

Pro-Poor Slums Integration Project

Environmental Management Framework (EMF)



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National Housing Authority
Ministry of Housing and Public Works

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EXECUTIVE SUMMARY

ES 1: Introduction

The Pro-Poor Slums Integration Project (PPSIP) has been initiated by the Government of Bangladesh (GoB) with financial support from the World Bank to improve the quality of life and overall living condition of the poor community living in the urban slums. National Housing Authority (NHA) under the Ministry of Housing and Public Works (MoHPW) will lead in planning and implementing the PPSIP. Poverty alleviation has engendered a strong emphasis for the PPSIP on the basis that a higher standard of living will be achieved by enhancing security of tenure, improving infrastructure, and facilitating access to credit.

Urban poverty is the most significant predictor of environmental health risks. In Bangladesh, out of 40 million people living in urban areas, around 62 percent of urban populations are living in 'informal settlement' or 'slum'. This segment of the population is deprived of physical assets, political influence, basic services and access to social capital. It is realized that global efforts to improve living conditions of slum dwellers, as enshrined in the Millennium Development Goals would not be achievable unless the slum dwellers are upgraded as communities with secure livelihood and the primary needs. Thus, the focus of the PPSIP is not limited to a housing project only; rather implement a sustainable solution enhancing the community's self-assurance, livelihood sustainability, and resilience.

ES 2: Pro-Poor Slums Integration Project (PPSIP)

The proposed PPSIP planned to be implemented in five City Corporations/ Pourashavas of Bangladesh and envisioned as a demonstration program to test several types of community-driven solutions. The proposed Development Objective of the PPSIP is to reduce vulnerability of designated urban poor communities by providing improved, secure and affordable shelter in select informal settlements in Bangladesh. There are four major components of this project which are focuses on urban community development, community mobilization and participation in different stages, monitoring and evaluation, and project management. The PPSIP will pilot four slum upgrading models to improve the living standard of urban selected poor communities: *in-situ* upgrading, re-blocking, land sharing, and voluntary resettlement.

Improving the provision of community services and utility facilities is the prime concern of in-situ slum upgrading approach. In the re-blocking model, re-adjustment of existing place occurred in an organized manner to improve the overall physical conditions. Land sharing project model is a planned model which benefit not only the landowner but also the community people. Both the land owner and the community people share the land and reach to a win-win situation after negotiating on this issue. Ensuring secured housing with land use rights, voluntary resettlement is one of the most functional project models. Under the four different models, investments pertaining to improve slum habitability for the urban poor include better housing facility with appropriate provisions of other basic utility services and facilities related to water supply and sanitation. In addition, roads, drainage system, and waste management, provision of multi-purpose community building would be designed with the active engagement of local community. However, various options of the interventions with detailed design will be reviewed and finalized when sites will be selected at the implementation phase.

ES 3: Environmental Management Framework (EMF)

The proposed Pro-Poor Slums Integration Project (PPSIP) will be implemented in five secondary towns or Class A Pourashava of Bangladesh. However, communities that would be improved under

the PPSIP or the interventions to be implemented for upgrading slums are not identified at this stage. Therefore, an Environmental Management Framework (EMF) has been prepared to provide an umbrella guidelines for environmental management of subprojects interventions with a purpose to integrate environmental concerns into the identification, design and implementation so that neither the subproject interventions nor the environment is compromised through the implementation of PPSIP. The EMF will facilitate compliance with the policies, acts, and rules of the Government of Bangladesh and environmental safeguard policies of the World Bank.

The EMF was prepared through a detailed review of relevant national and international policies, Environmental Conservation Act (1995), Environment Conservation Rules (1997), World Bank's Operational Policy 4.01: Environmental Assessment. Field visits and consultations with the community were conducted in different slums to observe the existing scenario of communities, develop the environmental baseline and generate an idea of probable impacts and mitigation options. A total of six communities were surveyed initially in Comilla town, namely Tikkharchar, Robidashpara, Mofizabad Colony, Godarmar Slum, Dolls House and Bou Bazar. Detailed field visits were conducted in three slums of Narayangonj and Comilla: Rishipara slum, City Colony, and Tikkacharchar.

ES 4: EA Categorization of PPSIP Interventions

Design and implementation of development projects in Bangladesh is guided by the Environment Conservation Act 1995 and Environment Conservation Rules 1997 and other relevant policies and acts. The Environmental Conservation Rules (1997) classifies industrial units and projects into four groups on the basis of location, size and the severity of potential pollution: (i) Green, (ii) Orange A, (iii) Orange B, and (iv) Red. While Green Category projects are considered relatively pollution-free and hence do not require initial environmental examination (IEE) and EIA, Red Category projects would cause significant adverse environmental impacts and are, therefore, required to submit an EIA report. Orange Category projects generate low to medium impacts which are mitigateable; considering significance of impacts Orange A require submitting process flow diagram and Orange B requires submitting an IEE report.

The World Bank's Operational Policy OP 4.01: Environmental Assessment is considered to be the umbrella policy for the Bank's environmental "safeguard policies". The other relevant policies include: Natural Habitats (OP 4.04) and Physical Cultural Resources (OP 4.11). The Bank classifies the proposed project into three major categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts: Category A, Category B, and Category C.

While Category 'C' likely to have minimal or no adverse impacts, Category 'A' likely to have significant adverse environmental impacts and require the implementing agency preparing an EIA. Mostly, impacts generated from Category B projects are site specific and in most cases mitigation measures can be designed more readily. Thus, these projects require preparation of an Initial Environmental Examination (IEE)

The interventions to be implemented under the PPSIP do not involve large-scale infrastructure development (e.g., construction of high-rise apartment, sanitary landfill, large scale wastewater treatment plant, major highways or dam/embankments). These subprojects do not appear to pose risk of significant adverse environmental impacts, rather likely to cause minor to moderate impacts which are subject to environmental screening that require preparing an Environmental Management Plan (EMP) with appropriate mitigation measures. Thus, in view of negative environmental impacts to be generated from relatively limited scale and magnitude of construction/rehabilitation works, the

proposed PPSIP is classified as Category ‘B’ project on an overall basis. Considering the nature and magnitude of potential environmental impacts, EA category of subprojects are shown in table ES 1.

Table ES 1: EA Categorization of PPSIP Subproject Interventions

PPSIP Subprojects	Specific Interventions	Major Negative Impacts	GoB EA Category	World Bank EA Category	PPSIP EA Category
Housing	Semi-permanent to permanent single house	May occur waterlogging, noise, traffic congestion, air and water pollution during land preparation and construction.	Not specified	B	IEE
	Compact multi story		Orange B	B	IEE
	Land preparation for in-situ upgrading and land restoration for voluntary resettlement	Health and safety from toilet demolition or abandoned interventions.	Not specified	B	IEE
Roads	Pathways	Construction of roads may lead to air, water, soil and noise pollution.	Not specified	B	
	Connecting road		Orange B	B	IEE
Water supply	Installation of Tube-well or supply from municipal connection	Installation of tube-wells or construction of pipeline may lead to air, water, soil and noise pollution. At the operation, intervention may deplete groundwater level or provide contamination water.	Not specified	B	IEE
Toilet	Pour flush latrine	Poorly designed toilet will pollute the air, water and soil due to discharge of liquid waste.	Not specified	B	IEE
Community Toilet	Pour flush latrine		Orange B	B	IEE
Solid Waste Management	Collection, temporary storage (bin), of disposal of household wastes	Due to poor design SWM may not function and uncollected solid may block the drains, and pollute the air, water and soil quality.	Not specified	B	IEE
Multi-purpose Community Building	Small building to be used for meeting, and various services	May occur waterlogging, noise, traffic congestion, air and water pollution during land preparation and construction.	Not specified	B	IEE
Community awareness and Training	Training program on environmental management	Training and awareness program on environmental management will create positive impacts.	Not specified	-	Excluded

ES 5: Environmental Management Process

Environmental management process in PPSIP will be initiated with the selection of slums/communities in Comilla, Narayanganj, Barisal, Sirajgajg, and Dinajpur. The PPSIP will use following negative environmental attributes in order to avoid damage or irreversible negative impacts on the environment:

- No activities to be carried out within 1 km of natural protected areas recognized by national or local governments;

- Any activities that require the conversion of natural habitats (when affecting critical natural habitats and natural land contours, natural habitats for this purpose being those water or land areas where most of the original plant and animal species are still present);
- Land reclamation such as drainage of wetlands (natural pond/beel/baor/haor etc.), or filling of water bodies to create land;
- Activities which would adversely affect cultural property, including archaeological and historical sites;
- Hazardous waste management and disposal as well as manufacture, transport and use of hazardous, and/or toxic materials (except small amounts of solvents, degreasing materials, paints, fuels, and the like used during construction).

PPSIP will identify and finalize the interventions based on site situation, community preference, technical, and environmental considerations. This project will not recommend any interventions that have significant, long-term, and irreversible negative environmental impacts. Following interventions are ineligible for funding under the PPSIP:

- Construction, reconstruction and extension of regional, national road and highway.
- Construction, reconstruction of dam/ embankment
- Tube-wells with arsenic contamination higher than national standard (currently 50 ppb). Water supply schemes with high probability of bacterial contamination or characteristics which may make water unsuitable for drinking.
- Construction of new landfill sites or improvement of existing land fill sites for industrial solid waste disposal.
- Extension of a drainage outlet or construction of drainage system within 1 km of a Protected Area.
- No unsanitary pit latrines will be considered. In addition, large scale effluent treatment plants, CETPs, etc. would not be eligible.
- Flood protection, sewage treatment, agricultural drainage, or other works which could adversely affect wetlands or natural waterways, either through pollution or hydrological changes;

ES 6: Environmental Assessment of Sub-projects Interventions

The ‘environmental assessment’ is a mandatory requirement for the design and implementation of a subproject intervention. Any activities or interventions, funded under the PPSIP, that are assumed to have some negative impacts on the environment will be considered under this category. The PPSIP will follow a two-stage environmental assessment for identification of potential negative impacts and their mitigation measures.

1. Environmental Screening (ES)
2. Initial Environmental Examination (IEE) / Environmental Impact Assessment (EIA)

The formal environmental assessment in the PPSIP starts with the Environmental Screening (ES) of subproject interventions. Environmental Screening will determine whether sub-project interventions will require an IEE or a full scale EIA. The NHA will conduct environmental screening of the proposed interventions to identify potential adverse impacts and stage of further assessment.

The IEE is conducted if the project is likely to have minor or limited impacts, which can easily be predicted and evaluated, and for which mitigation measures are prescribed easily. The major activities involved in carrying out IEE include: (1) preparing an environmental baseline within the sub-project influence area, against which impacts of the proposed sub-project would be evaluated; (2) Assessment and evaluation of impacts of major project activities on the baseline environment during construction

phase and operational phase; and (3) Identifying mitigation and enhancement measures and environmental code of practice (ECoP); and (4) Development of environmental management plan (EMP) including preparation of environmental monitoring plan with responsibility and estimation of budget for implementation EMP. If an intervention is found to have some serious environmental threats, an EIA will be conducted. EIA would be recommended when resettlement is suggested that require significant land filling.

ES 7: Assessment of Impacts

All PPSIP interventions are subject to an Environmental Screening and Initial Environmental Examination in order to avoid significant negative impact or prevent execution of projects with negative environmental impacts. Although most of the impacts would be localized due to the relatively small scale activities, there are some issues of concern that cut across the range of proposed interventions. The negative impacts would be avoided by designing and implementing appropriate mitigation and enhancement measures and following some Environmental Code (ECoPs) of Practices in different phases of planning and implementation. A list of potential environmental impacts and corresponding mitigation measures as well as ECoPs is shown in ES 2.

Site preparation is required for any slum upgrading model or any intervention to be designed and implemented under the PPSIP. Site preparation includes demolition of existing poor infrastructures, removal of debris, survey, land filling and leveling. However, in case voluntary resettlement, restoration of existing slum is essential while the project will also undertake activities for preparing sites for relocation.

Table ES 2: Environmental Impacts and Corresponding Mitigation Measures

Sub-Projects/ Activities	Environmental Impacts	Suggested Mitigation Measures/ Enhancement Measures/ Environmental Design Considerations
Preparation of Site/Land at the Selected Slum/Community		
<ul style="list-style-type: none"> ▪ Demolition of existing poor infrastructure ▪ Land cleaning ▪ Transportation of debris ▪ Land filling/raising land level 	<ul style="list-style-type: none"> ▪ Physical or social disruption to the existing and nearby communities ▪ Temporary loss of income from street vending ▪ Unhygienic/unsanitary environment due to demolition of old/ poor latrines and construction of camps in development site ▪ Soil erosion/ dust pollution/siltation/water pollution/ ▪ Loss of vegetation ▪ Traffic congestion due to transportation of debris. ▪ Uneven land filling causing soil erosion 	<ul style="list-style-type: none"> ▪ Engage the community members in the construction work ▪ Transport/handle debris from toilet in a hygienic manner ▪ Properly designed culverts ▪ Compaction of developed or raised land, watering during ▪ Tree plantation at the slum boundary/slope/open space ▪ Placement of construction equipment in a proper place to avoid traffic congestion and compaction of soils. ▪ Collection and disposal of construction debris in a designated dumping place. ▪ There should be installation of latrine and campaign on social awareness to stop the open defecation.
Design, Construction, and Operation of Sub-Project Interventions		
<ul style="list-style-type: none"> • Housing (single semi-pucca house to walk up apartment) • Multipurpose community building 	<ul style="list-style-type: none"> ▪ Noise and pollution due to construction ▪ The waste form the camps during the construction of houses ▪ Water pollution due to unplanned discharge of domestic wastewater ▪ Unplanned disposal of domestic solid waste ▪ Drainage congestion/waterlogging ▪ Greater demand of bricks and cement puts pressure on fossil fuel and timber which in turn reduces the forest areas and pollute air 	<ul style="list-style-type: none"> ▪ Using locally available construction materials ▪ Rooftop plantation and gardening may reduce the excess local temperature ▪ Accommodate a drainage of wastewater ▪ Design and incorporate latrine ▪ Keep an arrangement of shelter during any disaster ▪ Consider rainwater harvesting ▪ Consider solar panel for electricity supply ▪ Keeping adequate provisions (including fire/emergency exits) for fire safety in accordance with National Building Code
<ul style="list-style-type: none"> ▪ Water Supply (Tube-well, municipal pipeline, tap) 	<ul style="list-style-type: none"> ▪ Waterlogging condition/drainage congestion. ▪ Depletion of ground water table through over extraction of water. ▪ Land subsidence and increase of salinity due to over pumping of water. ▪ Arsenic contamination or degrading water quality 	<ul style="list-style-type: none"> ▪ Design and construction drains with appropriate outlets ▪ Encourage water use efficiency/demand management through awareness ▪ Facilitate groundwater recharge, protect natural system. ▪ Water filtration/ water treatment/rain water harvesting ▪ The digging of soil should follow the proper design to avoid the pollution and water logging.

Sub-Projects/ Activities	Environmental Impacts	Suggested Mitigation Measures/ Enhancement Measures/ Environmental Design Considerations
<ul style="list-style-type: none"> ▪ Toilet (Single/ Community toilet with pour flush / piped sewer system/ septic tanks) 	<ul style="list-style-type: none"> ▪ Noise and soil pollution during the construction. ▪ Microbial contamination to the ground water from the pit latrine. ▪ Waste during loading of sewage from the sanitary communal containers. ▪ Odor 	<ul style="list-style-type: none"> ▪ Design and installation of sanitary hygienic to stop the microbial contamination to the ground water. ▪ Adequate height with proper ventilation. ▪ water supply and hand wash facility ▪ regular cleaning and monitoring
<ul style="list-style-type: none"> ▪ Drains/ Drainage system 	<ul style="list-style-type: none"> ▪ Clogging/ stagnation of flow in the storm drain ▪ Backflow of water through drain (e.g., due to high water level at downstream discharge point, such as khal/ river) ▪ Pollution of downstream water body due to discharge from drain 	<ul style="list-style-type: none"> ▪ Designing drain considering the downstream discharge point; adequate slope and x-section; RCC cover for drain, where appropriate ▪ Not allowing direct connection to drain from sanitation facilities
<ul style="list-style-type: none"> ▪ Footpath/ connecting road 	<ul style="list-style-type: none"> ▪ Loss of agricultural and housing lands ▪ Dust and noise pollution from construction work ▪ Drainage Congestion/ Water logging due to road ▪ Soil erosion /Sedimentation of reservoir and loss of storage capacity ▪ Damage of natural drainage system due to new road construction ▪ Risk of accidents due to vehicular traffic and transport 	<ul style="list-style-type: none"> ▪ Soil compaction ▪ Proper slope of road surface ▪ Watering to reduce dust pollution ▪ Avoid construction of roads and transportation facilities which might harm cultural or historical sites ▪ Construction of drain and culvert with appropriate designs to avoid waterlogging/drainage congestion. ▪ Improvement and widening of roads for fire protection
<ul style="list-style-type: none"> ▪ Solid Waste Management 	<ul style="list-style-type: none"> ▪ Uncollected wastes blocked the drainage and sewage system. ▪ Air, water and soil pollution during the waste collection. ▪ Smoke from the open burning of uncollected waste. ▪ The loading and unloading of waste at transfer station pollutes the air and soil. ▪ Odor from waste disposal site and composting system. ▪ Contamination of ground water by leachate. 	<ul style="list-style-type: none"> ▪ Encourage 3R (reduce, reuse, and recycle) ▪ Encourage composting of kitchen waste ▪ Construct/supply garbage bin. ▪ Adequate distance between waste bin and water body. ▪ Adequate distance should be maintained between the waste collection point and house ▪ Coordinate with the municipality for collection of domestic waste and disposal at the designated site

ES 8: Environmental Management Plan (EMP)

Environmental Management Plan (EMP) is an integral part of all subproject interventions to be designed and implemented under the PPSIP. The PPSIP will prepare an EMP for subproject interventions to record environmental impacts resulting from the sub-project activities and to ensure implementation of the identified mitigation measures. 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. Table ES 2 shows potential mitigation measures as well as ECoPs to be recommended in the PPSIP.

ES 9: Estimation of Cost of EMP

The environment specialist of NHA will estimate the cost for the environmental mitigation and enhancement measures and will incorporate with the tender document. Many of the activities to be carried out as a part of EMP would not involve any additional direct cost e.g., employing local work force, where appropriate; keeping sub-project vehicles in good operating condition; good housekeeping, avoiding spills; prohibiting use of fuel wood for heating bitumen; etc. On the other hand, a number of activities would require additional cost. Table ES 3 shows a tentative list of indicate cost to be recommended in the PPSIP. For example, environmental monitoring during both construction and operational phases would involve direct cost. At the same time, a number mitigation measures (including health and safety measures) would also require additional cost; these include of installation of septic tank/sanitary latrine, installation of health and safety signs, awareness documents (signs/ posters), water sprinkling on aggregates and unpaved surfaces, plantation, and protective gear.

ES 3: Indicative cost for environmental management and training

Intervention/Mitigation /Enhancement/ Training	Unit	Unit cost (BDT)	Total cost (BDT)	Funding Source	Responsibility
Environmental Mitigation and Enhancement					
Re-excavation of water bodies	Person day	300	300,000	PPSIP	PMU, contractor
Constructing PSF for surface water purification	PSF Unit	100,000	500,000	PPSIP	PMU, contractor
Maintenance of PSF during the project period	PSF Unit	200	50,000	PPSIP	PMU, slum residents
Rain water harvesting	Cost of installation	10,000	500,000	PPSIP	PMU, contractor
Tree plantation Medicinal trees, timber plantation (local variety)	Each site	100,000	500,000	PPSIP	PMU, slum residents, contractor
Culvert for drainage Construction of 4.50x3.00m RCC Box culvert	One unit	50,000	500,000	PPSIP	PMU, contractor
Regular watering on the excavated land	Person day	300	109,500	PPSIP	PMU, slum residents
Environmental Awareness and Training					
Environmental awareness	No of sessions	10,000	50,000	PPSIP	PMU, slum residents, consultants
Training on environmental health and safety	amount for one unit	10,000	50,000	PPSIP	PMU, consultants
Training on environmental assessment and monitoring	Session	50,000	250,000	PPSIP	PMU, consultants

Intervention/Mitigation/Enhancement/ Training	Unit	Unit cost (BDT)	Total cost (BDT)	Funding Source	Responsibility
Training on Environmental Management Framework	Training sessions	50,000	250,000	PPSIP	PMU, consultants
Training on environmental concern and monitoring	Training sessions	50,000	250,000	PPSIP	PMU, consultants

Environmental Monitoring and Audit

Environmental Audit/EIA	One study	1,500,000	1,500,000	PPSIP	PMU
Environmental monitoring	Person day	1,500	75,000	PPSIP	PMU, consultant, slum residents, contractor
Water quality monitoring (PH, turbidity, hardness, Cl, TDS, Mn, As, Fe, TC, FC)	One sample	8,400	42,000	PPSIP	PMU, consultants
Air quality monitoring (SPM, PM ¹⁰)	One sample	16,000	80,000	PPSIP	PMU, consultants
Noise level monitoring (Equivalent noise level (dBA), Leq, Max Noise level (dBA), Lmax)	One sample	21,500	1,075,000	PPSIP	PMU, consultants

ES 10: Environmental Monitoring

Environmental monitoring provides a systematic review of planning, implementation and operation of subproject interventions and their mitigation measures to ensure that environmental concerns are addressed, environmental assets are protected and quality is enhanced. The NHA Environment Specialist, PMU, Urban resource Center (URC)/Consultants, Pourashava, and the community will be responsible for conducting the environmental monitoring. Throughout the implementation, the PPSIP will conduct three types of monitoring: 1) compliance, 2) community, and 3) effect monitoring.

The NHA will conduct a Compliance Monitoring at the construction stage to check whether Environmental Mitigation Measures or Environmental Code of Practices (ECoPs) suggested in the design phase are being followed or implemented properly. Community monitoring will be conducted by the slum residents or community people who reside at the project site. They will monitor various environmental issues at the both construction and post-construction stages that would cover two specific aspects: 1) Compliance of mitigation measures and 2) Effectiveness of the PPSIP interventions. The NHA and other appropriate authority (if applicable) will be responsible for effect monitoring. During the effect monitoring, the NHA would check whether slum upgrading interventions are functional and served their intended purposes.

Table ES 4: Environmental monitoring system

Interventions /Monitoring Issues	Monitoring Site/ Area	Monitoring Parameters/ Indicators	Types of Monitoring	Responsibilities
Housing & Community Complex	Project site	Land filling material, waterlogging, dust, air pollution, noise, traffic, vegetation coverage,	Compliance, Community, and Effect	URC, Contractor, Municipality, Community
Water supply	Project site	water quality, arsenic, coliform, GW level, waterlogging	Compliance, Community, and Effect	URC, Contractor, City Corporation/ Municipality, Community
Pathways/ road	Project site, surrounding area	noise pollution, dust, water stagnation, pot holes,	Compliance, Community, and Effect	URC, Contractor, Municipality, Community
Solid waste management	Project site, surrounding area	No. of HH waste managed properly, odor from bin, drain clogging,	Compliance, Community, and Effect	URC, Contractor, Municipality, Community
Demolishing of cultural heritage	Within 1 km of project site	No. of cultural heritage site fall under the area of intervention	Compliance, Community, and Effect	URC, Contractor, Municipality, Community
Drainage	Project site, surrounding area	Solid waste in the drain, water flow, outlet, water pollution	Compliance, Community, and Effect	URC, Contractor, City Corporation/ Municipality, Community
Sanitation /latrine	Project site	% of Kucha/semi pucca latrine, waste discharge, water supply, health	Compliance, Community, and Effect	URC, Contractor, Municipality, Community

ES 11: Special Environmental Clauses for Tender Document

Some special environmental clauses shall be included in the Tender Document under General/Particular Specification. These clauses are aimed at ensuring that the Contractor carries out following responsibility in implementing the EMP and other environmental and safety measures. The Contractor shall report to the Engineer promptly and in writing particulars of any accident or unusual or unforeseen occurrences on the site, whether these are likely to affect progress of the work or not.

Environmental Management Plan (EMP): The Contractor shall carry out all mitigation and enhancement measures (including those related to mitigation of air/noise/water pollution; drainage/traffic congestion) as specified in the Environmental Management Plan (EMP), annexed to this Contract.

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, run away, 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.

Health and Safety: The Contractor shall observe and maintain standards of Health and Safety towards all of his employees not less than those laid down by the national standards or statutory regulations and 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.

Where appropriate, to prevent workers falling from heights, the Contractor shall make sure that every temporary floor openings shall either have railing of at least 900 mm height or shall be constantly attended; every floor hole shall be guarded by either a railing or a hinged cover, or constantly attended; every stairway floor opening shall be guarded by railing at least 900 mm high on the exposed sides; every ladder way floor opening or platform shall be guarded by a guard railing; every open sided floor or platform 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 Contractor shall provide and maintain in prominent and well-marked positions all necessary first-aid equipment, medical supplies and other related facilities. A sufficient number of trained personnel will be required to be available at all times to render first aid.

Earthworks: During excavation of trenches in natural soils, the Contractor shall make sure that the first 300 mm to 450 mm of topsoil be excavated and stored on one side of the trench and the rest of the excavated soil is stored separately/ on the other side; during back filling of trench, the topsoil should be placed on the top again.

Disposal and Pollution: The Contractor shall not dispose any waste, 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, noxious 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 shall construct sanitary latrine or septic tank system or install portable cabin toilet 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 Pourashava or City Corporation.

ES 12: Review and Approval

After receiving the completed Environment Screening, IEE or EIA report of the selected slum or community, NHA Environment Specialist will assess the adequacy of the mitigation measures and EMP. This assessment will be conducted through desk review and field visits and concentrated on the quality of the baseline information, identification of potential impacts, effectiveness and the adequacy of the mitigation measures, and monitoring plan. This report will be submitted to the PD for approval and further action.

ES 13: External Environmental Audit

An independent environment evaluation will be carried out to ensure correctness of the sub-project wise Environmental assessment and implementation of the environmental management plan (monitoring and mitigation). NHA will hire the services of a consulting firm to carry out the external monitoring/evaluation of the subprojects. The team will include an environmental specialist who will assess the implementation of environmental mitigation and monitoring activities and also evaluate impact on environment. Based on the evaluation result, NHA will take remedial measures (if required) with IDA's concurrence.

