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# Low Income Community Housing Support Project

## Environmental Management Plan (EMP)

## Chowdhury Para Settlement

Prepared for

NHA

Project Funded by WORLD BANK

Dated: April 2019

## Quality Management Record

| Issue/Revision | Draft | Revision | Revision | Final |
|---|---|---|---|---|
| **Remarks** | Initial Submission | | | |
| **Date** | 15th April 2019 | | | |
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| **Project Number** | 10990 | | | |
| **File Reference** | **Environmental Management Plan (EMP): Chowdhury Para Settlement** | | | |

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**ABBREVIATIONS**

| | |
|---|---|
| BOQ | Bill of Quantity |
| CDC | Community Development Committee |
| CSC | Community Support Center |
| EA | Environment Assessment |
| ECA | Environment Conservation Act |
| ECoP's | Environmental Code of Practices |
| ECR | Environment Conservation Rules |
| EIA | Environment Impact Assessment |
| EMF | Environmental Management Framework |
| EMP | Environment Management Plan |
| EPA | Environmental Protected Areas |
| GoB | Government of Bangladesh |
| GRM | Grievance Redress Mechanism |
| GRO | Grievance Redress Officer |
| LICHSP | Low Income Community Housing Supporting Project |
| MoHPW | Ministry of Housing and Public Works |
| NHA | National Housing Authority |
| OP | Operational Policy |
| PAP | Project Affected Person |
| PMU | Project Management Unit |
| Sqm | Square meter |
| TRC | Technical Review Committee |
| UPPR | Urban Partnership for Poverty Reduction |
| CSC | Community Support Center |
| CDC | Community Development Committee |
| WB | The World Bank |

# 1. SUB-PROJECT DESCRIPTION

## 1.1 Sub-project Background

National Housing Authority (NHA), through its project, 'Low Income Community Housing Support Project' (LICHSP), is in the process of implementing sub-project interventions, with the financial assistance from World Bank, to reduce vulnerability of selected designated urban poor communities in five Pourashavas of Bangladesh, including Sirajganj Pourashava.

Sirajganj Pourashava lies just at the West side of the Brahmaputra River and beside the Jamuna River, about 70 miles (110 km) northwest of Dhaka. It has an area of 28.69 sq. km. There are 15 Wards and 50 Mahallas. Accordingly to the census of 2011, the total population of Sirajganj Pourashava is 158,913, out of which 80,241 male and 78,672 female. The literacy rate, among town residents, is 63.2%.

A total of 654 low-income settlements were identified in Sirajganj Municipality. These settlements consist of 38,941 houses and 51,977 households. The land area of the low-income settlements is 1,577.2 acres (about 43.8% of Sirajganj Municipality's total area of 3,602.8 acres). Out of 654 settlements, 142 settlements are categorized as "Very Poor", 494 settlements as "Poor" and 18 settlements as "Not Poor" with respect to land entitlement, infrastructure, utility services, community facilities, employment, income and vulnerability. Among all these settlements, six settlements have been selected for immediate development, including Chowdhury Para, which has53 houses.

The living environment of this low income community in Chowdhury Para is unhygienic, with rainwater drainage, internal sanitation and solid waste management systems being inadequate and substandard. During the rainy season, water-logging is a common problem for the settlement. Hence, to improve the living condition of the Chowdhury Para low income community, LICHSP, with the financial assistance from the World Bank, will finance a multi-sectoral package of infrastructure and service improvements. This includes upgrading works includes improved drainage, internal roads, sanitation services and land development and construction of CDC centre in line with the demands of the Chowdhury Para community.

To meet the WB regulatory requirements and guidelines, this **Environmental Management Plan** (EMP) is prepared for this sub-project, which details the projected impacts and subsequent mitigation measures to be considered during the sub-project implementation and post implementation stages.

## 1.2 Location and Setting of the Sub-project Site

The proposed Chowdhury Para settlement /sub-project site is located within the jurisdiction of Ward no 13 under Sirajganj Pourashava. The settlement occupies an area of 6,845.65 sq. meters. The geographic coordinates of the proposed low income community is 24°26'14.57"N and 89°42'28.03"E. The base map and layout plan of Chowdhury Para settlement are shown in **Figures 1.1**, **1.2, 1.3** and **1.4**.


