ponds)



## খুলনা সিটি কর্পোরেশন KHULNA CITY CORPORATION KHULNA, BANGLADESH

website: www.khulnacity.gov.bd | Fax: +88-02477-720946

স্মারক নং- ৪৬, ডি. ০০০০. ০০৬ ০৭. ০০২. ২৫- ১৩৪০

তারিখ- ১/৭/২৫

অবস্থানগত/ পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১।	আবেদনকারীর নাম	:	আবির উল জব্বার
২।	পিতা/স্বামী/স্বামী/স্ত্রীর নাম	:	এস এ জব্বার
৩।	আবেদনকারীর ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৪।	প্রকল্পের অবস্থানগত ঠিকানা	:	খুলনা সিটি কর্পোরেশন, খুলনা
৫।	প্রকল্পের তফসিল	:	

জেলার নাম	থানার নাম	মোজার নাম	খতিয়ান নং	দাগ নং	জমির ধরণ	মোট জমির পরিমাণ
খুলনা						

৬। প্রকল্পের উৎপাদিত/উৎপাদিতব্য পণ্যের নাম : পুকুর উন্নয়ন।

উপরোক্ত তথ্যাদির আলোকে খুলনা সিটি কর্পোরেশন এর আওতাধীন Climate Change Adapted Urban Development Program, Phase- II (CCAUD) কে নিম্নবর্ণিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো।

#### শর্তাবলীঃ

১. প্রকল্প স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরণ করতে হবে।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহণ করতে হবে।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকাণ্ড কিংবা অন্য কোন দুর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দদূষণ করা যাবে না।
৬. প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক প্রকল্প সংশ্লিষ্টদের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

তারিখঃ ১/৭/২৫

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ  
মশিউজ্জামান খান  
প্রধান প্রকৌশলী (চঃ দাগ)  
খুলনা সিটি কর্পোরেশন।



**খুলনা সিটি কর্পোরেশন**  
**KHULNA CITY CORPORATION**  
**KHULNA, BANGLADESH**

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website : www.khulnacity.org

স্মারক নং- ৪১/১৩.০০৩৩.০২৬.০০৫.২৩ - ৬৬০৮

তারিখ- ২১/১১/২০২৩

বিষয়ঃ সরকারি/বেসরকারি প্রতিষ্ঠানের মালিকানাধীন পুকুর উন্নয়নে খুলনা সিটি কর্পোরেশনের অনুকূলে অদাপ্তি প্রদান প্রসঙ্গে।

সূত্রঃ কেসিসি/পূর্ববিয়/২০২২/৭৭৩, তারিখঃ ২৪/০৩/২০২২খ্রিঃ।

উপর্যুক্ত বিষয় ও সূত্রোক্ত স্মারকের পরিপ্রেক্ষিতে জানানো যাচ্ছে যে, খুলনা সিটি কর্পোরেশন জার্মান উন্নয়ন সংস্থার আর্থিক সহায়তায় খুলনা শহর এলাকার কেসিসি ও সরকারি/বেসরকারি প্রতিষ্ঠানের মালিকানাধীন ২৩টি পুকুর সংরক্ষণ ও উন্নয়ন/সংস্কারের কাজ হাতে নেওয়া হয়েছে। জলবায়ু পরিবর্তনজনিত ক্ষতি মোকাবেলায় শহরের সার্বিক পরিবেশ উন্নয়নের লক্ষ্যে Climate Change-Adapted Urban Development Project এর আওতায় উক্ত (সংযুক্ত তালিকাভুক্ত) পুকুরগুলো নিম্নলিখিত শর্তে সংরক্ষণ ও উন্নয়ন/সংস্কার করা হবেঃ-

- ১। পুকুর সংরক্ষণ ও উন্নয়ন/সংস্কারকল্পে কেসিসি'র নগ্না অনুযায়ী অবকাঠামো নির্মাণ করতে হবে।
- ২। পুকুর সংরক্ষণ ও উন্নয়ন/সংস্কারের কাজ সমাপ্তির পর সম্বন্ধিত কর্তৃপক্ষ ইজারা কার্যক্রম পরিচালনা করতে পারবে না।
- ৩। পুকুর সংরক্ষণ ও উন্নয়ন/সংস্কারের কাজ সমাপ্তির পর জনসাধারণ যাতে উপভোগ করতে পারে তার সার্বিক ব্যবস্থা নিশ্চিত করতে হবে।

এমতাবস্থায়, সংযুক্ত তালিকা অনুযায়ী আপনার প্রতিষ্ঠানের মালিকানাধীন পুকুরগুলো সংরক্ষণ ও উন্নয়ন/সংস্কারের লক্ষ্যে কেসিসি'র অনুকূলে অদাপ্তি প্রদানের বিষয়ে অদ্যবধি অত্র দপ্তরকে অবহিত করা হয়নি বিধায় নির্দেশক্রমে পুনরায় আশামী ৭ কর্ম দিবসের মধ্যে অদাপ্তি পর প্রদানের জন্য অনুরোধ করা হলো।

সংযুক্তি: কর্তনামতে।

.....  
.....  
.....  
.....


প্রধান নির্বাহী কর্মকর্তা  
খুলনা সিটি কর্পোরেশন  
ফোন-০২৪৭৭-৭২০৪০৯  
E-mail: ceo.kcc.kln@gmail.com

২১/১১/২৩



অনুলিপি :


- ১। প্রধান প্রকৌশলী, খুলনা সিটি কর্পোরেশন।
- ২। প্রধান রাজস্ব কর্মকর্তা, খুলনা সিটি কর্পোরেশন।
- ৩। প্রকল্প পরিচালক ও চীফ প্রানিং অফিসার, খুলনা সিটি কর্পোরেশন।
- ৪। সিএ টু মেয়র, খুলনা সিটি কর্পোরেশন (মাননীয় মেয়র মহোদয়ের সদয় অবগতির জন্য)।
- ৫। সিএ টু প্রিন্সিপাল, খুলনা সিটি কর্পোরেশন।
- ৬। সংশ্লিষ্ট নথি।

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১৯ এপ্রিল, ২০২২ খ্রিষ্টাব্দ

বিষয়: সরকারি ব্রজলাল কলেজ, খুলনার মসজিদ সংলগ্ন পুকুর উন্নয়নে অনাপত্তি প্রদান।

সূত্র: কেসিসি/পূবিয়/২০২২/৭৭৩ তারিখ ২৪/০৩/২০২২ খ্রি.

মহোদয়,

উপর্যুক্ত বিষয় ও সূত্রের পরিপ্রেক্ষিতে জানাচ্ছি যে, খুলনা সিটি কর্পোরেশন, খুলনা জার্মান উন্নয়ন সংস্থার আর্থিক সহায়তায় খুলনা শহর এলাকার প্রতিষ্ঠানের মালিকানাধীন পুকুর সংরক্ষণ ও উন্নয়ন/ সংস্কার এর অধ্যে Climate Change-Adapted Urban Development Project এর আওতায় সরকারি ব্রজলাল কলেজ, খুলনার মসজিদ সংলগ্ন পুকুর প্রস্তাবিত শর্ত মেনে সংরক্ষণ ও উন্নয়ন/ সংস্কারে অনাপত্তি প্রদান করা হলো।

*S. M. M. M.*  
19.4.2022  
(প্রফেসর শরীফ আতিকুল্লাহমান)  
অধ্যক্ষ  
সরকারি ব্রজলাল কলেজ, খুলনা

✓ মাননীয় মেয়র  
খুলনা সিটি কর্পোরেশন  
খুলনা

দৃষ্টি আকর্ষণ- প্রধান নির্বাহী কর্মকর্তা

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**卐 পাবলা মধ্যপাড়া সার্বজনীন পূজা মন্দির 卐**