ES 14: Institutional Arrangement

The proposed PPSIP is built on existing institutional arrangements within the National Housing Authority (NHA) under the Ministry of Housing and Public Works. The effective implementation of environmental safeguard and management in the PPSIP project will be achieved by setting up an efficient institutional framework where the NHA will design and implement subproject interventions and ensure environmental sustainability of those interventions. The implementing body of PPSIP in the NHA is the Project Management Unit (PMU) that will be responsible for overall environmental management including implementation of mitigation measures and monitoring, and preparation of quarterly progress and monitoring reports. The NHA will implement the PPSIP with the active engagement of Urban Resource Center (URC) including consultants, City Corporations/Pourashavas' and local community. Table ES 5 shows the institutional arrangement for implementation of environmental safeguard and management.

ES 15: Capacity Building

Capacity building of NHA is required for proper implementation environmental safeguard and management. This could be done by arranging training session to educate and train existing NHA professionals and other relevant stakeholders so that they can ensure environmental management of PPSIP subprojects. Capacity building will enhance the project activities' EMF management role by allowing application of some of the critical practices. Those are as following:

Site selection to reduce environmental impacts, screening environmental impacts, scoping of impact assessments, planning appropriate mitigation options and consultation with affected people, impact management during construction and operation, and monitoring effectiveness of intervention;

Monitoring and grievance redress: transparency in planning, reporting and implementation; response to complaints; recordkeeping. Specific training plans for each stakeholder are shown in Table ES 6.

Table ES 5: Institutional Arrangement for Implementation of Environmental Safeguard

PPSIP Activities	Environmental Safeguard	Responsibilities/ Institutional Arrangement
Slum selection	Environmental Criteria/ attribute	PMU, URC/ Consultant, NHA Env Specialist, Pourashava, Community
Identification of Interventions	Intervention Identification and Description	PMU, URC/Consultant, Pourashava, Community
Designing of the Interventions	Engineering design	PMU, URC/Consultant, Pourashava
Environmental Assessment	Environmental Screening 	NHA Divisional Offices, URC/Consultant, Pourashava, Community
	Initial Environmental Examination 	
	Environmental Impact Assessment	PMU, Env Specialist, URC/Consultant
Review and Selection of Interventions	Incorporate Environmental Mitigation Measures, Environmental Code of Practices (ECoPs), Health & Safety	PMU, NHA Env Specialist
Construction	Compliance Monitoring	Compliance: NHA Div. Office, URC/Consultant. Pourashava
	Community Monitoring	Community groups
Operation	Effect Monitoring	URC/Consultant, Env Specialist, Community
	Environmental Audit	PMU, NHA Env Specialist, Consultant
Reporting	Quarterly progress report, Monitoring report	PMU, NHA Env Specialist, URC/Consultant

Table ES 6: List of suggested environmental training programs for capacity enhancement

Target Participants	Type of Training	Responsibility	Duration
Community Organization	Environmental awareness	PMU	1 day
	Environmental Concerns and Community Monitoring	PMU	2 days
Construction workers	Environmental Health and Safety	Contractor	0.5 day
PMU and NHA Divisional/Field Officers	Environmental Assessment and Monitoring	PMU	5 days
	Environmental Management Framework (EMF)		1 day
City Corporation	Environmental Concerns and Environmental Monitoring	PMU	1 day

ES 16: Public Consultation and Disclosure

Public consultation and acceptance is one of most important and difficult part of any development project. Although the main objective of this project is to improve the living situation of pro-poor settlements, there will be a particular degree of environmental impact. It is also important to know the community participation towards the problems of the locality. Which problem to address, who are the most affected groups, who are main stakeholders- such decisions should strongly reflect community views. All the steps of the projects will be finalized after extensive discussion with local community and approval of the relevant stakeholders. The key stakeholders will be considered for this project are: all the households living in the project and surrounding area, land owners and the tenants, local NGOs, officials of the local city corporation or municipalities, local government and political leaders.

The entire project related information needs to be disclosed to the community so that all the project affected persons are informed and take part in the development process. The different stages of the project will have different level of information dissemination. NHA will follow the disclosure requirement of the World Bank on environmental documentation. After the clearance from the World Bank, the draft final version of the EMF will be posted in the website of NHA along with a Bangla summary version and will be kept in the offices for further comments and inputs from non-governmental organization, civil society and general public. Newspaper advertisement will be published in two national dailies (Bangla) about the disclosure and request for comments on the EMF.

Acronyms

BAEC	Bangladesh Atomic Energy Commission
BBS	Bangladesh Bureau of Statistics
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BMD	Bangladesh Meteorological Department
BNBC	Bangladesh National Building Code
BRWSSP	Bangladesh Rural Water Supply and Sanitation Project
BWDB	Bangladesh Water Development Board
C3ER	Centre for Climate Change and Environment Research
CEGIS	Center for Environmental and Geographic Information Services
CODI	Community Organization Development Institute
CULG	Committee on Urban Local Governments
CUS	Centre for Urban Studies
DC	Deputy Commissioner
DDM	Department of Disaster Management
DEM	Digital Elevation Model
DFID	Department for International Development
DM	Disaster Management
DoE	Department of Environment
DPD	Deputy Project Director
DPHE	Department of Public Health Engineering
EA	Environment Assessment
ECA	Environment Conservation Act
ECR	Environment Conservation Rules
EIA	Environment Impact Assessment
EMF	Environmental Management Framework
EMP	Environment Management Plan
EPA	Environmental Protected Areas
ER	Environmental Review
ESA	Environmental Sensitive Areas

FAR	Floor Area Ratio
FS	Field Supervisor
GIS	Geographic Information System
GoB	Government of Bangladesh
GRM	Grievance Redress Mechanisms
GRO	Grievance Redress Officer
GRS	Grievance Redress System
GSB	Geological Survey of Bangladesh
IIDFC	Industrial and Infrastructure Development Finance Company Limited
INGO	International Non-governmental Organization
IOM	International Organization for Migration
IPM	Integrated Pest Management
IRGC	International Risk Governance Council
IUCN	International Union for Conservation of Nature
IWM	Institute of Water Modelling
IWT	Inland Water Transport
LEA	Limited Environmental Assessment
MDGs	Millennium Development Goals
MoC	Ministry of Communication
MoDMR	Ministry of Disaster Management and Relief
MoE	Ministry of Education
MoEF	Ministry of Environment and Forest
MoF	Ministry of Finance
MoFL	Ministry of Fisheries and Livestock
MoH&FW	Ministry of Health and Family Welfare
MoHPW	Ministry of Housing and Public Works
MoL	Ministry of Land
NAPA	National Adaptation Programme of Action
NEP	National Energy Policy
NGO	Non-governmental organization

NHA	National Housing Authority
OP	Operational Policy
PD	Project Director
PIO	Project Implementation Officer
PKSF	Palli Karma-Sahayak Foundation
PMU	Project Management Unit
PPSIP	Pro-Poor Slums Integration Project
PRSP	Poverty Reduction Strategy Paper
RAJUK	Rajdhani Unnayan Kartripakkha
RAP	Resettlement Action Plan
REP	Renewable Energy Policy
SFYP	Sixth Five Year Plan
SHAHAR	Supporting Household Activities for Hygiene, Assets and Revenue
SPARRSO	Space Research and Remote Sensing Organization
SRDI	Soil Resource Development Institute
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UPPR	Urban Partnership for Poverty Reduction
VIP	Ventilated Improved Pit
WARPO	Water Resources Planning Organization
WASA	Water Supply & Sewerage Authority
WB	The World Bank

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Operational Definitions

Operational definitions of principal terms of this framework are given below:

Environmental Management Framework (EMF): An instrument that examines the issues and impacts associated when a project consists of a program and/or series of sub-projects and the impacts cannot be determined until the program or sub-project details have been identified. The EMF sets out the principles, rules, guidelines and procedures to assess the environmental and social impacts. It includes measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive impacts, provisions for estimating and budgeting the costs of such measures, and information on the agency or agencies responsible for addressing project impacts.

Environmental Impact Assessment (EIA): An instrument to identify and evaluate the potential environmental impacts of a proposed project, evaluates alternatives and design appropriate mitigation, management, and monitoring measures. Projects and subprojects need EIA to address important issues not covered by any applicable regional or sectoral EA.

Environmental Management Plan (EMP): An instrument that details the measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental impacts or to reduce them to acceptable levels; and the actions needed to implement these measures (World Bank, 1999). EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EA and implementation and operation activities.

1 Introduction

1.1 Background

The Government of Bangladesh (GoB) has initiated the "Pro-poor Slum Integration Project (PPSIP)" with the financial assistance of the World Bank (WB). The main goal of the project is to improve the quality of life and overall living conditions of the underprivileged people or communities living in the urban slums. Poor urban slum dwellers are the 'center' of the process where the provision of housing would be considered as an effective tool for development. The current focus is to select around five most vulnerable communities in different pourashavas¹ or city corporations; where participation of slum dwellers is considered as a key criterion for selection. Community architects, engineers and other technical specialists are acting as facilitators to incorporate the community preference for a livable habitat as a part of achieving a better quality of life by 2015.

The National Housing Authority (NHA) under the Ministry of Housing and Public Works (MoHPW) is planning and designing of PPSIP interventions. The purpose of the PPSIP is not only limited to enhance the standard of housing alone, rather improve the standard of living and resilience by enhancing communities' self-dignity. Thus, an assessment of the environmental concerns is necessary to identify possible mechanism to avoid, minimize, mitigate and manage any adverse effects that might result from planning to design, construction and post-construction periods. A detailed feasibility report is expected to include necessary aspects covering technical, institutional and economic analysis, procurement, and financial management.

The Environmental Management Framework (EMF) has been prepared to guide the NHA and its consultants to identify and assess environmental problems that might occur during planning, design, construction and post-construction phases of the PPSIP interventions and suggest probable measures to mitigate those problems.

1.2 Development of Pro-Poor Slum Integration Project (PPSIP)

In recent years, 'pro-poor' has become the focal objective of many development projects. Theoretically, any growth is 'pro-poor' if the incomes of poor people grow faster than those of the population as a whole (DFID, 2004). Thus, 'pro-poor' integrated development generally refers to the sustained and concerted effort of policy makers for the development of greater quality of life including essential capacity building for the poor (ODI, 2008).

Approximately 40 million people in Bangladesh live in urban areas; around 62% of urban populations are living in slums (UN, 2012). The UNDP estimated that around one million new people arrive in the urban areas annually from different regions of Bangladesh. Half of country's population (some 90 million people) will be living in the urban areas by 2030; most of them living below the poverty line (UN, 2012). Slum communities are defined by poverty, low income, inadequate living conditions and sub-standard facilities and above all illegal land tenure. According to the UN-HABITAT, a slum household is a group of individuals living under the same roof in an urban area who need one or more

¹A Pourashava is an urban administrative division having three-fourths of the adult male population of the area chiefly employed in pursuits other than agriculture, such area contains not less than fifteen thousand population, and an average number of not less than two thousand population, and an average number of not less than two thousand inhabitants per square mile (GoB, 2004)

of the following: a) durable housing of a permanent nature that protects against extreme climate conditions; b) adequate living space, which means not more than three people sharing the same room; c) easy access to safe water in sufficient amounts at an affordable price; d) access to adequate sanitation in the form of private or public toilet shared by a reasonable number of people; and e) security of tenure that prevents forced evictions (UN-HAHITAT, 2007). Centre for Urban Studies (CUS) defined slums as residential areas characterized by the following conditions: a) predominantly poor housing; b) very high population density and room crowding; c) very poor environmental services, particularly water and sanitation facilities; d) every low socioeconomic status for the majority of residents; and e) lack of security of tenure (CUS, 2006).

Slum communities need the basic fundamental of life, including safe housing. Frequent exposure to natural disaster and climate-induced displacement often push the poor people to migrate in search of safe lives and livelihoods. Their recognition, even in the global forum, often referred to as 'informal settlement' (Millennium Development Declaration, 2000). According to International Organization for Migration (IOM), about 70% of slum dwellers in Dhaka migrate to Dhaka because of environmental shocks (IOM, 2008). Moreover, these poor communities create, along with poverty, a significant pressure on urban land and infrastructure, and environment and ecology of urban centers. So inhabitants live in inadequate and insecure houses often in unsanitary conditions and limited access to livelihoods. This situation made worse by having little or no social protection, access to health services and education opportunities. The slum living situation is further worsening by unplanned growth of settlements, making conventional service provision complicated and costly.

In densely populated areas of Bangladesh, maintaining a safe distance between pit latrines and drinking water sources is also problematic. The major sources of drinking water in slums areas were municipal taps and tube-wells, the location of such sources of water is not very ideal. Studies show that many of the slum communities have access to electricity through illegal channels (CUS, 2006). Further, they have limited access to adequate health services and education opportunities. They live in a disengage part of the country with limited access to transportation, commutation and information. It is a luxury for them to possess the right to reasonable rest, recreation and leisure through green and public space; though it is a fundamental right as citizens of Bangladesh, as the constitution states (GoB, 1972).

The conditions of slums is extremely unhygienic and fragile as they are located at sites such as solid waste dumps, open drains and sewers, low land, adjacent to hazardous industry, embankments, and often along the railway lines, inter-district highway (Chowdhury and Amin, 2006; UN-HABITAT, 2003). Solid waste is responsible for 49 vector-borne diseases, such as dengue, in Bangladesh (UNICEF, 2006). In the slums, only 12% of the households use an improved sanitation facility in conformity with the government standard, with a large number of households sharing one toilet due to lack of space.

Global efforts to improve living conditions of slum dwellers, as enshrined in the Millennium Development Goals (MDGs) and proposed in the Sustainable Development Goals (SDGs) would not be achievable unless the slum dwellers are upgraded as communities with secure livelihood and the primary needs. The focus on poverty alleviation has engendered a strong emphasis for PPSIP to the poorest people on the basis that a higher standard of living will be achieved. *Thus, the focus of the "Pro-poor Slum Integration Project" is not limited to a housing project only; focus is to implement a sustainable solution enhancing the community's self-assurance, livelihood sustainability and resilience (World Bank, 2013).*

1.3 Objective of the PPSIP

The proposed PPSIP planned to be implemented in five City Corporations/ Pourashavas of Bangladesh and envisioned as a demonstration program to test several types of community-driven solutions. The proposed Development Objective of the PPSIP is to reduce vulnerability of designated urban poor communities by providing improved, secure and affordable shelter in select informal settlements in Bangladesh.

1.4 Components of the PPSIP

There are four major components of this project which are focuses on urban community development, community mobilization and participation in different stages, monitoring and evaluation, and project management. In brief, each of the components are as follows:

Component 1: Community Mobilization and Participation (US\$30 million)

Community engagement remains a pillar of the pilot approach. Global experiences have demonstrated that significant efforts at social mobilization and the development and strengthening of community organizations is a prerequisite to any successful slum upgrading, as communities themselves are often best placed to navigate the complex political, social, economic and financial environments to determine the most appropriate solutions to insecure tenure and housing. This component is expected to build on the longstanding efforts of social mobilization, organization and development of local urban poor community groups under programs such as the UNDP/DFID/UN-Habitat funded Urban Partnerships for Poverty Reduction. With over ten years of engagement in 29 Class A Pourashavas throughout Bangladesh, the program has served to organize communities, promote literacy and other trainings, develop participatory planning skills through investments in small scale infrastructure projects, and promote savings and rotating credit groups. This component will build on the extensive community mobilization of existing urban poverty programs and will identify communities that exhibit maturity and readiness to transition to improved housing and will finance costs associated with additional social mobilization efforts targeted specifically at transition to improved and secure housing, participatory planning for land use and housing designs, planning and implementation of action planning, and technical assistance.

Component 2: Urban Community Development Fund (US\$75 million):

This component will support loans to organized communities for housing, land acquisition and slum upgrading, as well as for the relevant technical support to communities in the implementation of housing plans and designs. This is expected to make up a larger funding package that is made up of a mixture of grants and loans that would allow for selected organized and mobilized community groups to implement affordable and locally relevant housing solutions. It is expected that this approach will work well for a sub-segment of urban poor communities, specifically those that are organized and have benefited from significant efforts at social mobilization, and that exhibit abilities in managing savings and credit programs within their communities. This would allow for these community groups to receive a mixture of loans and grants to assist with securing tenure (through lease or purchase of land), as well as housing upgrades or construction. It is expected that significant technical assistance will also be required to assist these communities in the implementation of the participatory planning for housing developed under Component 1.

Component 3: M&E, Horizontal Learning and Supervision (US\$3 million)

This component will support independent monitoring and evaluation and learning activities. This will include the continuous and ongoing monitoring and evaluation of project results, as well as an impact evaluation of the project's interventions. As such, it would provide continuous feedback to the Government of Bangladesh (GoB), the Project Steering Committee (PSC), the Ministry of Housing and Public Works (MoHPW), and the National Housing Authority (NHA), as to the project progress, results, and lessons learned through implementation that could be integrated into an improved project design. In addition, this component will finance ongoing learning activities, such as peer-to-peer learning programs between community groups, and strengthening community networks at the town level. Finally, funds under this component would also be used for the supervision of the Environment and Social Management Plans to ensure compliance with World Bank guidelines.

Component 4: Project Management, TA & Strategic Studies (US\$12 million)

This component would finance costs associated with project management, technical assistance and capacity building activities, as well as strategic studies. This will include institutional capacity building for the NHA to better engage with communities and to improve outreach, communication and consultation practices for housing, as well as improved understanding of the role of social mobilization in housing programs. This could also include building links with regional partnerships on slum improvement and housing programs.

1.5 Environment Management Framework (EMF)

The proposed Pro-Poor Slum Integration Project (PPSIP) will be implemented in five secondary towns or Class A Pourashava of Bangladesh. However, slums /communities that would be improved under the PPSIP or the sub-project interventions and activities to be implemented for upgrading slums are not identified at this stage. Therefore, a framework approach has been adopted to provide general policies, guidelines, and procedures of environmental management of sub-projects interventions. For the PPSIP, an Environmental Management Framework (EMF) has been prepared using the framework approach.

The purpose of this Environmental Management Framework (EMF) is to integrate environmental concerns into the identification, selection, design and implementation of all sub-project interventions in order to ensure that neither the subproject interventions nor the environment is compromised through the implementation of PPSIP. It will outline tools and methodologies for environmental screening of the subprojects to be financed and specify appropriate roles and responsibilities to carryout environmental screening/assessment, environmental management (mitigation, monitoring and compensation) and reporting related to subprojects. The EMF will facilitate compliance with the World Bank's environmental safeguard policies and with policies, acts and rules of the Government of Bangladesh. The EMF will contribute to the goal of environmental sustainability by:

- preventing and/or mitigating any negative environmental impact that may emerge from the subproject interventions;
- enhancing environmental outcomes of the activities implemented under individual subprojects;
- ensuring the long-term sustainability of benefits from subprojects by securing the natural resource base on which they are dependent.

1.6 Approach and Methodology

The conceptual base of the EMF is finalized from wide literature review. The process adopted for the preparation of the EMF includes a detail review of both national and international policy frameworks, and relevant WB guidelines. Emphasis has also been given to paper and web-based publications on global and national best practices, reconnaissance field visits, and interactive discussions in public consultation sessions.

While preparing the EMF, a thorough emphasis was given on WB OP 4.01: Environmental Assessment. Analysis of WB OP 4.01 has facilitated the consultant team to sort out the relevant environmental issues pertinent to the project. In addition, issues extracted from WB Environmental Assessment Source Book (WB, 1998) have also been scrutinized.

Relevant administrative policies, regulatory frameworks, rules and acts provided by the GoB have been reviewed for identifying relevant barriers for environmental screening. Review of GoB procedures has generated a specific guideline of prescribed and prohibited proposition to be followed in various steps of the project. The documents were Environmental Conservation Act 1995 and Environmental Conservation Rules 1997. Environmental Policies, Laws and Rules of GoB along with the Constitution of Bangladesh were thoroughly assessed.

A number of nationally and internationally implemented environmental management documents on slum development and community driven development (CDD) were reviewed to portray the overall structure of the EMF for the PPSIP. Apart from that, the environmental guidelines prepared for the SHAHAR (Supporting Households Activities for Hygiene, Assets and Revenue) project, a part of the Integrated Food Security Program (IFSP) of CARE-Bangladesh was one of the important literatures for developing the EMF for the PPSIP.

Field visits and consultations with the community were another important source that guided the preparation of EMF. An initial reconnaissance field visit was conducted to observe the existing scenario of communities studied by the PPSIP design team. A total of six communities were surveyed initially in Comilla town, namely Tikkharchar, Robidashpara, Mofizabad Colony, Godarmar Slum, Dolls House and Bou Bazar. Detailed field visits were conducted in four different slum areas of Narayangonj and Comilla. Those are: Rishipara slum, City Colony, and Tikkacharchar. Based on the findings, environmental baselines were conducted. Furthermore, an idea of probable impact and mitigation options were conceptualized based on the field visits.

1.7 Structure of EMF

The EMF gives the implementing agency and stakeholders a sense of the types of environmental impacts that may arise in the course of implementing project activities. The EMF will also provide a range of checklists and screening tools which will be used in different phases (planning, designing and monitoring) of the project. The main elements this EMF include as follows:

- i. A detailed review of World Bank Operational Policies (OPs), environmental rules and regulations of the Government of Bangladesh to minimize and/or mitigate environmental impacts resulting from development interventions.
- ii. Description of the baseline environment provides an overview of physical, biological and socio-economic environmental baseline information pertinent to the relevant part of the proposed slum integration project area.
- iii. Proposed project description provides an outline of four different models to be implanted in this project.

- iv. Potential impacts, mitigation and enhancement measures of probable environmental impacts during pre-construction, construction and post-construction periods of interventions in the slums are summarized.
- v. Step by step guidelines on project planning, implementation and monitoring.
- vi. A framework for institutional arrangement of the implementing agency is prepared with an aim for effective implementation of environmental safeguard issues for the PPSIP project.
- vii. Public consultation outlines the steps needs to be followed to disclose all the project related information and collect & incorporate public views into the overall project planning, implementation and monitoring stage.
- viii. Different tools for measuring impact, monitoring and mitigation.
- ix. Guidance for development of proper Environment Assessment (EA), Environment Management Plan (EMP), etc.

2 Description of the Pro-Poor Slum Integration Project (PPSIP)

Rapid urban migration forces housing to be vital urban infrastructure to an unprecedented scale. Inadequate housing, particularly for the urban poor in municipalities, increases the informal settlements and slums in Bangladesh. Poor quality of housing infrastructure, along with inadequate services and destitute living condition are the basic characteristics of slum settlements resulting in acute deprivation to the urban poor living in these settlements.

In this context, and to support the urban poor to access safe and affordable housing, the Government of Bangladesh has initiated the Pro-Poor Slum Integration Project (PPSIP). It will involve communities in the identification, creating and financing safe and affordable housing solutions. This builds on global examples showing that the participation of slum dwellers, together with community architects, engineers, social, environmental and other technical specialists in the identification and realization of solutions to insecure tenure are critical to the sustainability and equity of slum developments.

2.1 Slum Upgrading Models

The proposed PPSIP would demonstrate community-based solutions to galvanize support for and attention to the growing issues of shelter for the urban poor. Considering longstanding community engagement and local government support that have created conditions to resolve shelter and land issues for the urban poor, five *pourashavas* have been selected. Within each of these cities, town-level planning will be undertaken to identify communities that meet measures of readiness to pilot different community-based housing approaches. The PPSIP would pilot four slum upgrading models, (1) in-situ upgrading, (2) re-blocking, (3) land sharing projects, and (4) voluntary resettlement under Component 2 (Community Development Funds). The models are described in the following subsections.

2.1.1 In-situ Upgrading

In-situ upgrading is an effective option for the enhancement of the physical environment and basic community services in slums. It has been considered as the best alternatives of eviction as it allows residents/communities to stay on the land they currently occupy and that transfers occupancy rights to them. However, the rapid growth of urban centers creates severe land shortages which make this option difficult to implement.

Eligible Interventions:

The major interventions eligible in the in-situ upgrading are: housing, health facilities, water supply, sanitation, waste management, roads, open space, etc. Typically, conditions of existing houses and urban basic services are very poor in slums or low income urban settlement. Appropriate water supply and sanitation options need to be backed by proper drainage system that will also help in managing storm water discharge and liquid waste flow. Pathways in the slums or connecting roads are poor. Thus, either new access needs to be planned for every house, or, the existing condition of a road need to be improved. Existing waste management facilities including the solid waste disposal bins need to be managed properly to prevent degradation of the environment in and around the project site. Open space can be allocated as playground for the children, if available.



Figure 2.1: Example of in-situ upgrading project model (before-after situation)

Source: *Land Sharing as an Alternative to Eviction*. Shlomo Angel and SomsookBoonyabancha. In *Third World Planning Review*, 10 (2) 1988. Available: <http://web.mit.edu/urbanupgrading/upgrading/issues-tools/tools/Reg-of-land.html> [25 December, 2013]

2.1.2 Re-blocking

Re-blocking stands for the re-adjustment of the existing place in order to enhance its physical condition. Haphazard, or unplanned constructions are transformed and combined into some planned design, essentially without interrupting the natural environment. Re-blocking occurs when the slum dwellers are granted a right to stay or security of tenure on-site and the existing houses need to be shifted or partially destroyed to allow for streets, drainage, canals, or other public infrastructure.

Eligible Interventions:

Scattered housing would be rearranged in a planned design, in re-blocking projects. At the same time, dispersed utility facilities and community services would be reorganized. Besides, construction of new roads, walkways, installation basic utilities including water supply and sanitation, storm sewers, waste management facilities, etc. are needed to be provided during re-blocking. Examples of re-blocking project are shown in figure 2.2. Utilization of unused open space can be made through re-blocking projects. Scattered and small open spaces can be combined and used as a common public space. Roads and drainage system can be planned and designed for combined use. Management of waste water and solid waste need to be ensured under the lens of cluster management approach. In this case, provision of utility services, except the electricity and gas supply, would be less expensive comparing with the situ development options. If needed, educational institute i.e. nursery school can be established in common public space as enhancement measures.