**Figure 1-1: Topographical location of proposed sub-project**

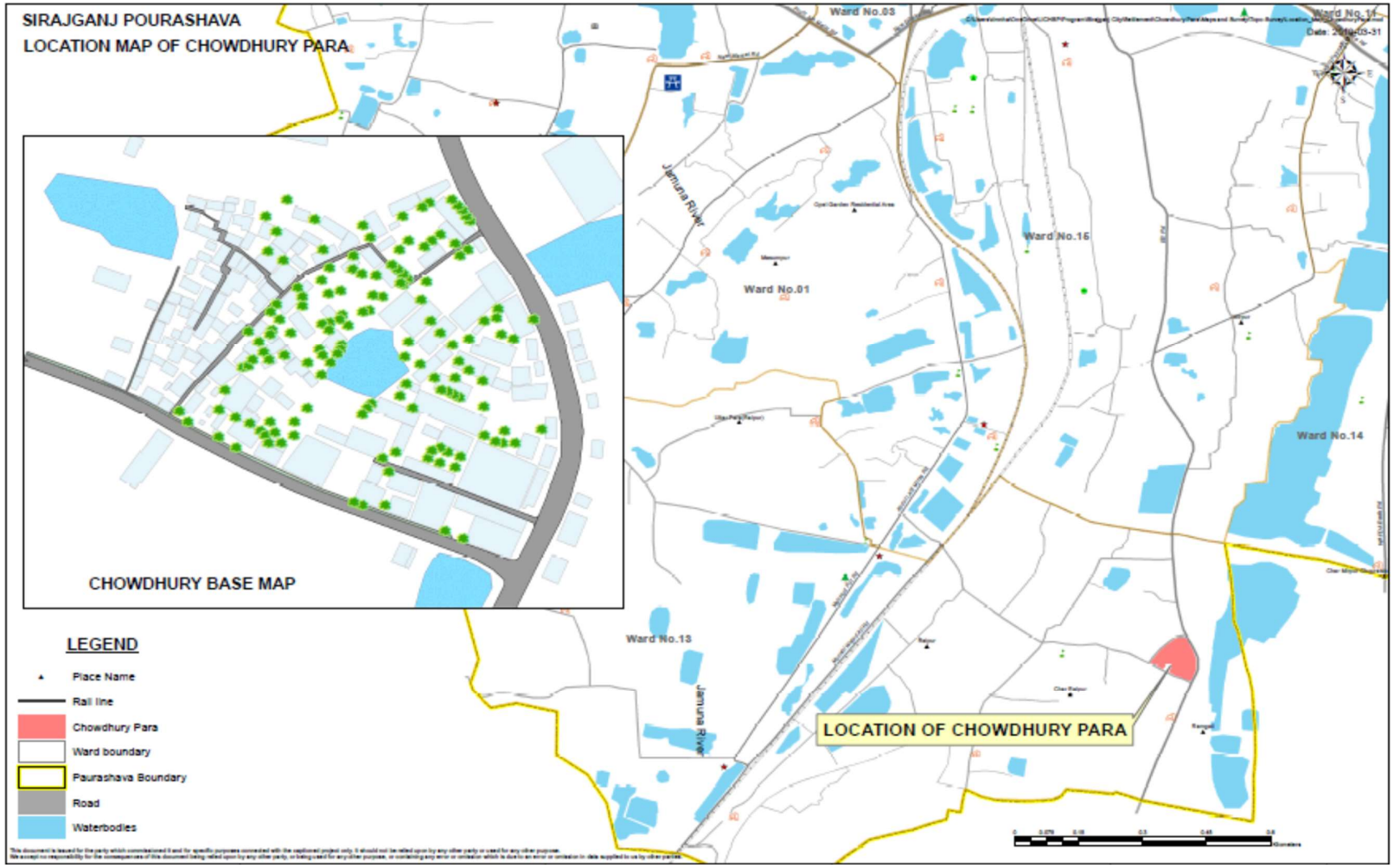


**Figure 1-2: Chowdhury Para Settlement Location within Pourashava map**

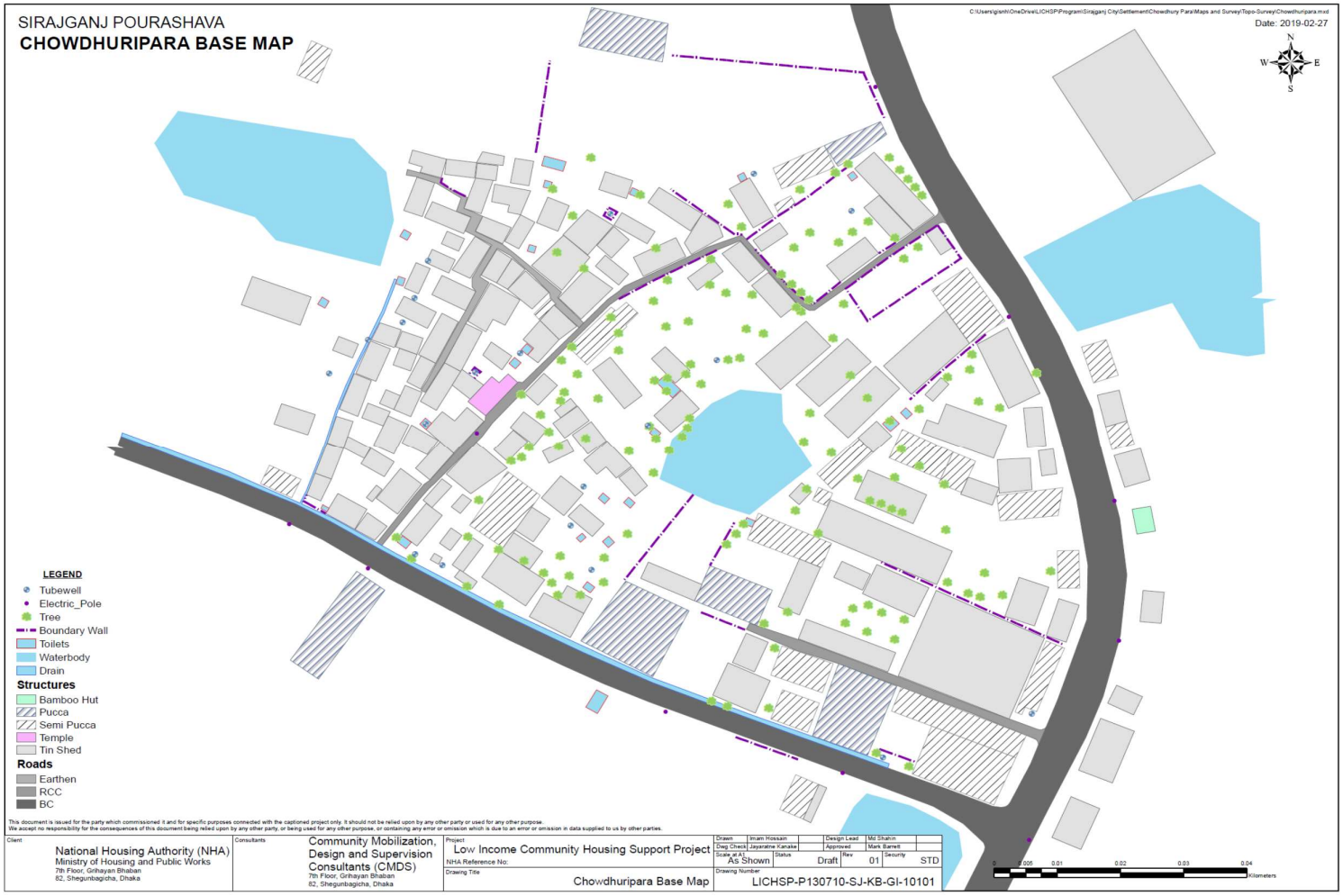


**Figure 1-3: Base map of Chowdhury Para Settlement**

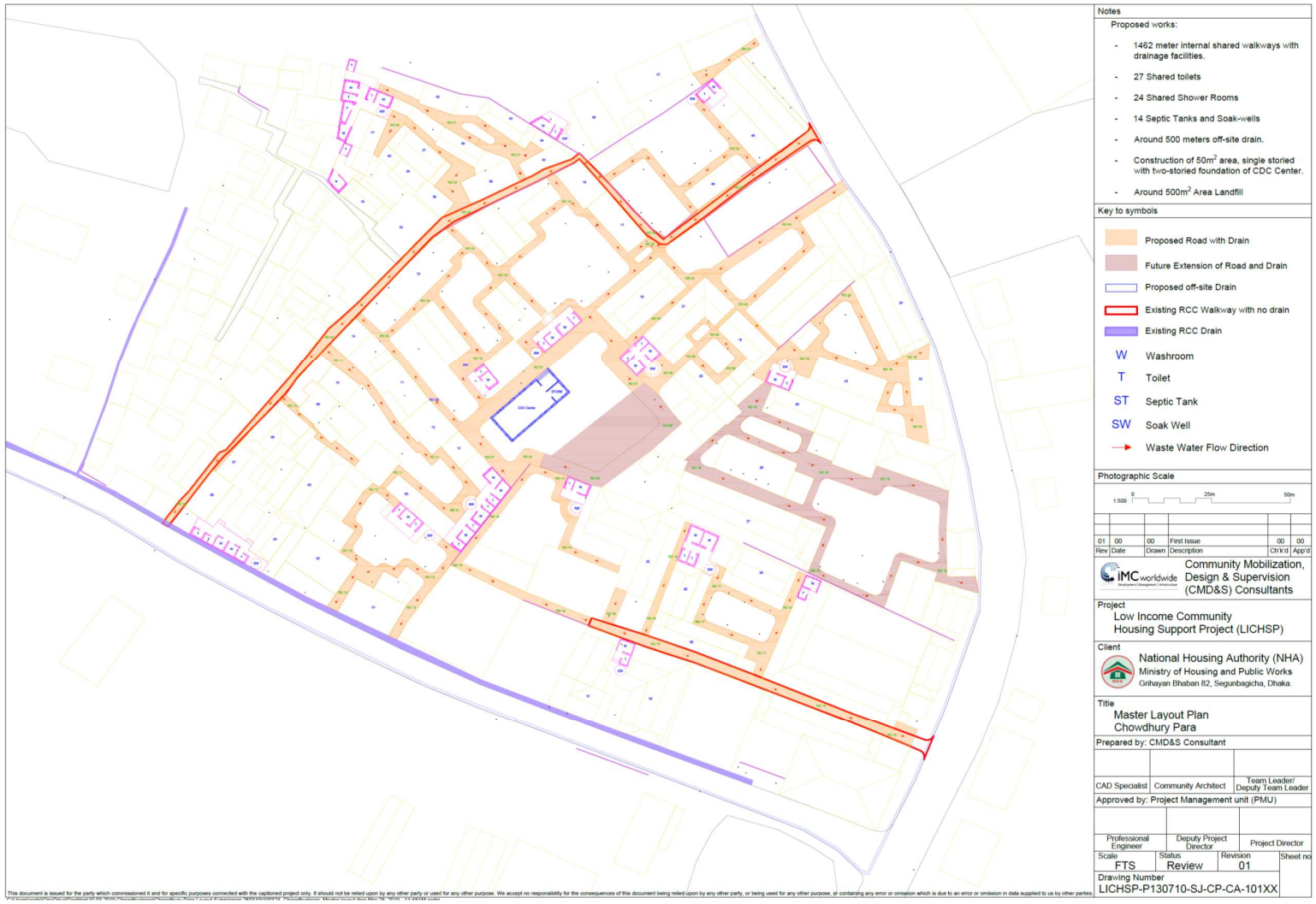


**Figure 1-4: Lay out plan of proposed interventions at Chowdhury Para settlement**

## 1.3 Sub-project Scope

LICHSP is targeting to implement particular components to cover three key factors of i) shelter improvement i.e. land, ii) infrastructure, and iii) housing. Implementation of the project will include a strong focus on monitoring and evaluation component, to better understand the impacts and potential for future scaling-up.

Under this settlement upgrading program, a multi-sectoral component has been included. This includes:

i) improvement of internal road surface, drainage facilities
ii) improvement of sanitation services (shared toilet, shower room andseptic tank with sock well)
iii) land development and construction of CDC center

## 1.4 Justification of Selection of the Sub-project

NHA has selected the long and short list of settlement, for the implementation of LICHSP, with the assistance of data sources of LGED, Sirajganj Municipality, Urban Partnership for Poverty Reduction (UPPR) officials and open sources. The following flow chart, shown in figure 1-5, was considered during the selection process.

Based on the overall selected list of low income community, NHA has prepared a short list on a priority basis, whereby PMU and Consultant team visited the site as a part of the reconnaissance survey. After site inspection, it was observed that the anticipated impacts due to the implementation of this pilot scale project, for low income community upgrading intervention, will not be severe, since it is considered as. Hence, considering the low environmental and social impacts due to this low income community upgrading, this sub-project has been selected.

The low income community settlement is mostly located at the existing right of way. After completion of the project, the living conditions, of the selected Chowdhury Para community, will be improved. Hence, considering the benefit that will be derived after construction, this settlement has been selected.

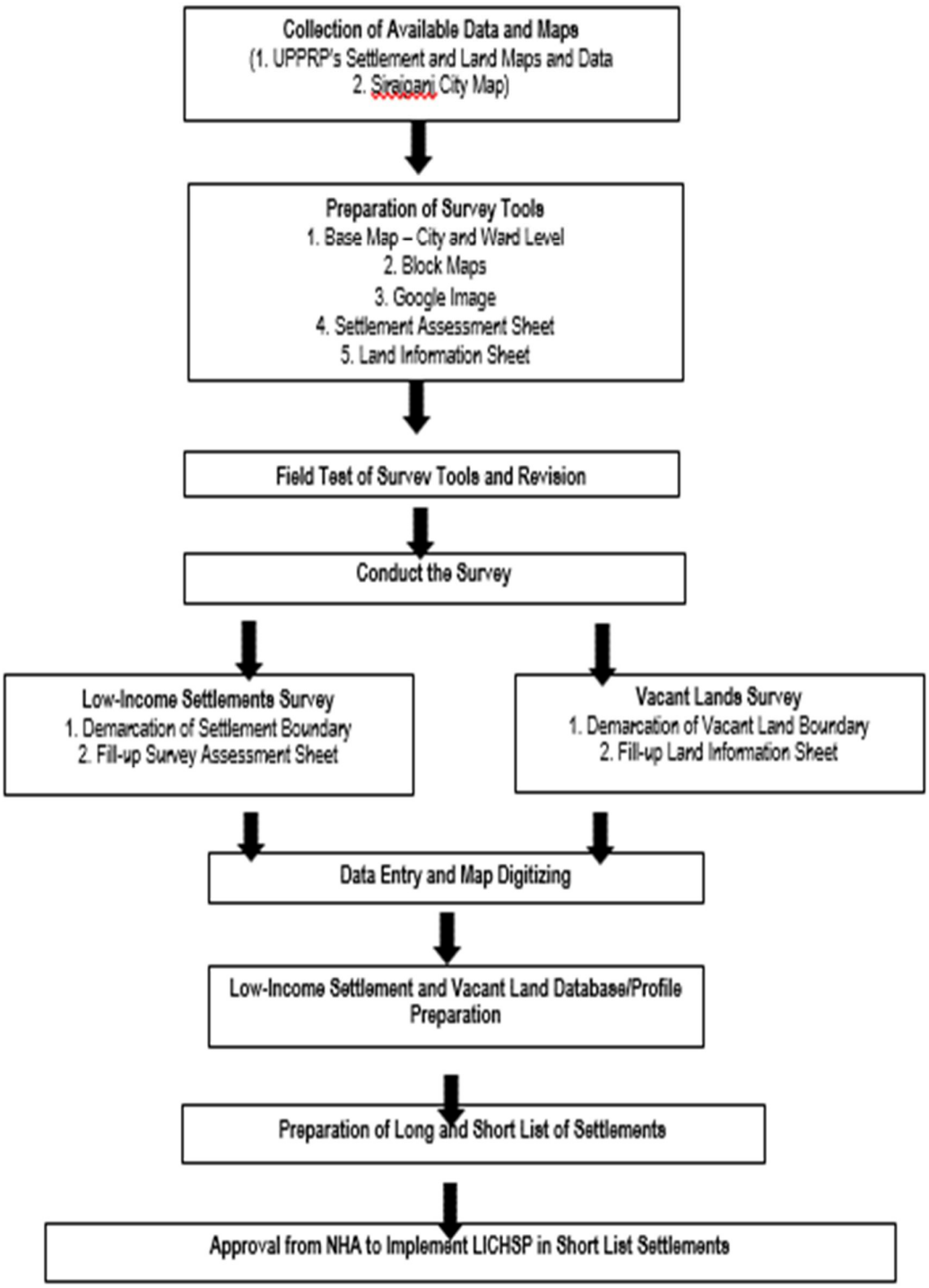


**Figure 1-5: Selection Approch of Low income community Settelment**

## 1.5 Current Situation for Chowdhury Para Settlement

### 1.5.1 Housing:

It was recorded that during the initial environmental reconnaissance survey, three major types of houses exist in Chowdhury Para Low income community, comprising semi-pucca, tin shed and number of pucca houses. During this initial site visit, it was also discovered that the built-up area of the community consist of housing spaced haphazardly in an unplanned, where several shortcomings, regarding basic needs and living conditions were identified, refer to **Figure 1-6**.

### 1.5.2 Drainage System:

There is no drainage facilities within the settlement. Beside the settlement area there is an existing Pourashava drain (RCC covered drain), which is insufficient to drain the storm/excess water of the area. So NHA authority has identified, as a priority to develop some tertiary drains with positive drainage outfall to the existing drainage system.

### 1.5.3 Toilet/Community Toilet:

Sanitation is one of the most important services for housing development interventions. Many types of human threatening diseases prevail when the sanitation system is non-functional and inadequate. In Chowdhury Para, the sanitation facilities are mostly inadequate and of an inappropriate design. The types of latrines observed, include i) sanitary latrine and ii) twin pit and single pit latrine. Maximum sanitary latrine are in damaged condition and unhygienic. There is a low land within the community. Wastewater from some pit latrine is directly discharged within the low land, causing widespread pollution of the existing watercourses and the potential spread of water borne diseases. Furthermore, most of the dwellers of Chowdhury Para depend on such facilities with several shared latrine and inadequate water supply provision. Overflow of latrines during any flood or heavy rainfall is a common phenomenon in the area. Thus, to ensure a better environment and living conditions in the Chowdhury Para community, NHA has proposed the provision of 27 toilet and 24 shower room with septic tanksand soak wells facilities, in promoting installation of hygienic latrine with water and wash facilities in replacement of the existing pit latrine.

### 1.5.4 Solid Waste Management

In the Chowdhury Para area, there is no proper arrangement of waste disposal for the low income community dwellers. It is found that, the highest number of household owners throw their household wastes in open dumping areas, which remain unhygienic and pollute the existing water bodies of the locality. People, also use the vacant places (low land) of the community for dumping their solid wastes, which causes the spread of bad odors and environmental degradation in the settlement areas.

## 1.6 Proposed Intervention for the Chowdhury Para Settlement

- 1462 meter internal shared walkways with drainage facilities.
- 27 Shared toilets
- 24 Shared Shower Rooms
- 14 Septic Tanks and Soak-wells
- Around 500 meters off-site drain.
- Construction of 50$m^2$ area, single storied with two-storied foundation of CDC Center.
- Around 200 sqm area Landfill






**Figure 1-6: Current Situation of the Settlement: Poor Infrastructural Facilities**

## 1.7 Major Sub-project Activities:

The key physical activities to be performed for the implementation of the sub-project include the following:

- Land development and Construction of CDC center;
- Earth excavation for PVC pipe drain
- Pipe laying and backfilling
- Construction of interceptor / inspection pits
- Make connection with existing RCC covered drain
- Demolition of existing damaged toilet
- Construction of septic tank, toilet and bathroom;
- Improvement of internal road (RCC) surface with RCC covered drain

**Table 1-1: Proposed interventions of sub-project activities in Chowdhury Para**

| Sl | Name of interventions | Approximate Estimated cost (Taka) |
|---|---|---|
| 1 | Internal road and pipe drain | 10,200,000 |
| 2 | RCC road with U drain | |
| 3 | Toilet with septic tank and sock well | 8,400,000 |
| 4 | Proposed CDC Center | 800,000 |
| **Total Estimated cost** | | **19,400,000** |

## 1.8 Schedule of implementation :

a) Duration : 6 months

b) Tentative start date : June 2019

c) Tentative completion date : December 2019

**Note: This EMP is a live document, so for any circumstances it can need to be updated**

# 2. SURROUNDING FEATURES

The preparation of the sub-project, entails a detailed conditional survey to get a clear profile on the existing situation regarding surrounding and prevailing facilities and features. This EMP has been prepared by conducting comprehensive field reconnaissance and related surveys, whereby the data collected from such field visits is addressed in this EMP. Refer to **Figure 2-1** for the photographic aerial view of Chowdhury Para settlement.