স্থাপিত- ১৯৮১ ইং

পাবলা মধ্যপাড়া, দৌলতপুর, খুলনা।

স্মারক নং:..... তারিখ: ২৯/৩/২০২৪

বর্ষাবর

মন্দিরীয় মেগর মন্দির,  
খুলনা সিটি কর্পোরেশন, খুলনা

বিষয়ঃ পাবলা মধ্যপাড়া সার্বজনীন পূজা মন্দিরের নিজস্ব পুকুরটি সরকারী অনুদানে সংস্কার ও সৌন্দর্য বর্ধনে  
আপত্তি নাই।

জনাব,

যথাবিহীত সম্মান পূর্বক বিনীত নিবেদন এই যে, আমরা খুলনা সিটি কর্পোরেশনের দৌলতপুর থানার  
অন্তর্গত-০৬ নং ওয়ার্ডে পাবলা মধ্যপাড়া সার্বজনীন পূজা মন্দিরটি অবস্থিত। উক্ত মন্দিরের নিজস্ব পুকুরটি  
দীর্ঘদিন যাবৎ পুনঃখননের অভাবে ব্যবহারের অনুপযোগী হয়ে পড়েছে। পুকুরের পানিতে মন্দিরের আগত  
দর্শনার্থীসহ এলাকাবাসীরা নিত্য ব্যবহারের মাধ্যমে উপকৃত হইয়া থাকেন এবং অত্র পুকুরের পানি দিয়ে  
দীর্ঘদিন যাবৎ বিভিন্ন এলাকায় অগ্নি নির্বাপক কাজে পুকুরটি ব্যবহার হয়ে আসছে। বর্তমানে পুকুরটি আপনার  
মাধ্যমে পুনঃখনন, সংস্কার কাজ ও সৌন্দর্য বর্ধন করা একান্ত প্রয়োজন।

অতএব, এলাকাবাসীর আকুল আবেদন ও জোরালো দাবী, যাহাতে পাবলা মধ্যপাড়া সার্বজনীন পূজা  
মন্দিরের নিজস্ব পুকুরটি সংস্কার কাজ ও সৌন্দর্য বর্ধনের প্রয়োজনীয় ব্যবস্থা দানে জনাবের সদয় মর্জি হয়।

বিনীত নিবেদক-

**অমর কুমার কুহু**  
(অমর কুমার কুহু)  
সভাপতি  
পাবলা মধ্যপাড়া সার্বজনীন পূজা মন্দির কমিটি  
পাবলা মধ্যপাড়া, দৌলতপুর, খুলনা  
মোবাঃ ০১৮১৬-৪৫৪৮৬৯

**তারক মজুমদার**  
(তারক মজুমদার)  
সাধারণ সম্পাদক  
পাবলা মধ্যপাড়া সার্বজনীন পূজা মন্দির কমিটি  
পাবলা মধ্যপাড়া, দৌলতপুর, খুলনা  
মোবাঃ ০১৭৯৩-৭০২০০০

শ্রী শাহসুদ্দিন আহমেদ  
কর্তৃকিতর, ওয়ার্ড নং-০৬  
খুলনা সিটি কর্পোরেশন,  
খুলনা।

HIA  
2/1/28  
HIA  
2/1/28

PO

খালিশপুর মাধ্যমিক বিদ্যালয়

টাউন খালিশপুর, থানা-খালিশপুর মেট্রো, ডাকঘর-জিপিও-৯০০০, খুলনা।  
 স্থাপিত-১৯০৪, স্থায়ী স্বীকৃতি-১৯০৪, বোর্ড কোড-৩৫৭৯, এমপিও কোড-৬০১২০২১৩০১, EIIN-117082

তারিখঃ ২৪/১১/২০২৩ খ্রি.

২৭-৫৬১৮  
২৭/১২/২৩

Abanul  
২৮/১২/২৩

বরাবর, প্রধান শিক্ষক  
খুলনা সিটি করপোরেশন খুলনা।

মাধ্যমঃ যথাযথ কর্তৃপক্ষ

DIA

বিষয়ঃ বিদ্যালয় মালিকানাধীন পুকুর উন্নয়নে অনাপত্তি প্রসংগে।

জনাব,

যথাযথ সম্মান পূর্বক আপনাকে জানানো যাচ্ছে যে, ঐতিহ্যবাহী খালিশপুর মাধ্যমিক বিদ্যালয়টি ১৯০৪ সালে প্রতিষ্ঠিত এবং একই সালে কলিকাতা বিশ্ববিদ্যালয় কর্তৃক স্থায়ী স্বীকৃতি প্রাপ্ত। বিদ্যালয়ের একটি পুকুর খনন না করার কারণে এবং দীর্ঘ দিন অব্যবহৃত থাকায় ১৫০ফুটx৬০ফুট মাপের পুকুরটি উহার অস্তিত্ব প্রায় হারিয়ে ফেলেছে। পূর্বে খুলনা সিটি করপোরেশন এর নিকট উহা খননের জন্য আবেদন করা হয়েছিল বিধায় Climate Change Adaptation Urban Development Project কর্তৃক পুকুর খনন বা উন্নয়ন করা হলে নির্ধারিত শর্ত মেনে নিতে বিদ্যালয় কর্তৃপক্ষের কোন আপত্তি নেই।


অতএব, কার্যকরী পদক্ষেপ গ্রহণ করতে আপনার সদয় সহানুভূতি কামন করছি।

আপনার বিশ্বস্ত,

সভাপতি  
খালিশপুর মাধ্যমিক বিদ্যালয়  
জিপিও, খুলনা-৯০০০  
(এস.এম. সোরশেদ আহমেদ মনি)  
সভাপতি  
খালিশপুর মাধ্যমিক বিদ্যালয়  
খালিশপুর, খুলনা-৯০০০।

প্রধান শিক্ষক  
খালিশপুর মাধ্যমিক বিদ্যালয়  
খালিশপুর, খুলনা-৯০০০।


মাদরাসা কোড : ১৫৩৬৭ E.I.N NO. : ১১৭৪২২	অধ্যক্ষের কার্যালয়	ফোন : ০৪১-৭২৪১৩৫ মোবাইল : ০১৯১১-৭০১০৬০ E-mail : afnazmussaud@yahoo.com
	<b>তা'লীমুল মিল্লাত রহমাতিয়া ফাযিল মাদরাসা</b> <b>المدرسة تعليم الملة الرحمتية الفاضل</b> <b>Talimul Millat Rahmatia Fazil Madrasah</b> খানজাহান নগর, সোনাডাঙ্গা, খুলনা-৯১০০	
স্মারক নং - <u>১৫৩৬৭/খুলনা/২০২২/১৮</u>	তারিখ : <u>২৭/০৬/২০২২</u>	
বরাবর মাননীয় মেয়র খুলনা সিটি কর্পোরেশন, খুলনা।		
বিষয়ঃ তা'লীমুল মিল্লাত রহমাতিয়া ফাযিল মাদরাসার পুকুর সংরক্ষনে উন্নয়ন মূলক কাজে অনাপত্তি প্রসঙ্গে।		
জনাব যথা বিহীত সম্মান প্রদর্শন পূর্বক নিবেদন এই যে, আপনার প্রেরিত পত্র, সূত্র স্মারক নং- কেসিসি/পূর্ণনিঃ/২০২২/৭৭৩, তারিখঃ ২৪/০৩/২০২২খ্রি. এর আলোকে জানাচ্ছি যে, অত্র তা'লীমুল মিল্লাত রহমাতিয়া ফাযিল মাদরাসা, খানজাহান নগর, সোনাডাঙ্গা, খুলনা'র ক্যাম্পাসের পুকুরটি সংরক্ষণ ও উন্নয়ন/সংস্কার করলে প্রতিষ্ঠান কর্তৃপক্ষের কোন আপত্তি নাই।		
প্রয়োজনীয় ব্যবস্থা গ্রহণ করতে মর্জি হয়।		
আপনার বিশ্বস্ত  (এ. এফ. এম. নাজিমুদ্দিন সিউল) অধ্যক্ষ ইনকোড নম্বর-৩৫ ৭৩০৭ তা'লীমুল মিল্লাত রহমাতিয়া ফাযিল মাদরাসা খানজাহান নগর, সোনাডাঙ্গা, খুলনা। মাদরাসা কোডঃ ১৫৩৬৭, ই.এ.ই.নং-১১-৭৪২২ মোবাইল নম্বরঃ ০১৯১১-৭০১০৬০		