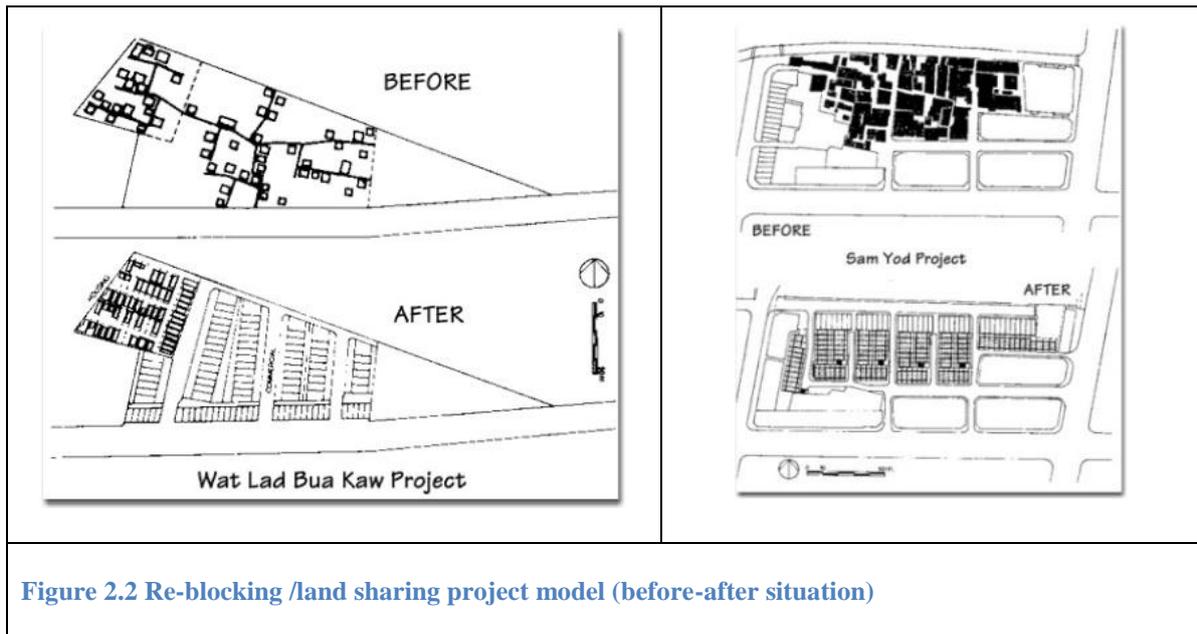


Figure 2.2 Re-blocking /land sharing project model (before-after situation)

Source: *Land Sharing as an Alternative to Eviction*. Shlomo Angel and SomsookBoonyabanacha. In *Third World Planning Review*, 10 (2) 1988. Available: <http://web.mit.edu/urbanupgrading/upgrading/issues-tools/tools/Reg-of-land.html> [25 December, 2013]

2.1.3 Land Sharing

Land sharing model is a strategic approach where slum dwellers and private developers and /or government jointly share a given site. The developers may be given some benefits from the government as an incentive. Thereby, the community and the developer/ government reach to a win-win situation after negotiating on this issue. The community sells or leases out the less attractive (commercially) part of the site.

Eligible Interventions:

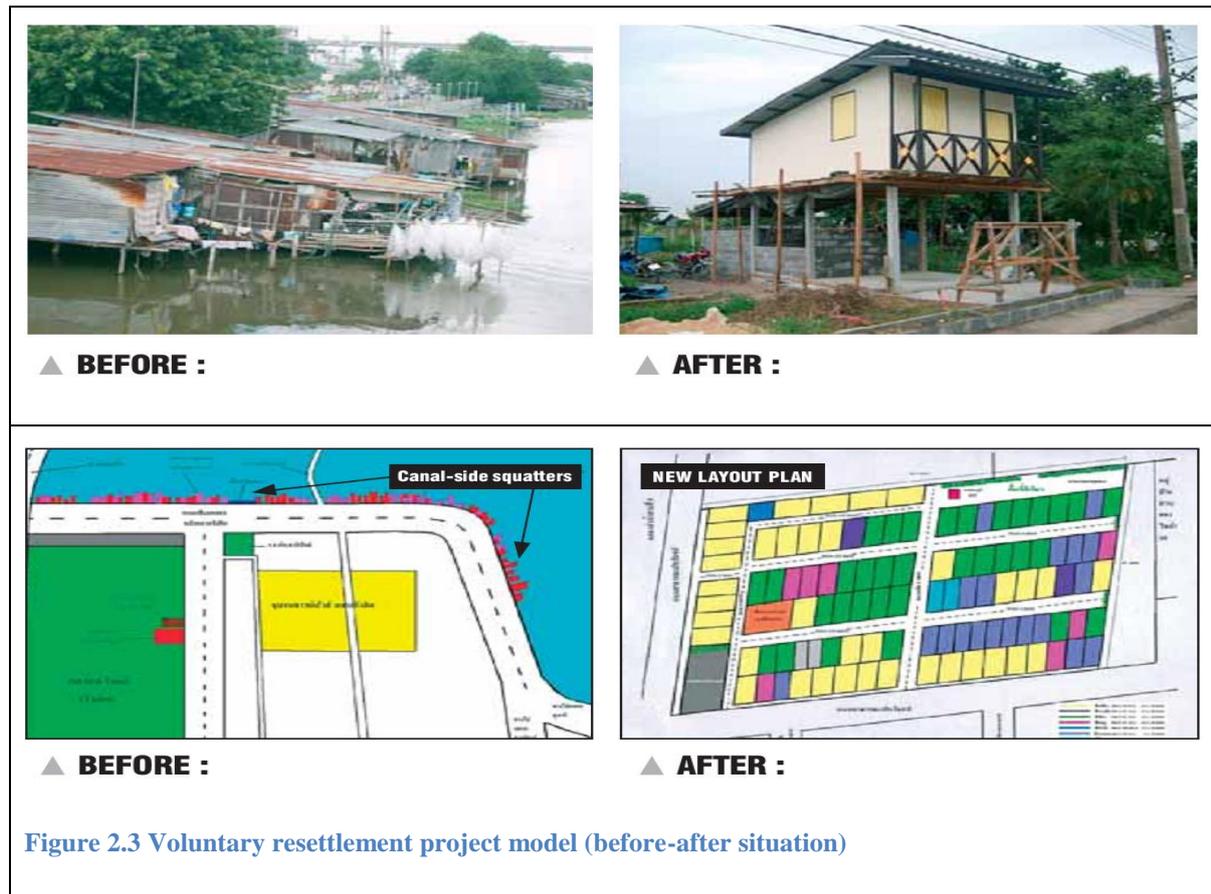
In this model, usually compact housing is built rather than scattered built development. All types of community services and utility facilities are also planned in a compact fashion. This model attracts investments in the critical infrastructure, i.e. affordable housing for the urban poor. Examples of land sharing project are shown in figure 2.2. When done in an existing settlement, scattered housing would be re-arranged in a planned pattern in a land sharing project. Like other design options, community participation is considered pivotal in every step.

2.1.4 Voluntary Resettlement

Voluntary resettlement is one of the most functional project models, which ensures secure housing with land use rights. If the slum is located on legally disputed or environmentally or otherwise risky land, voluntary resettlement can be a suitable option. Voluntary resettlement can sometimes affect the livelihoods of the people. In that case, those affected people have to be provided with proper job opportunity. Examples of voluntary resettlement project are show in figure 2.3.

Eligible Interventions:

Voluntary resettlement project is very crucial as it needs a new site for project implementation. Community willingness is the prime concern of this model. Site selection is the first part, and every other component of the project is required to be established newly on the relocation site. This model has huge freedom to construct compact housing with wide permanent (concrete/ brick) roads. Utility facilities and community services are provided in a planned manner so that it takes least costs, occupies minimum space and at the same time, offers standard living.



Source: *Land Sharing as an Alternative to Eviction*. Shlomo Angel and Somsook Boonyabanha. In *Third World Planning Review*, 10 (2) 1988. Available: <http://web.mit.edu/urbanupgrading/upgrading/issues-tools/tools/Reg-of-land.html> [25 December, 2013]

2.1.5 Major Environmental Concerns in Slum Upgrading Models

Community support and willingness is a major issue in the proposed slum upgrading project. Though existing national policies doesn't allow residential development in the vicinity of industrial areas, but in reality most of the slums in urban areas are concentrated nearby. In the case of land which has already been in use of some kind, especially of a kind that produced toxicity or some other social or environmental threat, may need special attention as mitigation and enhancement. If a community requires voluntary resettlement, social conflict can be seen as a major concern. Social issues are discussed in detail in the Social Management Framework. Since low come communities live in an environmentally polluted and degraded land, nearby a dumping site or ecologically sensitive areas, the possible environmental concerns that may arise due to the implementation of PPSIP are:

encroachment to ecologically critical areas and natural water bodies, land filling, collection of land filling material from agricultural land, identification of dumping sites, management of drains and solid waste. In addition, establishing the connectivity with the urban utility services provided by the city corporations, management of liquid waste, protection of natural water bodies and aquatic lives deserve significant attention.

2.2 Types of Sub-project Interventions in the Proposed PPSIP

During field visits to the potential project sites in Comilla and Narayanganj, it was found that following sub-projects or interventions would be required for upgrading living environment of a slum or low income community:

1. Housing (Semi Pucca to 2-3 story walkup apartments)
2. Multipurpose community center for meeting and other service
3. Water supply (supply from municipal tap or tube-well with a distribution network)
4. Drainage system
5. Sanitation (Toilet with options for individual and community use)
6. Pathway (inside the slum) and small connecting paved road
7. Solid waste management
8. Disaster management
9. Training and awareness

Table 2.1 shows the typical sub-project interventions to be considered for implementation under each slum upgrading models. A brief description of the sub-project is given in the following sections. A tentative list of activities to be undertaken for each sub-project interventions is given in Annex A.

Table 2.1 Slum Upgrading Models and Proposed Interventions

Planning Interventions		Project Models				
		<i>In situ</i> upgrading	Re-blocking	Land Sharing	Voluntary Resettlement	
Types of Sub-projects		Various Options				
	Housing	Permanent single house to Ground +1	✓	✓	✓	✓
		Compact multi-story	✗	✓	✓	✓
		Semi-permanent single house	✓	✓	✓	✓
	Multi-purpose Community center	One- story small building	✓	✓	✓	✓
	Water Supply	Rainwater harvesting	✓	✓	✓	✓
		Municipal supply	✓	✓	✓	✓
		Tube-well	✓	✓	✓	✓
	Drainage	Open drain	✓	✓	✓	✓
		Semi-covered drain	✓	✓	✓	✓
		Covered drain	✓	✓	✓	✓
	Sanitation	Pour flush latrine	✓	✓	✓	✓
		Unsanitary Pit latrine	✗	✗	✗	✗

Planning Interventions		Project Models				
		<i>In situ</i> upgrading	Re-blocking	Land Sharing	Voluntary Resettlement	
Types of Sub-projects		Various Options				
	Waste Management	Collection and Storage (Dustbin)	✓	✓	✓	✓
		3R (Reuse, Reduce, Recycle)	✓	✓	✓	✓
		Composting	✓	✓	✓	✓
	Cooking Fuel	Bio-gas	✓	✓	✓	✓
		Improved Cooking Stove	✓	✓	✓	✓
	Roads/Footpath	Footpath/ Access road (concrete)	✓	✓	✓	✓
		Access road (brick)	✓	✓	✓	✓
	Public Space/open yard	Create open space	✓	✓	✓	✓
	Disaster Management	Fire protection	✓	✓	✓	✓



= Proposed Intervention



= Enhancement



= Not Feasible

2.2.1 Housing

Provision of improved housing is a major infrastructure in the proposed PPSIP where securing land tenure is a pre-requisite. In this infrastructure investment, the NHA planned to include following options and selection would be made based on land availability, topography, environment, and socio-economic conditions, and willingness of the community:

- i) Semi-permanent single house
- ii) Permanent single to Ground+1 story
- iii) Compact multi-story

Housing options would be accompanied by sanitary toilet, kitchen, and electricity facilities. For cooking, natural gas, bio-gas and eco-friendly cooking stove model are identified as the possible options as cooking fuel/system in the slums. Power grid electricity connection can be provided to the slum dwellers, if they become willing to pay the electricity bill properly. Considering land availability, the PPSIP would design and construct multipurpose community building for meetings, education, etc. A list of activities for design and construction of houses is presented in Annex A.

2.2.2 Water Supply

Water supply options are divided into three major categories based on the source: Municipal supply piped, tube-well with distribution line, and rain water harvesting. It has been observed that water supply from the tube-well and municipal pipeline are the two most convenient sources in the urban and peri-urban areas. Rainwater Harvesting (RWH) is a splendid drinking water source for a country like Bangladesh. The PPSIP would encourage this option among slum dwellers through special initiatives. However, preference for drinking water options, design of water supply network can be identified and finalized through community participation.

In case of supply from a tube-well, households sink small tube-wells, equipped with either hand-pumps or electrically powered pumps. A small number of these systems serve local distribution systems but the majority delivers water directly or via a tank serving a single household or single multi-apartment building. The municipal system is supplied by deep production tube-wells, in some cases directly and in others via overhead reservoirs. However, to keep the water supply options functional, the issues need to be considered are: land terrain to flow water under gravity, avoiding arsenic contamination, water filtration (PSF), etc. Maintenance of pipeline and regular cleaning of storage tanks are required in post-construction stage of water supply provision. A list of major activities that are involved for design/ construction of water supply services is presented in Annex A.

2.2.3 Pathways/ Connecting Roads

Construction of pathways or footpaths in the slum is another important intervention to be considered under the PPSIP. Broken roads hamper the daily activity of the dwellers. Adequate width of roads is needed to ensure the fire safety. Often, a small segment of a road that connects the poor community with the main section of the town needs to be constructed to facilitate accessibility to the slums. The PPSIP would design and implement pathways/ roads following appropriate engineering guidelines.

2.2.4 Drainage

Usually, drainage situation is very poor in a slum. The situation used to become worse during the rainy season. In most of the urban poor settlements, drains are open and many are stagnant with no discernable flow. Often, drains discharge to canals, but some end in open fields or agricultural land

where their discharge is used for irrigation or to feed fish ponds. The practice of depositing solid waste in drains increases the risk of drain blockages. This practice is attributable partly to the poor quality of the solid waste collection service and partly to lack of awareness on the part of users. Municipalities clean open drains, leaving the material removed in heaps by the sides of the drains, where it may be washed back into the drain if not removed before rain. The proposed PPSIP will implement a drainage system and connect it with proper outlet channel or city's drainage networks. Drains will not provide intended results if adequate and timely maintenance cannot be ensured.

2.2.5 Sanitation

In the urban poor community, people mostly use unsanitary latrines and open defecation. Therefore, proper sanitation system is essential to improve the living standard of the slum dwellers. Designing of pour flush latrine are identified as the most functional options of sanitary latrines for the slums. Major activities seen in this stage are community awareness and support, demolishing of existing unsanitary latrines, identifying sites and types of latrines, design of latrines (individual/ community).

Construction of sanitation system would require transportation of construction materials, construction of temporary shed, digging of land, pit, and construction of septic tank. Proper guidelines should be followed during the construction of latrines. A minimum distance should be kept between the water sources and the sanitary latrines. Only sanitary latrine cannot improve the condition of sanitation. People are needed to be aware to maintain appropriate hygienic practices, e.g., wash hands after using the toilet and before eating food. Regular maintenance of latrine is required to ensure hygiene.

2.2.6 Solid Waste Management

Solid waste management would be considered as a slum upgrading intervention in the proposed PPSIP. The main sources of solid waste in the low income urban communities are household and small informal entrepreneurial activities that pose immediate or direct harm to the human health and environment. Low income urban communities are often outside the jurisdiction of a municipality due to lack of waste management capacity. Therefore, uncollected wastes block the drains and sewage and eventually, create waterlogging. Smoke from the open burning of uncollected waste may pollute the air. Wastes may contain leachable chemical substances that can degrade groundwater quality.

Waste management options to be considered under the PPSIP are waste collection, temporary storage and disposal in a designated waste dumping site. For a proper waste management system, it is necessary to ensure an organized dumping system (typically waste bins) in the slum area and a waste management system (typically collection and processing of waste). These bins must be set up from a safer distance from the living areas, and it must be covered. Otherwise, it would spread germs and cause water and soil pollution. The vehicles that would be used to collect filth from the bins must be covered because waste collection vehicles pollute the environment by spreading the waste throughout the way. The loading and unloading of waste at transfer station pollute the air and the soil. The PPSIP would encourage 3R (Reduce, Reuse, Recycle) in a slum. Making compost from perishable waste would be considered as an enhancement measures.

2.2.7 Training and Awareness

The PPSIP would design and implement environmental awareness and training program for the project beneficiaries, construction workers, and other stakeholders.

3 Relevant Policies, Acts, and Regulatory Framework

The EMF guides the implementing agency in designing and implementation of environmentally sustainable subproject interventions. It is anticipated that the on-going slum integration project may have some environmental impacts on the surrounding environment due to a range of interventions related to in-situ upgrading, land sharing voluntary resettlement and re-blocking. The Operational Policies (OP) of the Bank as well as the national and international conventions, treaties and protocols provide specific guidelines to minimize and/or mitigate environmental impacts resulting from development interventions. There is hardly any guideline for the improvement of slums in Bangladesh. As a result, policies for low-income housing are mainly discussed in this chapter. This chapter provides a brief summary of relevant OPs and national and international conventions, treaties and protocols. Furthermore, Bank's EA source books have also been reviewed for identification of potential environmental concerns.

3.1 Relevant Government Policies, Acts, Rules, and Guidelines in Bangladesh

Protection and improvement of environment and biodiversity is one of the fundamental principles of the State Policy. It is the constitutional accountability of the State to protect and improve the environment and to preserve and safeguard country's natural resources, biodiversity, wetlands, forests and wildlife for the present and future citizens (GoB 1972, Sec. 18 A).

The requirements for compliance with environmental regulations are laid down by the policy, legal and regulatory framework in the country. A large number of laws related to environmental issues, some dating back to the 19th century exist in Bangladesh. The most important of these are the Environment Conservation Act 1995 (ECA, 95) and the Environment Conservation Rules 1997 (ECR, 97). Many of the other laws are cross-sectoral and are only partially related to environmental issues pertinent to the project. Most of the old legislations have become mostly obsolete also with the promulgation of the ECA, 95 and the ECR, 97.

The focus of the slums integration project is towards the poor segment of the society that is the most vulnerable to natural hazards and environmental degradation. The project is concentrated toward slum integration, and the components for development include housing, with the provision of basic services and facilities like road, water and sanitation, waste management, education, and health care. Thus, a number of relevant rules and acts, other than the ECA, 95 and the ECR, 97 that are relevant to the project components were reviewed.

3.1.1 The Bangladesh Environment Conservation Act 1995, amended 2002 and 2010

The ECA (1995 amended 2002 and 2010) was enacted for the 'conservation of environment'. It is also focused for the 'improvement of environmental standards'. Similarly, it is emphasized on the 'control and mitigation of environmental pollution'. Moreover, 'conservation of environment' defines the improvement of the qualitative and quantitative status of the environment. Accordingly, the components of the environment should not be degraded (ECA, 1995; Section 2).

Furthermore, the ECA (1995 amended 2002 and 2010) specified different types of environmental pollution (ECA, 1995; Section 2). Accordingly, it is expected that:

- Any development project should not contaminate or alternate the physical, chemical or biological condition of air, water and soil. Moreover, there should not be any change of these environmental components in terms of temperature, taste, odor and density.

- Projects should not discharge any liquid, gaseous, solid, radioactive or other substances (waste) into air, water and soil which are harmful for the public health and the environment.
- The discharge of waste should not degrade the air, water, soil, livestock, wild animal, bird, fish, plant or other forms of life in the project area.

According to the ECA (1995 amended 2002 and 2010), 'control and mitigation of environmental pollution' is applicable for development interventions. Therefore:

- Development project should encourage environment friendly use, store, transport, import and export of hazardous substance (ECA, 1995; Section 2).
- The project should take precautionary measures so that there should not be any incidents which lead to environmental degradation (ECA, 1995; Section 2).
- The project intervention should consider the national environmental standards and the information should be available in the project area (ECA, 1995; Sections 4 & 6).

It is also specified in the ECA that Environmental Clearance Certificate is required before initiating of the project from the Director General of Department of Environment (ECA, 1995; Section 12).

3.1.2 The Environment Conservation Rules 1997, amended 2003

The Environment Conservation Rules provide a first set of rules under the Environment Conservation Act, 1995. The ECR is further amended in 2002 and 2003. These provide, amongst others items, standards and guidelines for: (1) Categorization of industries and development projects, including roads and bridges on the basis of actual and anticipated pollution load, (2) Requirement for undertaking Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA), as well as formulating an Environmental Management Plan (EMP) according to categories of industries/development projects/activities, (3) Procedure for obtaining environmental clearance, and (4) Environmental quality standards for air, surface water, groundwater, drinking water, industrial effluents, emissions, noise and vehicular exhaust.

Under the Environmental Conservation Rules (1997) a classification system was established for development projects and industries on basis of the location, the size and the severity of potential pollution. It classifies industrial units and projects into four categories for the purpose of issuance of Environmental Clearance Certificate (ECC): (i) Green, (ii) Orange A, (iii) Orange B, and (iv) Red. **Green Category** projects are considered relatively pollution-free and hence do not require initial environmental examination (IEE) and EIA. An environment clearance certificate (ECC) from the Department of Environment (DoE) is adequate for a project that fall into the Green category. **Orange Category** projects fall into two categories. Orange A projects are required to submit general information, a feasibility report, a process flow diagram and schematic diagrams of waste treatment facilities along with their application for obtaining DOE environmental clearance. Orange B projects are required to submit an Initial Environmental Examination (IEE) report, along with their application and the information and papers specified for Orange B projects. **Red Category** projects are those which may cause significant adverse environmental impacts and are, therefore, required to submit an EIA report. It should be noted that they may obtain an initial site clearance on the basis of an IEE report, and subsequently submit an EIA report for obtaining environmental clearance along with other necessary papers, such as feasibility study reports and no objections from local authorities. The DoE has recently developed IEE and EMP checklists in order to simplify the preparation of conventional and voluminous IEE and EMP reports that may contain irrelevant and unnecessary information.

It is understood that the interventions related to housing and other facilities will lead to deterioration of air and water quality. The national standards of different environmental components are placed in the ECR. The ECR (1997 amended 2003) has clearly specified the standard of air and water quality for the residential areas (i.e. for residential area the suspended particulate matters in the air and drinking water should be within 200 microgram per cusec meter and 50 total coliform number (per 100 ml) (ECR, 1997; Rule 12). It has also set limit for the generation of waste from household (ECR, 1997; Rule 13), emission from cooking stoves (ECR, 1997; Rule 12), vehicular exhaust from the adjacent pathways (Rules 12 & 13) and noise pollution during construction or from vehicular movement (ECR, 1997; Rule 12). Thus the ECR (1997 amended 2003) would guide the planners and designers on the accepted level of the pollution during the intervention in the slums. Table 3.1 presents are standards for air, water, wastewater, and noise set by Department of Environment.

Table 3.1: Standards provided under Environment Conservation Rules (ECR) 1997

A. Drinking Water Quality Standards (ECR, 1997)

Sample ID	Units	WHO drinking water guidelines	Bangladesh drinking water standards (ECR '97)
pH	--	6.5 – 8.5	6.5 – 8.5
Turbidity	NTU	15	15
Iron, Fe	mg/L	0.3	0.3 – 1.0
Manganese, Mn	mg/L	0.4	0.1
Arsenic, As	ppb	10	50
Chloride, Cl ⁻	mg/L	250	150 - 600
Electrical Conductivity	mS/cm	--	--
Total Dissolved Solids, TDS	mg/L	1000	1000

B. Waste Water Quality Standards (ECR, 1997)

Parameter	Unit	Places for determination of standards		
		Inland Surface Water	Public Sewerage system connected to treatment at second stage	Irrigated Land
BoD ₅ at 20 ⁰ C	mg/l	50	250	100
CoD	mg/l	200	400	400

C. Sound Level Standards (ECR, 1997)

Locations	Noise level (dBA) at day	Noise level (dBA) at night
Silent zone	50	40
Residential area	55	45
Mixed area	60	50
Commercial area	70	60
Industrial area	75	70

D. Air Quality Standards (ECR, 1997)

Categories of Area	Suspended Particulate Matters (SPM)	Sulphur-dioxide	Carbon Monoxide	Oxides Nitrogen
	Density in microgram per cusec meter			
Industrial and mixed	500	120	5000	100
Commercial and mixed	400	100	5000	100
Residential and rural	200	80	2000	80
Sensitive	100	30	1000	30

Notes:

(1) At national level, sensitive area includes monuments, health center, hospital, archeological site, educational institution, and government designated areas (if any).

(2) Industrial units located in areas not designated as industrial areas shall not discharge pollutants which may contribute to exceeding the standard for air surrounding the areas specified at Sl. nos. c and d above.

(3) Suspended Particulate Matter means airborne particles of a diameter of 10 micron or less.

3.1.3 The City Corporation Act, 2009

City Corporation will create “Citizen Charter” where provision of citizens services, description of citizens services and time frame for providing citizens services will be clearly described (GoB, 2009; Act 60, Section 44(1), p. 6934). City Corporation will form ‘permanent committee’ on each of the following sectors: Solid Waste Management, Education, Health, Family Planning & Health Security, Social Welfare & Community Centre, Water & Electricity, Environment Development, Sports & Cultural, Communication, Disaster Management, and City Planning & Development (GoB, 2009; Act 60, Section 50(1), p. 6940). Moreover, City Corporation will dedicate a separate budget on the establishment and up gradation of water supply and sanitation according to Water Supply and Sanitation Authority Act, 1996 (GoB, 2009; Act 60, Section 75(4), p. 6946).

The City Corporation Act (2009) of Bangladesh addresses different issues of development which are highly relevant to the PPSIP, since any development project of the slums which will fall under a City Corporation area must be in line with the City Corporation Act (2009). Under the PPSIP, City Corporation would take the lead to form permanent committee on each of the 11 sectors mentioned above. These permanent committees would help at the monitoring process of PPSIP.

3.1.4 The Pourashava Act, 2009

The Pourashava Act (2009) clearly states the responsibilities of the Pourashava. The relevant sections of the Act are described below.