Moreover, this EMP is considered as a live document, which shall be subject to any revisions and updates, as required over the duration of implementing the associated sub-project infrastructural development initiatives under LICHSP. The key findings of the related site inspection and investigative work are given in **Table 2.1**.

**Table 2-1: Major Surrounding Features**

| Side/ Direction | Major Environmental and Infrastructural Features |
|---|---|
| **North** | Sawmill, BC Road, Shops, tin shade houses, pucca houses, semi pucca houses, tree, electric pole, tube well, boundary wall |
| **South** | BC Road, drain, electric pole, trees, tin shade houses, pucca houses, paddy field, 1 std building |
| **East** | 4 storied building, Semi Pucca and Pucca Houses, tin shade houses, Electric Pole, branch of Jamuna river (800 m far from the settlement) |
| **West** | Mondir, pucca houses, semi pucca houses, tin shade houses, RCC path way, katakhali khal, trees, electric pole |


**Figure 2-1: Drone fly view of Chowdhury Para settlement**

# 3. ENVIRONMENTAL SCREENING

### Part A: General Description

| | |
|---|---|
| **Location of the low income community:** | Chowdhury Para, Sirajganj Pourashava, Sirajganj. |
| **Number of people/households to be benefited:** | Generally, whole population of the Chowdhury Para Low income Community will be benefited, where 53households, with a present 214population, will be benefited. |

### Part B: Environmental Screening Checklist

| | Environmental issues | Yes | No | Remarks |
|---|---|---|---|---|
| 1 | **Encroach onto an important natural habitat or protected area?** | | √ | The sub-project is for the improvement of under-developed settlement areas to a developed area |
| 2 | **Disturbance or harm of historical or culturally important site?** | | √ | In the sub-project area, there is no historical or cultural site of importance. So, there is no question about disturbance of historical place. |
| 3 | **Adverse effects or destruction of designate wetlands?** | | √ | The intervention to be implemented under this sub-project will have no adverse impact or destruction of wetland, since all the interventions will be constructed in the developed land of proposed settlement. Rather, there will be a positive impact by ensuring provision of waste management system and drainage system to control illegal discharge and disposal of waste in the nearby water courses and wetlands. However there is a low land (seasonal wetland) within the Chowdhury para settlement. People of the community use the low land for dumping their solid wastes and wastewater from toilet and kitchen is also discharged within the area, which causes the spread of bad odors and environmental degradation in the settlement areas. This low land will be developed to upgrade the environment of the area. |
| 4 | **Development interventions in high risk (climatic/disaster) area?** | | √ | No risk |
| 5 | **Drainage, water logging or congestion in the project area?** | | √ | Existing drainage systems are scattered and not integrated. Hence, during monsoon period locations within thelow income community become flooded due to delayed discharge of rainwater. However, proposed drainage improvement will ensure integrated drainage system. During the construction work, earthen drainage and pumping facilities will be provide in the site to ensure area drainage. |
| 6 | **Deforestation or cutting down of trees and vegetation?** | √ | | For the implementation of the sub-project, there will be needed cut down of trees during sites clearing work. However, the ecological imbalance to be caused by the feeling of trees will compensate by replantation of trees. |
| 7 | **Over exploitation of ground water in the project area?** | | √ | During the short term construction work and construction of toilet, septic tanks, pits, installation of PVC pipe, RCC road with U drain, CDC center a minimal quantity ground water will be required. |
| 8 | **Adverse effects on groundwater quality?** | | √ | There shall be no adverse effect on groundwater quality. |
| 9 | **Adverse effects on surface water quality or flow?** | | √ | No risk |

| | Environmental issues | Yes | No | Remarks |
|---|---|---|---|---|
| 10 | **Involve destruction of topsoil?** | √ | | Low income community upgrading sub-project involves some excavation work for drain construction work. However, during excavation work, the top soil will stored in a separate designated place and shall be segregated from excavated soils and during backfilling. The top soil shall then be placed on the top 300 mm and all reinstated excavated materials. |
| 11 | **Conversion or degradation of agricultural land?** | | √ | Chowdhury Para is a residential settlement and does not comprise any agricultural land. So, there is no matter of agricultural land conversion or degradation. |
| 12 | **Increased noise due to every day construction activities?** | √ | | Noise and vibration, caused by the construction equipment (mainly concrete mixture machine and concrete vibrator) and construction materials carriage vehicles may temporarily disturb nearby residents. However, mitigation measures shall be taken as part of the Contractor's EMP, whereby use of low noise generating equipment shall be closely managed. |
| 13 | **Functional operating system for waste management?** | | √ | Solid waste management system shall be imposed in compliance with the provisions of the Contractor's EMP. Provision of essential secondary transfer station (during construction)and SWM shall be considered |
| 14 | **Increase of wind-blown dust i.e. fine aggregate, from storage?** | √ | | In full compliance of the provisions of the Contractor's EMP, all necessary mitigation measures shall be managed for the control of potential wind-blown dust from stockpiled construction material, including necessary water spraying and proper covering. |
| 15 | Use or transportation of any toxic or hazardous materials? | √ | | In full compliance of the provisions of the Contractor's EMP, all necessary mitigation measures shall be managed for the control of potential risk due to use of toxic and hazardous material like oil, grease for the operation of construction materials carriage vehicles and equipment. Thus, there shall be no, or minimal adverse impact on the species of aquatic environment due to disposal of waste construction materials and accidental leakage and spillage of the oil and grease from sub-project vehicles and equipment into the existing water bodies. |

**Decision of EA Category and Further Assessment:** In the EMF of LICHSP, all of the interventions implemented under LICHSP, fall in Category B as per WB guidelines. According to GOB guideline housing, road and drainage intervention are classified as category orange B. Category of remaining intervention to be implemented by the LICHSP are not addressed in GOB guideline. However, in the project EMF, it is also mentioned that, depending on assessment, sub-project intervention can be classified as Orange A and or Orange B or green as per ECR-97.

Considering the environmental impacts which is low, very much site specific and significantly manageable through mitigation measures, primarily this sub-project can be considered as Orange-A Category as per ECR-97.

Considering the anticipated impacts, the implementation of the sub-project is classified as **Category C**, according to the WB classification. Therefore, environmental management plan is acceptable to meet the WB and GOB regulatory requirement.

**Environmental Assessment Category**

As per GOB □ Orange A√ □ Orange B □C

**As per WB** □ Category B □**Category C**√

Therefore there is no need for further evaluation:

Need IEE □ Yes □**No**√

Need EIA □ Yes □**No**√

# 4. IMPACT ASSESSMENT AND MITIGATION MEASURES

## 4.1 General

From this sub-project, the probable impact is expected from the activities to be performed for implementing the proposed interventions (internal road, drainage network, toilet and solid waste management). However, most of the impacts are considered minor and site specific, short term during the construction period, which are identified in this Section along with the related mitigation/enhancing measures.

## 4.2 Impact during Pre-construction for Site Preparation

### 4.2.1 Disposal of Demolished Toilet Waste

If during demolition of existing toilet is not properly planned and executed or protection gears are not adopted, it will affect health of residents, construction workers, and neighboring communities. Human excreta of those toilets (if untreated) might result into the health problem, water pollution and air pollution.

**Mitigation Measure:**

- Ensure use of vacuum pump to collect sewage sludge and it shall be carried with covered drum truck;
- Sewage sludge shall be disposed in the nearby fecal sludge treatment plant (if available), or that shall be engraved in the earthen pit and soil cover shall be ensured at least one feet.
- Ensure disposal tanks, drums or containers coming to site are in a satisfactory condition – check for damage or leaks;
- Ensure all deliveries are made as far away from watercourses and drains as possible;
- Ensure use of PPEs for the associate workers;

### 4.2.2 Land Filling and Leveling Work

Within the settlement there is a low land which will be developed by land filling. During land filling work, if proper measure are not taken it would have impact on dust pollution, noise and soil erosion. Even, this land filling work will have probability to soil erosion by runoff, if proper measures are not taken.

**Mitigation Measure:**

- To avoid soil erosion, proper slope will be maintained.
- For getting compactness and stability to avoid soil erosion proper compaction will be maintained;
- During compaction and leveling of land moist condition should be ensured by sprinkling of water;
- Sand carrying truck should be covered up with tarpaulin or polythene;
- Transportation of the filling material have to be carried during the scheduled times, and mainly during the day;
- Ensure use of face mask to the workers.

### 4.2.3 Clearing of Vegetation and Cutting of Trees

During site visit it was counted that, total 32 numbers of tree will be cut down for the upgrading of the low income community. There is also be needed few vegetation clearing works.

**Mitigation Measure:**

- 64 numbers of trees will be planted to compensate the felled down trees and enhance the ecological condition in the sub-project area.

## 4.3 Impact during Construction Phase

### 4.3.1 Management of Site (Labor-shed, Material andWaste storage)

This sub-project consists of different interventions at specific location. Hence, absent of proper site management such as storage of construction material and equipment here and there and lack of labor shed and site office may arise different types of problem in the community and to the surrounding peoples. The problem associates with improper site management of waste disposal, dust generation, drainage congestion are considered for determining the required mitigation measures, as incorporated within this EMP and as follows:

**Related Mitigation Measures**:

- Prior to construction work one labor shed and site office with sanitation facilities and open space for stockyards will be arranged by the contractor;
- Selected stockyard place will be fenced to restrict the free movement of people and minimize windblown dust blowing in the stockpile of fine aggregate;
- In the camp site waste bin shall be provided;
- Transportation of construction material and equipment should be followed according to the management plan and scheduled time;
- Soil and sand carrying vehicles shall be covered to avoid risk of windblown dust;
- Road side storage of construction material and equipment shall be prohibited;
- Generated waste shall be correctly disposed in to the approved dumping site of municipality;
- Locations for the placement of containers, for temporary storage of waste, shall be provided and be emptied on a regular basis by the arrangements made by the contractor and the municipal services;
- Excavated soil mostly will be reused for the backfilling of drains and surplus portion, if any, shall be disposed in the designated dump site(s).

### 4.3.2 Construction of CDC Building

Due to construction of building anticipated impact is mainly on physicochemical parameter. Construction of CDC building (one storied) involves use of equipment/machines which are produced noise, it may temporarily disturb nearby residents. However, if the settlement is located close to human settlements, noise pollution would be significant though the impacts are anticipated to be limited. Similarly, air pollutants will be emitted from the excavation work, equipment and construction vehicles are expected to remain low. Storing of cement bag without cover may also degrade the air quality. Local residents in the vicinity of the work sites will be temporarily disturbed by the limited dust pollution. If proper measure are not adopted temporary water-logging may be occurred. Moreover, the finishing work of construction stage is plastering, and painting. These works may degrade the soil and surface water quality if measure are not taken. Eventually, lime paint (locally known as white wash) need lime (Chun) to be mixed in water. Mixing lime will pollute air and possess potentials of serious pollutants and health hazards. However, scale of work is minimal (only 50 sqm one storied building). So, anticipated impact is also expected to remain low and site specific.