 <b>লায়ঙ্গ স্কুল এন্ড কলেজ, খুলনা।</b> স্থাপিত : মাধ্যম - ১৯৬২ উঃ মাধ্যম ২০০৫ ডাকঘর : খুলনা বিশ্ববিদ্যালয়, গল্যানারী। শেরে বাংলা রোড, খুলনা- ৯২০৮	টেলিফোন : ০৪১-৭২১০৭৩ lscck196@gmail.com lscck.edu.bd															
	বিন্যাস কোড কলেজ কোড ই আই আই এন	<table border="1"> <tr> <td>৩</td><td>৫</td><td>৩</td><td>৮</td> </tr> <tr> <td>৩</td><td>৫</td><td>০</td><td>৮</td> </tr> <tr> <td>১</td><td>১</td><td>৭</td><td>৩</td><td>৯</td><td>৮</td> </tr> </table>	৩	৫	৩	৮	৩	৫	০	৮	১	১	৭	৩	৯	৮
	৩	৫	৩	৮												
৩	৫	০	৮													
১	১	৭	৩	৯	৮											
স্মারক নং : ২৪৭/২০২২ তারিখ : ৩১/০৩/২০২২ ইং																

প্রধান নির্বাহী কর্মকর্তা,  
 খুলনা সিটি কর্পোরেশন,  
 খুলনা।

বিষয় : প্রতিষ্ঠানের পুকুর উন্নয়নে অনাপত্তি প্রদান প্রসঙ্গে।

জনাব,  
 উপর্যুক্ত বিষয়ের পরিপ্রেক্ষিতে জানানো যাচ্ছে যে, খুলনা সিটি কর্পোরেশন জার্মান উন্নয়ন সংস্থার আর্থিক সহায়তায় অত্র প্রতিষ্ঠানের পুকুর সংরক্ষণ ও উন্নয়ন/সংস্কারের ব্যাপারে কেসিসি কর্তৃক প্রদত্ত শর্তে প্রতিষ্ঠানের কোনো আপত্তি নাই।

আপনার বিশ্বস্ত  
  
 মোঃ বাদশা খান  
 অধ্যক্ষ  
 লায়ঙ্গ স্কুল এন্ড কলেজ, খুলনা।  
 মোঃ বাদশা খান  
 অধ্যক্ষ  
 লায়ঙ্গ স্কুল এন্ড কলেজ, খুলনা।  
 ই-মেইল নং : ৭১৯৬৪৬  
 মোবাইল : ০১৯১২-৯৯৭৭৯৯

১৫০  
৫৪৭৯  
১৭/১২/২০২৩

ফোন : ০২৪৭৭ - ৭২৫৭০৪

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার  
অধ্যক্ষের কার্যালয়

সরকারি মজিদ মেমোরিয়াল সিটি কলেজ, খুলনা।

EIN : 117170

স্থাপিত : ১৯৬৫ ইং

আইডি নং : ১৯৬৫ ইং

৩মেম : [www.mmcitycollege.edu.bd](http://www.mmcitycollege.edu.bd)

ই-মেইল : [mmcitycollege.khulna@yahoo.com](mailto:mmcitycollege.khulna@yahoo.com)

অনার্স/ডিগ্রী কোড - ০০১৬

স্মারক নং- স.এম.এম.সি.সি./ ৩৭৬/২৩

তারিখ : ১৭/১২/২০২৩

বিষয় : সরকারি মজিদ মেমোরিয়াল সিটি কলেজ, খুলনার হোস্টেল সংলগ্ন পুকুর সংস্কারে অনাপত্তি পত্র।

মহোদয়,

উপর্যুক্ত বিষয়ের আলোকে জানানো যাচ্ছে যে, খুলনা সিটি কর্পোরেশন, খুলনা জার্মান উন্নয়ন সংস্থার আর্থিক সহায়তায় খুলনা শহর এলাকার প্রতিষ্ঠানের মালিকানাধীন পুকুর সংরক্ষণ ও উন্নয়ন/সংস্কারের লক্ষ্যে Climate Change-Adapted Urban Development Project এর আওতায় সরকারি মজিদ মেমোরিয়াল সিটি কলেজ, খুলনার হোস্টেল সংলগ্ন পুকুর প্রস্তাবিত শর্ত মেনে সংরক্ষণ ও উন্নয়ন/সংস্কারে অনাপত্তি পত্র প্রদান করছে।

মাননীয় মেয়র  
খুলনা সিটি কর্পোরেশন  
খুলনা।

প্রফেসর শেখ মোঃ বদিউজজামানি  
আইডি নং - ০০০০৬৩৬৮  
অধ্যক্ষ  
সরকারি মজিদ মেমোরিয়াল সিটি কলেজ  
খুলনা।

দৃষ্টি আকর্ষণ : প্রধান নির্বাহী কর্মকর্তা  
খুলনা সিটি কর্পোরেশন  
খুলনা।

মা ও শিশু স্বাস্থ্য পরিচর্যা সমাজসেবা ও কল্যাণ তহবিল

১১০/-

Appendix IX: Minutes of Information Disclosure Meeting Among Stakeholders



Memo No. : DDC/WRE/CCAUD-Phase II/2024/04

Dated 08/10/2024.

Subjects: Minutes of the meeting held on 25 September 2024 on Consultancy Services for "Climate Change Adapted Urban Development (CCAUD) Program Phase II-Khulna".

The minutes of the meeting for Consultancy Services onr Climate Change Adapted Urban Development (CCAUD) Program Phase II-Khulna held on 25 September 2024 at 10.00 a.m at DMD's Conference Room (9th Floor), DDC Centre, Dhaka is forwarded herewith for his/her kind necessary action.

- Enclosure :
- (1) Minutes of the Meeting
  - (2) Attendance Sheet (Annexure 1)
  - (3) Meeting Notice (Annexure 2)

Thank you,

With best regards,

*(Signature)*  
 (Engr. Md. Habibur Rahman, PEng.)  
 Director-in-Charge  
 Water Resources and Environment Division(WRED)  
 Development Design Consultants Limited, Dhaka

Copy for information and necessary action to:

1. Mr. Christian Koopmann, Senior Project Manager and Company's representative of Fichtner Water Transport GmbH, Germany.
2. Dr. Asit K. Mohanty, Team Leader, Climate Change-Adapted Urban Development Programme (CCAUD) Phase II – Khulna for FWT;
3. Mr. Mohammad Ali, Additional Director, WRED, DDCL, Dhaka;
4. Md. Abdul Mannan, DTL, DDCL, CCAUD, Khulna;
5. Dr. Md. Kabil Hossain, Environment Experts, DDCL, CCAUD, Khulna;
6. Ms. Helen Rahman, Social safeguard/ Resettlement Expert, DDCL, CCAUD, Khulna;
7. Mr. Muhammed Dabir Uddin, Drainage Engineer, DDCL, CCAUD, Khulna;
8. Mr. Md. Abdur Rakib Khan, Urban Planner, DDCL, CCAUD, Khulna;
9. Ms. Sabrina Islam, Landscape architect, DDCL, CCAUD, Khulna;
10. Mr. Md. Asaduzzaman, Structural Engineer, DDCL, CCAUD, Khulna;
11. Mr. K.M. Bipul Shahnar, Geotechnical Engineer, DDCL, CCAUD, Khulna;
12. Mr. Mohammad Rashidul ISLAM, Electro-mechanical Engineer, DDCL, CCAUD, Khulna;
13. Mr. Md. Azizur Rahman, Procurement Expert, DDCL, CCAUD, Khulna;
14. Mr. Md. Shahadat Hossain/ Selim Reza, GIS Expert, DDCL, CCAUD, Khulna;
15. Mr. Md. Saiful Islam/ Md. Mozammel Hossain, Embankment Engineer, DDCL, CCAUD, Khulna;
16. Mr. Mr. Annanta Kumar Das, WRED, DDCL, Dhaka;
17. Mr. Md. Mahbubur Rahman, Technical Manager, WRED, DDCL, Dhaka;
18. Office Copy.