- Each Pourashava will publish “Citizen Charter” containing a provision of citizen services, description of citizen services and time frame for providing citizens services (GoB, 2009; Act 58, Section 53(1), p. 6722).
- Pourashava will form permanent committees for city planning, citizen services and development; and communication (GoB, 2009; Act 58, Section 55(1), p. 6723).
- Pourashava will form permanent committees for disaster management, poverty reduction & slum up gradation, health, water & sanitation; and waste management if necessary (GoB, 2009; Act 58, Section 55(2), p. 6723).

- **Health**

If there is any unhealthy building or place, Pourashava will give notice to the owner to clean the place (GoB, 2009; Act 58, p. 6751). Pourashava will establish adequate number of hospital and dispensary according to the need of the citizens (GoB, 2009; Act 58, p. 6751). Pourashava will organize awareness programmes for health education (GoB, 2009; Act 58, p. 6754).

- **Solid Waste Management**

Pourashava will take all necessary steps for management and disposal of waste from roads, public toilet, drain, surroundings under its authority. Pourashava will set up ‘dustbin’ in different locations and alert the citizens for proper usage (GoB, 2009; Act 58, p. 6751).

- **Water Supply & Sanitation**

Pourashava will ensure to all citizens of pure drinking water. Establishment of new water well, tube well or any other sources of water supply are restricted without Pourashava’s permission (GoB, 2009; Act 58, p. 6754).

- **Water Drainage Management**

Pourashava will build and maintain proper drainage system. Citizens can connect household drain to the main system upon submitting a fixed amount to the Pourashava (GoB, 2009; Act 58, p. 6755).

- **Public Water Body**

Person responsible for pollution of public water bodies will be punished by the Pourashava (GoB, 2009; Act 58, p. 6756).

Punishable Acts (GoB, 2009; Act 58, p. 6778):

- Any change or providing layout of drain without Pouroshava’s permission.
- Establishment of private drain by the public roads.
- Pollution of drinking water supply.
- Use of drinking water for other purposes like – taking bath, taking domestic animals for drinking, or any other deeds which can pollute the water source.
- Existence of leather industry within the residential area of Pourashava.
- Dig soil, well or stone within the residential area.

3.1.5 Bangladesh National Building Code, 2010

The objective of Bangladesh National Building Code (BNBC) is to follow minimum standards for design, construction and quality of materials. It also regulates the use, occupancy, location and maintenance of a building within Bangladesh. Rules and regulations of BNBC should be followed strictly to avoid the adverse impact of housing on environment. Set back rules and Floor Area Ratio (FAR) should be followed to minimize the impact of both natural disasters-like earthquake and man-made disasters like- building collapse and fire hazard (MoHPW, 2006; Chapter 4). According to this code the following issues should be considered before constructing a building. Appropriate sites should be chosen for development (MoHPW, 2010; Part: 2, Chapter: 1, section: 1.2.1). Adequate spaces between buildings and around buildings should be allowed for natural ventilation (MoHPW, 2010; Part: 2, Chapter: 1, section: 1.2.3). Existing water-bodies should be preserved (MoHPW, 2010; Part: 2, Chapter: 1, section: 1.2.6). Ecologically sensitive sites should be conserved and avoided for building construction (MoHPW, 2010; Part: 2, Chapter: 1, section: 1.2.8). No building shall be constructed on any site which is water logged. Site should be avoided where any part of site is deposited refuse, excreta or other objectionable material (MoHPW, 2010; Part: 3, Chapter: 1, section:

1.5.1.1). The relevant permitting authority may waive the requirement of side setback for approved low income row type, cluster or site and service schemes (MoHPW, 2010; Part: 3, Chapter: 1, section: 1.7.12.3). There should be provision of water seal latrine in low income housing. Water seal latrine can be provided on the basis of community toilets or shared toilets (MoHPW, 2010; Part: 3, Chapter: 3, section: 3.4.9). Requirements of fire safety, structural design, building services and plumbing services shall be as specified in the Code for low income housing. Piped water supply should be provided for all household in low income housing. In the absence of piped water, hand pump may be provided for all (MoHPW, 2010; Part: 3, Chapter: 3, section: 3.6).

3.1.6 National Housing Policy, 2008

Ensuring safe and secured housing with minimum standard of living facilities can improve the existing condition of housing in the slums. National Housing Policy (2008) of Bangladesh has also emphasized providing minimum standard of living to improve the existing unhealthy conditions in the slums (NHA, 2008; Section 5.9.2, p. 14). Night shelters and water supply, toilet facilities have to be provided to improve the existing condition of slum (NHA, 2008; Section 5.9.2, p. 14). But at the designing and planning phase, environmental impacts have to be considered before the provision of housing in slums. To ensure environment-friendly housing; agricultural land, forest, rivers and water bodies must not be altered into settlements (NHA, 2008; Section 5.2.2, p. 6). Natural heritage and historically important sites have to be conserved to balance equilibrium between cultural and natural environment (NHA, 2008; section 4.20, p. 5). Multi-storied, model and compact housing would be encouraged for the best use of land. Hazardous and toxic construction materials should be avoided for housing. Environment-friendly, healthy, inexpensive local construction materials, i.e. local natural resource and available materials should be used in housing (NHA, 2008; Section 5.3.2, p. 7).

3.1.7 National Land Use Policy, 2001

According to the National Land Use Policy the declared park, open space, play field and water bodies cannot be changed or modified for other usage. Identical characteristics (e.g. a tree) of a park cannot be cut down. Any kinds of development which affect the surrounding environment would be discouraged. For an example, if the establishment of a restaurant inside a park create noise and air pollution, it would be strictly prohibited. Water bodies under private ownership cannot be filled up without the permission of responsible agency. Green buffer area and open space have to be created in both coastal region and beside highways. Tree plantation would be encouraged socially to keep the environmental balance (MoL, 2001; Section 17.11, p 13; Section 17.12, p 13; Section 17.14, p 13; Section 17.15, p 13).

3.1.8 National Water Act, 2013

According to the policy of the Government of Bangladesh, the water sources should be free from any type of pollution (MoWR, 2013; Section 4.15.2 (i), p. 2789). However, the run-off of chemicals from the agricultural land into the water bodies will pollute the water. Serious consideration should be given to non-point pollution of water systems by fertilizers and pesticides as the pollution of water in urban outfalls and reservoirs, e.g., lakes, canals, ponds and ditches may result in amenity losses, fisheries depletion, and health problems and fish and aquatic species contamination. According to the policy of the Government of Bangladesh, the water should be examined in order to find ensure water quality (MoWR, 2013; Section 4.15.2 (i), p. 2783). In this regard, the treatment of wastewater is also important (MoWR, 1999; Section 4.6, p. 15). Though construction on the bank of river is seen in

order to protect the area from flood and erosion, but construction activities in the water bodies are strictly discouraged (MoWR, 2013; Section 4.15.2 (i), p. 2786). Thus, there will not be any encroachment on the bank of water body, clearance of vegetation, engineering intervention to drain water from beels (a type of natural water body) in order to turn it to cropland.

3.1.9 Safe Water Supply and Sanitation Policy, 1998

The collection, disposal and management of sewage in the slums of Bangladesh are very poor although the City Corporations or Poursavas in the urban areas are responsible for these activities. Water Supply & Sewerage Authority (WASA) is also responsible for the sewerage and storm water drainage system. However, these organizations may transfer the responsibility of collection, removal and management of sewage waste to the private sector (MoLGRD, 1998; Section 8.4.2, p. 12).

It falls under the responsibility of City Corporation or Pourashava to promote sanitary latrine in every household along with the set-up of public and community latrines. Similarly, the drainage system in the cities and municipalities will be integrated with the overall drainage system with the coordination of Ministry of Water Resources (MoLGRD, 1998; Section 8.4.1, p. 12). At the same time, measures will be taken to recycle, as much as possible, the contaminated ground water by sewerage and drainage (MoLGRD, 1998; Section 8.4.10, pp. 13). The use of sewage waste for compost and bio-gas will be promoted, and contamination of water by sewerage waste will be discouraged (MoLGRD, 1998; Section 8.2.7, p 10).

The policy for Safe Water Supply and Sanitation states that the City Corporation or Pourashava is the responsible authority to collection, disposal and management of solid waste. However, private sector can also take the responsibility of collection, removal and management of solid waste with the permission of proper authority (MoLGRD, 1998; Section 8.4.2, p. 12). In this regard, Department of Environment should deal with the private sector for solid waste management. The Policy also states that the collection of solid waste from urban areas will be used in various purposes, such as production of organic fertilizer (MoLGRD, 1998; Section 3 (viii), p. 5). Moreover, the ground and surface waters should be free from the contamination of solid waste (MoLGRD, 1998; Section 4 (q), p. 6).

3.1.10 National Urban Sector Policy, 2011

National Urban Sector Policy for Bangladesh is prepared to ensure urbanization through decentralized development. Some major issues are discussed in this policy regarding the low income housing and slum improvement. According to this policy participation of poor in decision making and in implementation process should be ensured (MoLGRD, 2011; Chapter: 3). Access of poor people to varied livelihood opportunities, secure tenure and basic affordable services is necessary to increase their security (MoLGRD, 2011; Chapter: 3). The government can increase the pool of land through the implementation of land banking, land pooling, land readjustment, land sharing, sites and service schemes etc. In addition to these lands, khas (government acquired) land can be used for low-income housing sites in the cities (MoLGRD, 2011; Chapter: 5; Section: 5.5.7). According to this policy government should undertake slum improvement project to provide housing for poor (MoLGRD, 2011; Chapter: 5; Section: 5.6). Environmental friendly local building materials and construction techniques should be encouraged for low-income housing (MoLGRD, 2011; Chapter: 5; Section: 5.6.5). Slum improvement is a priority program of Bangladesh government. There should be allocation of land for slum improvement project in national policies. There should be designated areas

in Master plan for slum rehabilitation. Access to infrastructure and services should be provided by the government to all slum dwellers (MoLGRD, 2011; Chapter: 5; Section: 5.6.6).

3.1.11 National Energy Policy, 2004 and Renewable Energy Policy of Bangladesh, 2008

The sustained economic growth in the country means the demand for electricity is also increasing at a very high rate. To develop the living of the slum dwellers ensuring access to electricity is very much important. In the circumstances of providing electricity access to any new development is challenging. It is suggested that fossil fuel based electricity production should be minimized as much as possible and renewable sources of energy should be introduced. The National Energy Policy, Renewable Energy Policy and Poverty Reduction Strategy Paper provide guidelines and acknowledge the need of introducing renewable energy sources (MoPEMR, 2008; Section 1.2, p. 3; MoPEMR, 2004; Section 7.1.9 B, p.27; MoP, 2011; p. 127). Renewable energy policy also outlined the importance government incentives to renewable energy production and involvement of local resources and NGOs in electricity generation (MoPEMR, 2008; Section 5.2, p. 7, Section 5.3, p. 7). Power Division of the Ministry of Power, Energy and Mineral Resources, Power Development Board, City Corporations or Local Municipalities and local NGOs will help implementing and monitoring the electricity development options. Another issue regarding the electricity production is the in site generation of electricity during the construction phase (e.g. the use of oil-based generators). According to Bangladesh Environmental Conservation Act it is advised that measures should be taken to ensure sound use and disposal of polluting and hazardous substances (DoE 1995; Section 4.2.C, p. 156). Department of Environment (DoE) will be the monitoring agency regarding this issue.

Provision of cooking facilities in any housing improvement project is an integral component. In Bangladesh, especially in the low income and informal settlements, the cooking smoke is one of the main sources of indoor air pollution (Dasgupta *et al.*, 2009). The main source for cooking fuel in slum settlements is burning of wood and other biomass (MoPEMR, 2008; Section 1.2, p. 3). An increase in the use of wood as the main cooking fuel will result in the reduction of nearby vegetation area. Also burning of wood and other biomass will increase the risk of indoor air pollution. In this regard, it is proposed that the use of biogas as the main cooking fuel in the slum areas (MoPEMR, 2008; Section 4.6, p. 7). National Energy Policy also discourages the use of wood as cooking fuel and suggests introduction of alternative fuels (MoPEMR, 2004; Section 7.1.9 C, p. 28). City Corporations, local NGOs and Sustainable Energy Development Agency (SEDA) will help implement and monitor the fuel generation.

3.1.12 National Disaster Management Act, 2012

Every year many people face one or more disaster like flood, earthquake, cyclone, landslides etc in Bangladesh. Hence, it is very essential to consider the disaster management perspective before the initiatives of any sort of development project in Bangladesh. For example, hazard-prone area should be avoided for the construction of such projects to minimize the risk of hazards. Thus, to combat with the disasters, the Government of Bangladesh has developed a framework to manage the disaster in a comprehensive way. In such context, three phases, namely preparedness, prevention and recovery are needed to be considered for the disaster management process in the proposed slum improvement project areas. Hazardous sites should not be encouraged at the time of housing site selection. Because housing structures are usually affected by some natural conditions, like seismic activity. In relation to this, Bangladesh National Disaster Management Act emphasizes the equipment purchase, preparation of volunteers for earthquake emergency management plan (MoFDM, 2012; Section 3.3.1, p.13). During the development works low quality raw materials should be avoided to minimize the risk of hazards.

3.2 International Obligations

Bangladesh has signed a number of international environmental conventions, treaties and protocols (ICTPs) related to environmental issues. These have to be taken into account in the implementation of PPSIP sub-components where applicable. In the implementation stage of the project, NGOs and Citizens Groups may invoke these agreements if they have concerns on infringements. The following conventions, treaties and protocols mainly focus on the adverse environmental impacts of development activities worldwide. As Bangladesh has ratified these treaties and the conventions, it is also important not to violate these during the slum integration project. Relevant ICTPs are reviewed in the following section.

3.2.1 Global Strategy for Shelter, 1988

In 1988, the United Nations Conference on Human Settlements (UN Habitat) declared Global Strategy for shelter to the year 2000 with an objective to ensure clear and visible improvement of shelter to poor and disadvantaged group of people by the year 2000. This declaration came in the 83rd plenary meeting of UN general assembly. In the annex of that declaration they mentioned guidelines to be taken to formulate strategy for shelter at the national level. In the national strategy, construction and maintenance of housing and related services should be mentioned properly in the operational objectives. Shelter development should be seen as such kind of process where men and women should be benefited gradually. Similarly, finance, land, manpower and institutions, building materials and technology as well as the ownership i.e. public, private, formal or informal, should be addressed properly. National strategy will be linked with other national and international policies e.g. social, economical and environmental. Government sector will play the leading role including administrative and legislative issues like land registration while private sector will be responsible to develop action plans, locally based small-scale building industry as well as provide adequate training to execute the plans. Equal participation of women should be ensured at all level i.e. design, construction, and maintenance of housing and they will be given preference to get shelter. Finally, monitoring and maintenance will be ensured by either government or financial organization.

3.2.2 UN Istanbul Declaration on Human Settlement, 1996

Istanbul declaration on Human Settlements has its foundation on the universal goal of ensuring satisfactory shelter for all and making human settlements safer, healthier, livable, equitable, sustainable and productive. In the current urbanizing world it is necessary to work towards adequate shelter and sustainable human settlements development. Deterioration of condition in human settlements is particularly eminent in low income urban areas of developing and less developed countries. This declaration avows that global leaders must address, unsustainable population changes including changes in economic structure and wealth distribution. Priority consideration should be given to the tendency towards over concentration of population, homelessness, increasing poverty, unemployment, social exclusion, lack of basic infrastructure and services; absence of planning, growing insecurity and violence; environmental degradation; and increased vulnerability to disasters.

The challenges of human settlements are global phenomenon. The need to intensify efforts and cooperation to improve living conditions in the cities, towns and villages throughout the world, especially in developing countries and countries with transitional economies is recognized. At the same time particular needs of women, children and youth for safe, healthy and secure living conditions is also recognized. Efforts to eradicate poverty and discrimination, to provide for basic

needs and above all adequate shelter for everyone should be intensified. According to this declaration, living conditions in human settlements should be improved in ways that are in lieu with local needs and realities. At the same time there is a need to address the global, economic, social and environmental trends to ensure the establishment of better living environments for all. For this adoption of the principles of partnership and participation is deemed as the most democratic and effective approach. In the implementation of the Habitat Agenda, local authorities are essential agent of the process. Steps should be taken towards strengthening financial and institutional capacities of democratic local authorities simultaneously ensuring their transparency, accountability and responsiveness to the needs of people.

3.2.3 Convention on World Cultural and Natural Heritage, 1972

The Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, was adopted in 1972 (also known as World Heritage Convention) and was ratified by Bangladesh in 1983. The Lalmai-Mainamati Group of monuments of Comilla was proposed to declare as world heritage by UNESCO in 1999. Moreover, the ecologically critical areas (ECA) should be treated carefully. No project site can be selected near the ECA. For an example, as Gulshan- Baridhara Lake was declared as an ECA in 2001, so project site should not be located there. According to Article 4 of the Convention, it is the responsibility of the state party to ensure the identification, protection, conservation, preservation and transmission of cultural and natural heritages. In this regard, the PPSIP cannot be undertaken in a site which may have any kind of environmental impact upon cultural or natural heritage site.

3.2.4 United Nations Framework Convention on Climate Change, 1992

The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 and came into force in 1994. The objective of the UNFCCC is “to protect the climate system for the benefit of present and future generation of mankind”. The UNFCCC says that the countries with obligations would take measures to mitigate the effects of climate change and they would provide finance to developing countries for their obligations under the UNFCCC to help them adapt with the adverse effect of climate change. Under this project, no housing integration initiatives shall be implemented out in the climatic hotspot areas without appropriate risk management.

3.3 World Bank Safeguard Policies

The Bank’s position for compliance with the environmental concerns is clearly elaborated mandatorily in the form of Operational Policy (OP) and bank Policy (BP). Operational Policies (OP) is the statement of policy objectives and operational principles including the roles and obligations of the Borrower and the Bank, whereas Bank Procedures (BP) is the mandatory procedures to be followed by the Borrower and the Bank. The Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making.

The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment. This policy is considered to be the umbrella policy for the Bank's environmental "safeguard policies" which among others include: Natural Habitats (OP 4.04), Forests (OP 4.36), Pest Management (OP 4.09), Physical Cultural Resources (OP 4.11), and Safety of Dams (OP 4.37). These directives framed as environmental ("Safeguard") policies are designed to achieve a number of objectives: i) to avoid harm to the environment and affected people and provide affected people an opportunity to participate in

the development process; ii) to improve project design and performance; and iii) to protect the reputation of the Bank.

For the current project it is planned that the donor will provide loan for developing some of the components and the community will act as the borrower. Therefore, it is mandatory that environmental consequences should be recognized early in the project cycle and taken into account in project selection, sitting, planning, and designing by preventing, minimizing, mitigating or compensating for adverse environmental impacts and enhancing positive impacts. The Environmental Assessment Source Book (1991) and its updates (1998) provide technical guidance on these issues. OPs/BPs relevant with the proposed PPSIP are discussed below:

3.3.1 OP/BP 4.01 Environmental Assessment

This policy is considered to be the umbrella safeguard policy to identify, avoid, and mitigate the potential negative environmental impacts associated with Bank lending operations. The World Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensuring that they are environmentally sound and sustainable, and thus to improve decision making. The assessment evaluates potential environmental risks and impacts, examines project alternatives, identifies ways of improving project selection, sitting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts, and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. The Bank favors preventive measures over mitigation or compensatory measures, whenever feasible.

The borrower is responsible for carrying out the EA and the Bank advises the borrower on the Bank's EA requirements. The Bank classifies the proposed project into three major categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

- Category 'C': The proposed project is likely to have minimal or no adverse environmental impacts. Expected impacts are small in scale, beyond screening, no further EA action is required for this category.
- Category 'B': The proposed project's potential adverse environmental impacts on human population or environmentally important areas-including wetlands, forests, grasslands, or other natural habitats- are less adverse than those of Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than Category A projects. These projects require preparation of a Limited Environmental Assessment (LEA) and incorporation of recommended mitigation measures into subproject design.
- Category 'A': The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. For a Category A project, the project sponsor is responsible for preparing an EIA.

3.3.2 OP/BP 4.04 Natural Habitats

The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development by ensuring protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank

does not support projects that involve the significant conversion or degradation of critical natural habitats.

3.3.3 OP/BP 4.11 Physical Cultural Resources (PCR) and Chance-Find Procedures

Physical cultural resources (PCRs) are the foundation of valuable scientific and historical information, assets for economic and social development. It is believed that physical cultural resources are integral parts of people's cultural identity and practices. Operation Policy 4.11 addresses reserving physical cultural resources, which are defined as movable or immovable objects, sites, structural, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.

If any physical cultural resources are found above or below the ground, or under water, the policy must be strictly followed to avoid any environmental degradation resulting from the project. For example, connectivity or linkage of the Lalmai and Maynamoti Monument and Temple sites in Comilla district possesses notable archaeological significance, located adjacent to the urban area and needs to be carefully managed. Therefore, the following guidelines should be strictly pursued to avoid any harm to the archeological and cultural resources.

- Projects which have chance of excavations, demolition, movement of earth, flooding, or other environmental changes need environmental screening before initiating the project.
- Projects which are located in the surrounding area of a physical cultural resources site also need environmental screening first.
- Proper Environmental Assessment (EA) process has to be accomplished when there is a chance of occurring harm to the PCR.

3.4 Implications of Policies on the PPSIP Interventions

The Development Objective of the Pro-Poor Slum Integration Project (PPSIP) is to reduce vulnerability of designated urban poor communities by providing improved, secure and affordable shelter in select informal settlements in Bangladesh. The National Housing Policy, 1999 (amended in 2008) will have an implication in successful implementation of the PPSIP, provisions have been created for the government to increase lawful ownership of land, enhance purchasing capacity of lands by giving priority to the women, children, women lead family, socially neglected, vulnerable, sick and the deprived, poor and homeless people. The government will provide land in the appropriate places among low-income groups by giving subsidy, if necessary.

National Housing Policy (2008) of Bangladesh has also emphasized providing minimum standard of living to improve the existing unhealthy conditions in the slums. Any kinds of development which affect the surrounding environment is discouraged in the policy. While Urban Sector Policy suggests government to undertake slum improvement project to provide housing for the poor, it encourages environmental friendly local building materials and construction techniques for low-income housing. The policy states that government should provide access to infrastructure and services to all slum dwellers. The Pourashava Act (2009) facilitates planning and designing of development interventions in the urban and peri-urban areas. However, Safe Water Supply and Sanitation Policy specifies responsibility of City Corporation or Pourashava for establishing sanitary latrine to every household. In addition, drainage system in the cities and municipalities will be integrated with the overall drainage system. The policy for Safe Water Supply and Sanitation states that the City Corporation or Pourashava is the responsible authority to collection, disposal and management of solid waste.

Bangladesh has always been a disaster-prone country, and the lower income strata of the society are much more vulnerable to different natural disasters. The PPSIP aims to build safer and environment-friendly houses for the slum dwellers. Hazardous site should be avoided at the time of site selection. The Environmental Conservation Rules (ECR) 1997 (DoE, 1997) classifies projects into four categories according to potential environmental impacts: (1) Green; (2) Orange A; (3) Orange B; and (4) Red. Green category projects are those with mostly positive environmental impacts or negligible negative impacts whereas Orange A category projects are those with minor and mostly temporary environmental impacts for which there are standard mitigation measures and Orange B category project are those with moderately significant environmental impacts. As discussed in Section 2.4, most of the subprojects to be implemented under PPSIP would fall either under Orange A or Orange B category and a few would fall under Green category, and none are likely to fall under Red category. These interventions would be done at a very small scale which might have low impact on the environment. Therefore, planning and implementation of the PPSIP subproject interventions will be done through a systematic Initial Environmental Examination which will suggest appropriate mitigations for mitigation of adverse impacts, if any.

Also it is unlikely that any designated physical cultural resources will be affected by the subprojects. However, the impacts will be examined as part of the environmental screening/assessment of each sub-project. The EMF provided criteria for screening and assessment of physical cultural resources. In addition, ‘Chance find’ procedures conforming to local legislation on heritage would be evaluated that any physical or cultural resources will not be impacted. OP 4.11 (Physical Cultural Resources) has been triggered.

3.5 EA Categorization of PPSIP Subprojects

The investments pertaining to improve slum habitability for the urban poor includes better housing facility with appropriate provisions of other basic utility services and facilities related to water supply, sanitation and waste management. The subprojects to be implemented under the PPSIP do not involve large-scale infrastructure development (e.g., construction of sanitary landfill, large scale wastewater treatment plant, major highways or dam/embankments). The subprojects to be carried out do not appear to pose risk of significant adverse environmental impacts, rather likely to cause minor to moderate environmental impacts which are subject to environmental screening. However, interventions having no significant environmental impacts will be funded through the PPSIP. If the potential environmental impacts are expected to be minimal and temporary, an Environmental Management Plan (EMP) with appropriate mitigation measures or suitable mechanism for managing the residual impacts will be prepared and implemented. In addition, these would involve either minimum or no involuntary land acquisition.

Thus, in view of subprojects’ nature and overall negative environmental impacts to be generated from relatively limited scale and magnitude of construction/rehabilitation works, the proposed PPSIP is classified as Category ‘B’ project on an overall basis. Considering the nature and magnitude of potential environmental impacts, EA category of PPSIP subprojects are shown in table 3.2.