**Mitigation Measure:**

- Construction materials must be selected to ensure the least possible negative impact on the environment;
- Water should be sprayed at the work site for dust control;
- Ensure sprinkle and cover stockpiles of loose materials (e.g., fine aggregates);
- Maintain adequate moisture content of soil and sand for transportation, compaction and handling;
- Avoid use of dust generating equipment which produce significant amount of particulate matter far from the local residents;
- Ensure all sub-project vehicles are in good operating condition;
- For managing noise nuisance, construction works should be limited to daytime and all employees likely to be exposed to ear noise must use ear plug;

- If needed and applicable, all powered mechanical equipment and machineries will be fitted with noise abating gear such as mufflers for effective sound reduction;
- Place polythene at the ground to prevent discharge of paints, and plastering wastes in the soil ;
- Carefully mixing of lime with water by ensuring safety gear and it should be in confined zone.
- For storing of construction materials like cement bag, shed must be covered as well as must have a concrete floor.
- In the construction process, use of chemical or binder in the concrete to strengthen and fasten the process should be avoided.

### 4.3.3 Air Quality and Dust

To implement the sub-project interventions (internal road, drainage network, toilet, septic tank, CDC building) appropriate and approved types of equipment and construction vehicles shall be used. The probability of emission of potential air pollutants shall be controlled in line with the mitigation measured detailed in the EMP. Although all of the intervention shall short term, the overall use of equipment and construction vehicles is expected to create a minimal impact.

Local residents in the vicinity of the work sites will be temporarily disturbed by the limited dust pollution. The overall impacts are expected to remain low.

**Related Mitigation Measures**

- Water shall be sprayed at the work site for dust control;
- Water sprinkling and use of cover to stockpiles of loose materials (e.g., fine aggregates) shall be assured;
- Adequate moisture content of soil and sand for transportation, compaction and handling shall be maintained;
- Use of dust generating equipment, which produce significant amount of particulate matter, shall be avoided and kept far away from the local residents;
- All sub-project vehicles shall be kept in good operating condition.

### 4.3.4 Noise and Vibration

Noise and vibration, caused by the equipment and movement of the construction vehicles may temporarily disturb nearby residents. In this sub-project, sensitive areas, including roadside houses and shops, are likely to be affected, though the impacts are anticipated to be limited.

**Related Mitigation Measures**

- Transportation of the construction materials shall to be carried during the scheduled times, and arranged mainly during the day;
- All powered mechanical equipment and machineries shall be fitted with noise abating gear, such as mufflers, for effective sound reduction.

### 4.3.5 Interruption of Pedestrians Movement

Having been congested nature of the existing road in the settlement area, during construction of road with drain and laying of PVC pipe drain will be restricted free movement of the pedestrian. Even, if proper measure is not taken it may occur accident to the pedestrians. However, all of the road and drain are short in length and very much site specific. Therefore, anticipated impact is less.

**Related Mitigation Measures**

- Pipe laying work and construction of inspection pit shall be conducted during the dry season;
- Slope protection shall be maintained for trenches/ excavations of more than 1.5 m depth;
- Backfilling and compaction work shall be done immediately after pipe laying;
- Proper protection and temporary fencing shall be provided to excavations including inspection chamber and pit construction work;
- Sufficient lighting system shall be provided beside open trench, as required;

- Construction work shall be performed in a systematic manner, section wise, as required;
- Appropriate cautionary warning and diversionary signs shall be provided for protection of pedestrians and for directing alternative road routes.
- Potential discharge of fuel, lubricants, chemicals, and wastes into adjacent water bodies, shall be avoided;
- During construction sufficient temporary waste bins shall be provided by the contractor and according to CDC direction.

### 4.3.6 Momentary interference to neighbouring settlements

The proposed interventions and demands of the infrastructural development work, within the area of the Chowdhury Para community shall not give rise to momentary interference, or inconvenience, to neighboring settlements.

## 4.4 Impact during Operation Phase

### 4.4.1 Waste Management (Toiletand Septic Tank)

During operation phase, the fecal sludge generated from the toilets of the low income community area, will be managed through proper on-site sanitation i.e. through providing proper septic tank and soak pit ***(Figure-4-3).***

As required, septic tanks are be cleaned in regular intervals with effective sludge transport and disposal systems in place so that potential environmental pollution, including risk of overflow of septic tank and requisite health hazard to the community shall be safeguarded against.

**Related Mitigation Measure:**

- The community dwellers shall clean the septic tanks at regular interval with the help of conservancy unit of Pourashava or arranged privately, in a hygienic and approved manner;
- Community awareness programs about health impacts and proper sanitation practices shall be conducted;
- A functional monitoring system within the community shall be organized;
- During emptying pits proper handling of fecal sludge shall be arranged in a proper and acceptable manner using sealed carrying containers and adequate container size;
- Use of suitable sized vacuum truck shall be arranged to collect septage from the toilet, along with safe disposal;
- Fecal sludge and septage shall be correctly disposed in the nearby fecal sludge treatment plant or shall be disposed in approved earthen pit(s),using soil cover of at least one foot coverage thickness.
- Disposal tanks, containers used in septage collection shall be correctly sealed and free from damage or leaks;

### 4.4.2 Waste Water Management:

Operation of the drainage system may create a risk of degraded quality of discharge at outfall, particularly if kitchen and bathroom waste water of the settlement are discharged directly into the drain. Even, backflow of drain water may take place in adjacent areas of the drain if proper design is not correctly adopted.

**Mitigation Measures:**

- Water retention tank (***Figure 4-1***) shall be constructed at regular intervals, for treatment of drain wastewater, before disposing in the water bodies;
- Correctly engineered drainage systems shall be designed considering the downstream discharge point; adequate slope and x-section (***Figure 4-2);***
- Direct connection to the drainage system of sewerage and wastewater shall not be permitted;
- Effective use of soak well for discharging of waste water (toilet, kitchen etc.) shall be ensured.