Copy for information to:

1. Ms. Jehra Zerín, Deputy Managing Director, DDCL, Dhaka.
2. Mr. A.K.M Nafisuddin, Deputy Managing Director, DDCL, Dhaka.

Memo No. : DDC/WRE/CCAUD-Phase II/2024/04(1)

Dated 08/10/2024.

Copy for information to:

- (1) Md. Abir Ul Jabbar, Project Director, CCAUD Project, Khulna City Corporation, Khulna.



গির্ডিসি সেন্টার, ৪৭, বিট উটাম অক খান্দাকার রোড, মোহাকালী চ/এ, ডাকা-১২১২, বাংলাদেশ।  
 DDC CENTRE, 47, Bit Utam AK Khandakar Road, Mohakhalí C/A, Dhaka-1212, Bangladesh. PABX: Auto Hunting.  
 Pilot Nos. +880-2-38810365, 222295303, Fax: +880-2-38810337, E-mail: ddcsm@bangla.net, Website: www.ddclbd.com

**Development Design Consultants Ltd.**  
47 Mohakhali Commercial Area, Dhaka 1212  
**Water Resources and Environment Division**

**MEETING DETAILS**

*Particular, Participants and Minutes*

<b>Subject</b>	: Meeting minutes of the meeting held on 25 September 2024 related to the Consultancy Services of CCAUD Program Phase II-KCC Project.
<b>Chairperson</b>	: Engr. Md. Habibur Rahaman, P Eng., Director-in Charge, WRED, DDCL
<b>Time and Date</b>	: 10:00 a.m., 25 September 2024.
<b>Venue</b>	: MD's Conference Room (10 <sup>th</sup> Floor), DDC Centre, Dhaka.
<b>Participants</b>	: Attendance Sheet as Annexure-1

At the very outset, the Chairperson welcomed all the participants. He thanked Mr. Christian Koopmann, Senior Project Manager & Dr. Asit K Mohanty, Team Leader (TL), for the hectic and effective field visit in view of preparation for the Inception report. The Chairperson also thanked all other experts for their endeavor to make the field visit program a success.

At this stage, the Chairperson presented an outline of the activities of the Inception Phase including timeline. Specific activities outlined:

- (1) MoM of Kick-off meeting,
- (2) Inception Report,
- (3) Updated Detailed Workplan for the Design Phases,
- (4) Updated Procurement Plan, Project Implementation Schedule, Work Schedule and Staffing Schedule.
- (5) Review and Update of the Environmental & Social Impact Assessment (ESIA) and ESMP
- (6) Review and Update of the Stakeholder Engagement Plan (SEP)
- (7) Development of a Survey and Investigation Program including Budget Cost Estimate

He then requested the Team leader to proceed following the meeting-agenda as follows:

- (1) Minutes of the Meeting of 17 September 2024
- (2) Post Field Visit Interaction
- (3) Preparation of Inception Report
- (4) Miscellaneous

**01. Minutes of the Meeting held on 17 September 2024**

The Chairperson informed the meeting about the decisions of the meeting held on 17 September 2024 (the minutes was shared to all attendants through e-mail vide Memo No. DDC/WRE/CCAUD-Phase II/2024/03, dated 19 September 2024), and asked for their comment/ observation. As there was no comments/ observation, the decisions are accepted without any amendment.

He then invited Mr. Asit Mohanty, Team Leader to preside the remaining part of the meeting.

Dr. Asit K Mohanty, the Team Leader, CCAUD-Phase-II, thanked DDCL for arranging well-organized site visit program including the requisite Experts of CCAUD-Phase-II especially required for the Inception Phase. He also thanked all the experts for their through and laborious work during the field visit program as a team, meeting with the client and stakeholders or focus group discussion. He also expressed gratitude to the Project Director and other officials of KCC for their support and assistance during the meeting and field visit program.

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## 02. Post Field Visit Interaction:

All the members/ experts of the field visit team expressed their views, observations, ideas and learnings during the field visit. They opined that for implementing of most of the subprojects, there may arise constraints due to availability of required land. The consultant should seek necessary assistance from KCC timely so as to avoid any delay for land availability.

Dr. Mohanty told that for all the sub-projects, effective design and implementation is very crucial to address the concerns of the affected people and the requirement of the Client. The situation and complexity of each sub-project may be varied slightly but methodology will be same. He urged the experts to use the best practices/ KfW guidelines as well as ToR for the development of conceptual design and ideas. In this regard, he emphasized involvement of the stakeholders in project activities for smooth implementation of the projects. The consultant's social experts with assistance from the KCC should be more active to motivate the local stakeholders.

Dr. Mohanty also urged the experts to consider the Feasibility Study Report, Baseline Data, Phase I Learnings during preparation of the deliverable of Phase-II, CCAUD. He especially requested the related experts to collect and use climate data since it is a climate resilience project.

## 03. Preparation of Inception Report:

Dr. Mohanty then presented an outline of the preparation of the Inception Report. He said that the Inception Report will be precise, and the content will be to the point not too much descriptive including maps, pictures, tables of data or information. He also requested all concerns to collect all related documents from the project authority to be required for service delivery.

He then presented the Table of Contents (ToC) for the Inception Report, briefed the distribution of functions and responsibilities of the experts as per the ToR and requested them to complete their inputs for preparation of inception reports promptly.

## 04. Miscellaneous

Following points were discussed in the miscellaneous agenda.

- **Kick-off Meeting Minutes:**

The Chairperson of the meeting told that the Kick-off meeting of the Consultancy Services was held on 11 July 2024. As per terms and conditions of the ToR and the Contract agreement, the minutes of the meeting is one of the deliverables of the Inception Phase. So, the preparation and approval the same is essential.

- **Standards and criteria for Design:**

The chairperson and TL said that the standards and criteria for preparation of design must be set first. Feasibility Study Report, KfW guidelines & policy, Design standard & manual of KCC/or other related organization, and national & International standards, Procurement policy & guidelines, other documents if needed might be consulted beforehand.

- **Development of a Survey and Investigation Program including Cost Estimate with the provision in the project:**

The TL told that as per ToR of the Consultancy Services, the Implementing Consultant (IC) will thoroughly review available data, information and planning documents. The IC will then identify gaps on the basis of additional updated information obtained during the inception phase to understand the actual situation of the project and identify the changes to the situation. Based on the findings, the IC

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shall review and decide to the extent of survey and investigation required (Topographical Survey, Drone Survey, to assess existing conditions, Environmental and Geotechnical Investigations). Then, prepare a survey and investigation plan including budget cost estimate for approval.

- **Base Data**

The TL emphasized that for development of climate resilient infrastructures, preliminary data/historical data will be collected from the KCC/ or other government agencies and verify authenticity. All data to be preserved with a copy to the Team Leader.

- **Construction of Pump House & Hydraulic Structures and Operation of Gates:**

The TL emphasized that the proper operation of the Pump House or Sluice Gate operation is a vital part and the designer may think of auto-operation of gates when water level crosses certain pre-fixed datum.

- **Storm Water Drainage System**

The TL urged that the storm water component or drainage subproject is the very crucial part of the project since people are suffering due to water logging. He requested to apply the 'lessons learned' from Phase-I into Phase-II. The Drainage Engineer Mr. Dabir Uddin told that for an effective and successful drainage system, proper geophysical data is very important and sought assistance and support from GIS expert. GIS Expert assure the TL for providing required assistance and support as per ToR.