Table 3.2: EA Categorization of PPSIP Subproject Interventions

PPSIP Subprojects	Specific Interventions	Major Negative Impacts	GoB EA Category	World Bank EA Category	PPSIP EA Category
Housing	Semi-permanent to permanent single house	May occur waterlogging, noise, traffic congestion, air and water pollution during land preparation	Not specified	B	IEE

PPSIP Subprojects	Specific Interventions	Major Negative Impacts	GoB EA Category	World Bank EA Category	PPSIP EA Category
	Compact multi story	and construction.	Orange B	B	IEE
	Land preparation for in-situ upgrading and land restoration for voluntary resettlement	Health and safety from toilet demolition or abandoned interventions.	Not specified	B	IEE
Roads	Pathways	Construction of roads (e.g. use of bituminous) may lead to air, water, soil and noise pollution.	Not specified	B	
	Connecting road		Orange B	B	IEE
Water supply	Installation of Tube-well or supply from municipal connection	Installation of tube-wells or construction of pipeline may lead to air, water, soil and noise pollution. At the operation, intervention may deplete groundwater level or provide contamination water.	Not specified	B	IEE
Toilet	Pour flush latrine	Poorly designed toilet will pollute the air, water and soil due to discharge of liquid waste.	Not specified	B	IEE
Community Toilet	Pour flush latrine		Orange B	B	IEE
Solid waste management	Collection, temporary storage (bin), disposal	Due to poor design SWM may not function and uncollected solid may block the drains, and pollute the air, water and soil quality.	Not specified	B	IEE
Community Building Complex	Small building to be used for meeting, and various services	May occur waterlogging, noise, traffic congestion, air and water pollution during land preparation and construction.	Not specified	B	IEE
Community awareness and training	Training program on environmental management	Training and awareness will have position impact	Not specified		-

4 Description of the Baseline Environment

The Pro-Poor Slum Integration project (PPSIP) has been designed to provide housing solutions in the selected slums or urban low income communities. The locations slums or communities to be upgraded under the PPSIP have not been fully identified yet. However, the NHA primarily identified five pilot towns/City Corporations/ Poushavas through a process of multi criteria analysis. The criteria adopted for selection of towns are: the class and population of towns, the presence of urban poverty programs and organized urban poor communities, levels of community savings in the town, willingness of the municipality and local government to participate in the project. The selected final towns are: Comilla, Sirajganj, Barisal, Narayanganj, and Dinajpur. The selection has been validated through visits to the towns, discussions with local government, and with community networks of slum dwellers. A map of five towns with their brief description is attached in Annex B. This chapter provides an overview of physical, biological and socio-economic environmental baseline information pertinent to the relevant component of the proposed slum integration project area.

4.1 Baseline Environment

Slums are underserved and or with no service parts of cities where living and working conditions are often appallingly poor. Since the growth of slum is largely a manifestation of poverty, slum settlements are being developed in an area that is very poor and fragile. As evident from studies and field visits, the environment of slums is extremely unhygienic as they are located at sites such as solid waste dumps, open drains and sewers, low land, embankments (Chowdhury and Amin, 2006; CUS, 2006). In the PPSIP, baseline environment of the slums or low income communities was studied through field visits in Comilla and Narayanganj. Both quantitative and qualitative data sets have been collected to understand physico-chemical, biological and socio-economic environment of a slum. A total of six communities were visited initially in Comilla town, namely Tikkharchar, Robidashpara, Mofizabad Colony, Godarmar Slum, Dolls House and Bou Bazar. Detailed field visits were conducted in four different slum areas of Narayanganj and Comilla. Those are: Rishipara slum, City Colony, Tikkarchar (North and South). Besides, quantitative data on water and wastewater quality, air quality and noise level have been collected from Tikkarchar (North and South), Shuvopur (Gangpar) and Shongraish. Based on the quantitative and qualitative data/findings, environmental baseline of PPSIP has been established. However, Tikkarchar slum is selected as an example of the detailed environmental baseline. Tikkarchar is situated in Comilla Sadar upazila (Figure 4.1). It occupies an area of 142.72 sq. km and located between 23°21' and 23°32' north latitudes and between 91°04' and 91°18' east longitudes. The Gumti River and Moragang Canal are flowing by the Tikkarchar slum.

The baseline data on Tikkar Char slum presented in the EMF was collected through key informants interview, focus group discussions, environmental mapping, lab analysis of air water and noise level data, satellite imagery, and some secondary sources. Usually, environmental baseline information of a project area can be collected from two sources: (1) Primary sources: The data can be collected from field visits, public consultations, key informants interview, focus group discussions, environmental mapping etc. and (2) Secondary sources. The baseline data can be collected from the published or unpublished literature, maps, satellite image, websites etc. Information about location, and administrative boundary of the project site should be collected from upazila office and municipality office Table 4.1 summarizes the types of data and data sources to be collected and used in baseline environment analysis of a selected slum.

4.2 Physical Environment

4.2.1 Bio-ecological Zoning

According to the environmental policy and regulations of Bangladesh and the World Bank, the proposed intervention should avoid ecologically critical or sensitive areas, like forests and wetlands. In such context, the delineation of the bio-ecological zone is necessary to understand the biological and physical characteristics of the project area and to identify the bio-ecological critical areas. IUCN has divided Bangladesh into 12 distinct bio-ecological zones some of which were then further divided into sub-zones (Nishat *et al.*, 2002). Tikkarchar is a part of Meghna floodplain. This floodplain occupies a low-lying landscape of chars (riverine islands) and many meandering channels. This zone is mostly affected by seasonal flooding.

Table 4-1 Primary and secondary sources of data

Data Type	Primary Source	Secondary Source
Physical Environment		
Location		Upazila Office, Municipality office
Bio-ecological Zone		Bio-ecological zone of Bangladesh by IUCN
Climate		Bangladesh Meteorological Department (BMD)
Topography		Digital Elevation Model (DEM)
Land type		IWM
Soil	Field Survey	SRDI, Agriculture Extension Offices
Surface Water	Lab Analysis	BWDB, WARPO
Ground Water	Lab Analysis	DPHE, BWDB, WARPO
Water Pollution	Field Survey	DoE, BWDB, WARPO
Air Pollution	Lab Analysis	DoE
Noise Pollution	Lab Analysis	DoE
Land Use Change		Satellite Image, SPARRSO
Biological Environment		
Flora and Fauna	Field Survey	Literature Review
Environmental Sensitive areas / Protected Areas	Field Survey	Literature Review
Socio-Economic Environment		
Demography	Field Survey	BBS
Livelihood	Field Survey	
House Type	Field Survey	BBS
Land Tenure	Field Survey	Land office, RAJUK
Water Supply and Sanitation Status	Field survey	BBS
Solid Waste Generation and Management	Field survey	Municipality office

Data Type	Primary Source	Secondary Source
Hazard and Climate Change	Field Survey	IWM, CEGIS, BWBD, WARPO, SRDI, GSB

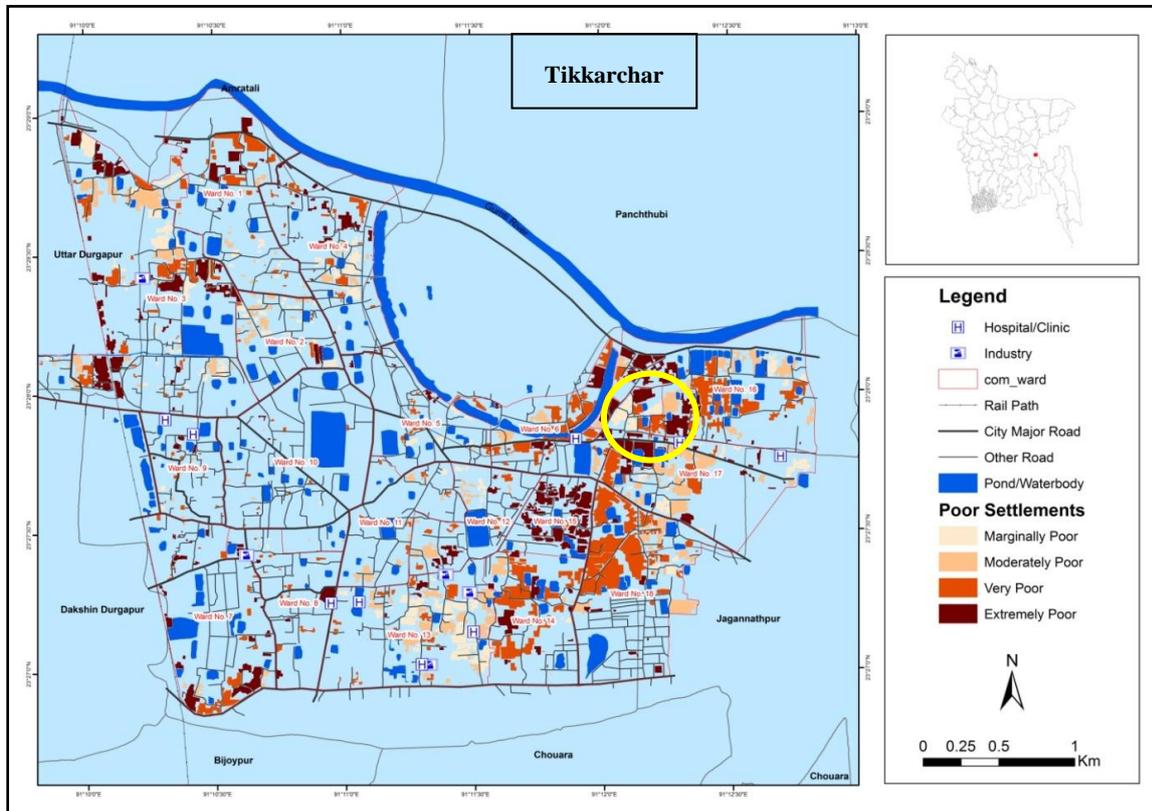


Figure4.1 Location of Tikkarchar in Comilla City Corporation

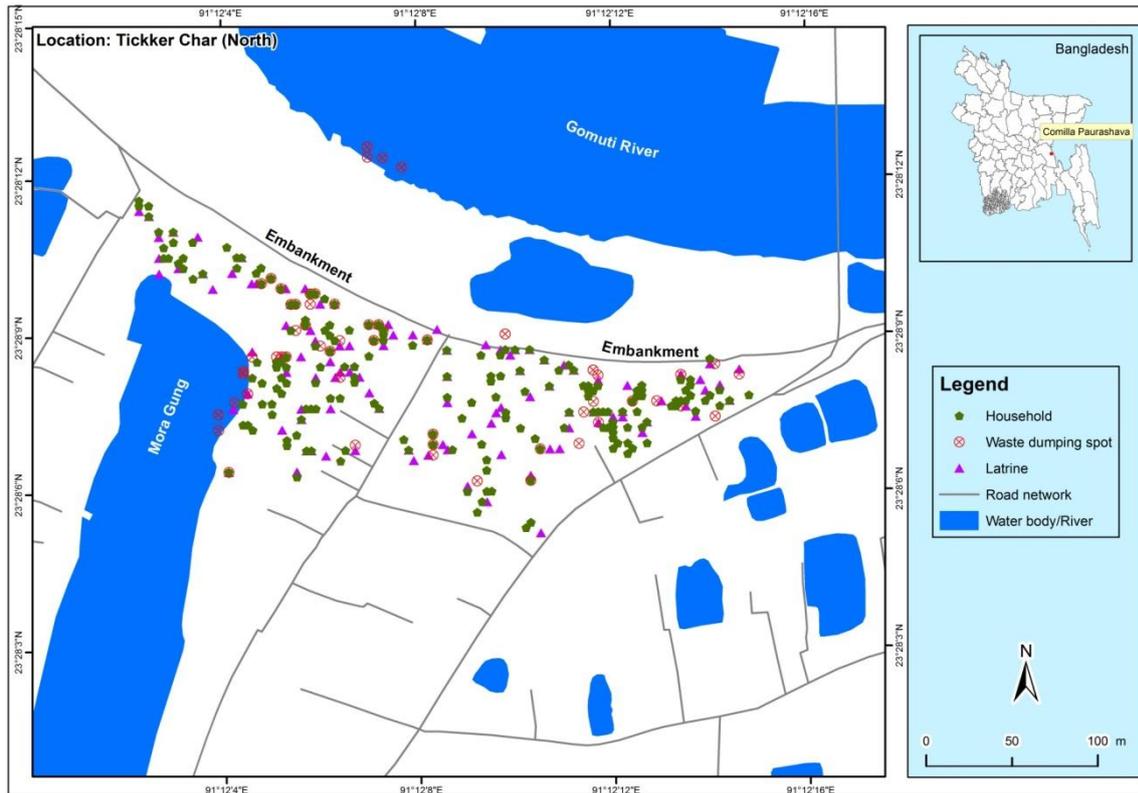


Figure 4.2 Location of unsanitary toilet and waste dumping sites in Tikkarchar, Comilla

4.2.2 Climate

To understand the meteorological conditions in and around the study areas, the baseline information needs to describe the climate factors from the nearby station of Bangladesh Metrological Department (BMD) (Table 3.1). The annual mean temperature of Comilla region varies from 17°C to 31°C. The mean annual rainfall is 3026.67 mm. However, in Tikkarchar, slum dwellers reported they feel extra heat during summer and too much cold in winter. This is because they live in the tin shed houses, which transmit temperature rapidly and there is little to no tree shade over the houses. One possible solution of excess heat could be provision of ventilation and shading.

4.2.3 Land Type and Elevation

Before the construction of any kind of urban infrastructural development, physiographic characteristics, such as land elevation (for flooding and drainage congestion), presence of water bodies in and around the site, and types of land use in the adjacent areas need to be taken into account. As for example, low-lying areas need to be avoided as these areas are generally prone to flood and water-logging problems.

Different land types (inundation land type) can be identified through the analysis of DEM² from IWM (Table 4.1). Bangladesh is an alluvial floodplain though there is a topographic variation. Interpretation of DEM data in GIS platform will provide the topographic variation and its orientation in and around the core city. Land elevation map of Comilla city is shown in Figure 4.3. This map was prepared using DEM with spatial resolution 300m that involved analysis of hill-shade view and contour.

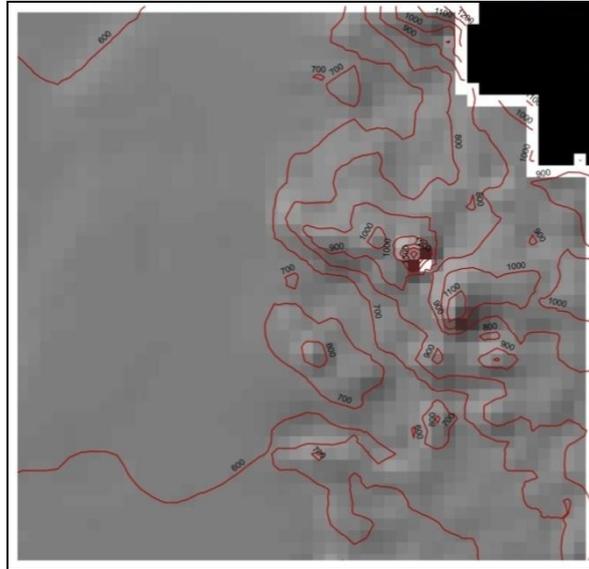


Figure4.3 Hill-shade view and contour of Comilla city and around

4.2.4 Soil

Soil characteristics that are related with the implementation of slum upgrading interventions are soil type, soil porosity for infiltration and erosion, salinity and nutrient concentrations. Information on soil properties of the selected project sites can be collected from the SRDI or local Agriculture Office (Table 4.1). In the development project, productive lands should be avoided to construct new infrastructure. As the Tikkarchar area is situated in Meghna floodplain, its soil is non-calcareous grey floodplain soil.

4.2.5 Surface Water

Surface water refers to the river, stream, khal (canal), ponds, wetland etc. Surface water resources are represented in terms of quantity of water, such as river flow available (discharge hydrograph), depth of water (water level hydrograph) and rainfall-runoff (modeling). These information should be collected from BWDB and WARPO (Table 4.1). It is essential to look into the sustainability of available surface water resources by avoiding over exploitation (e.g., through domestic and agricultural usage). In this regard, maintaining the environmental flow requirement in the surface water sources through appropriate assessment methods would be useful. During the field trip, it was revealed that, Tikkarchar was bounded by the Gumti River and Moragang canal.

² Digital Elevation Model (DEM) of an area represents the topographical variation with respect to the height. In DEM spatial resolution is also a factor for data quality. High resolution DEM ensures high quality. Different analysis of an area, like slope steepness, slope direction, contour generation and analysis, hill-shade generation can be done in GIS.

4.2.6 Groundwater

In Tikkarchar, it is observed that most of the households are dependent on tube-well for drinking water supply. However, the number of tube-wells is not adequate to serve the high demand of drinking water. Also, the inhabitants reported that they faced severe water scarcity problem during dry season. The PPSIP collected baseline information on groundwater or drinking water to check water quality at the project sites. Table 4.2 shows water samples analysis data collected at the project sites. As revealed by the data, drinking water quality is not so good. The drinking water quality in the four slum areas was not acceptable as it was contaminated with Manganese (in all the samples). Turbidity and pH values were also outside the national standards limits. Therefore, before setting up tube well for the study area groundwater availability should be taken into account. Consequently, the distance between two tube-wells and between tube-wells and latrine can be chosen in such a way so that it meets the need of safe extraction of groundwater.

Table 4-2 Drinking water quality at the project sites

Sample ID (tube-well)	Latitude- Longitude	pH	Turbi dity	Iron, Fe	Mangane se, Mn	Arsenic, As	Chloride, Cl ⁻	Electrical Conductivity	Total Dissolved Solids, TDS
Units		--	NTU	mg/L	mg/L	ppb	mg/L	mS/cm	mg/L
DW1	N 23° 7.987' E 91° 11.782'	6.30	0.83	0.06	1.72	2.8	57.0	4.52	273
DW2*	N 23° 27.946' E 91° 11.743'	7.61	85.2	0.80	5.76	1.9	16.5	10.98	554
DW3	N 23° 27.992' E 91° 11.771'	6.19	0.82	0.06	2.09	1.6	73.0	4.65	297
DW4	N 23° 27.977' E 91° 11.749'	6.14	3.30	0.30	3.87	1.5	10.2	7.33	431
DW5	N 23° 28.066' E 91° 12.314'	6.78	16.0	2.40	0.31	1.0	5.0	2.04	126
DW6**	N 23° 28.056' E 91° 12.327'	7.24	182.0	1.60	0.12	6.0	13.5	7.97	380
DW7	N 23° 28.010' E 91° 12.386'	6.43	32.1	4.20	0.38	1.2	6.0	1.91	115
DW8	N 23° 28.060' E 91° 12.348'	6.40	26.8	3.60	0.39	1.9	6.0	1.92	126
DW9	N 23° 28.112' E 91° 11.881'	6.23	8.85	1.05	1.71	0.7	51.0	4.35	271
DW10	N 23° 28.139' E 91° 11.917'	6.46	0.84	0.10	2.33	2.9	37.0	4.25	280
DW11	N 23° 28.153' E 91° 11.936'	6.44	0.92	0.06	1.39	0.5	24.0	2.82	165
DW12	N 23° 28.179' E 91° 11.950'	6.60	29.6	0.08	0.72	0.4	10.0	1.62	151
DW13	N 23° 28.143' E 91° 11.974'	6.60	2.64	0.30	0.46	1.2	11.0	2.36	156
DW14	N 23° 28.103' E 91° 11.961'	6.64	1.56	0.22	0.91	0.8	13.0	2.72	179
DW15	N 23° 28.029' E 91° 11.912'	6.86	1.31	0.08	0.76	1.5	41.0	4.07	247
DW16***	N 23° 27.941' E 91° 11.877'	6.65	10.4	1.10	0.34	1.8	11.0	2.76	190
DW17	N 23° 28.162' E 91° 12.041'	6.50	7.59	1.00	0.99	0.9	10.0	2.23	158
Standards	(ECR 1997)	6.5 – 8.5	15	0.3 – 1.0	0.1	50	150 - 600	--	1000

*Gomoti river water, **pond water, ***from municipal tank

4.2.7 Water Pollution

Water pollution in the PPSIP is considered from two perspectives: a. polluting the water body through PPSIP interventions and b. Risks of using polluted water in the water supply and sanitation interventions. Direct discharge of waste water or effluent from drains and toilets into water bodies is one of the main reasons of the contamination of surface water. The contaminated water is responsible for fisheries depletion as well as fish and aquatic species contamination. Often, high concentration of arsenic is observed in the groundwater and may affect public health if used for drinking purposes. Sub-surface layer of groundwater can also be contaminated by coliform bacteria released from unsanitary pit latrines. Thus, the quality of water is needed to be analyzed before commencement of development works to ensure that public health is not affected or PPSIP shall not raise the degree of water pollution. Water pollution related information can be collected from DoE, BWDB and WARPO.

After the field visit in Tikkarchar slum, it was seen that a number of households use the nearby canal for dumping solid and liquid waste. Besides, Sewerage pipe is interconnected with drains which are further linked with the nearby canal (Figure 4.3).

Table 4-3 Wastewater quality at the project sites

Location	Wastewater Sampling Location	Latitude	Longitude	Chemical Oxygen Demand (COD), mg/L	Biochemical Oxygen Demand (BOD ₅), mg/L
Shuvopur Gangpar)	Old Gomoti River-Mora Gang	N 23° 27.99'	E 91°11.79'	222	55
Shongraish	Pond	N 23° 28.01'	E 91°12.34'	309	120
Tikkarchar (South)	Gomoti River	N 23° 28.11'	E 91°11.88'	246	66
Tikkarchar (North)	Gomoti River	N 23° 28.18'	E 91°11.90'	244	70

Wastewater quality was sampled from effluent discharge points at open water bodies. The sample collection locations are shown in Table 4.2. Samples were collected from Old Gomoti River, Mora Gang, and a local pond near the slum areas and tested for selected water quality parameters. Table 4.3 shows the characteristics of the water samples at the different locations tested. All the samples collected registered high values of COD.

4.2.8 Air Pollution

Air quality at the slum sites are generally poor as slums are located next an industrial area or municipal dump sites. Table 4.4 shows at the selected slum sites in Comilla.

Table 4-4 Air quality parameter values in different locations visited in this study

City	ID	Location	Latitude	Longitude	SPM ($\mu\text{g}/\text{m}^3$)	PM ₁₀ ($\mu\text{g}/\text{m}^3$)
Comilla	SPOT – 1	Tikka Char (North)	N 23° 28.140'	E 91° 11.955'	1478	244
	SPOT – 2	Tikka Char (South)	N 23° 28.109'	E 91° 11.980'	424	65
	SPOT – 3	Shongraish	N 23° 28.056'	E 91° 12.327'	816	143
	SPOT – 4	Shuvopur Gangpar	N 23°27.940'	E 91°11.743'	796	51

It is observed that the value of PM₁₀ in Tikka Char (South), Shongraish, and Shuvopur Gangpar is well below the allowable 24 hours average PM₁₀. For Tikka Char (North) the value of PM₁₀ was higher than the standard value, this may be due to the short averaging time period used while

monitoring the PM₁₀ and SPM (the sampling time was only 2 hours in this study). Air quality parameters can vary temporally over different parts of the day. The air quality was monitored during the daytime and it is likely that the concentrations of the components will be reduced within the national standards limit if they are monitored over longer periods (e.g. 24 hours, 365 days etc.).

The PM₁₀ parameter of air quality was within acceptable limit in most of the areas. Only Tikka Char (North) registered PM₁₀ value exceeding the national standards, which may be due to the short averaging period of data collection. The concentration of PM₁₀ and SPM is expected to go down if monitored over longer time duration (like 24 hrs).

Indoor air quality is also poor as the slum people use fire wood for cooking. Slum dwellers of Tikkarchar usually use firewood; sawdust, rice husk, leaves and paper for cooking purposes. Many dwellers cook inside the house, so smoke and grease are deposited on the wall of houses. Also, smoke causes discomfort in breathing. Apart from smoke slum dwellers reported about dust from nearby sand field. During windy weather dust is flown inside the house and causes discomfort. Similarly, many houses dump solid and liquid waste into open space, drain and canal which also creates odor pollution. So, use of Bondhuchula could be an intervention to reduce fuel consumption and smoke.

4.2.9 Noise Pollution

The quality of an environment is also deteriorated by noise pollution. For example: if the project site is located adjacent to a highway or a factory, people living in that area will be exposed to a certain degree of noise pollution. However, it is also needed to ensure that any kind of construction work at the project site shall not increase the noise pollution to a high extent. Table 4.5 shows the noise baseline data, in dBA at the project sites. Noise quality assessment data also showed that the equivalent noise levels in the four slum areas were from 54 – 68 dBA. The higher levels of noise observed in the study area was mostly due to vehicular movement. The observed noise levels fall under suitable national standard limits for residential, mixed, or commercial areas.

The project has consulted Environment Conservation Rules 1997 and IFC EHS guidelines in order to establish an ambient noise baseline associated with the project. However, mitigation measures that are readily identifiable regardless of exact baseline measurements will be used. Some of the mitigation measures are mufflers for construction engines, personal protective equipment for workers to protect against hearing loss, and restrictions on hours of the day when works can be performed.

Table 4-5 Noise level measurements during daytime at selected locations

Name of the Slum	Latitude	Longitude	Equivalent Noise level (dBA), L_{eq} ³	Maximum Noise level (dBA), L_{max}	Description
Tikkar Char (North)	N 23° 28.140'	E 91° 11.955'	67.66	73.8	Wind flow normal, main road nearby of the project site, few vehicles passing
Tikkar Char (South)	N 23° 28.109'	E 91° 11.980'	56.46	60.9	Wind flow normal, main road is just nearby the site, few motor vehicles passing, main vehicle is rickshaw
Shongraish	N 23° 28.056'	E 91° 12.327'	54.92	58.8	Wind flow normal, main road is away from site
Shuvopur Gangpar	N 23° 27.940'	E 91° 11.743'	58.73	64.0	Wind flow normal, main road is away from site

4.2.10 Land Use and Land Cover Change

Generally, rapid urbanization process is accompanied by development of slum in the periphery of any urban area. The ultimate outcome of urbanization is conversion of most part of the agricultural land and vegetation into settlements due to the ever-expanding population of urban areas. Time series remote sensing satellite images from SPARSSO can be used to infer and understand the expansion of urbanization in Comilla City Corporation. Lands of the Comilla city corporation area have been analyzed for two different years one is for 1997, and another is for 2010. As Tikkarchar is located in the Comilla City Corporation, land use analysis of the respective zone was also considered for the proposed slum. It is observed that the major land use classes in the Comilla city are settlement, water bodies, fallow land, crop land and vegetation which are similar to Tikkarchar. From the image analysis, drastic land use change is seen in the settlement and vegetation covered areas. For example settlement area has increased around 37.25%, and vegetation covered area has decreased 99.91% with respect to the year of 1997. However, it can be said that day by day the percentage of the settlement area is increasing, and the vegetation covered area is decreasing dramatically which is a major concern for the surrounding environment of the Comilla city as well as the Tikkarchar slum. Strict development control and land use zoning regulations can be useful to address unsustainable land use change.

³ [Note: *The equivalent level is the level (L_{eq}) of a hypothetical steady sound that would have the same energy (i.e., the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The equivalent level represents the time average of the fluctuating sound pressure and is close to the maximum level observed during the measurement period. For the fluctuating noise scenario the equivalent noise level (L_{eq}) is generally used for more complete noise sample and is calculated as follows:*

$$L_{eq} = 10 \log_{10} \left[\sum_{i=1}^n P_i 10^{L_i/10} \right]$$

where P_i is the probability of the noise level lying in the i -th measurement interval and L_i is the mid-point of that interval.]