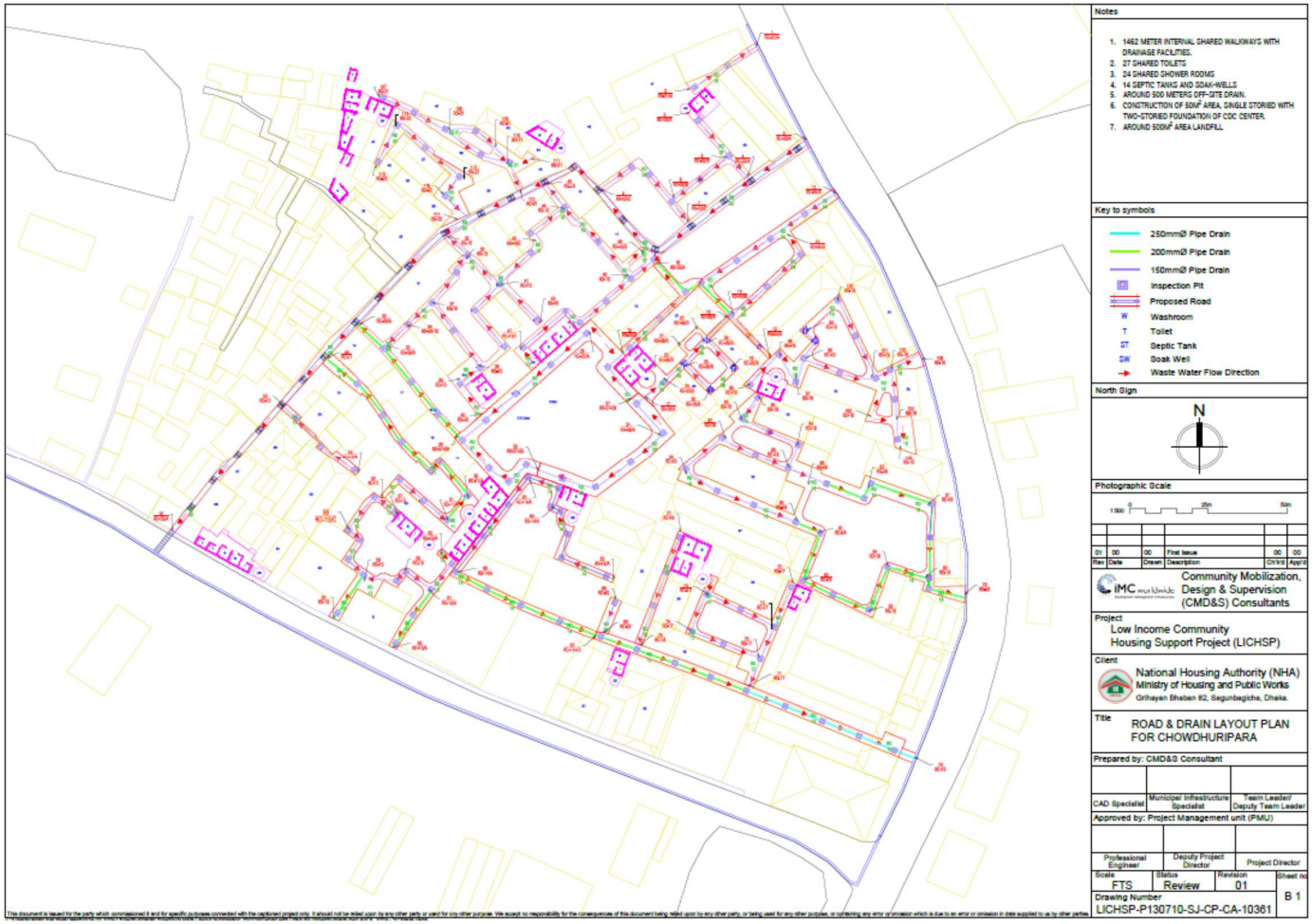


**Figure 4-1: Layout plan of proposed road, retention tank and drainage network**

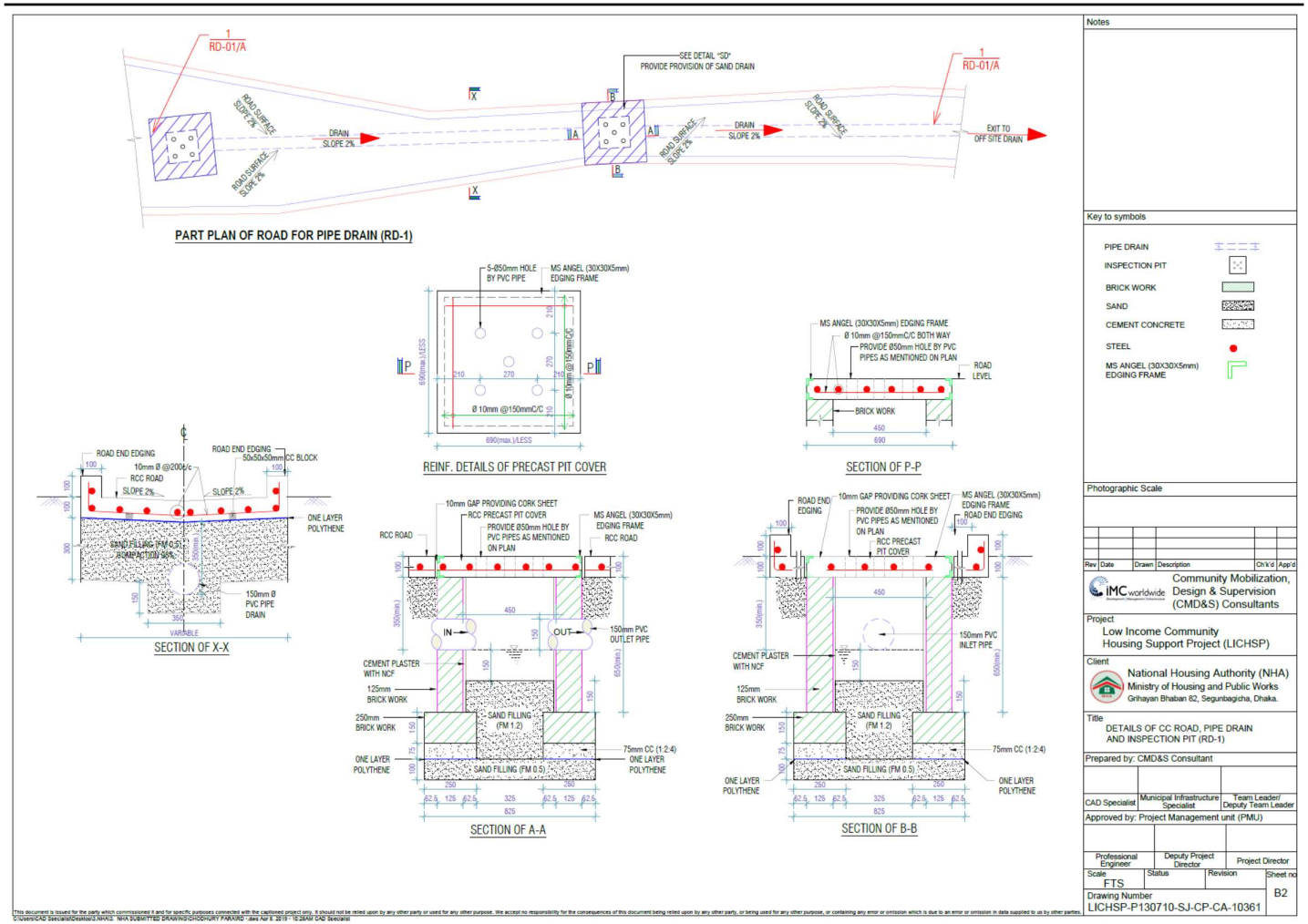


**Figure 4-2 : Downstream discharge point; slope and x-section of drainage network**

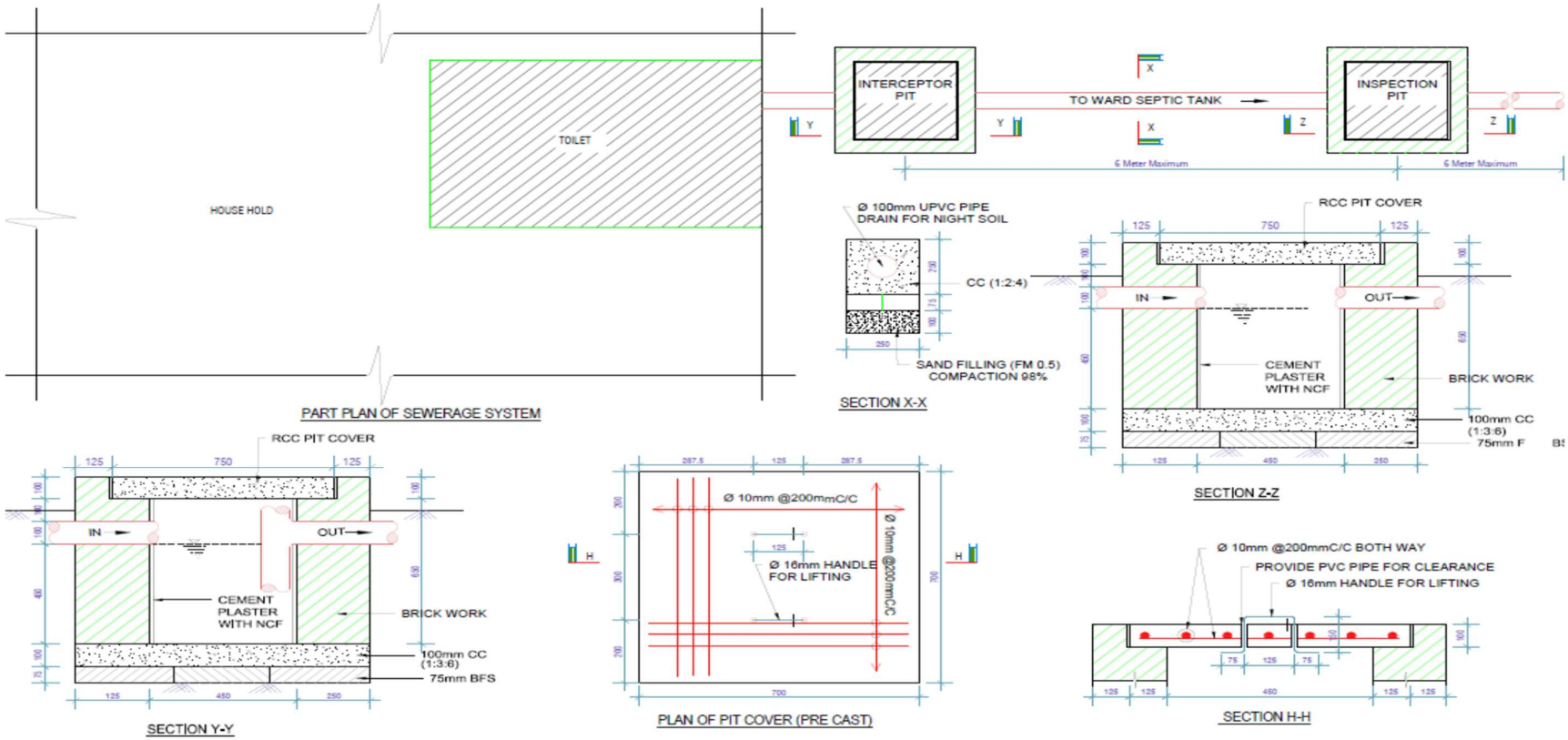


**Figure 4-3: Layout plan of septic tank with soak pit and cross section**

# 5. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

## 5.1 General

This EMP consists of a set of institutional arrangements, mitigation measures, monitoring plan, EMP implementation costs to be taken during the design, construction and operation (post-construction) stages of the project. The activities to be performed under this sub-project are expected to have minimal impact and result in minor disturbance to the local environment and community. However, to ensure sustainable development and avoid temporary disturbance to the social and environmental aspect, required public consultation feedback is considered with regard to effective output in the final implementation of all EMP related interventions.

## 5.2 Institutional Arrangement for Safeguard Compliance

This project is implemented by National Housing Authority under the Ministry of Housing and Public Works. The PMU of the NHA under LICHSP will be responsible for overall environmental management, including implementation of mitigation measures, monitoring, and preparation of all statutory progress and monitoring reports.

The PMU has been formed with the Project Director, Deputy Project Director, Environment Specialists, Social Specialist, Procurement Specialist and Financial Management Specialist. In the institutional arrangement procedure, PMU of the NHA and the Consultant's Team Leader/ Deputy Team Leader are directly involved in the planning, design and implementation.

NHA/ Consultant's shall ensure the effective implementation of safeguard compliance, will ensure active engagement of Community Support Center (CSC), Community Development Committee (CDC). The CSC has been established in Chowdhury Para, Sirajganj, under the project and shall be active during the construction period. The CSC is monitored by the PMU. The CSC officials, especially 'engineer' will be responsible for supporting the construction supervision. In addition, CSC focal person for Environment and local community head will be responsible to monitor and supervise the overall environmental concern. The construction work of Chowdhury Para will be done through the CDC, as coordinated through the Consultant's, who will be responsible to implement the environmental mitigation measures, in accordance with the provisions of the EMP.

For effective implementation of the project, a very efficient institutional linkage has to be developed. Therefore, two major bodies are needed to be included, which are:

(i) National Steering Committee (NSC) headed by the Secretary, MoHPW;

(ii) Technical Review Committee (TRC) headed by the PD, which will also work as national level environmental committee.

The Environment Specialist will report the PD regarding any issues related to environmental supervision and management and will be responsible for overall environmental management of LICHSP interventions. PD will make final decision on any environmental actions, after due consultation with NSC and Technical Review Committee.

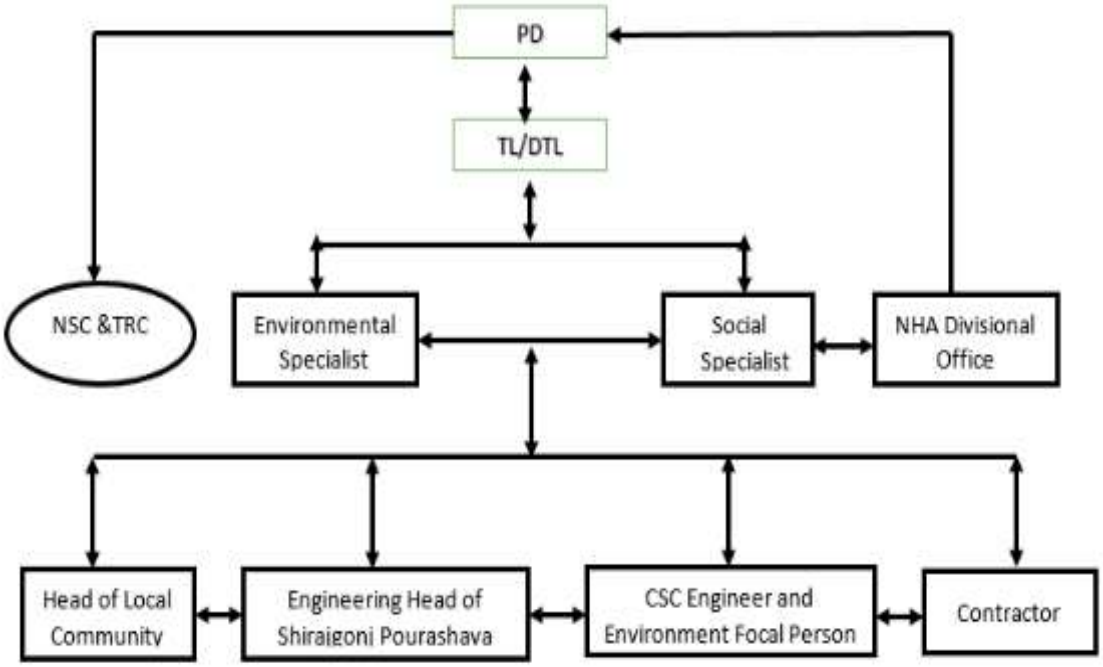


**Figure 5-1: Institutional Arrangement for Environmental Safeguard**

## 5.3 Public Consultation and Participants and Final Design Feedback

During the environmental survey stage, an attempt was taken to encourage stakeholder involvement including community people, local commissioner, NGOs representative, consultant teams and NHA representation. The proposed development interventions and the related activities to be performed, including feedback from the stakeholders, was also encouraged. This was incorporated in the final design of the proposed interventions. Photograph of public consultation and participant list with signature are included in the **Annex 1** and **Annex 2**.

The following feedbacks were addressed during the stakeholder engagement meeting by the participants.

- Participant stated that, before discharging of drain water into the water bodies, treatment facilities shall be provided to minimize the water pollution;
- Concern was stated regarding excessive noise and impaired air quality of the study area, during construction activates, which would need to be adequately controlled;
- It was stated that sufficient number of waste bins shall be needed, in the study area, for primary collection of the waste from houses. It was also stated that they expect regular disposal of generated waste by engaging the conservancy unit of Pourashava;
- They suggested for ensuring the quality construction work for sustainable development;
- They all expressed the need to avoid unnecessary roadside storage of construction materials and equipment, in keeping free movement of pedestrians during construction period.

Aforementioned feedback from the participants has been considered in the design of sub-project intervention as much as possible adhered to in ensuring sustainable development in the study area. Some of the suggestions of participants which are reflecting in the design are mentioned below.

- The design of storm water drain system is provided with adequate attenuation retention tank capacity**(Figure-4-1)** as a part of the water treatment facilities.
- Provision of adequate amount of waste bins has been given and PMU shall ensure involvement of Pourashava for regular disposal of collected waste from the STS;
- The contractor will be responsible for ensuring suitable and adequate space for storage of all construction materials and equipment, which will be monitored closely by the CDC and the CSC;
- To avoid air and noise pollution, the probable impact, associated with construction activities, has been assessed and the corresponding mitigation measures have also been incorporated in the EMP.

## 5.4 Grievance Redress Mechanism (GRM)

A common GRM is in place for social, environmental, or any other grievances related to the project; inclusive of the Resettlement Plans (RPs) and EAs, which has been developed in consultation with key stakeholders. The GRM shall provide a reachable and reliable platform for receiving and facilitating the satisfactory resolve of grievances made by the Project Affected Persons (PAP's) according to the related interventions proposed under the project. The multi-level GRM for the project is outlined below, with each level having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.

Affected Persons (APs) will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes that have already been installed by NHA at the project site, in front of the office of the CDC. In addition to this complaints box, online registration link (e-mail, fax and phone number of CSC office shall be made available at the construction site signboards. A sample registration form has been sent to the office of the CDC and the CSC. After getting any grievance, the issue shall be clearly recorded and archived for monitoring purposes, in written format, in the CSC office.