- **Cost Estimate**

The chair advised to prepare cost estimate of each subproject within the provision of DPP. Preliminary costs may be assessed considering those in the feasibility study report as well as conceptual design utilizing preliminary data. The rate schedule should be finalized in consultation with the PEA. The rate not included in the rate schedule should be estimated as per direction of the Project Director.

- **Line of Communication with the Client**

The Team leader said that the communication from the JV Consultant with the Client should be according to the service contract.

- **Data Cloud**

The TL said that a data cloud is needed to set for sharing all document and easy of access to all experts.

- **Work Plan**

The TL present a work plan for all the expert for the inception phase devising all activities required by the timeline which was sent to all earlier. He discussed all the experts workplan one by one and requested to follow the same for effective, smooth and successful implementation of the inception phase as per terms and conditions of the ToR and contract agreement.

- **Meeting Among TL, DTL, Senior Project Manager, Fitchner WT, other International and National Experts:**

The experts present in the meeting urged the interaction between international and national experts and necessary and timely inputs from international experts. They also urged consultation among TL, DTL and Senior Project Manager, Fitchner WT as and when required. The TL agreed with the proposal and told that online meeting environment will be created.

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### Decisions

Both international and national experts were actively participated in the agenda-wise detailed discussion and afterward following decisions were taken unanimously.

- Previous meeting minutes and decisions accepted without amendment.
- The Additional Director, WRED will arrange the Kick-off MoM drafting, review by the Senior Project Manager Fitchner WT and the Client and will get approval from the Client.
- Concerned Experts for the component of the subproject will set the design standards and criteria, discuss with the TL and finalized it.
- The TL and DTL will review the ToR of the survey and investigation work prepared by DDC. DDC then will start the survey and investigation work following that TOR.
- The DTL will arrange collection and authentication of all data from KCC and related other agencies or sources.
- The Electro-Mechanical Expert will decide the gate operation system and design accordingly.
- Drainage Engineer will do all the needful for storm water drainage system design and implementation. GIS Expert will ensure required support and assistance to the Drainage Engineer.
- Any communication with the PD and Client will follow the Service Contract.
- All experts will share their document and information in the established data cloud for ready access to others as allowed.
- Online meeting will be arranged at a regular interval with prior scheduling.
- The responsibilities of the experts for the Inception report are distributed as under:

Ch.	Chapter or Item	Responsibility	Remarks
	Executive Summary	Dr. Asit K Mohanty, TL / (Kim)	2-3 pages,
1	Project Background	(Kim) / Dr. Asit K Mohanty, TL)	2-3 pages
2	Base Data	Abdul Mannan, DTL	
3	Embankment Sub-Project #1	Md. Mozammel Hossain, Embankment Engineer	
4	Stormwater Management Sub-Projects #3, #4, #7	Md. Dabir Uddin, Drainage Engineer	
5	Outlet Gates & Pumping Station Sub-Project #5, #6)	Md. Mozammel Hossain, Embankment Engineer; Md. Asaduzzaman, Structural Engineer.	
6	Blue-Green Infrastructure Sub-Projects #5, #6	Ms. Subrina Islam, Landscape Architect	
7	Social Safeguard / RAP	Ms. Helen Rahaman, Social Safeguard Expert	
8	Environmental Safeguard	Dr Md. Kabil Hossain, Environmental Expert	
9	Cost Estimate	Abdul Mannan, DTL	
10	Procurement Plan	Md. Azizur Rahaman	
11	Project Management	Dr. Asit K Mohanty, TL/ Christian Koopman, SPM	

- All the experts as per their responsibilities, will ensure inputs to the Inception Report by 15 October 2024.

The TL thanked all the experts and participants for their active participation in the meeting

As there were no other issues for discussion and the Chairperson thanked all the participants and declared the meeting closed.

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*Asit K Mohanty*

(Dr. Asit K Mohanty)  
TL, CCAUD Phase-II, Khulna

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**ATTENDANCE SHEET**

Project Name : Climate Change-Adapted Urban Development (CCAUD) Programme Phase II of KCC  
 Meeting Venue : Conference Room (10<sup>th</sup> Floor), DDC Centre, 47 Mohakhali C/A, Dhaka-1212  
 Date & Time : 25<sup>th</sup> September, 10:00 AM

Sl. No.	Name of Person	Designation	Organization	Email	Mobile	Signature
1.	Christian Koopmann	Senior Project Manager	FWT			
2.	Dr. Asit K. Mohanty	Team Leader	FWT			
3.	Md. Habibur Rahman, PEng.	Director-In charge	DDC			
4.	Mohammad Ali	Additional Director	DDC	mali.wro@ddc.gov.bd.com	01711221150	
5.	Md. Abdul Mannan	Deputy Team Leader	DDC	m.aman@ddc.gov.bd.com	01753303133	
6.	Dr. Md. Kabil Hossain	Environmental Safeguard Expert	DDC	kabilh@ddc.gov.bd.com	1716105640	
7.	Helen Rahman	Social Safeguard / Resettlement Expert	DDC	rahmanh@ddc.gov.bd.com	01712532003	
8.	Md. Davir Uddin	Drainage Engineer	DDC	uddin@ddc.gov.bd.com	01716-373112	
9.	Md. Saiful Islam/Md. Mozammel Hossain	Civil Engineer / Embankment Expert	DDC		01775532378	
10.	Md. Abdur Rakib Khan	Urban Planner	DDC	urplan@ddc.gov.bd.com	01715611306	
11.	Sabrina Islam SUBRINA	Landscape architect	DDC		01768762506	
12.	Md. Assaduzzaman	Structural Engineer	DDC		01715011039	
13.	K.M. Bipul Shahnian/Md. Sejb Ahmed	Geotechnical Engineer	DDC			

\* Please correct the spelling

Sl. No.	Name of Person	Designation	Organization	Email	Mobile	Signature
14	Mohammad Rashidul Islam	Electro-mechanical Engineer	DDC	rashidul islam1@yahoo.com	01720579350	
15	Md. Azizur Rahman	Procurement Expert	DDC			
16	Md. Shahadat Hossain/Md. Selim Reza	GIS Expert	DDC		01727210365	
17	Md. Mehabubur Rahman	Technical Manager	DDC			
18	Subodh Mondal	Electrical Engineer	DDC		01711315856	
19	Md. Towhidul Islam	Jr. Structural Engineer	DDC		01521253105	
20	Md. Beshir Ahmed Bhuiyan	Administrative Officer	DDC			
21	Ananta Kumar Das	Civil Engineer	DDC		01765999080	



Memo No. : DDC/WRE/CCAUD-Phase II/2024/03

Dated 23/09/2024

### Meeting Notice

A meeting on the Consultancy Services related to the Climate Change-Adapted Urban Development Program (CCAUD) Phase II – Khulna, Bangladesh will be held on 25 September 2024 at 10 :00 am at the MD's Conference Room (10th Floor), DDC Center, 47 Mohakhali C/A, Dhaka 1212.

All Experts (Key and Non-Key) are requested to attend the meeting in time.