4.3 Biological Environment

4.3.1 Flora and Fauna

Baseline information on flora and fauna at the project sites are critical to any development projects in order to identify ecological resources which are important to protect and/or which may be particularly sensitive to project impacts. In the PPSIP, it is important to know whether implementation of interventions would affect any flora and fauna that identified as threatened, endangered, or rare, and need to be protected because of their particular value from a biodiversity or cultural perspective.

In recent years, forest and wetland habitat is under threat due to rapid encroachment of humans and by different types of development projects. However, in Takkarchar, no species of importance or areas of natural habitat are present. The medicinal tree mentioned is presumably plentiful in the region. Field survey revealed that most of the household have fruit trees (i.e. mango, jackfruit, star fruit, coconut, guava etc.) as well as medicinal tree (i.e. arjun tree). Similarly, some of the households have domestic animal such as chicken, duck, cattle, etc. Moreover, the inhabitants reported that several types of birds are found in this area such as magpie, crow, pigeon, dove, king fisher, etc.



Figure 4.4 Domestic animal at Tikkarchar

Usually, in slum area, housing pattern is very much congested. Open space is rarely seen in Tikkarchar slum. Even according to 70% slum dwellers, there is no community space in Tikkarchar. Almost 90% households do not have space for kitchen gardening. Half of the houses have no tree in this slum. Mango, jackfruit, blackberry, guava, coconut, star fruit etc. are seen within the slum. Medicinal tree i.e. Nim, Bashok, Arjun etc. are also found in Tikkarchar. Most alarming situation is that people who have trees inside their houses are planning to cut down trees and would construct more houses. About 80% slum dwellers do not have any domestic animals. Chicken, duck, pigeon, cow, goat, rabbit etc. different types of domestic animals are found in this slum. Sparrow, crow, heron, magpie, kite, shalik, dove, cuckoo, tailorbirds, king fisher etc. various types of birds are seen in Tikkarchar slum.

4.3.2 Environmental Sensitive areas (ESA)/Protected Areas (EPA)

Government of Bangladesh has declared 5 conservation sites, and 12 ecologically critical areas, where any development project is not allowed, because it may cause harm to biodiversity and also for the cultural and historical heritages. ESA or EPA in or nearby the project area should be listed out from literature review and Field Survey to preserve and protect the biodiversity and cultural and historical

heritages. There are no protected ecologically critical areas, cultural and historical places in and around Tikkarchar slum.

4.4 Socio-Economic Environment

4.4.1 Demography

One of the main objectives of the Pro-Poor Slum Integration Project (PPSIP) is to improve the quality of life and overall living conditions of the poor (underprivileged) people (community). In relation to this, population characteristics such as total population, Population density etc. need to be collected from field survey and BBS to recognize the overall condition of the study area. It is usually seen that the population density remains high in all the city corporation areas of Bangladesh.

4.4.2 Livelihood

Different types of livelihood groups are found in a different location which can be collected from field survey. Moreover, development projects may hamper the daily activities of these groups. For example farmers can be affected by the housing development project due to the encroachment of agricultural land or fishermen can be affected by the fish habitat depletion due to water pollution from industrial projects. For this, the existing livelihood condition, types of livelihood etc. need to be explored to know the probable impacts of such development projects on the existing livelihood groups. Generally slum dwellers are involved in different type of occupations.

In Tikkarchar, most of people are rickshaw puller, van puller, day labor, carpenter, domestic worker, etc. On the other hand, some are also engaged with fish cultivation in the canal as well as kitchen gardening. However, many of the slum dwellers prefer to live in this area because of low living cost, short distance to workplace and also for the presence of de facto property rights.

Slum inhabitants do multidisciplinary works as their occupation. In Tikkarchar slum, more than 15% people are carpenter. Another prominent occupation pattern is rickshaw pulling. More than 10% people are rickshaw puller in Tikkarchar slum. Day laborer, EPZ worker, driver, vendor, hawker, domestic worker etc. different types of occupation are found in the slum. Almost half of the dwellers have no relation with slum in regards to their livelihood.

4.4.3 House Type

In this slum integration project, one of the major objectives is to develop the community through the process of improving the standard of household of slum areas. The house type information will be collected from field survey and BBS. In this regard, it is essential to explore the existing household structure of the project site i.e the percentage of Pucka, Semi-Pucka, Kutcha and Jhupri household. After the field visit, it is seen that houses in the Tikkarchar are constructed in an unplanned manner. And maximum households are Pucka, semi pucca and Kutcha. The provisions of sunlight and ventilation system inside the houses are very poor.

It is seen from the field visit that there are three types of houses in slum. These are pucca houses, semi-pucca houses and kutcha houses. Most of the houses are one storey in slum. The slum dwellers prefer local materials like bamboo, mud etc. for constructing their houses. It is seen in Tikkarchar slum that almost 80% houses have connecting roads of which almost 50% roads are pucca. There are around 70% houses which are very near to pucca roads in Tikkarchar slum. More than 50% existing road condition is good, and 24% existing roads have proper usability in Tikkarchar. More than 20% roads of Tikkarchar slum become muddy, uneven and broken due to rainfall and causes sufferings to the slum dwellers.

4.4.4 Land Tenure

Land titling or land tenure of an area is important and securing land tenure is a pre-requisite for upgrading and improving shelter conditions in a slum. In the PPSIP, land tenure related information can be collected from Land Office and field survey. Slum and vacant land maps, currently available for the project towns, can be used as a basis to identify vacant land and current informal settlements, and land ownership of potential settlements will be verified with land records, and land use mapping and planning with town planning cells in the City Corporation.

The PPSIP does not anticipate any involuntary resettlement. Organized community groups selected under the project could, if willing, identify off site development of vacant sites, and opt to voluntarily move to these new locations. In addition, no land acquisition is planned. The Social Management Framework (SMF) of the PPSIP has extensively discussed the issues and impacts associated with securing land tenure for urban poor communities. In the Northern part of Tikkarchar, most of the slum dwellers live in a rented house whereas people of the southern part have been living for last 20-25 years.

4.4.5 Water Supply and Sanitation

In order to upgrade the condition of the poor people in the slum area the existing water supply and sanitation status need to be recognized. These data are available from DPHE and BBS. If the WATSAN status is not satisfactory then steps needs to be taken with. Water supply status refers to the identification of the percentage of peoples who use the tap, tube well other (pond, well, dig etc) as the drinking water sources. On the other hand, sanitation status refers to the recognition of the percentage of peoples who use the sanitary and non-sanitary latrines. The main sources of drinking water in the slum of Tikkarchar at Comilla are the tube well (both personal and common), nearby canal (previously linked with active river), and individual and Comilla City Corporation (CoCC) pipe water. For drinking purposes, maximum households share common tube well and pipe water supplied by CoCC.



Figure 4.5 Tube-well and pipe water supply at Tikkarchar

On the other hand, slum dwellers mainly depend on canal water for domestic purposes e.g. cooking, washing and bathing. During the slum visit, inhabitants informed that the availability and adequacy of pipe water remain same throughout the year. But the quality in some areas is not up to the standard due to the presence of excess iron. Tube wells, both common and personal, become in-operative in the dry season. So in that time, slum dwellers depend on the canal or pipe water. But the quality of canal

water is poor. As most of the drains which carry liquid waste from households are directly connected with the canal. Moreover, some slum dwellers are also using the adjacent canal for the fish cultivation. At present, less than 1% slum dwellers use surface water for drinking whereas more than 25% slum inhabitants use surface water in domestic purposes. Slum dwellers usually use surface water for cooking, washing, bathing etc. More than 20% dwellers of Tikkarchar slum have their own tube-well. At the same time in Tikkarchar, there are more than 20% households that have personal motor for pipe water supply. Around 30% households face water quality problems like- odor, excess iron, sand, dirt, algae etc. Less than 5% slum dwellers claim that there is unavailability and inadequacy of water during the dry season. 50% respondents are satisfied with their existing water supply situation in Tikkarchar slum. As most of the inhabitants depends on moragang canal water for domestic purposes and the quality is not good enough, so re-excavation and water purification of that canal could be an important intervention there.



Figure 4.6 Sanitation facilities at Tikkarchar

Several types of latrine are found in Tikkarchar e.g. pit, pour flush, along with open defecation. Latrines are made of tin or bamboo. Maximum households share common latrines and conditions of those are very poor both in terms of hygiene and quantity. In some cases, it is observed that ring or wall of the pour flush latrine is broken. In addition to that, incidents of open defecation in the drain sand surrounding areas are frequent. Sewerage pipe is connected drains which are linked with the nearby canal.

Maximum households use sanitary latrines in Tikkarchar slum. It is revealed from field data that less than 10% slum dwellers use unsanitary latrines. Slum dwellers use common latrine to minimize their latrine construction cost. After analyzing the field visit data, it is found that individually owned latrines face more problems (i.e. broken, dirty, waste flow etc.) than common shared latrines. In Tikkarchar slum, one third households have their own latrines. More than 45% slum dwellers use pit latrine whereas around 25% slum dwellers use pour flush (septic tank system) latrines. Measures should be taken to ensure access to sanitary latrines for all slum dwellers.

4.4.6 Solid Waste Management

Improper management of solid waste may degrade the quality of environment and also responsible for the health hazards. For this, the details of waste generation sources and management procedure of the projects it needs to be explored from the data of municipality office and field survey. After the identification of the potential sources and the gap of the waste management system the possible

remedial measures needs to be taken to improve the overall condition. There is no particular dumping site in the slum of Tikkarchar; therefore the slum dwellers usually dump their household waste haphazardly (Figure 4.2). They usually dump the solid waste beside the canal, in the adjacent drain or roadside which is responsible for the blockage of drain and bad odor. Similarly, few peoples have open ditch inside their house to dump solid and liquid waste from the household which also creates odor. In terms of liquid waste disposal, the slum dwellers directly dump it into the drain which is connected with the canal.



Figure 4.7 Solid and liquid waste dumping at house in Tikkarchar

Proper waste management is not seen in Tikkarchar slum. It is found from the field report that about 50% households dump their solid waste into canal (Mora Gang) and drain in Tikkarchar. Slum dwellers also use open space beside home, beside the river, beside road, hole of other houses etc. as solid waste dumping sites.

In Tikkarchar slum, more than 35% households use drain and about 20% households use canal (Mora Gang) to dump liquid wastes. These wastes deteriorate the water quality of the canal as a result fish culture is almost absent in canal.

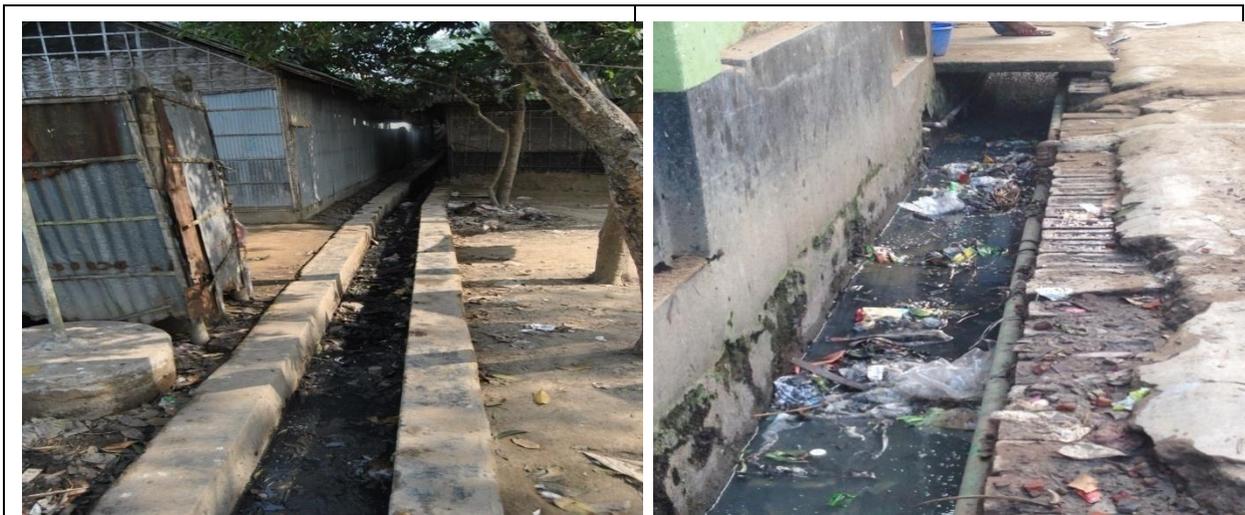


Figure 4.8 Drainage system at Tikkarchar

In Tikkarchar slum, more than 50% houses have built canal while 31% houses have no drain. It is found from the field analysis that less than 10% houses are distant from existing drainage channel. It

is also seen in Tikkarchar slum that more than 40% existing drains are blocked and dirty which is the result of poor maintenance. This blockade causes water logging inside slum. Almost 40% houses face water logging inside Tikkarchar slum because of blocked drainage as well as no drainage. In this scenario setting up a fixed waste dumping point, waste collection system by city corporation and connecting internal drains with municipality main sewerage line will be helpful to reduce environmental degradation.

4.4.7 Health Care

Healthcare related information can be collected from DPHE, field survey and literature review. Diarrhea, cold, fever, skin diseases, typhoid, stomach pain, jaundice, eye sight problem etc. are some common type of diseases in Tikkarchar slum. More than 90% slum dwellers suffer from diarrhea, cold and fever throughout the year. Around 10% dwellers face skin diseases due to unhygienic lifestyle. Half of the slum dwellers go to Nagar Health Complex for taking the medical services. Nagar Health Complex is 30 minutes walking distance from Tikkarchar slum. People have to wait a long time there for the treatment. Near about 30% inhabitants go to Shurjer Hashi Clinic, Merry Stops Clinic and other private clinics for getting better treatment. Less than 10% slum dwellers take medical treatment from paramedics and homeopaths. Inside the slum one community clinic can be established to ensure health care facilities to all dwellers.

4.4.8 Education

More than 50% children of slum go to government school which is near to their home. Besides, children also go to private schools, BRAC School, madrassa etc. for education. Almost 95% dwellers are satisfied with the present education system in Tikkarchar slum. Beside the current syllabus, co-curricular activities can also be incorporated.

4.4.9 Access to Information

About 90% slum dwellers do not have any media access to information. Mobile, television, radio, newspaper etc. are seen within the rest 10% houses of Tikkarchar. One third slum dwellers get land related information from local urban government. Land registry office, police station etc. also provide information to the slum dwellers.

4.4.10 Energy

Electricity is found almost every house in Tikkarchar slum. About 70% households use own meter whereas around 30% houses use rented electricity meter. Slum dwellers cannot afford the installment cost of gas supply. As a result, almost 60% households use wood fuel and 40% households use natural gas for cooking. More than half of the slum dwellers face inadequate electricity supply.



Figure 4.9 Piped gas and wood fuel are used for cooking in Tikkarchar

4.5 Hazard and Climate Change

In a particular slum improvement project, it is required to have a detailed profile of the hazards currently occurring and have a high probability to occur in the future. Hazard related information will be collected from different organization like, IWM, CEGIS, BWDB, WARPO, SRDI, GSB and CDMP. The usefulness of this information is twofold. First, if the area is located in a very high hazard risk area, then all development needs to be avoided from there and second, possible mitigation measures can be incorporated in the planning process to reduce the impact.

In this particular study information for several hazards needs to be collected. The significant hazards for Bangladesh are flood, storm surge, drought, salinity and earthquake. The spatial map with different hazard intensity classes will be used to identify areas under potential hazard zones. The following map shows the different poor settlements under different flood intensity class in Comilla City Corporation.

After the construction of river embankment, people of Tikkarchar slum face no river flooding for last 10 years. Around 80% slum dwellers have mentioned that they never face river flooding. According to 20% slum dwellers, the depth of last flood was low because of the high terrain of Tikkarchar slum.

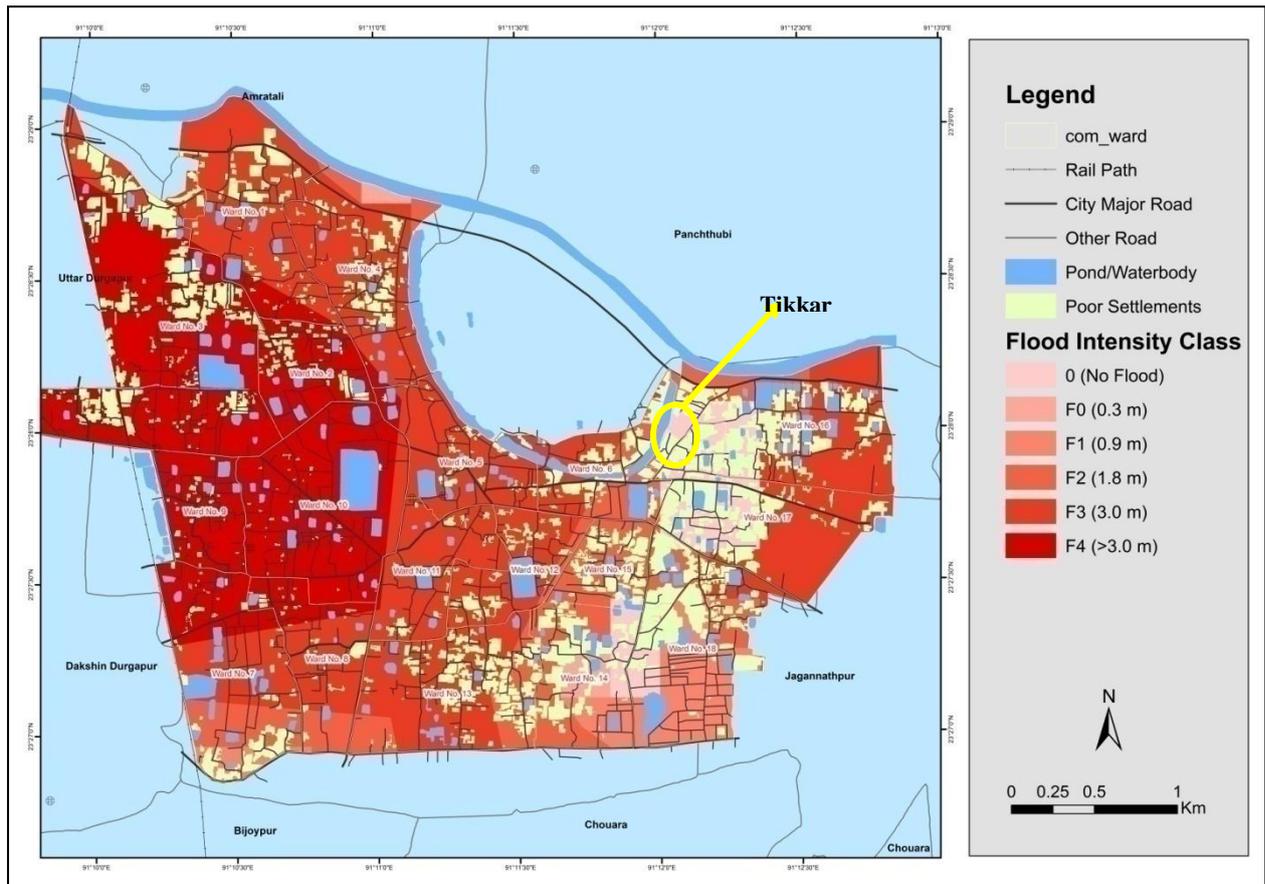


Figure 4.10 Sample flood exposure of Camilla City Corporation

The map above shows that part of Tikkarchar is under no flood risk. However, other part of this slum is under flood intensity class F2 (1.8 m depth).

The risk of natural hazard is not only calculated with the hazard intensity. It is analyzed by using the hazard severity and the vulnerability of the exposed element. In this particular project, the risk is calculated by using the following risk assessment formula.

$$\text{Risk} = \text{Hazard} \times \text{Exposure} \times \text{Vulnerability}$$

Here, Vulnerability is the measure of inherent susceptibility of the elements. In this particular study vulnerability of the settlements will be calculated by using a set of indicators. A list of provable vulnerability indicators can be outlined in the following table (Table 3-2):

Table 4-6 Indicators for Vulnerability Analysis

Physical	Social	Economic	Environmental
-Density of Population	-Household Size	-Income Diversity	Access to safe drinking water.
-House Type	-Presence of young or elderly dependents	-Unemployment rate	Access to sanitary toilet
	-Literacy rate		

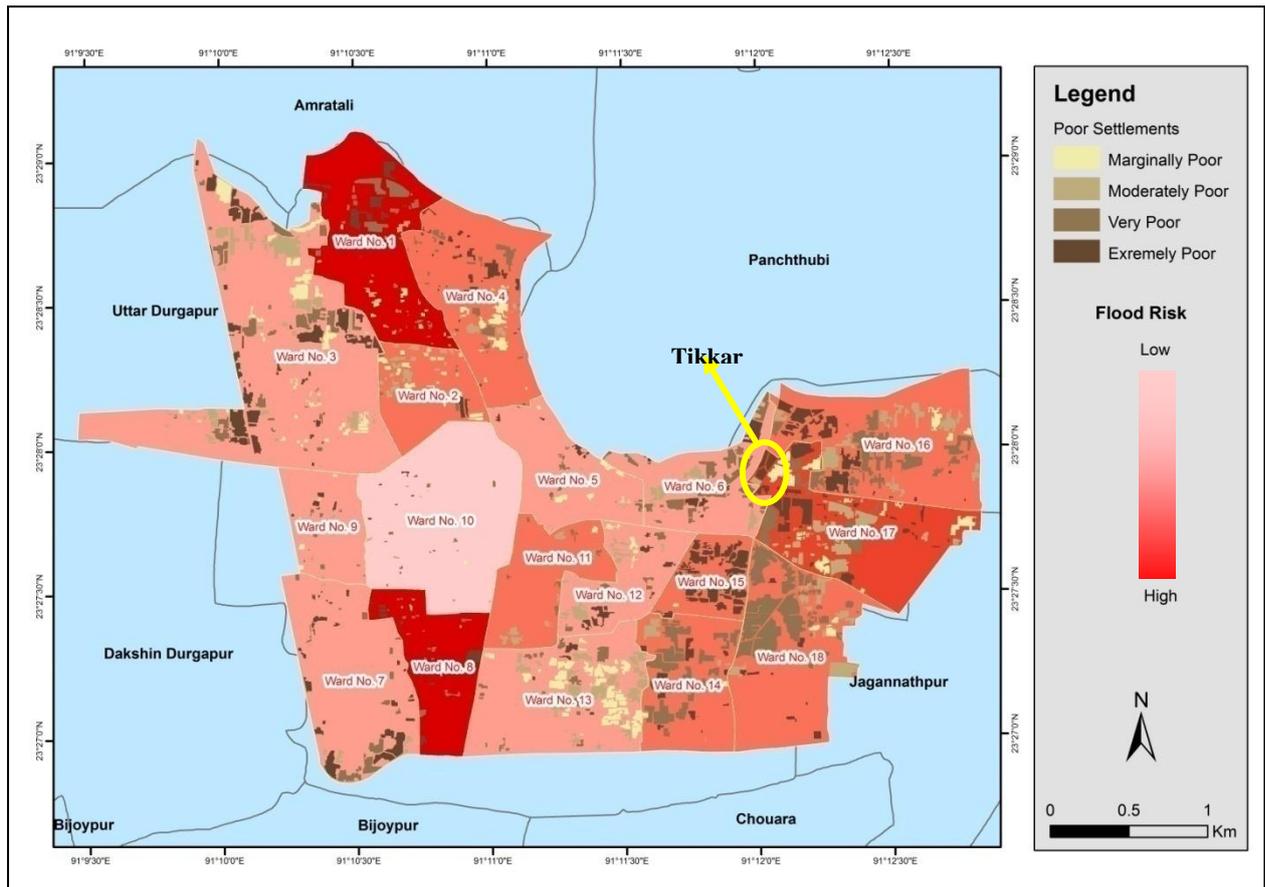


Figure 4.11 Flood Risk map of Comilla City Corporation

The standardized values of these indicators will be used to assess the vulnerability of the community. Once the vulnerability analysis is performed then the standardized values will be combined with hazard exposure values to generate the risk of the area. The following map is showing the ward wise risk from the flood in the Comilla city corporation. The map shows Tikkar char is located in the moderate risk zone.

5 Environmental Management Process in PPSIP

This chapter outlines the general guidelines for mainstreaming the environmental considerations in different components/phases of the project. It also provides necessary tools for screening or assessing environmental impacts. The environmental assessment of the PPSIP subprojects to be carried out following the provisions of the Environment Conservation Rules 1997 and the relevant World Bank Operational Policies (e.g., OP 4.01 Environmental Assessment; OP4.04 Natural Habitats and OP 4.11 Physical Cultural Resources). Following sections discuss the overall process of environmental management to be followed in the Pro-poor Slums Integration Project. A process flow diagram showing planning and implementation of PPSIP interventions and various phases of environmental management process has been illustrated in Figure 5.1.

5.1 Selection of Slums/Communities

Environmental management process in the PPSIP will be initiated with the selection of slums/communities. Primarily, communities located in five Class A Pourashava and City Corporations (with population of more than 100,000), such as Comilla, Narayanganj, Barisal, Sirajgajg, and Dinajpur will be selected and upgraded. However, slums/communities located in the five Pourashavas will be identified and final selection will be made using some social and environmental criteria. Major cities, such as Dhaka, Chittagong City Corporations have been excluded. The PPSIP will use a list of negative environmental attributes in order to avoid damage or irreversible negative impacts on the environment. The main principle to be followed for selection of slums in PPSIP is “no slums or communities located in the environmentally sensitive areas or no sub-project interventions with significant and long-term environmental impacts will be recommended for implementation. The negative environmental attributes that would guide the selection of slum are as follows:

- No activities to be carried out within 1 km of natural protected areas recognized by national or local governments;
- Any activities that require the conversion of natural habitats (when affecting critical natural habitats and natural land contours, natural habitats for this purpose being those water or land areas where most of the original plant and animal species are still present);
- Land reclamation such as drainage of wetlands (natural pond/beel/baor/haor etc.), or filling of water bodies to create land;
- Activities which would adversely affect cultural property, including archaeological and historical sites; and
- Hazardous waste management and disposal as well as manufacture, transport and use of hazardous, and/or toxic materials (except small amounts of solvents, degreasing materials, paints, fuels, and the like used during construction).