The urban resources center, CSC office will have the overall responsibility, with the assistance of the local level GRO, involving the GRC committee. This procedure will facilitate for timely grievance redresser on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved person/party.

With the facilitation of NHA, the Pourashava Mayor nominated the GRC members and included representative from community development committee, government agencies, local NGO, and civil society. The GRC has been formed and established for the Chowdhury Para settlement, including the following key members:

| Sl # | Name | Position in GRC |
|---|---|---|
| 1 | Sabita Rani | Convener |
| 2 | Mostafa Kamal | Member Secretary |
| 3 | Anima Chowdhury | Member |
| 4 | Popy Rani Das | Member |
| 5 | Shikha Rani | Member |

**The First Stage: Field Local Level**: of the grievance redress involves solution of the problem directly at the field level (locally). At the local level the Chairman of Municipality will act as the Grievance Redress Officer (GRO). Most of the grievances are to be resolved at the field level. The Grievance Redress Officer, in the presence of GRC Member, resolves on-site in consultation with each other and will be required to do so within 15 days of receipt of a complaint/grievance.

**The Second Stage: District Level**: of grievance redress: If the complaint is not addressed within this period of time, the petitioner may go directly to the next level of GRS. That is, if a complaint at local level is not addressed within fifteen working days, the petitioner may directly appeal to the district level GRO. At district level the Deputy Commissioner (DC) will act as the GRO, who will attempt to resolve those **within 7 days**.

If it remains unresolved, then it will go to the central level where Deputy Project Director will be act as GRO to resolve the issues within 7days.

**The Third Stage: National Level**: of grievance redress: if it is not satisfactorily resolved, it will then proceed to the national level GRO. At this stage, the Chairman of National Housing Authority (NHA) would be given the responsibility to act as the GRO and given the supreme authority to address any compliant. An aggrieved person shall also have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

Every level must prepare and send a monthly report on the nature and types of complaints to its next level. A resolution register will be maintained by the all level GRO. The resolution register will contain (i) serial no., (ii) case no., (iii) name of complaint, (iv) complaint story and expectation, (v) date of hearing, (vi) date of field investigation (if any), (vii) results of hearing and field investigation, (viii) decision of GRO, (ix) progress (pending, solved) and (x) agreement or commitments. Closing register will keep records such as, (i) serial no., (ii) case no., (iii) name of complaint, (iv) decision and response.

## 5.5 Environmental Management Plan (EMP)

Environmental Management Plan (EMP) is an integral part of all sub-project interventions to be designed and implemented under the LICHSP. The LICHSP has prepared the EMP for every sub-project intervention, where all the anticipated impacts resulting from the sub-project activities and mitigation measures have been recorded, for all the anticipated impacts have been suggested.

The major components of an EMP include: Mitigation Measures, Enhancement Measures/ ECoPs, Estimation of Cost of EMP, Environmental Monitoring, and Institutional Arrangement for Implementation of EMP. The following table shows potential mitigation measures as well as ECoPs, which are recommended in the LICHSP.

The activity-wise anticipated environmental impacts and corresponding mitigation measures have been outlined in **Table 5.1**.

**Table 5-1: Environmental Management Plan (EMP)**

| Sub-Project Activities | Anticipated Environmental Impacts | Suggested Mitigation Measures/Enhancement Measures/ Environmental Design Considerations | Responsible Parties |
|---|---|---|---|
| **Pre-Construction of Sub-Project Interventions** | | | |
| Land development | ▪ Dust generation and possibilities of soil erosion | ▪ After filling , raised land shall be compacted to protect soil erosion;<br>▪ Ensure moist condition of the filling material during compaction;<br>▪ Soil shall be avoided as filling material and will be ensured use of sand for filling material;<br>▪ To protect soil erosion proper slope will be maintained | CDC that is to be monitored by CSC, PMU, NHA |
| Site preparation | ▪ Demolition of existing toilet | ▪ Ensure use of vacuum pump to collect sewage sludge and it shall be carried with covered drum truck;<br>▪ Sewage sludge shall be disposed in the nearby fecal sludge treatment plant if available, or that shall be engraved in the earthen pit and soil cover shall be ensured at least one feet.<br>▪ Ensure disposal tanks, drums or containers coming to site are in a satisfactory condition – check for damage or leaks;<br>▪ Ensure all deliveries are made as far away from watercourses and drains as possible;<br>▪ Ensure use of PPEs for the associate workers; | CDC that is to be monitored by CSC, PMU, NHA |
| **Design and Construction of Sub-Project Interventions** | | | |
| Site Management (Material and equipment Storage, Labor Influx etc.) | ▪ Waste disposal, dust generation, drainage congestion etc. | ▪ Prior to the start of the construction activities, labor shed, site office with sanitation facilities, and open space for stockyards, will be arranged by the contractor;<br>▪ Selected stockyard place will be fenced to restrict the free movement of people and minimize dust blown particles from the stockpile of fine aggregate;<br>▪ Transportation of construction material and equipment should be completed in accordance with prior approved activity and time schedule;<br>▪ Soil and sand carrying vehicles should be fitted with covers to avoid | CDC that is to be monitored by CSC, PMU, NHA |

| Sub-Project Activities | Anticipated Environmental Impacts | Suggested Mitigation Measures/Enhancement Measures/ Environmental Design Considerations | Responsible Parties |
|---|---|---|---|
| | | dust blown material;<br>▪ Roadside storage of construction material and equipment shall be prohibited;<br>▪ Generated waste and construction debris shall be properly disposed in accordance with the approved designated disposal site(s) of the municipality;<br>▪ Acceptable quality of excavated soil shall be mostly reused for the backfilling of drain, with the surplus portion, if any, disposed in the approved designated disposal site(s).<br>▪ Separate waste collection bins, for organic and inorganic wastes, shall be provided throughout the construction and camp sites, whereby all waste collection bins shall be regularly emptied and cleaned;<br>▪ Waste shall be disposed at the approved designated dumping site(s) of Sirajganj Pourashava, comprising all forms of generated waste (solid wastes and other forms of wastes);<br>▪ Dump trucks of the Pourashava shall be made available to facilitate transportation of all generated wastes, which will entail the proper disposal of the wastes and effluents. | |
| CDC building (one storied, 50sqm building) | ▪ Noise Pollution due to using of rod cutter, vibrator, concrete mixture and other machine | ▪ Using of rod cutter and wielding machine shall be avoid at night.<br>▪ Avoid use of wooden shuttering work and ensure steel shuttering work.<br>▪ Proper Acoustically designed machinery should be used. | CDC<br>that is to be monitored by CSC,<br>PMU, NHA |
| | ▪ Air pollution due to black smoke emission from diesel based concrete mixer machine and vibrator machine<br>▪ Dust pollution from construction | ▪ Regular maintenance of the concrete mixer and vibrator machine shall be ensured to avoid any black smoke emission.<br>▪ Water should be sprayed at the work site for dust control;<br>▪ Ensure sprinkle and cover stockpiles of loose materials (e.g., fine aggregates);<br>▪ Maintain adequate moisture content of soil and sand for transportation, compaction and handling; | |

| Sub-Project Activities | Anticipated Environmental Impacts | Suggested Mitigation Measures/Enhancement Measures/ Environmental Design Considerations | Responsible Parties |
|---|---|---|---|
| | materials (cement, sand etc.) | ▪ Avoid use of dust generating equipment which produce significant amount of particulate matter far from the local resident | |
| | ▪ Impact on health and safety | ▪ The workers should wear PPE (Personal Protective Equipment), safety goggles, and other necessaries.<br>▪ Restrict access to the construction site. | |
| | ▪ The waste form the site during the construction ofhouses | ▪ Awareness must be raised among workers on solid waste management.<br>▪ Specific dumping containers are to be kept in the site.<br>▪ Regular and quick disposal of generated construction debris shall be done. | |
| Toilet (Single/ Community toilet with pour flush / piped sewer system/ septic tanks) | ▪ Noise, water and soil pollution during the construction. | ▪ All excavated top soil shall be properly segregated and stockpiled prior to final reinstatement for all excavated surfaces;<br>▪ Night time construction works activities, which may generate noise nuisance such as casting work, welding work, drilling work, rod cutting etc, shall be avoided at all times;<br>▪ Proper acoustically designed machinery should be used to avoid noise nuisance.<br>▪ Contractor will be responsible to control the workers from discharging of construction waste into adjacent water bodies. | CDC<br>that is to be monitored by CSC,<br>PMU, NHA |
| Drains/ Drainage system | ▪ Noise Pollution due to using of rod cutter and concrete mixture machine | ▪ Using of rod cutter and wielding machine is to be avoided at night;<br>▪ Avoid use of wooden shuttering work and ensure steel shuttering work;<br>▪ Proper acoustically designed machinery should be used. | CDC<br>that is to be monitored by CSC,<br>PMU, NHA |
| | ▪ Air pollution due to black smoke emission from diesel based concrete mixer machine and | ▪ Regular maintenance of construction equipment and vehicles, including concrete mixer and vibrator machine should be ensured to avoid any black smoke emission. | |

| Sub-Project Activities | Anticipated Environmental Impacts | Suggested Mitigation Measures/Enhancement Measures/ Environmental Design Considerations | Responsible Parties |
|---|---|---|---|
| | vibrator machine | | |
| | ▪ Impact on health and safety | ▪ The workers shall be provided with suitable PPE (Personal Protective Equipment), safety goggles, and other necessaries;<br>▪ Bamboo made barrier is to be provided for restricting access to the construction site. | |
| | ▪ Generation of excavated loose soil and clay soil | ▪ Contractor will be responsible for regular and quick disposal of excavated soil to the approved designate disposal site(s); | |
| Internal road and Road with RCC U drain | ▪ Air and dust, noise and water pollution from construction work | ▪ Watering and sprinkling shall be ensured to reduce dust pollution;<br>▪ Proper acoustically designed machinery should be used for minimizing the noise nuisance;<br>▪ All construction activities, including concreting work is to be performed at day time;<br>▪ To avoided accident proper protection and lighting (at night time) facilities will have to be arranged.<br>▪ Proper slope protection will be provided during excavation and drain construction work<br>▪ The contractor is to maintain adequate moisture content of soil and sand for transportation, compaction and handling;<br>▪ Avoid use of dust generating equipment, which may produce significant amount of particulate matter, within the construction site(s) and near vicinity of the local residents;<br>▪ Ensure all sub-project vehicles are in good operating condition;<br>▪ The discharge of any kind of solid, or liquid wastes, from the construction activities, into adjacent water bodies shall be avoided. | CDC<br><br>that is to be monitored by CSC,<br>PMU, NHA |
| | ▪ Impact on health and safety due to operation of mechanical equipment | ▪ Ensure use of personal protective equipment ( PPEs)<br>▪ Carefully operation of mechanical equipment, with provision of suitable safety gear, shall be used at all times. | |