#### Agenda of the Meeting

- (1) Minutes of the Meeting held on 17 September 2024
- (2) Post Field Visit Interaction
- (3) Preparation of Inception Report
- (4) Miscellaneous

*Handwritten signature and date:*  
23/09/2024

(Engr. Md. Habibur Rahman, PEng)  
Director-in-Charge  
Water Resources and Environment Division(WRED)  
Development Design Consultants Limited, Dhaka

#### Copy for information and necessary action to:

1. Mr. Christian Koopmann, Senior Project Manager and Company's representative of Fichtner Water Transport GmbH, Germany
2. Dr. Asit K. Mohanty, Team Leader, Climate Change-Adapted Urban Development Programme (CCAUD) Phase II – Khulna for FWT,
3. Mr. Mohammad Ali, Additional Director, WRED, DDCL, Dhaka;
4. Md. Abdul Mannan, DTL, DDCL, CCAUD, Khulna;
5. Dr. Md. Kabil Hossain, Environment Experts, DDCL, CCAUD, Khulna;
6. Ms. Helen Rahman, Social safeguard/ Resettlement Expert, DDCL, CCAUD, Khulna;
7. Mr. Muhammed Dabir Uddin, Drainage Engineer, DDCL, CCAUD, Khulna;
8. Mr. Md. Abdur Rakib Khan, Urban Planner, DDCL, CCAUD, Khulna;
9. Ms. Sabrina Islam, Landscape architect, DDCL, CCAUD, Khulna;
10. Mr. Md. Asaduzzaman, Structural Engineer, DDCL, CCAUD, Khulna;
11. Mr. K.M. Bipul Shahriar, Geotechnical Engineer, DDCL, CCAUD, Khulna;
12. Mr. Mohammad Rashidul ISLAM, Electro-mechanical Engineer, DDCL, CCAUD, Khulna;
13. Mr. Md. Azizur Rahman, Procurement Expert, DDCL, CCAUD, Khulna;
14. Mr. Md. Shahadat Hossain/ Selim Reza, GIS Expert, DDCL, CCAUD, Khulna;
15. Mr. Md. Saiful Islam/ Md. Mozammel Hossain, Embankment Engineer, DDCL, CCAUD, Khulna;
16. Mr. Mr. Annanta Kumar Das, WRED, DDCL, Dhaka.
17. Mr. Md. Mahbubur Rahman, Technical Manager, WRED, DDCL, Dhaka.
18. Office Copy

#### Copy for information to:

1. Ms. Johra Zerin, Deputy Managing Director, DDCL, Dhaka.
2. Mr. A.K.M. Nafisuddin, Deputy Managing Director, DDCL, Dhaka.



Page 1 of 1  
 ডিভি সেন্টার, ৯৯, বিটা টাওয়ার ৫ তম ফলাকার তলা, মোহাখালী এ/এ, ডিএ- ১২১২, বাংলাদেশ (সিআইটি)। ফোন: ৯৯৯০-২-৫৭৯১০০৯৫ এবং ৯৯১২৫৬০০০  
 DDC CENTRE, 47, Beta Tower AK Khondokar Road, Mohakhali C/A, Dhaka-1212, Bangladesh. PABX: Auto Ringing.  
 Phone Nos. +880-2-58810365, 222295303, Fax: +880-2-58810337, E-mail: ddc@ddc.org.bd, Website: www.ddcbsl.com

## Appendix X: TOR approving letter of DoE


Government of the People's Republic of Bangladesh  
Ministry of Environment, Forest and Climate  
Change  
Department of Environment  
Environment Clearance Section  
www.doe.gov.bd

Record Number: 22.02.0000.018.72.054.24.68 Date: 15/08/2024

**Subject: Approval of Terms of Reference (ToR) for the EIA of the Climate Change Adapted Development (CCAUD) Project (Phase-11) Under Khulna City Corporation**

With reference to the subject mentioned above, the Department of Environment hereby gives approval of the Terms of Reference (ToR) for the Environmental Impact Assessment (EIA) of the **Climate Change Adapted Development (CCAUD) Project (Phase-11)** Under Khulna City Corporation subject to fulfilling the following terms and conditions:

- I. The project authority shall conduct a comprehensive Environmental Impact Assessment (EIA) considering the overall activity of the said project in accordance with the ToR submitted to the Department of Environment (DoE). The EIA study shall be conducted as per the provision laid down in the Environmental Conservation Rules, 2023.
- II. The EIA report shall be prepared in accordance with the guidelines provided in schedule 11 and Rules-15, 16 of the ECR, 2023.
- III. Consultation with Stakeholders/Public Consultation should be done in accordance with Rule 16 of the Environmental Conservation Rules, 2023.
- IV. The project authority shall submit the EIA report to the Head Office of DoE in Dhaka.
- V. Without approval of the EIA report by the Department of Environment, the project authority shall not make any land and infrastructure development.

  
 15-08-2024  
 Masud Iqbal Md Shameem  
 Director  
 222218342  
 direc@doe.gov.bd

Project Director,, Khulna City Corporation, Khulna, CCAUD Phase II and Chief Planning Officer Khulna City Corporation, Khulna.

Record Number: 22.02.0000.018.72.054.24.68/1 (2) Date: 15/08/2024

(Not in the order of  
Copy for Kind Information and Necessary Action seniority)

## Appendix XI: DoE Approved ToR for EIA Study

Climate Change-Adapted Urban Development Project (Phase II) - Khulna Component

ToR for EIA

**TERMS OF REFERENCE (TOR) FOR  
ENVIRONMENTAL IMPACT ASSESSMENT OF  
CLIMATE CHANGE-ADAPTED URBAN DEVELOPMENT PROJECT (PHASE II) -  
KHULNA COMPONENT**

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## 1 INTRODUCTION

### 1.1 Background to the Project

Khulna, as one of world's most climate-vulnerable cities, has been facing repeated flooding, river bank erosion and water logging, especially during the monsoon season, which are already posing significant challenges for the present city administration. This owes mainly to inadequate flood and river bank protection and drainage systems, coupled with inadequate solid waste management. As a result, the daily life of Khulna's citizens remains severely hampered for several months each year. The poor population is being affected the most, as they often reside in areas particularly prone to erosion, flooding or water logging, while their public services and infrastructure (e.g. access roads, pathways) usually are in worse condition compared to other areas of the city. As a consequence, basic services are often interrupted, and free movement of goods and people are hampered during the rainy season. Given the imminent impacts of climate change, these problems are expected to increase in the future. Moreover, as climate change is also negatively affecting the livelihoods in rural coastal areas, more people from the rural south-west of Bangladesh are temporarily or permanently migrating to Khulna City, putting additional pressure on the already overburdened city administration and infrastructure.

The Project is part of Phase II of the KfW funded CCAUD Program titled "CCAUD Phase II - Khulna Component". While CCAUD Phase I funded projects are in Barisal and Satkhira, KfW separately funded project units in Khulna as part of the "City Region Development Project (CRDP)", which was co-funded by ADB and SIDA. This preceding component was aimed at improving the resilience of the current KCC area by provisioning transport infrastructure, whilst also considering climate change, poverty, and governance aspects. Physical measures included raising road embankments along the river, improving access roads to slums and key road intersections, and construction of bus and river terminals. The project started in 2012 was implemented by the Local Government Engineering Department (LGED) in cooperation with KCC and was completed in 2017.

### 1.2 Objective

The main objective of the EIA study is to assess both positive and negative environmental impacts due to each project activities during pre-construction, construction, and operational periods of the project. Assess the impacts and recommend appropriate mitigation measures during project phases to minimize negative impacts of the project to acceptable levels. Prepare an EIA including EMP for the project in compliance with the Government requirements and World Bank Environmental and Social Standards (ESS) and obtain Environmental Clearance Certificate (ECC) from the Department of Environment, Bangladesh.

### 1.3 Scope of the Study

- i. Conduct field visit, detail survey and consultation with local stakeholders;
- ii. Collect primary data on water resources, land resources, agriculture, fisheries, ecosystems, and socio-economic condition through focus group discussion (FGD), questionnaire survey (QS) and other method as relevant for the establishment of baseline conditions of the Project;
- iii. Identify important environmental and social components likely to be impacted by the proposed Project;
- iv. Assess environmental and social impacts of the proposed interventions of the proposed development;
- v. Conduct comprehensive public consultations; and

- vi. Include in the environmental assessment report an environmental management plan (EMP) which includes a listing of mitigation table (EMiT) and monitoring table (EMoT) as well timing and responsibility.

## 2 LEGAL AND INSTITUTIONAL FRAMEWORK

This section will review and present relevant information regarding environmental legislation, statutory orders, by-laws etc., connected to preparation and approval of the EIA report by the Department of Environment and granting of environmental clearance to implement the Project.

The project proponent will conduct meetings with the Department of Environment, the Ministry of Environment and Forest (MoEF) and Roads and Khulna City Corporation (KCC) under Local Government Division with regard to legal requirements and administrative procedures will be discussed and other relevant environmental laws, regulations, Norms and Standards on Air, Noise, Vibration, Water, Waste and Wildlife will be reviewed.