5.2 Identification of Subproject Interventions

Although a broad list of eligible sub-project interventions are discussed in Chapter 2, the propose PPSIP will identify and finalize the interventions based on site situation, community preference, technical, and environmental considerations. The NHA will use a Form for identification and selection of sub-project interventions in the design phase of the project (Annex C). This project will not recommend any interventions that have significant, long-term, and irreversible negative environmental impacts. Following interventions are ineligible for funding under the PPSIP:

- National/Regional Highway: Construction, reconstruction and extension of regional, national road and highway. Improvement and rehabilitation of any existing roads within 5 kilometers of any protected areas or any other areas of natural forest;
- Dam/ Embankment: Construction, reconstruction of dam/ embankment involving major concrete/ cement concrete/ reinforced cement concrete/ concrete blocks or earthen dam/embankment above 15 meter.
- Water supply: Tube-wells with arsenic contamination higher than national standard (currently 50 ppb). Water supply schemes with high probability of bacterial contamination or characteristics which may make water unsuitable for drinking.
- Solid Waste Management: Construction of new land fill sites for the municipality or improvement of existing land fill sites for industrial solid waste disposal that may have negative health impacts on nearby water sources or population.
- Drainage system: Extension of a drainage outlet or construction, reconstruction of drainage system within 1 km of a Protected Area.
- Sanitation: No unsanitary pit latrines will be considered as a slum upgrading intervention. In addition, large scale effluent treatment plants, CETPs, etc. would not be eligible. However, project may consider community scale effluent/wastewater treatment option to improve the environment.
- Flood protection, sewage treatment, agricultural drainage, or other works which could adversely affect wetlands or natural waterways, either through pollution or hydrological changes;

However, a full scale EIA has to be carried out if the PPSIP find the above interventions extremely essential for the community and there are no other alternative for upgrading the living and working environment of the slum resident. The EMF outlines a TOR for full scale EIA and suggests a broad range of mitigation and enhancement measures. Furthermore, the EMF also includes a general monitoring procedure and institutional setup to identify different role of institutional stakeholders for monitoring and implementation. The PPSIP will finalize the range of interventions considering technical appropriateness, social acceptability, financial and economic viability and environmental sustainability.

5.3 Review of Subproject Interventions and EA Categorization

The first step of environmental management is to review the interventions suggested for the selected PPSIP site and conduct an EA categorization. This would be a desk-based activity that would identify if interventions require an EA or excluded categorically from an EA. Figure 5.1 shows the overall environmental management process to be followed in the PPSIP. The level of environmental assessment (EA) of a sub-project would primarily depend on the class/category of the subproject according to OP 4.01 and ECR 1997. In general, almost all subprojects to be carried out under PPSIP could be classified as “Category B” according to OP 4.01 and require an EA. A few interventions may (e.g., training, education) fall under “Category C” and do not require an EA. Thus, considering potential environmental impacts and their significance, proposed subproject interventions identified in the initial stage of implementation will be categorized into two groups:

- a) Categorical exclusion (Green Category/C)
- b) Environmental assessment (Orange ‘A’ or ‘B’ Category/B)

5.3.1 Categorical Exclusion

In the PPSIP each subproject has to be screened on a case by case basis for safeguard applicability, even if national law does not require anything, since there could be minor construction even for the activities below which may cause localized impacts. However, these are also some interventions that do not have any negative impacts will be categorically excluded from environmental assessment process. Usually, these interventions/ activities can be named as green intervention. According to Environment Conservation Rules (ECR) 1997, for Green Category sub-projects, no further environmental assessment would be required.

Since all possible interventions to be required for upgrading a slum or low income community are not identified yet, a complete list of interventions that will be categorically excluded from EA are not finalized yet. Environment Specialist of NHA will review the interventions and do the categorization. Considering the possible nature of the project, following is a tentative list of interventions that are categorically excluded from environmental assessment.

- Rain water harvesting (HH scale)
- Pond sand filter (HH scale)
- Making compost from kitchen waste
- Small-scale compost or vermin compost
- Access to alternative livelihood (Non-agriculture related IGAs)
- Small-scale kitchen garden (with IPM)
- Education, health services and training except construction of facilities
- Awareness program for the community

5.3.2 Environmental Assessment of Subproject Interventions

The ‘environmental assessment’ is a mandatory requirement for the design and implementation of a subproject intervention. Any activities or interventions, funded under the PPSIP, that are assumed to have some negative impacts on the environment will be considered under this category. The PPSIP will follow a two-stage environmental assessment for identification of potential negative impacts and their mitigation measures. Figure 5.1 shows the stages of environmental assessment in the PPSIP.

- a. Environmental Screening (ES)
- b. Initial Environmental Examination (IEE) / Environmental Impact Assessment (EIA)

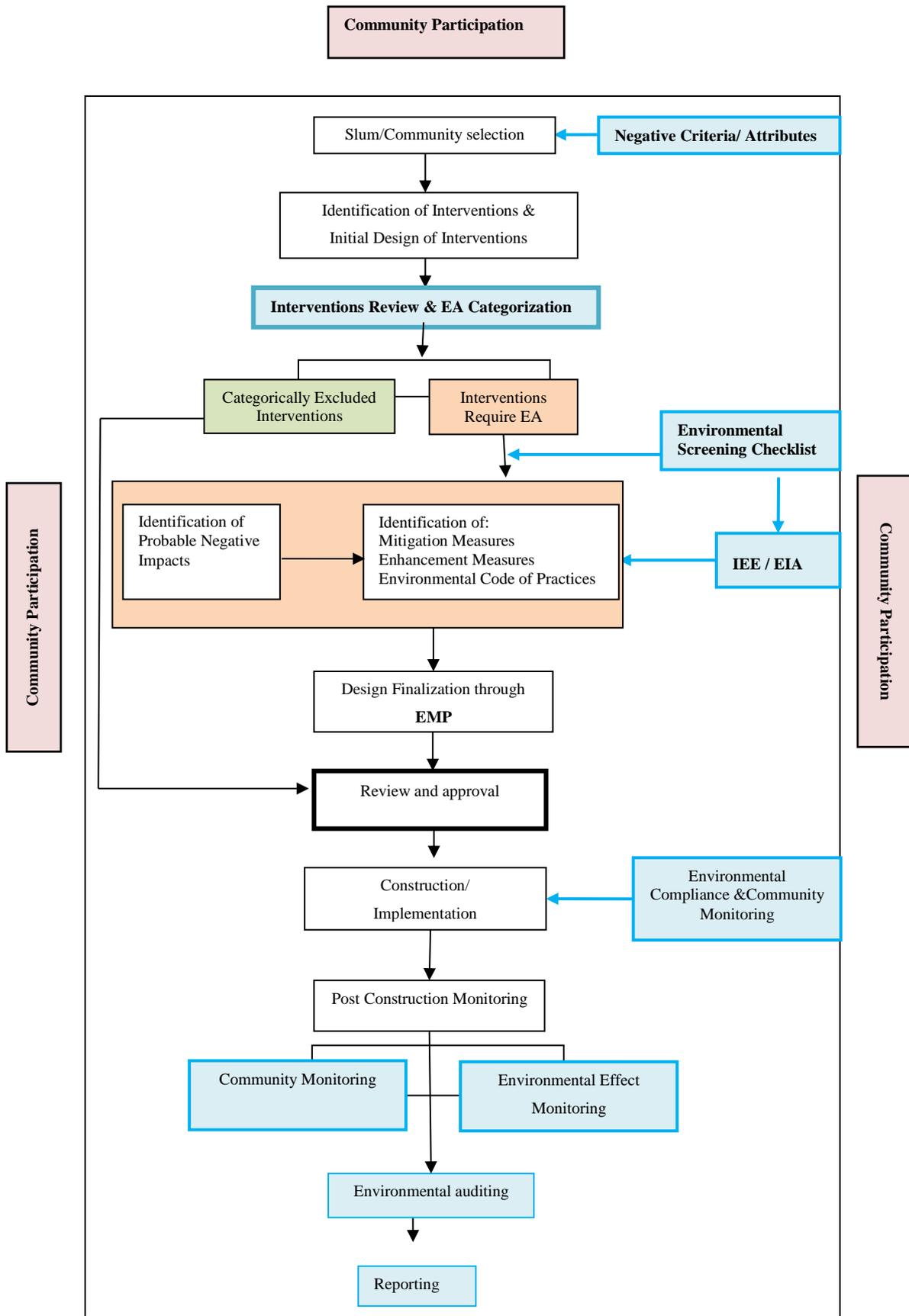


Figure 5.1 Flow diagram for environmental management process in the PPSIP

5.3.2.1 Environmental Screening

The formal environmental assessment in the PPSIP starts with the Environmental Screening (ES) of subproject interventions. The purpose of the environmental screening is to get relevant concerns addressed in the design phase of the project. Environmental Screening will determine whether subproject interventions will require an IEE or a full scale EIA. An Environmental Screening format is attached in Annex D. The Bangla form will be used for the screening purposes at field level. Using the screening form, the proposed sub-projects interventions will be screened by NHA to identify any potential adverse impacts/effects from the sub project activities and stage of further assessment with preparation of separate environmental management plan to be required for the PPSIP.

The environmental screening would involve: (i) reconnaissance of subproject area and its surroundings; (ii) identification of major subproject activities; and (iii) preliminary assessment of the impacts of these activities on the ecological, physico-chemical and socio-economic environment of the subproject surrounding areas and consideration that need to be further investigated through IEE.

5.3.2.2 Initial Environmental Examination (IEE)

The IEE is a review of the reasonably foreseeable effects of a proposed development intervention/activity on the environment. The IEE is conducted if the project is likely to have minor or limited impacts, which can easily be predicted and evaluated, and for which mitigation measures are prescribed easily. Section 5.3.3 discusses the negative impacts by subproject interventions and activities.

The participation and consultation with local communities are important in identifying the potential impacts of the proposed interventions. The IEE format for the sub grant projects is provided in Annex E. The major activities involved in carrying out IEE include the following:

- preparing an environmental baseline within the sub-project influence area, against which impacts of the proposed sub-project would be evaluated;
- Assessment and evaluation of impacts of major project activities on the baseline environment during construction phase and operational phase;
- Identifying mitigation and enhancement measures and environmental code of practice (ECoP);
- Development of environmental management plan (EMP) including preparation of environmental monitoring plan with responsibility and estimation of budget for implementation EMP.

5.3.2.3 Environmental Impact Assessment (EIA)

If slum upgrading through various interventions/ sub-projects is found to have some serious environmental threats, an EIA will be conducted. A TOR for conducting full scale EIA has been attached in Annex F. Environmental screening and IEE will serve the purpose when sub-projects will be implemented in an existing slum where site situation is relatively better and slum upgrading interventions will improve the environment. However, EIA would be recommended for the following cases:

- When resettlement in a poorly drained/waterlogged/low-lying area which requires significant land filling for land development and all infrastructures will be newly constructed to make the area habitable for urban poor. Land development by land filling may have significant adverse impact on the environment.
- If a slum development require blocking or filling out a water body/pond or cutting a forest area.

- If a slum site located next to a hazardous industrial plant.

5.3.3 Identification of Negative Environmental Impacts

All PPSIP interventions are subject to an Environmental Screening and Initial Environmental Examination in order to avoid significant negative impact or prevent execution of projects with negative environmental impacts. This section provides briefly the potential negative environmental impacts of the possible PPSIP interventions on the environment. After identification of the subproject interventions, the next step is to assess/predict the impacts of these activities on the environment. In the environmental management process of PPSIP, the potential impacts of a subproject intervention are divided into two phases:

- (A) impacts during site preparation, design and construction phase, and
- (B) impacts during operational phase.

For each phase, the impacts have been further categorized into ecological, physico-chemical, and socio-economic impacts and a number of parameters have been identified for each of these categories. Although most of the impacts would be localized due to the relatively small scale activities, there are some issues of concern that cut across the range of proposed interventions. Field visits and lessons from similar slum upgrading project in Bangladesh and other countries of the world show that issues such as community involvement, community ownership and selection of appropriate sites are some of the key concerns that influence project success and sustainability. These environmental impacts are very generic and may vary from one location to another. The following Section discusses environmental impacts by each subproject interventions:

5.3.3.1 Impacts during site preparation and construction of interventions

This section discusses the impacts associated with 1) site preparation including demolition of existing poor infrastructures, removal of debris, land filling and leveling, and 2) designing of appropriate subproject interventions and their construction.

5.3.3.1.1 Decommissioning, Site Preparation, and Restoration

Site preparation is required for any slum upgrading model or any intervention to be designed and implemented under the PPSIP. Site preparation includes demolition of existing poor infrastructures, removal of debris, survey, land filling and leveling. However, in case voluntary resettlement, restoration of existing slum is essential while the project will also undertake activities for preparing sites for relocation. If restoration is not undertaken, the entire benefit /value of undertaking the resettlement may be lost as new families may re-colonize the vacated area. Also, care should be taken to use native species, minimize erosion, maximize their ecological potential as habitat for local birds and wildlife, and also create usable public spaces for the communities to the extent possible on these areas.

Construction of the proposed PPSIP subproject interventions would take place in a community when site preparation is done. Therefore, major environmental impacts anticipated from the slum upgrading project would be occurred if site preparation is not done properly following engineering guidelines. Impacts associated with site preparation are discussed in the following section:

The physico-chemical parameters that are likely to be affected due to site preparation are: air pollution, noise, water pollution, and physical cultural resources. While the socio-economic parameters to be affected from site preparation are income loss, health and safety, temporary

dislocation, the PPSIP interventions may also affect some biological parameters, such as flora, fauna, biodiversity, etc. Upgrading a slum or community often requires demolition of existing poor infrastructures, which may create noise pollution and dust pollution. Moreover, if the demolished debris is not stored properly, the runoff from these materials may result into water and soil pollution. If vehicles and machineries are used for clearing the debris, it will also pollute air and create noise.

Site preparation may require land filling which is sometimes subject to soil erosion from surface runoff and consequently, deteriorate quality of water including aquatic habitat and biodiversity. If soil is collected from any agricultural, it will result into some impacts, e.g., loss of top soil, which may decrease soil fertility. Collecting soil from any wetland may result into disturbance in fish migration and disturbance of ecology of the wetland as a whole. If land filling is done during the dry season, serious dust pollution may occur if specific mitigation measures are not considered. Newly developed land may suffer from inadequate compactness and instability. Movement of inhabitants, construction workers and equipments in the whole project area may result in the increasing concentration of suspended solids in the air.

Demolishing existing infrastructures for in-situ development is an environmental concern. If removal of debris including 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. The excreta must be managed or removed from the project area and treated properly. The vehicles or other means that would be used for collecting and carrying debris may also create noise and air pollution in the project area.

Demolition of existing houses may require temporary resettlement and in some cases cutting down of trees. If a large number of trees are required to cut down, it will result into environmental degradation in and around the project area. If temporary resettlement requires, the PPSIP will follow the guidelines provided in the Social Management Framework (SMF).

During site preparation, physical cultural resources or archaeological sites might get affected. Since the exact locations of the subprojects interventions to be implemented under PPSIP are not known at this moment, a guideline for identification of physical cultural resources (PCR) and determination of the suitability of the sub-projects from the perspective of PCR is provided in Annex G. The likely impacts to PCR for typical activities of the sub-projects are also discussed in Annex G. The “Chance Find” procedure for protection of cultural property is presented in Annex H following the World Bank Operational Policy OP 4.11 (Physical cultural resources).

While there are archaeological and historical sites at five PPSIP Pourashavas, none of these assumed to be directly affected by the sub-project activities. Since archeological and historical sites are protected resources, possible damage of such sites by digging, crushing by heavy equipment, uprooting trees, exposing sites to erosion, or by making the sites more accessible to vandals are of particular concern. A guideline for archaeological impact assessment is presented in Annex H and a list of archaeological sites and environmental protected areas is presented in Annex H.

Often preparation of site may result in loss of income from inability to use a particular piece of land/ footpaths that were used by the road-side vendors or footpath shops. However, these groups would be able to operate by just moving a short distance away from the project site.

5.3.3.1.2 Housing and Multi-purpose Community Building

Considering actual situation at the site and need of the community, housing intervention will be designed with toilet, electricity, and cooking facilities. Therefore, impacts of basic utility services

have to be considered while conduct impact assessment of housing facilities in a selected slum. Impacts associated with the design and construction of housing interventions are discussed below:

The physic-chemical parameters that may be affected due to design and construction of housing and accompanying basic utility services include waterlogging/drainage congestion, noise and air pollution, water pollution, land loss, and top soil loss. Construction of houses involves use of equipment/machines producing significant noise (e.g., generators, pile driver, heavy truck/vehicle) and if the sub-project site is located close to human settlements/ schools/ hospitals, noise pollution would be significant. Similarly, use of stone crushers, burning of asphalt, excavation works and movement of vehicle would generate air pollution. Transportation of construction materials (e.g. cement, brick, sand) need to be transported to the project area. If cement, sand and bricks are carried without covering, it will result into air pollution. On the other hand, transportation vehicles will also result into noise and air pollution. The following activity of the construction stage is construction of temporary sheds. Construction of temporary sheds may also result into noise pollution. On the other hand, if the construction shed is not well designed (e.g. covered) it might have some environmental impacts also. For example, if cement is stored without proper cover it will result into air pollution. Leachate or residue of different chemicals used for construction may also result into water pollution if the shed is not designed properly.

During construction of houses, temporary water-logging is a potential environmental impact. Moreover, noise and air pollution are also a couple of negative impacts of construction works. If chemicals (e.g. binder) are used in preparing concrete for construction, it will result into serious air pollution and health impact. The final activity of construction stage is plastering, finishing and painting. Lead and formaldehyde based painting might have severe environmental impact and occupational hazard. On the other hand, 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 accidents and health hazards.

Three parameters have been considered for screening of ecological impacts during construction phase; these include felling of trees, vegetation and impact on aquatic (water) environment. If a toilet with the housing intervention is not designed with a septic tank or sewerage system it may discharge waste water to adjacent water body (e.g., khal, pond) close to the sub-project location and affect the aquatic environment.

The parameters considered for screening of socio-economic impacts during construction phase include traffic congestion, health and safety, and employment. Construction of houses likely to generate traffic congestion during the construction phase which may aggravate when sub-projects would involve transportation and storage of significant construction materials.

5.3.3.1.3 Water Supply

PPSIP would broadly provide water for the households from two major sources: 1) tube-well for a group of households with water distribution line and 2) supply connected with municipal stand-post or municipal supply line. For a water supply intervention, area surrounded by the tube-well or municipal stand-post and the routes along which of the water distribution lines would be laid and the immediate surrounding areas are likely to experience impact of the sub-project activities, and should be considered as sub-project influence area.

The parameters involve with water supply are: land loss, waterlogging, soil erosion, water quality, environmental health and safety, and noise. In a highly crowded poor urban settlement where land value is very high, installation of a new tube-well would result in loss of land that might have used for

housing or other purposes. New tube-well may supply contaminated water to a community and affect human health and safety if quality of source water is not tested in terms of arsenic and bacterial contamination and the tube-well is located within 10m of a pit latrine. Therefore selection of new tube-well site has to be made accordingly.

Construction of water distribution lines in the PPSIP involves digging or excavation which may result into top-soil loss, soil erosion, cutting trees, temporary waterlogging, noise and hindrance in free movement of people and vehicles. Carrying pipe might have almost the same impacts as identified in the housing section above. If the intervention requires construction of over-head water tanks, it may create air and noise pollution. The PPSIP may consider designing Rain Water Harvesting with a filtration system as an environmental enhancement measures to reduce pressure on the scarce groundwater resources which could supplement to the existing water supply options.

5.3.3.1.4 Toilet/Sanitation

Proper sanitation system is essential to improve the living condition of the slum dwellers. In the proposed PPSIP, toilets would be mostly suggested with the housing intervention. However, in some communities based on site situation, individual toilet for a family or group of family or community toilet may be implemented. Although installation of new sanitation system/ toilets is likely to bring significant positive impact on the public health and safety in a community, it might create some negative environmental impacts if not designed properly and constructed in an inappropriate location. The important environmental parameters that may be affected from the design and construction of toilet/community toilet and need to be studied carefully to avoid or mitigate adverse impacts are: land loss, soil erosion, surface runoff, waterlogging, health and safety, air pollution, odor, water pollution, etc.

Because of poor design and inappropriate location, toilets may directly discharge wastewater into adjacent storm drain that could cause pollution of the final receiving water body. This can be avoided by ensuring installation of septic tank in all establishments which would stop direct connection from sanitation facilities to storm drain. Sanitation intervention is linked to water supply and without having proper water supply option in place sanitation is worthless to the community and may create negative environmental impacts. Construction of toilet for improvement of sanitation system or preparation of land for construction would have the same impacts as identified in the land preparation and water supply sections above. Moreover, the sanitation system may result into some other impacts. For example, demolishing the existing toilet may pose serious environmental threat to the public health if excreta not managed or removed from the project area and treated properly. The vehicles or other means that would be used for collecting and carrying the excreta may also create noise and air pollution in the project area.

5.3.3.1.5 Drainage System

Planning and construction of new drainage system or rehabilitation of existing system might have some environmental impacts. Since the main purpose of the drainage system would be to drain out storm water, surface run-off, and grey water⁴, the important environmental parameters associated with the drainage system are: land loss, waterlogging/drainage congestion, traffic, water pollution, air pollution, noise, etc.

⁴ Grey water is the total volume of water generated from washing food, clothes and dishware as well as from bathing.

If a new drainage system is planned to build in a community, the drainage network would require land and may appear as a loss of valuable land that might have used for other purposes. If a drainage system is designed and constructed without maintaining connectivity with the city's drainage network or an appropriate outlet, drains would not function, rather create permanent waterlogging situation at the selected site. Therefore, careful consideration is required at the planning stage that would identify and incorporate an appropriate outlet which would facilitate drainage and avoid pollution to the existing surface water body. Construction of drains would require excavation of land that would create temporary muddy situation, temporary water-logging and road blockage. Movement of vehicles and human would also be obstructed. When construction work involves usage of binder and other chemicals with the cements, it might have environmental impact from unregulated runoff. Construction of drainage system would have same impacts as identified in the land preparation and water supply sections above. Therefore, issues/parameters explained in those sections would have to be considered while design and implement drainage system in a community. However, the PPSIP will also consider ecological design elements for drainage (for example, looking for opportunities to increase infiltration) along with "hard engineering" drainage pipes, which may be more effective and also environmentally more positive.

5.3.3.1.6 Pathways or Connecting Roads

For road construction/ rehabilitation of a footpath or connecting road, the length of footpath up to the major intersections at either end of the road could experience impacts and therefore, should be considered as the sub-project influence area. The major environmental parameters to be affected during construction are employment, traffic congestion, noise and air pollution, waterlogging or drainage congestion.

Road construction/ rehabilitation needs to be preceded by drain construction/ improvement along the road otherwise it will create drainage congestion or waterlogging at the community. In addition, proper slope of road surface (e.g., toward adjacent surface/storm drains) needs to be maintained. During construction/rehabilitation of a section of road or footpath, road-side vendors or small temporary shops on footpaths may not be able to operate for a period of time. However, considering the extent and scale of the sub-projects, it appears that such impacts would not be significant and in most cases, the affected road-side vendors or footpath shops would be able to operate by just moving a short distance away from the sub-project site. However, such impacts should be carefully assessed following the framework developed for social impact assessment.

5.3.3.1.7 Solid Waste Management

Dumping of solid wastes in the drains, pathways/ roads, open space has been a typical characteristic of all the slums in Bangladesh. Therefore, management of solid wastes is another area of interventions that would significantly improve living environment in a slum. No development interventions would work at the slum or low income community, if the PPSIP does not design or implement an intervention on Solid Waste Management. Generally, SWM involves collection, temporary storage, and disposal of solid waste that may generate from household or small entrepreneurial activities in a slum. For a proper waste management system, it is necessary to ensure collection and processing (typically collection of waste from the houses through carts and processing of waste including 3R) and an organized dumping of non-recyclables (supply of waste bins at the community for temporary storage and dumping at the designated municipal dumping place).

Implementation of the subproject involving solid waste management would significantly improve overall environmental condition and reduce the risk of clogging of drains by household solid waste. Disposal involves transportation of household solid wastes and the entire route of transportation of solid

waste from the point of generation to the temporary collection points (community garbage bin) to the locations of ultimate disposal are considered as the subproject influence area.

The parameters that are involved with solid waste management are: health and safety, sanitation, drainage congestion, water pollution, etc. These bins must be set up from a safer distance from the living areas, and it must be covered. Otherwise, it would spread germs and pollute the ambient environment. Uncovered bins would cause water and soil pollution. The vehicles that would be used to collect filth from the bins must be covered; otherwise pollution will occur as mentioned above. In the PPSIP, 3R (Reuse, Reduce, and Recycle) and composting are the two suggested environmental enhancement measures.

Table 5-1 Environmental Impacts and Corresponding Mitigation Measures

Sub-Projects/ Activities	Environmental Impacts	Suggested Mitigation Measures/ ⁵ Enhancement Measures/ Environmental Design Considerations
Preparation of Site/Land at the Selected Slum/Community		
<ul style="list-style-type: none"> ▪ Demolition of existing poor infrastructure ▪ Land cleaning ▪ Transportation of debris ▪ Land filling/raising land level 	<ul style="list-style-type: none"> ▪ Physical or social disruption to the existing and nearby communities ▪ Temporary loss of income from street venting at the selected slum ▪ Unhygienic/unsanitary environment due to demolition of old/ poor latrines and construction of camps in the development site ▪ Soil erosion/ dust pollution/siltation/water pollution/ ▪ Loss of vegetation ▪ Traffic congestion due to transportation of debris. ▪ Uneven land filling causing soil erosion 	<ul style="list-style-type: none"> ▪ Engage the community members in the construction work ▪ Transport/handle debris from toilet in a hygienic manner ▪ Properly designed culverts ▪ Compaction of developed or raised land ▪ Tree plantation at the slum boundary/slope/open space ▪ Placement of construction equipment in a proper place to avoid traffic congestion and compaction of soils. ▪ Collection and disposal of construction debris in a designated dumping place. ▪ There should be installation of latrine and campaign on social awareness to stop the open defecation.
Design, Construction, and Operation of Sub-Project Interventions		
<ul style="list-style-type: none"> • Housing (single semi-pucca house to walk up apartment) • Multipurpose community building 	<ul style="list-style-type: none"> ▪ Noise and pollution due to construction ▪ The waste form the camps during the construction of houses ▪ Water pollution due to unplanned discharge of domestic wastewater ▪ Unplanned disposal of domestic solid waste ▪ Drainage congestion/waterlogging ▪ Greater demand of bricks and cement puts pressure on fossil fuel and timber which in turn reduces the forest areas and pollute air 	<ul style="list-style-type: none"> ▪ Using locally available construction materials ▪ Rooftop plantation and gardening may reduce the excess local temperature ▪ Accommodate a drainage of wastewater ▪ Design and incorporate latrine ▪ Keep an arrangement of shelter during any disaster ▪ Consider rainwater harvesting ▪ Consider solar panel for electricity supply ▪ Keeping adequate provisions (including fire/emergency exits) for fire safety in accordance with National Building Code

⁵ The PPSIP will follow Environmental Code (ECoPs) of Practices in different phases of planning and implementation. ECoPs are attached in Annex K.