**Operation of Sub-Project Interventions**

| Sub-Projects/ Activities | Anticipated Environmental Impacts | Suggested Mitigation Measures/Enhancement Measures/ Environmental Design Considerations | Responsible parties |
|---|---|---|---|
| Waste Management<br>(Sewer system/ septic tanks) | ▪ Contamination to the ground water from fuel spillage and pit latrine discharge.<br>▪ Inappropriate operation may causes odor, health hazard problem by discharge of and overflowing of human excreta etc. | ▪ Encourage all community members, for installation of sanitary hygienic toilets to stop contamination of the ground water;<br>▪ The community dwellers will clean the septic tanks in regular intervals with the help of conservancy unit of Pourashava, or privately, whereby the desludged material shall be disposed to approved and designated disposal site(s) ;<br>▪ Ensure use of vacuum tanker/pump to collect desludged material<br>▪ appropriate awareness programs shall be arranged for the community members on health and hygiene issues and the impacts of improper sanitation practices;<br>▪ Sewage sludge shall be disposed in the nearby fecal sludge treatment plant, if available, or that shall be disposed in approved designated earthen pit and properly covered with at least 300 mm thickness of impervious soil backfill material;<br>▪ Ensure disposal tanks, drums or containers coming to, and from, the site are in a satisfactory condition – check for damage or leaks;<br>▪ Ventilation systems and facilities shall be kept in good functional order to minimize untoward odor problems, | CDC and Municipality |

| Sub-Projects/ Activities | Anticipated Environmental Impacts | Suggested Mitigation Measures/Enhancement Measures/ Environmental Design Considerations | Responsible parties |
|---|---|---|---|
| Waste Water | ▪ Improper disposal of drain water may degrade the outfall water quality and surrounding environment | ▪ Water retention tank (***Figure 4-1***) shall be constructed at regular interval for treatment of drain waste water before disposing in the water bodies;<br>▪ Drainage system has to be designed considering the downstream discharge point; adequate slope and x-section (***Figure 4-2);***<br>▪ Direct connection of sewerage and sullage waste to thedrainage system shall not be permitted;<br>▪ All toiletunits shall be fitted with suitable collector systems and be equipped with proper soak well for discharging of waste water (toilet, kitchen etc.);<br>▪ Separate sewer lines for kitchen, bath room and toilet facilities should be provided. | |
| Drains/Drainage system | ▪ Clogging/ stagnation of flow in the storm drain | ▪ Proper maintenance and cleaning of the drainage system and outfall shall be conducted on a regular basis. | CDC and Municipality |
| | ▪ Backflow of water through drain (e.g., due to high water level at downstream discharge point, such as khal) | ▪ Designing drain considering the downstream discharge point; adequate slope and x-section; PVC drain pipe, where appropriate | |
| | ▪ Discharge from drain pollute downstream water body | ▪ Not allowing direct connection to drain from toilet;<br>▪ Awareness program for the community people should be taken to increase knowledge about improper waste disposal and its impact. | |

## 5.6 Environmental Monitoring Plan

Environmental monitoring is an essential component of the EMP, as it provides the basic scenario of the impact of the project on the baseline conditions. Hence, a three tier system of monitoring schedule is considered for (i) compliance monitoring, (ii) community monitoring and (iii) effect monitoring. This is based on the environmental components that may be affected during the pre-construction, construction and operation stages of the project.

Since the project is likely to have impact on various components of environment; a comprehensive monitoring plan, covering all identified parameters of related environment issues, including physicochemical, ecological and socio economic, has been considered. Monitoring points have been selected based on the sensitivity of the location, with respect to sensitive receptors. The main purpose of this Monitoring Plan is to ensure that the various tasks, as detailed in the EMP, particularly the mitigation measures, are implemented in an effective and efficient manner. The Plan also included the necessary evaluation program of impacts on the key environment and social parameters. Various types of EMP monitoring are discussed below.

### 5.6.1 Compliance Monitoring

The purpose of Compliance Monitoring, at the construction stage, is to check whether the Environmental Mitigation Measures or Environmental Code of Practices (ECoPs) suggested in the design phase, are followed and implemented by the sub-project contractor, in full compliance with the provisions of the EMP.

A simple checklist has been prepared for compliance monitoring by visual observation during construction and operation phase (shown in **Table 5-2**).

**Table 5-2: Compliance Monitoring Checklist during Construction and Operation Phase**

| Monitored Parameter/ Issues | Monitoring Method/ Key Aspects | Location of Monitoring | Frequency of Monitoring | Responsibility |
|---|---|---|---|---|
| Safety orientation and training of workers | Frequency of training and orientation of workers for safety | Sub-project site | Once a month | CDC,CSC PMU and Municipality |
| Personal Protective Equipment | Ensure every single person involved in the activities wear and use safety equipment | Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Worker's health | Monitoring health and safety of workers | Sub-project site/Labour camp | Regular | CDC,CSC PMU and Municipality |
| Sanitation and drinking water facility to the workers | Availability of safe drinking water and sanitation to the workers | Sub-project site and work campsite | Regular | CDC,CSC PMU and Municipality |
| Incident record and reporting | Documented record of all incident, accident, its remedial process | Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Site security/ Fencing at the site | Isolation of site from general access by fencing, restriction of the un-authorized entry in the site. | Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Notice/ announcement boards/ prevention signs | Visible in good condition or not | In front of the Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Stagnant water in the excavated pit | Pumping facilities available and functional | Sub-project Site | Regular | CDC,CSC PMU and Municipality |

| Monitored Parameter/ Issues | Monitoring Method/ Key Aspects | Location of Monitoring | Frequency of Monitoring | Responsibility |
|---|---|---|---|---|
| Stockpile material | Storage material is cover-up or not | Sub-project Site | Regular | CDC,CSC PMU and Municipality |
| Equipment /vehicles | -Switched-off diesel engines when not in use;<br>-Search any possible leakage;<br>-Fuelling. | Sub-project site | Regular/ Specially when in operation | CDC,CSC PMU and Municipality |
| Dust | Dust is visible or not | Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Oily waste generation and disposal | Quantity of oil and fuel waste, storage and disposal | Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Solid waste generation | Quantity of solid waste generated and correct disposal | Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Discrimination on gender | Direct survey in the field by interviews with the women in order to ensure that there is no any gaps between man and women | Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Child labour | No child shall be engaged in the construction activities | Sub-project site | Regular | CDC,CSC PMU and Municipality |
| Handling of hazardous materials | Fuelling, storage, operation | Sub-project site | Regular | CDC,CSC PMU and Municipality |

### 5.6.2 Monthly Environmental Monitoring Report

All the above mentioned environmental problems that may be generated at construction stage will be mitigated by the contractor and monitored by CDC during implementation of the sub-project works. This will be supervised by the PUM, NHA, with the assistance of Sirajganj Pourashava and CSC officials. A monthly compliance monitoring report will be prepared by the field level focal environmental expert, which will be officially submitted to the NHA Environmental Specialist.

### 5.6.3 Community Level Monitoring

The community level monitoring of the EMP shall involve i) compliance of mitigation measures and ii) effectiveness of the proposed interventions. This monitoring will be conducted by the low income community residents, or community members who reside at the project site.

At the beginning of the project, PMU, NHA will arrange a short training program to provide an orientation on the process and effectiveness of community monitoring. In addition, a Bangla format community monitoring check list will be prepared prior to the commencement of the work that would concentrate on the compliance of mitigation measures during the construction phase, whereas functionality of newly implemented interventions will be monitored at the operation stage. A monitoring check list has been prepared for the visual observation during operation phase. While, at construction stage environmental compliance will also be monitored accordingly Table 5-3. With the involvement of community residents.

**Table 5-3: Community Monitoring at Operation Phase**

| Parameter/ Activity | Location | Means of Monitoring | Compliance indicator/ threshold limits | Frequency | Responsible Agency | |
|---|---|---|---|---|---|---|
| | | | | | Implemented by | Super-vision |
| **During Operation and Maintenance** | | | | | | |
| Drainage congestion | At sub-project site drain | Inspection to find any drain water is in stagnant condition | No waste materials to be disposed into the drain | Regular | Community Committee | Municipality |
| Waste bin | At sub-project site | Visual inspection | Empty the bin | Regular or as required | Municipality Conservancy Unit | Municipality and Community |
| Street Light | At sub-project site | inspection to find the functionality | Properly functional | Regular | Municipality Electrical Unit | Municipality and Community |
| Solid Waste Management | Secondary Transfer Station (STS) | Visual inspection | Deposition and vacating waste in the STS regularly | Regular | Municipality Conservancy Unit | Municipality and Community Committee |
| Ground water quality | Tube well or supply water | Visual observation and taste | inspection iron and taste | Regular interval | Municipality water supply section | Municipality and Community |
| Toilet connection | sub-project site (near drain) | Visual inspection | No connection of toilet with drain | Regular | Whole community | Municipality and Community |
| Water harvesting pond | Near Water harvesting system | Visual inspection | Cleaning the source periodically | Two times in year | Community Committee | Municipality and Community |
| Good house-keeping | At sub-project | Visual inspection | Ensure daily housekeeping | Regular | Whole community | Community people |
| Contaminate STS-nearby lands or dump site lands | Household, STS and dumping ground | Visual inspection | No waste to be stored at outside of house premises, STS and dumpsite | Regular | Whole community | Community people |

### 5.6.4 Effects monitoring

Effects monitoring is a very important aspect of environmental management to safeguard the protection of environment. The effects monitoring plan proposed for the sub-project is presented in Table 5.4. The monitoring will comprise surveillance to check whether the contractor is meeting the provisions of the contract during construction. The monitoring will also check whether the Pourashava and NHA is meeting requirement during operation and maintenance of the sub-project. In addition, community will be careful in monitoring activities. Furthermore, under the effect monitoring two aspect will be served such as environmental management and analytical monitoring during construction and operation phase of the proposed sub-project. Hence, environmental management related monitoring has been presented in Table: 5.5. Compliance indicators or threshold limits for the monitoring are also given in Table 5-4.

**Table 5-4: Effect Monitoring for the environmental Management**

| Parameter/ Activity | Location | Means of Monitoring | Compliance indicator/ threshold limits | Frequency | Responsible Agency | |
|---|---|---|---|---|---|---|
| | | | | | Implementation | Super-vision |
| **During Construction** | | | | | | |
| Drainage congestion | Near camp site and in the sub-project site | Visual; to ensure temporary drain to drain out excess water during construction | There will be no stagnant water in the drain | Regular | CDC | CSC, PMU and Municipality |
| Infectious Disease HIV/AIDS | At camp site | Engaging Physician | No such affected person | Twice in a year | CDC | CSC, PMU and Municipality |
| Traffic Safety | Access roads around sub-project | Proper traffic signs are in place | Smooth flowing of traffic around | Regular | CDC | CSC, PMU and Municipality |
| Dust | Sub-project site | Inspect to ensure dust suppression measures (water spray) | No dust from construction activities | Regular | CDC | CSC, PMU and Municipality |
| | Material storage sites and labour camp | Visual ; ensure dust suppression measures | No dust from the material storage sites and labour camp site | Regular | CDC | CSC, PMU and Municipality |
| Traffic movement | At sub-project site | Inspection and record keeping | Note of accidents | Regular | CDC | CSC, PMU and Municipality |
| Accident | At sub-project site | PPEs are available at working site | Ensure use of PPEs as per requirement | Regular | CDC | CSC, PMU and Municipality |
| Solid Waste Management | Construction sites, and labour shed premises | Visual inspection for proper solid waste collection and disposal | Facilities and works are clean and in place | Regular | CDC | CSC, PMU and Municipality |
| Restoration of Work Sites | All Work Sites | Visual Inspection | The facilities are clean with no waste at the works sties | After completion of all works | CDC | CSC, PMU and Municipality |
| Grievances | In the sub-project area | Number of grievances registered and addressed | Record of grievance redress meetings | Monthly | Environ-mental focal person | CSC, PMU and Municipality |
| Reporting on Environmental Monitoring | During Construction | All parameters | To meet the compliance requirement | Monthly | CSC and CDC Safeguard concern | PMU and Municipality |

| Parameter/ Activity | Location | Means of Monitoring | Compliance indicator/ threshold limits | Frequency | Responsible Agency | |
|---|---|---|---|---|---|---|
| | | | | | Implementation | Super-vision |
| During Operation Phase | | | | | | |
| Drainage congestion | At sub-project drain | Visual inspection | There will be no stagnant water in the drain | Regular | Community, Municipal Conservancy Unit | PMU and Municipality |
| Toilet connection | At sub-project site (near drain) | Visual inspection | There will be no direct connection of toilet with drain | Regular | Whole community | Municipality and Community Committee |

**Table 5-5: Effect monitoring for Analytical analysis**

| Environmental Indicator | Means of Monitoring | Frequency | Responsibility | |
|---|---|---|---|---|
| | | | Implementation | Supervision |
| Air Quality | Air quality monitoring (SPM, $PM^{10}$) by Portable air quality measuring machine | • One time before the commencement of the project<br>• Two times in construction period<br>• One time after completion | CDC | PMU, NHA |
| Noise Control | (Equivalent noise level (dBA), Leq, Max Noise level (dBA), Lmax) by Portable noise measuring machine | • One time before the commencement of the project<br>• Two times in construction period<br>• One time after completion | CDC | PMU, NHA |
| Water quality | Inspection and Water analysis through laboratory (PH, turbidity, hardness, Cl, DS, Mn, As, Fe, TC,FC) | • One time before the commencement of work (sample for water source)<br>• One time after completion (One sample for each water source) | CDC | PMU, NHA |