Discussion will also be held with the Department of Environment, particularly for "Environmental Clearance Certificate" in accordance with the Environmental Conservation Act, 1995 and Bangladesh Environmental Conservation Rules, 1997.

## 3 PROJECT DESCRIPTION

This section will provide a description of the project, the project units, size and layout of the project area, as well as associated facilities including a brief description of the project phases and related activities.

Under the "Climate Change-Adapted Urban Development Program (CCAUD) Phase II - Khulna Component" (the "Project"), KfW will provide a loan to Bangladesh for investments in KCC's storm-water drainage and erosion and flood control. A Feasibility Study including Climate Risk Assessment and Environmental and Social Impact Assessment (ESIA) is carried out to identify priority measures in urban drainage and flood protection for implementation. The selection of measures was informed by a Baseline Scenario and Climate Risk Assessment and a Multi Criteria Assessment (MCA) conducted in 2020. On that basis a total of eight project units have been developed which include measures ranging from comprehensive drainage solutions for two Moyur sub-catchments, to preservation of existing hydrology combined with public space, and public inclusive river fronts.

The project area is 85 km<sup>2</sup> including the current Khulna City Corporation (KCC) administration area and an area proposed for extension of the KCC administration area. The budget available from KfW for implementation of all adaptation measures or project units is estimated to be around 297.4 crore BDT whereas GoB's contribution is 185.06 crore BDT. The estimated total cost of the project is 482.46 crore BDT.

A key consideration in the selection of project units was potential environmental and resettlement impact and site visits and surveys of potentially affected people, where the bank protection Embankment at Daulatpur, the river front development at Rupsha Ghat, Labonchara outlet gates and pumping station, and the Nirala khal and link park were found to be potentially associated with significant resettlement impacts based on the assumed corridor of impact associated with the designs. Redesign options were identified for the embankment, and Nirala khal units and relocation sites identified for river front

development, and Labonchara outlet gates and pumping station. Figure 3-1 presents the location of the eight shortlisted project units and Table 3-1 illustrates a very brief description of the project unites.

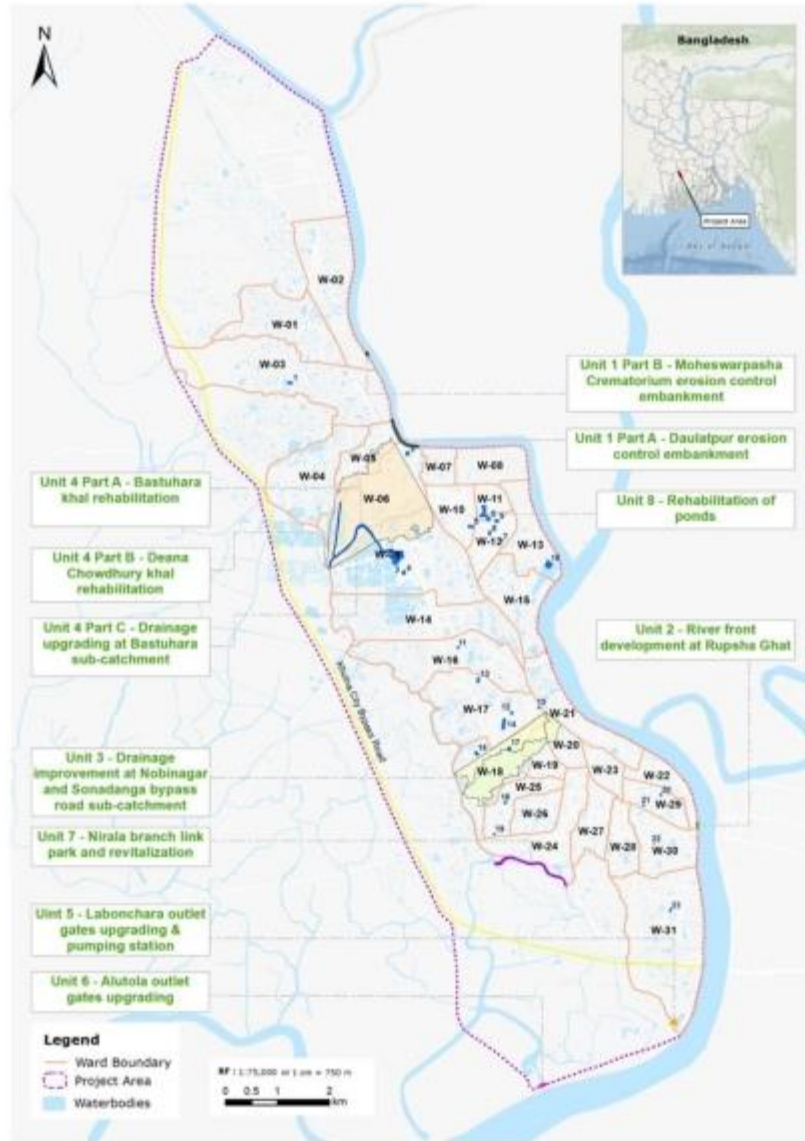


Figure 3-1 Location of project units

Table 3-1 Description of Project Units

No.	Unit	Unit and description
1	Daulatpur Erosion Control Embankment	<ul style="list-style-type: none"> <li>Part A: Implement 760m of shore/ erosion protection embankment from BL College along Daulatpur Bazar to Flour Mill to control erosion and flooding along the Rupsha.</li> <li>Part B: 65m of shore/ erosion protection along banks of the Rupsha at Daulatpur (Maheshwarpasha) Hindu crematorium.</li> </ul>
2	River front development at Rupsha Ghat	<ul style="list-style-type: none"> <li>Riverfront development with 100m long and 25m wide promenade and raising of flood wall at Rupsha Ghat North.</li> </ul>
3	Drainage Improvement at Nobinagar and Sonadanga bypass road sub-catchment	<ul style="list-style-type: none"> <li>Urban drainage system upgrading and extension with a total length of 4560m at sub-catchment 21.</li> <li>Urban drainage system upgrading and extension with a total length of 1191m at sub-catchment 17.</li> <li>Reconstruction of Sonadanga Bypass Road with construction of new outlet drain.</li> </ul>
4	Drainage upgrading at Bastuhara sub-catchment	<ul style="list-style-type: none"> <li>Part A: Rehabilitation of Bastuhara Khal incl. dredging/ lining and establishment of a link park along the banks with access paths, and lighting.</li> <li>Part B: Rehabilitation of Deana Chowdhury Khal incl. dredging/ lining and establishment of access paths along the khal.</li> <li>Part C: Urban drainage system upgrading and extension in Bastuhara Khal Sub-catchment over a total length of 9654m.</li> </ul>
5	Labonchara outlet gates upgrading & pumping station	<ul style="list-style-type: none"> <li>Labonchara Khal 2 outlet gate upgrading including demolition of existing structure and reconstruction of the concrete superstructure, complete with concrete guide walls and bottom erosion protection and installation of new motorized gates, as well as power supply.</li> <li>Labonchara pumping station will comprise a reinforced concrete structure and brick building to house pumping equipment, standby power supply will be provided in the form of generators. Guide walls to guide the flow and channel erosion protection will be part of this solution.</li> </ul>
6	Alutola outlet gates upgrading	<ul style="list-style-type: none"> <li>Alutola outlet gates upgrading including demolition of the existing structure and reconstruction of the concrete superstructure, complete with concrete guide walls and bottom erosion protection and installation of new motorized gates as well as power supply.</li> </ul>
7	Nirala branch Link Park and Revitalization	<ul style="list-style-type: none"> <li>Nirala branch revitalization and link park including foot path along both banks and construction of interceptors to collect and divert dry weather flow.</li> </ul>
8	Rehabilitation of 23 ponds	<ul style="list-style-type: none"> <li>Rehabilitation of 23 ponds owned by KCC (15), National housing Authority (5) and three different educational institutional authorities through dredging and beautification of public space around the ponds.</li> </ul>