## 5.7 Environmental Safeguard Cost during Construction Phase

Considering the environmental impacts and their mitigation measures for these sub-projects, several items are included in the BOQ to address these issues. The estimated cost to implement the EMP is elaborated in **Table.5-6, Table 5-7 and Table 5-8**

**Table 5-6: Environmental Safeguard Cost**

| Sl. | Description of the Items | Costs (Tk) |
|---|---|---|
| 1 | Dust suppression measures by water spraying throughout the construction period in and around the sub-project site, uncovered aggregates and loose materials such as stockpiles of the sands, excavated earth etc. daily or as per requirements (lump sum) | 10,000.00 |
| 2 | Installation of cautionary sign in term of health and safety signs ( 4nos) | 10,000.00 |
| 3 | Providing PPEs like hand gloves, spectacles for eye protection, helmets, masks, visible jacket, ear plug, safety boots for at least 20 person (15 for workers and 5 for visitor) and one first aid box with necessary medicine | 65,000.00 |
| 4 | Wastes disposal facility during the construction period; collection, transportation, and providing 2 bin to be provided where 1 for organic and 1 for inorganic waste | 12,000.00 |
| 5 | Tree plantation for ecological enhancement work- preferably local fruits, flowers, medicinal and ornamental trees- 64 nos. trees (Lum sum) | 32,000.00 |
| | **Sub-Total** | 129,000.00 |

**Table 5-7: Environmental Enchantment Budget**

| Sl. | Description of the Items | Costs (Tk) |
|---|---|---|
| 1 | Awareness documents (signs/ posters) for effective use of water source and proper waste management, Lump sum basis, ) | 10,000.00 |
| 2 | Environmental awareness training will be arranged by the PMU one at construction period and one at operation phase | 30,000.00 |
| 3 | Training on environmental health and safety will be arranged by PMU at implementation phase | 20,000.00 |
| | **Sub-Total** | **60,000.00** |

**Table 5-8: Environmental Monitoring Budget**

| Sl. | Description of the Items | Costs (Tk) |
|---|---|---|
| 1 | Noise level measurement. It can be measured from the pre-approved public institute/ university 2 times during construction | 20,000.00 |
| 2 | Water quality one for ground water and one for surface water (PH, turbidity, hardness, Cl, TDS, Mn, As, Fe, TC, FC) - by any recognized laboratory. Total 3 times. One before construction, one during construction and one sample during operation stage. Total cost= 2 (SW and GW) X 3 X 5,000 (taka)=30,000 taka | 30,000.00 |
| | **Sub-Total** | **50,000.00** |
| **Total** | | **239,000.00** |

## 5.8 Sub-project Specific Environmental Compliance Clauses for Tender Document

Apart from the provisions under “General Specification” and “Particular Specification” for different sub-project components, the following special environmental clauses shall be included in the Tender Document under General/Particular Specification. These clauses are aimed at ensuring that the Contractor, or CDC, carries out the responsibility of implementing the EMP and other environmental measures, including safety measures.

### 5.8.1 Environmental Management Plan (EMP)

All of the prescribed mitigation and enhancement measures in the Environmental Management Plan (EMP), which are related to mitigation of air/noise/water pollution / drainage/traffic congestion, have to be carried out by the contractor. Even, if additional environmental issues are identified then new mitigation measures, regarding the specific parameter(s) shall be added and shall be addressed under a revised EMP by the contractor. Moreover, after completion of work, the contactor will be responsible for the contracted one year, Defects Liability Period, to conduct any required rectification works and monitor the plantation of grass and trees.

### 5.8.2 Temporary Works

The Contractor shall make sure that all equipment and safeguards, required for the construction work, such as temporary stair, ladder, ramp, scaffold, hoist, barricade, chute, lift, etc. are substantially constructed and erected, so as not to create any unsafe situation for the workmen using them, or the workmen and general public passing under, on or near them.

### 5.8.3 Health and Safety

The Contractor shall observe and maintain standards of Health and Safety for all site personnel, in accordance with the guidelines laid down by the national standards or statutory regulations. Where applicable, to prevent workers falling from heights, the Contractor shall make sure that every temporary floor openings shall have safety railing of at least 900 mm height, or shall be constantly attended; and shall be provided with a hinged cover, Every open sided floor or platform of 1.2 m or more, above adjacent ground level, shall be guarded by a railing on all open sides.

The Contractor shall provide all appropriate protective clothing and equipment for the work to be done and ensure its proper use. Where required, safety nets, belts, harnesses and lines shall be provided by the contractor. The “safety directives for work equipment” and “safety directives for protective gears”, as specified in the Occupational Health and Safety Guidelines (attached) shall be followed. The contractor has to ensure that sufficient numbers and good quality Personnel Protective Equipment (PPE) will be provided to staff and labor at all times, as defined in the Occupational Health and Safety Guidelines, along with the Environmental Management Plan (EMP).The Contractor has to ensure a first aid kits with adequate medical supplies and other related facilities in the working site. The Contractor will also be responsible for ensuring trained personnel who are available at all times to render first aid. In addition, contractor will be kept provision of saline water in the working site especially at dry season while labor has probability to effect on de-hydration. The Contractor must provide or ensure that appropriate safety and/or health signs are in place at their work sites where hazards cannot be avoided or reduced such as place of construction chemical storage and construction vehicles re-fueling place etc.The Contractor has to record any accident or unusual or unforeseen occurrences on the site, whether these are likely to affect progress of the work, or not, and shall officially report to the Engineer promptly in written format.

### 5.8.4 Waste Disposal and Pollution

The Contractor shall not dispose any waste, construction debris, rubbish or offensive matter in any place not approved by the Engineer or Statutory Authority having jurisdiction. The Contractor shall not discharge into any watercourse oil, solids, toxic or floating materials. The Contractor shall take all reasonable precautions to keep public or private roads clean of any spillage or droppings from his vehicles or equipment. Any spillage or droppings which accrue shall be cleaned without delay to the satisfaction of the Engineer. The Contractor has to provide sanitary latrine (one for male and one for female) for disposal of human waste in the site office and temporary labor sheds for workers/ employees; the Contractor shall provide waste bins/ cans for collection of solid waste at appropriate

locations (as directed by the Engineer), and ensure proper transfer/ disposal of solid waste with support from the Pourashava.

### 5.8.5 Earthworks

Any kind of earthwork activities, such as excavation of trenches in natural soils or filling on the natural top soil, which are involved for the proposed intervention, the contractor has to make sure that the top 300 mm to 450 mm of topsoil be segregated during excavation and stored to one side of the trench. The remaining excavated soil is to be stored separately/ away from the stockpiled top soil. During backfilling of the trench, the topsoil shall be correctly reinstated as the top layer again.

### 5.8.6 Third Party Monitoring

For effective implementation and an independent environment evaluation, a third party consulting firm will be hired by the NHA. This consulting firm will be given the responsibility to independently monitor the overall performance of the contractor in complying with the provisions of the EMP for satisfactory environmental management of the proposed project, including compliance with the DoE conditions.

# 6. CONCLUSIONS AND RECOMMENDATIONS

The sub-project has minor negative impacts on the ecological components as 32 trees are to be cut due to the sub-project implementation. During the construction phase, the physio-chemical components, such as air quality (because of dust) and noise level may be disturbed due to the sub-project activities. The proper handling and disposal of the generated solid wastes is important issue that should be considered properly.

Based on the findings of the study, a few key recommendations are outlined below:

- NHA is responsible to ensure availability of the EMP in the Site Office;
- With the facilitation of the Consultant, NHA will supervise effective implementation of EMP;
- Formal and informal consultation should be carried-out by Consultant team, NHA Officials and Contractors regularly;
- Workforce environment and labor shed management should be monitored regularly.

# ANNEXURES

# ANNEXURE 1

## Photograph of Public Consultation

## Annexure 2: List of the Participants

**National Housing Authority**
**Low Income Community Housing Support Project (LICHSP)**
**Attendance of Local Participants in the Screening Exercise**
**Local Stockholders , Community Members**

Name of Subproject: Settlement upgrading at Chowdhury Para Shirajganj.

Package Name :

District: Shirajganj Upazilla : Shirajganj

Pourashava: Shirajganj Date: 24-03-2019

| SL | Name | Gender | Social Status | Contact Number | Signature |
|---|---|---|---|---|---|
| ১ | শ্রীমতি শ্রদ্ধা রানী | নারী | গৃহিণী | 01754025412 | সন্তুষ্ট রানী (সহ সভাপতি) |
| ২ | শ্রীমতি সবিতা রানী | নারী | গৃহিণী | 017 67799465 | সবিতা রানী (সভাপতি) |
| ৩ | ফাতেমা | নারী | গৃহিণী | 01767977677 | ফাতেমা (সেক্রেটারি) |
| ৪ | মুন্নি | নারী | | " | মুন্নি |
| ৫ | মোঃ আব্দুল মোত্তাব | পুরুষ | প্রাথমিক | 01745466672 | [illegible] |
| ৬ | মোহন | পুরুষ | ছেলে | 01795227457 | |
| ৭ | সলিয়া | নারী | প্রাথমিক | " | সৌলিয়া |
| ৮ | অনিমা | নারী | গৃহিণী | 01747792312 | অনিমা |
| ৯ | মানিক | পুরুষ | মিস্ত্রি কাজ করেন | 01732085350 | মানিক |
| ১০ | গোলাপ | পুরুষ | প্রাথমিক | — | |
| ১১ | শিল্পী রানী | নারী | গৃহিণী | 01732085350 | শিল্পী রানী |
| ১২ | সান্ত্বনা রানী | নারী | গৃহিণী | 01738759798 | সান্ত্বনা রানী |
| ১৩ | পপি রানী | নারী | গৃহিণী | " | পপি রানী |
| ১৪ | কুসুম | নারী | গৃহিণী | — | |
| ১৫ | গবিন্দ | পুরুষ | প্রাথমিক | — | গোবিন্দ |

২৪/৩/১৯
মোঃ মমিদান আলী খান
কাউন্সিলর ১৩ নং ওয়ার্ড
সিরাজগঞ্জ পৌরসভা, সিরাজগঞ্জ।
মোবাঃ ০১৭৪১-৪৭৬২০৯

**National Housing Authority**
**Low Income Community Housing Support Project (LICHSP)**
**Attendance of Local Participants in the Screening Exercise**
**Local Stockholders , Community Members**

Name of Subproject: Settlement Upgrading at Chowdhury Para Shirajganj

Package Name :

District: Shirajganj

Upazilla : Shirajganj

Pourashava: Shirajganj

Date: 24-03-2019

| SL | Name | Gender | Social Status | Contact Number | Signature |
|---|---|---|---|---|---|
| ১৬ | মোঃ সাইফুল ইসলাম | পুরুষ | সুতার কাজ | 01734694464 | মো: সাইফুল |
| ১৭ | লাইলী খাতুন | নারী | গৃহিণী | " | লাইলী |
| ১৮ | রাজিয়া | নারী | গৃহিণী | 01765224969 | রাজিয়া |
| ১৯ | নাজিন | নারী | গৃহিণী | 01753141481 | নাজীন |
| ২০ | মেঘলা | নারী | গৃহিণী | – | মেঘলা |
| ২১ | সাইফুল ইসলাম | পুরুষ | চাকুরী | 01796171125 | সাইফুল |
| ২২ | ইতি ঘোষ | নারী | গৃহিণী | – | |
| ২৩ | আব্দুর রহমান | পুরুষ | চাকুরী | 01726800749 | আব্দুর |
| ২৪ | চায়না | নারী | গৃহিণী | 01784583000 | চায়না |
| ২৫ | রেহানা | নারী | গৃহিণী | 01716321207 | রেহানা |
| ২৬ | শেলীনা | নারী | গৃহিণী | — | শেলীনা |
| ২৭ | নাজমা | নারী | গৃহিণী | 01737322606 | নাজমা |
| ২৮ | হারুনুর রশীদ | পুরুষ | চাকুরী | – | হারুনুর রশীদ |
| | | | | | |
| | | | | | |

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মোঃ মমদান আলী খান
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সিরাজগঞ্জ পৌরসভা, সিরাজগঞ্জ।
মোবাঃ ০১৭৪১-৪৭৬১০৯