## 4 BASELINE ENVIRONMENT

### 4.1 Preparation of Baseline Assessment

In the baseline assessment process, relevant reports and secondary data collected during the project's feasibility study will be reviewed. Studies conducted by KCC and KfW as well as the studies on similar projects carried out also will be reviewed. Baseline assessment process will include baseline information on existing environmental conditions in the project influence area and baseline monitoring of environmental quality along the project corridor and identification of the environmental components that need detailed study. Baseline assessment will be done based on the available secondary information, field visit, sampling and environmental monitoring including but not limited to the following:

- i. Physical Resources: Topography, geology, soils, climate, surface and groundwater resources, land use and land cover, and landscape and visual amenity.
- ii. Environmental Risks: Cyclones and storms, floods, earthquakes, etc.
- iii. Biological Resources: Natural ecosystem or bio-ecological zone, floral and faunal diversity, fisheries resources, and protected areas and critical habitats.
- iv. Environmental Quality:
  - Air Quality: On the basis of air quality samples identify the baseline air quality in the project area.
  - Noise and Vibration Level: Noise and vibration level during day and night times to identify the baseline and present noise and vibration level in the project area.
  - Surface, Groundwater, Wastewater Quality: Establish baseline setup and identifying the quality of the surface water and drinking water.
  - Sediment Quality: Establish baseline and identify the quality of the sediment.
- v. Cultural Resources Sites: Structures or sites those are of historical, religious, or architectural significance should be identified and documented.

#### 4.2 Field Investigation and Analysis of Results

To ensure that the project is compatible with the national regulation specified for construction sites cadastral maps showing the project locations and descriptions of the surrounding activities will have to be collected and reviewed.

Investigations and fieldwork for gathering of additional information on ecological and environmental baseline parameters of the Important Environmental Components selected during the studies in the project area will also have to be carried out. These will include:

- i. Physical Environment:
  - Regional Hydrology;
  - Drainage Patterns;
  - River Bank Erosion;
  - Land use, Land cover, and Landscape.
- ii. Biological Environment:
  - Agriculture;
  - Tree Cutting/ Plantation;
  - Terrestrial and Aquatic Flora and Wildlife;
  - Water bodies and Fisheries.
- iii. Environmental Pollution:
  - Surface and Groundwater Quality;
  - Air Pollution;
  - Noise and Vibration;
  - Soil Contamination and dredged spoil; and
  - Pollution due to waste and wastewater.
- iv. Social Environment:
  - Livelihood Patterns;
  - Employment Opportunities;
  - Land use and Land tenure;

- Agricultural Production and Livestock Farming;
- Cultural Resources;
- Health and Safety;
- Infrastructure and industry.

## 5 ENVIRONMENTAL RISKS AND IMPACTS

This section will predict and assess the project's likely positive and negative direct and indirect impacts on physical, biological, and socioeconomic (including occupational health and safety, community health and safety, vulnerable groups and gender issues and impacts on livelihoods, and physical cultural resources) environment in the project area of influence, in quantitative terms as far as possible; identify mitigation measures and any residual negative impacts that cannot be mitigated; explore opportunities for enhancement; identify and estimate the extent and quality of available data, key data gaps, and uncertainties associated with predictions and species topics; and examine cumulative impacts as appropriate.

## 6 ANALYSIS OF ALTERNATIVES

Under alternatives the EIA will examine alternatives to the proposed project interventions, technology to be used, design and operation - including the no project alternative - in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. It also states the basis for selecting the particular project unit's design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.

## 7 CONSULTATION, INFORMATION DISCLOSURE, AND PARTICIPATION

This section will:

- i. describe the process undertaken during project design and preparation for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders;
- ii. summarize comments and concerns received from affected people and other stakeholders and how these comments have been addressed in project design and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women, and the poor; and
- iii. describe the planned information disclosure measures (including the type of information to be disseminated and the method of dissemination) and the process for carrying out consultation with affected people and facilitating their participation during project implementation.

## 8 GRIEVANCE REDRESS MECHANISM

This section will describe the grievance redress framework (both informal and formal channels) prepared for the Climate Change-Adapted Urban Development Project (Phase II) - Khulna Component, setting out the time frame and mechanisms for resolving complaints about environmental performance.

## 9 ENVIRONMENTAL MANAGEMENT PLAN

In this section of the EIA, the proposed project proponents will incorporate the set of mitigation and management measures to be adopted during project implementation to avoid, reduce, mitigate, or compensate for adverse environmental impacts (in that order of priority). It may include multiple management plans, sub plans and actions. It will include the following key components:

### 9.1 Mitigation:

Under mitigation the EMP will:

- vi. identify and summarize anticipated significant adverse environmental impacts and risks;
- vii. describe each mitigation measure with technical details, including the type of impact to which it relates and the conditions under which it is required (for instance, continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate; and
- viii. provide links to any other mitigation plans (for example, for waste management or dredged spoil management, health and safety, or emergency response) required for the project.

### 9.2 Monitoring:

Under monitoring the EMP will:

- i. describe monitoring measures with technical details, including parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits and define thresholds that will signal the need for corrective actions; and
- ii. describe monitoring and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures and document the progress and results of mitigation.

### 9.3 Implementation Arrangements:

Under the implementation arrangement the EMP will:

- i. specify the implementation schedule showing phasing and coordination with overall project implementation;
- ii. describe institutional or organizational arrangements, namely, who is responsible for carrying out the mitigation and monitoring measures, which may include one or more of the following additional topics to strengthen environmental management capability: technical assistance programs, and training programs related to environmental management and monitoring; and
- iii. estimate capital and recurrent costs and describes sources of funds for implementing the environmental management plan.

## 10 INSTITUTIONAL ARRANGEMENTS

The EIA will identify the institutes who will be responsible for implementation and supervision of the Environmental management and monitoring plan. It will also assess the institutional capacity of the implementing agencies (KCC) for the effective implementation of environmental management and monitoring plan, training needs of these agencies, and propose capacity building measures and institutional arrangements to strengthen these agencies along with the cost estimates.

## 11 MONITORING AND REPORTING

Describe the desired outcomes as measurable events to the extent possible, such as planned outcomes, targets, or acceptance criteria that can be tracked over defined time periods.

## 12 FINDINGS, RECOMMENDATION AND CONCLUSION

This section will provide the findings and conclusions drawn from the assessment and provides recommendations in terms of the completeness of the work and need for any further analyses.

## 13 REFERENCES AND ANNEXES

## 14 EIA STUDY TEAM

The EIA team may comprise:

1. International Environmental Specialist/ Team Leader	04 months
2. National Environmental Safeguard Specialist	02 months
3. Climate Change Specialist	02 months
4. Hydrologist	02 months
5. Drainage Expert	02 months
6. Ecologist	02 months
7. Social and Resettlement Specialist	03 months
8. GIS Specialist	04 months
9. Jr. Environmental Professional	04 months

KCC will be responsible to coordinate with the Consultant to carry out the EIA study along with EMP in accordance with environmental guidelines of GOB within the project stipulated time schedule. Focal Person of KCC will monitor the EIA and EMP activities on a regular basis.

## 15 WORK PROGRAM

The duration of the preparation of the EIA including EMP will be about four months starting from January 2023 to April 2023.

## 16 EIA REPORT STRUCTURE

The EIA report will be prepared following the DOE guidelines. The EIA report prepared by KCC will contain the following Chapters:

Executive Summary

- 1 Introduction
- 2 Legal and Institutional Frameworks
- 3 Project Description
- 4 Baseline Environment
- 5 Environmental Risks and Impacts

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- 6 Analysis of Alternatives
- 7 Institutional Arrangements and Grievance Redress Mechanism
- 8 Consultation, Information Disclosure, and Participation
- 9 Environmental Management Plan
- 11 Monitoring and Reporting
- 12 Findings, Recommendation, and Conclusion