Sub-Projects/ Activities	Environmental Impacts	Suggested Mitigation Measures/ Enhancement Measures/ Environmental Design Considerations
<ul style="list-style-type: none"> ▪ Water Supply (Tube-well, municipal pipeline, tap) 	<ul style="list-style-type: none"> ▪ Waterlogging condition/drainage congestion. ▪ Depletion of ground water table through over extraction of water. ▪ Land subsidence and increase of salinity due to over pumping of water. ▪ Arsenic contamination or degrading water quality 	<ul style="list-style-type: none"> ▪ Design and construction drains with appropriate outlets ▪ Encourage water use efficiency/ demand management through awareness ▪ Facilitate groundwater recharge, protect natural system. ▪ Water filtration/treatment/rain water harvesting ▪ The digging of soil should follow the proper design to avoid the pollution and water logging.
<ul style="list-style-type: none"> ▪ Toilet (Single/ Community toilet with pour flush / piped sewer system/ septic tanks) 	<ul style="list-style-type: none"> ▪ Noise and soil pollution during the construction. ▪ Microbial contamination to the ground water from the pit latrine. ▪ Waste during loading of sewage from the sanitary communal containers. ▪ Odor 	<ul style="list-style-type: none"> ▪ Design and installation of sanitary hygienic to stop the microbial contamination to the ground water. ▪ Adequate height with proper ventilation. ▪ water supply and hand wash facility ▪ regular cleaning and monitoring
<ul style="list-style-type: none"> ▪ Drains/ Drainage system 	<ul style="list-style-type: none"> ▪ Clogging/ stagnation of flow in the storm drain ▪ Backflow of water through drain (e.g., due to high water level at downstream discharge point, such as khal/ river) ▪ Discharge from drain pollute downstream water body 	<ul style="list-style-type: none"> ▪ Designing drain considering the downstream discharge point; adequate slope and x-section; RCC cover for drain, where appropriate ▪ Not allowing direct connection to drain from toilet
<ul style="list-style-type: none"> ▪ Footpath/ connecting road 	<ul style="list-style-type: none"> ▪ Loss of agricultural and housing lands ▪ Dust and noise pollution from construction work ▪ Drainage Congestion/ Water logging due to road ▪ Soil erosion /Sedimentation of reservoir and loss of storage capacity ▪ Damage of natural drainage system due to new road construction ▪ Risk of accidents due to vehicular traffic and transport 	<ul style="list-style-type: none"> ▪ Soil compaction ▪ Proper slope of road surface ▪ Watering to reduce dust pollution ▪ Avoid construction of roads and transportation facilities which might harm cultural or historical sites ▪ Construction of drain and culvert with appropriate designs to avoid waterlogging/drainage congestion. ▪ Improvement and widening of roads for fire protection
<ul style="list-style-type: none"> ▪ Solid Waste Management 	<ul style="list-style-type: none"> ▪ Uncollected wastes blocked the drainage and sewage system. ▪ Air, water and soil pollution during the waste collection ▪ Smoke from the open burning of uncollected waste. ▪ The loading and unloading of waste at transfer station pollutes the air and soil. ▪ Odor from waste disposal site and composting system. ▪ Contamination of ground water by leachate. 	<ul style="list-style-type: none"> ▪ Encourage 3R (reduce, reuse, and recycle) ▪ Encourage composting of kitchen waste ▪ Construct/supply garbage bin. ▪ Adequate distance between waste bin and water body. ▪ Adequate distance should be maintained between the waste collection point and house ▪ Coordinate with the municipality for collection of domestic waste and disposal at the designated site

5.3.3.2 Potential Environmental Impacts During Operation

At the post-construction or operation stage, the proposed PPSIP subproject interventions generally would not create significant negative impacts if designed and constructed properly. During post-construction period, a properly maintained house would have almost no or insignificant environmental impact. However, special attention needs to be given to the operations and maintenance of water supply, toilet, solid waste management, and drainage subproject interventions in order to ensure environmental sustainability in the selected community.

5.3.3.3 Water Supply

The major environmental issues need to be considered at this stage are: waterlogging or drainage congestion, contamination of supply water, and over-extraction. If the water supply network is not designed properly it may result into frequent nonfunctioning, leakage and waterlogging at the operation stage. It is important to carryout regular maintenance and cleaning of pipe lines in order to avoid temporary waterlogging at the site.

At the operation stage, water quality needs to be tested routinely to check if the source water is contaminated by arsenic or fecal coliform. If water is found contaminated, an alternative measure needs to be adopted or water has to be treated. Over extraction of groundwater by tube-wells would lower the groundwater table and makes the tube-well nonfunctional. This would ultimately deplete the groundwater and put pressure on scarce fresh water resources. PPSIP should implement awareness program on efficient water management at the slum/poor community.

5.3.3.4 Drainage System

At the operation stage, if drains do not function properly it would create impacts on the environment. Usually, if the drainage system is not properly maintained, it may overflow at the site and create unhygienic situation and eventually affect human health. While construction and rehabilitation of storm drains are likely to bring about improvement in the drainage condition, blockage of the drains by solid wastes due to improper maintenance could aggravate drainage problem. Therefore, utmost efforts must be made to keep the drains operational (i.e., flowing) by restricting discharge of solid wastes into it and by periodically cleaning the drain. Adequate monitoring is also needed to make sure that the storm drain does not receive direct discharge of toilet wastewater from households. Better management of solid waste could significantly facilitate the maintenance of storm drains.

5.3.3.5 Toilet

During the post-construction period, toilets or community toilets need regular cleaning and maintenance. Water supply for washing and cleaning need to be ensured in all toilet facilities. If the sanitation system does not function well, harmful microorganisms may be mixed with the water sources resulting serious health impact. Emptying pits would be a big concern once they are full. Therefore, proper planning should be made to the arrangements of emptying of pits, effective sludge transport and disposal systems. It is likely that many latrine users pay others to remove the pit contents and dispose of it away from their dwellings. Where this is the case, household members may be less interested in the health benefits of the twin-pit systems than if they emptied the pits themselves. In the sanitation system, pits have to be operated in a way that ensures that the material removed is pathogen free and being free of pathogens, fecal sludge or dried feces can be used as a soil conditioner in the kitchen garden or agriculture field.

5.3.3.6 Solid Waste Management

At the operation stage, solid waste management generally involves collection, temporary storage, and disposal of household solid waste in a slum. If a solid waste management system does not work properly, household wastes will remain uncollected or partially collected and uncollected wastes will block the drainage and sewage system and as a result, it would create odor and unhygienic environment. Besides disposal, perishable kitchen can be used for making compost and later on used at the kitchen garden as an environmental enhancement measures.

5.3.4 Positive Impacts

As per the purpose and objectives of the PPSIP, there will be some positive, commendable impacts of all the proposed interventions of the project. All these impacts are divided into two categories. First is the certain positive impacts i.e. the impacts that are expected from interventions, second is the probable positive impacts i.e. the impacts that are expected from the enhancement measures.

5.3.4.1 Certain Positive Impacts

First of all, housing development itself will raise the living standard of the community. Moreover, it will give them a feeling of security and belongingness to the land. If a permanent house is built on the land, land dispute will also be minimized among the community people. When land dispute is resolved, it will automatically enhance the internal coalition among the community people. This will in result, empower them and increase their negotiation power with any organizational or institutional bodies. A permanent house that will be less vulnerable to any natural disaster will in the long run save their frequent house repairing costs. Moreover, housing will provide safety, security and shelter to the community. Most importantly it will ensure one fundamental right recognized in the constitution of the People's Republic of Bangladesh. Moreover, if efficient water supply is ensured and safe drinking water is provided for all the community people, they will not be suffering from water-borne diseases, like diarrhea and jaundice. Access to safe drinking water will also help them to stop using arsenic contaminated water. Proper and functioning drainage system will keep the project area free from water-logging and reduce the possibility of breeding of mosquitoes. In turn it will help reducing the chances of dengue fever and so on. Installation of sanitary latrine in the project area will no doubt decrease health hazards. Proper sanitation will help the community retain good health and clean environment. Moreover, it will help reducing the chances of water, air, odor and soil pollution.

5.3.4.2 Probable Positive Impacts

If the enhancement measures are ensured, some probable positive impacts are expected. For example, Fish cultivation near the project area will diversify the livelihood options of the community people. Tree plantation in the project area will help increasing the environmental sustainability and offer protection from natural disasters. Bio-gas plantation will help reducing air and odor pollution in the project area. Moreover, it will produce organic fertilizer as well as reduce pressure on natural gas. On the other hand, solar energy will also reduce pressure on electricity demand. A drug store in the project area will ensure at least the primary medicines for the community.

5.3.5 Analysis of Alternatives

At the stage of interventions identification, alternatives of the interventions in terms of location, design and route will also be identified and analyzed in order to reduce negative impacts and costs and enhance

positive impacts as well as sustainability. In the PPSIP, following aspects will be considered during the analysis of alternatives:

- Alternative location, route and design, and
- No intervention scenario.

5.3.5.1 Alternative Design, Location, and Route

In the slum upgrading project, alternatives of slum upgrading interventions would vary based on nature of project site and types of sub-projects identified. While project team identifies an intervention, alternative designs and location of that intervention need to be identified and considered. For example: alternative designs of a footpath/road could be earthen footpath or herring brick bone or bituminous road. Similarly, alternative designs of a drain could be: earthen drain, RCC drain with cover, open RCC drain etc. In case of toilet, the alternatives could be single pit or double pit pour flush toilet etc. Analysis of alternative location is very important when project team propose a toilet and drains. In case of linear interventions such as, road/footpaths and drainage system, alternative route can be considered and analyzed in order to select an option that is environmentally less harmful and more beneficial. Annex C can be used for identification and analysis of alternatives.

5.3.5.2 No Intervention Scenario

This section briefly describes the scenario of a project area without the proposed interventions. The project aims to improve the housing as well as overall living condition of the selected community people. Although a number of negative impacts of different proposed interventions have been identified earlier in this section, no intervention may lead to a more vulnerable and inhuman situation in the long run. For a better understanding, Chapter 3 could be more helpful. For example, if a community is left without any intervention the housing pattern will remain same and the current environmental consequences may be deteriorated day by day. Moreover, the community will be deprived of safe drinking water, if the demand based supply source or connectivity is not ensured. If the drainage system is not improved, current water-logging and muddy situation will not be changed. Further, to set up a functional waste management system in the intervention area, planned action is necessary. Without such interventions both solid and liquid waste of the project area will continue to degrade the environment and thereby increase the risk from health hazard. Moreover, the community will be deprived of access to legal electricity connection, gas connection and other facilities in absence of proposed interventions. In general, it can be depicted that, the community -who is the principle component of the environment, will be deprived of a chance of having a better way of life. While on the contrary, with the intervention they will be given the opportunity to lead a better life they deserve.

5.4 Preparation of Environmental Management Plan (EMP)

Environmental Management Plan (EMP) is an integral part of all subproject interventions to be designed and implemented under the PPSIP. The primary objective of the environmental management plan (EMP) is to record environmental impacts resulting from the sub-project activities and to ensure implementation of the identified “mitigation measures”, in order to reduce adverse impacts and enhance positive impacts. Besides, it would also address any unexpected or unforeseen environmental impacts that may arise during construction and operational phases of the sub-projects.

The overall impact assessment of the proposed sub-projects to be implemented by PPSIP reveals that most of the adverse impacts could be minimized or eliminated by adopting standard Mitigation

Measures. In addition, there is also scope to enhance some of the beneficial impacts to be generated from the proposed sub-projects by adopting Environmental Enhancement Measures and Environmental Code of Practices. This section describes the standard mitigation and enhancement measures and a monitoring plan that could be applied to PPSIP interventions. The major components of the EMP include:

- Mitigation Measures
- Enhancement Measures
- Environmental Code of Practices (ECoPs)
- Estimation of Cost of EMP
- Environmental Monitoring
- Institutional Arrangement for Implementation of EMP

5.4.1 Mitigation Measures

The EMF suggests a broad range of mitigation and enhancement measures to reduce negative impact and enhance positive impacts of PPSIP sub-project interventions. Mitigation measures are identified and designed to eliminate or offset adverse environmental impacts, or reduce them to acceptable levels during both construction and operation phases of a subproject intervention. This section discusses the possible mitigation measures and suggests how to minimize and /or mitigate the adverse environmental impacts to be generated from the implementation of subproject interventions. Discussions on mitigation measures are focused to various stages of implementation. A summary of mitigation measures against each subproject interventions has been presented in Table 5.1.

- When land will be filled or excavated, regular watering on the excavated land would minimize the amount of dust produced from the land. But the curator must be careful enough to create any muddy environment.
- The storage sites of construction materials must be covered with shed so that no dust or small particles from the stored cement, brick or sand could mix in the open air.
- The storage shed must have proper drainage system so that no polluted water can be mixed with other sources of water or water bodies nearby.
- When old latrines and pits would be demolished, excreta must be treated and disposed-off in appropriate manner. Specially designed vehicles must be used to carry the excreta out of the project area. If it is not possible, the pit should be covered with sand to avoid leaching and the pit must have at least 30 meters of distance from any water source.
- To mitigate water pollution during the construction stage, construction materials must be stored in a safe place. Necessary steps must be taken to make sure that the store is not situated in the vicinity of any water bodies or source. No runoff from the storage area is allowed to be discharged into the water bodies.
- Water-logging resulting from landfilling and excavation must be mitigated. Uneven soil mining from the project vicinity needs to be avoided, as it might result into water logging at source.
- Rejuvenation of silted water bodies through bed excavation might be encouraged. In one hand, it may mitigate the problem of water-logging in the nearby area, on the other hand, helps rejuvenation of aquatic ecosystem.
- During house construction, no chemical or binder are encouraged to be used in the concrete to strengthen and fasten the process.

- If concrete mixture machines are used, machine can be set up in a safer distance from the settlements and housing areas.
- When the houses would be painted, environment-friendly paints (lead free) should be encouraged.
- Use of rain water for drinking purpose could reduce the pressure on tub-wells and piped water supply.
- Community operated small scale water treatment plant (e.g., pond sand filter) can also be set up to use surface water. Steps must be taken to ensure conjunctive use all water sources (surface, ground and rain) to create a sustainable water supply system in the project area.
- The bins must have a minimum distance from the houses.
- Bins must be covered to avoid air and water pollution. Covered vans or vehicles must be used to carry the wastes from the project area.

5.4.2 Enhancement Measures

There are numbers of recommended services and / or facilities that are not integral part of the project, but if possible, can be provided to enhance the environmental sustainability of the project. The steps that might be taken to provide these services and / or facilities are called enhancement measures. The probable list of environmental enhancement measures to be used in the PPSIP is as follows:

- Environmentally sustainable as well as locally available construction materials could be used to build infrastructures. This will reduce pressure on the available resources.
- Any natural water reservoir near the project area could be preserved and used for fish cultivation. In addition, trees could be planted around the banks of the reservoirs to preserve surface soil.
- Big trees, especially medicinal trees, in the project area must not be cut down in the project area. After the development interventions are completed, trees can be planted in the whole project area to improve the living environment.
- For different purposes, like cooking fuel and electricity, alternative sources could be used. Use of bio-gas, improved cook stove, for example, could be encouraged and if possible bio-gas plants could be set up in the project area. Solar home system for energy sources could also be inspired.
- For disaster management and emergency situation like fire hazard, some steps could be taken. Points for a hosepipe connection, sand store, water tanks etc. can be arranged in the project area.
- If possible, a drug store and a meeting place or small open space can be provided in the project area to provide some medical facilities and open space in the project area. Except all these measures, any other kinds of enhancement measures that would be found to be useful and feasible for the project are also prescribed.

5.4.3 Environmental Code of Practices

Along with the environmental mitigation and enhancement measures, the PPSIP will follow Environmental Code of Practice (ECoP) to manage construction operations in harmony with the environment in an effort to contribute to the well-being of the community and the environment. The Environmental Code of Practices (ECoP) includes the activities associated from planning to implementation of different types of interventions to be considered in the PPSIP, such as, planning and designing of subprojects, site preparation, construction camps, material storage, transport and handling, waste management, and public health. A list of ECoPs is shown in Annex K.

5.4.4 Estimation of Cost for Environmental Management of PPSIP Interventions

The environment specialist of NHA will estimate the cost for the environmental mitigation and enhancement measures and will incorporate with the tender document. Many of the activities to be carried out as a part of EMP would not involve any additional direct cost e.g., employing local work force, where appropriate; keeping sub-project vehicles in good operating condition; good housekeeping, avoiding spills; prohibiting use of fuel wood for heating bitumen; etc. On the other hand, a number of activities would require additional cost. Environmental monitoring during both construction and operational phases would involve direct cost. At the same time, a number mitigation measures (including health and safety measures) would also require additional cost; these include of installation of septic tank/sanitary latrine, installation of health and safety signs, awareness documents (signs/ posters), water sprinkling on aggregates and unpaved surfaces, plantation, and protective gear.

Table 5-2 Indicative cost for environmental management and training

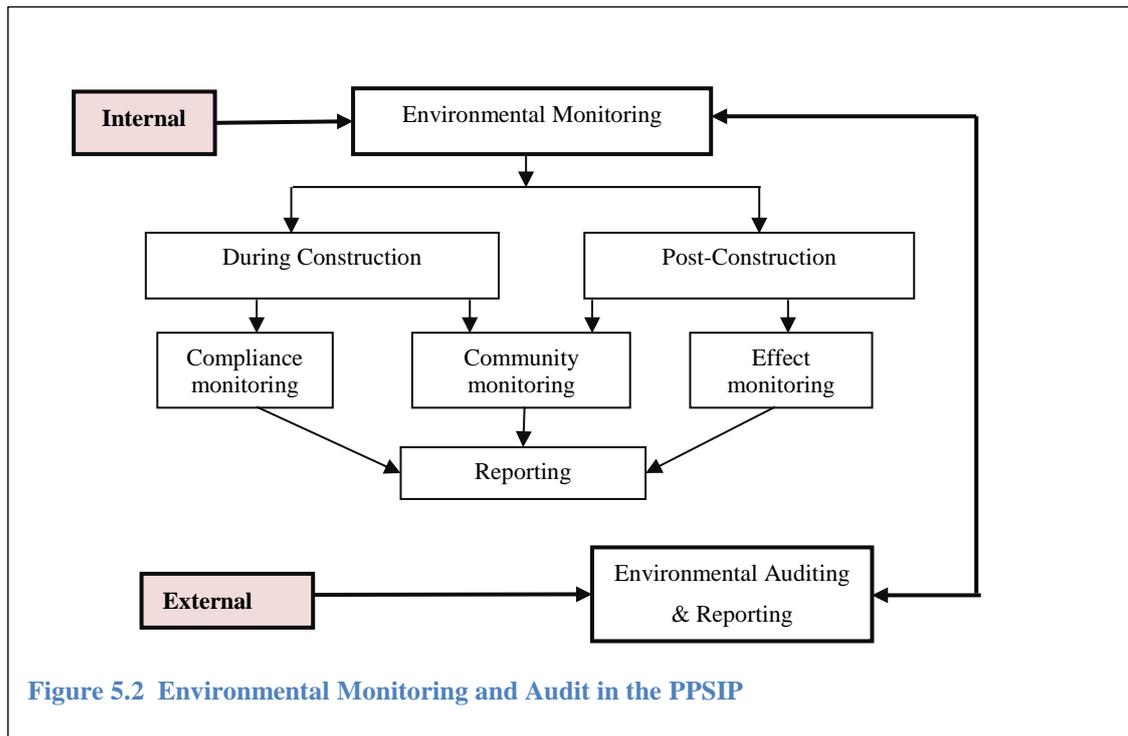
Intervention/Mitigation /Enhancement/ Training	Unit	Unit cost (BDT)	Total cost (BDT)	Funding Source	Responsibility
Environmental Mitigation and Enhancement					
Re-excavation of water bodies	Person day	300	300,000	PPSIP	PMU, contractor
Constructing PSF for surface water purification	PSF Unit	100,000	500,000	PPSIP	PMU, contractor
Maintenance of PSF during the project period	PSF Unit	200	50,000	PPSIP	PMU, slum residents
Rain water harvesting	Cost of installation	10,000	500,000	PPSIP	PMU, contractor
Tree plantation Medicinal trees, timber plantation (local variety)	Each site	100,000	500,000	PPSIP	PMU, slum residents, contractor
Culvert for drainage Construction of 4.50x3.00m RCC Box culvert	One unit	50,000	500,000	PPSIP	PMU, contractor
Regular watering on the excavated land	Person day	300	109,500	PPSIP	PMU, slum residents
Environmental Awareness and Training					
Environmental awareness	No of sessions	10,000	50,000	PPSIP	PMU, slum residents, consultants
Training on environmental health and safety	amount for one unit	10,000	50,000	PPSIP	PMU, consultants
Training on environmental assessment and monitoring	Session	50,000	250,000	PPSIP	PMU, consultants

Intervention/Mitigation/Enhancement/ Training	Unit	Unit cost (BDT)	Total cost (BDT)	Funding Source	Responsibility
Training on Environmental Management Framework	Training sessions	50,000	250,000	PPSIP	PMU, consultants
Training on environmental concern and monitoring	Training sessions	50,000	250,000	PPSIP	PMU, consultants
Environmental Monitoring and Audit					
Environmental Audit/EIA	One study	1,500,000	1,500,000	PPSIP	PMU
Environmental monitoring	Person day	1,500	75,000	PPSIP	PMU, consultant, slum residents, contractor
Water quality monitoring (PH, turbidity, hardness, Cl, TDS, Mn, As, Fe, TC, FC)	One sample	8,400	42,000	PPSIP	PMU, consultants
Air quality monitoring (SPM, PM ¹⁰)	One site	16,000	80,000	PPSIP	PMU, consultants
Noise level monitoring (Equivalent noise level (dBA), Leq, Max Noise level (dBA), Lmax)	One site	21,500	1,075,00	PPSIP	PMU, consultants

5.4.5 Environmental Monitoring

Environmental monitoring provides a systematic review of planning and/or designing and/or construction practice and operation activities which might have an adverse impact on the surrounding atmosphere. Monitoring will ensure that the environmental concerns are addressed, environmental assets are protected and quality is enhanced. Environmental monitoring is carried out to achieve the following results:

- to ensure that the facility is meeting all environmental regulatory requirements, and that commitments made in the EIA document and/or the conditions of approval are being met;
- to test impact hypotheses, and to verify the predictions and assessment of environmental impacts, thus contributing to better assessments in the future;
- to evaluate the performance effectiveness of mitigation;
- to compare actual and predicted changes to the environment, so that immediate actions can be taken to mitigate unanticipated impacts; and
- to strengthen confidence of the government and the public in the EIA process.



The NHA Environmental Specialist, PMU, Consultants, Pourashava, and the community will be responsible for conducting the periodical environmental monitoring. Throughout the implementation period, the PPSIP will conduct three types of monitoring: 1) compliance monitoring, 2) community monitoring, and 3) effect monitoring. Figure 5.2 shows an overall process of environmental monitoring and audit to be followed in the PPSIP

5.4.5.1 Compliance Monitoring:

The NHA will conduct a Compliance Monitoring at the construction stage to check whether Environmental Mitigation Measures or Environmental Code of Practices (ECoPs) suggested in the design phase are being followed or implemented properly. A simple format for compliance monitoring has been presented in Annex L.

5.4.5.2 Community Monitoring

Community monitoring will be conducted by the slum residents or community people who reside at the project site and monitor various environmental issues at the both construction and post-construction stages of the PPSIP. The community monitoring would covers two specific aspects: 1. Compliance of mitigation measures and 2. Effectiveness of the PPSIP interventions. A Bangla format will be prepared and shared with the community 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 sample format for community monitoring has been presented in Annex M. A short training program will also be organized to provide an orientation on the process and effectiveness of community monitoring.

5.4.5.3 Effect Monitoring

The NHA and other appropriate authority (if applicable) will be responsible for effect monitoring and the community will complement the monitoring as a watch dog. A separate format for environmental effect monitoring has been attached in Annex N. During the effect monitoring, the NHA would check whether slum upgrading interventions are functional and served their intended purposes. Table 5.3 provides a guideline for environmental monitoring system for the PPSIP. With respect to storm drains, utmost efforts must be made to keep it operational (i.e., flowing) by restricting discharge of solid wastes into it and by periodically cleaning the drain. Adequate monitoring is also needed to make sure that the storm drain does not receive direct discharge of toilet wastewater from households. Such discharges would contaminate the drainage water and eventually the receiving water body (river or khal), and would bring about a wide range of adverse environmental and health outcomes. Regarding effectiveness of solid waste management intervention, the NHA will monitoring whether Disposal of household solid and other wastes are causing any environmental pollution.

Table 5-3 Environmental monitoring system

Interventions /Monitoring Issues	Monitoring Site/ Area	Monitoring Parameters/ Indicators	Types of Monitoring	Responsibilities
Housing	Project site	Land filling material, waterlogging, dust, air pollution, noise, traffic, vegetation coverage,	Compliance, Community, and Effect	Contractor, Municipality, Community
Water supply	Project site	water quality, arsenic, coliform, GW level, waterlogging	Compliance, Community, and Effect	Contractor, City Corporation/ Municipality, Community
Pathways/ road	Project site & surrounding area	noise pollution, dust, water stagnation, pot holes,	Compliance, Community, and Effect	Contractor, Municipality, Community
Solid waste management	Project site & surrounding area	No. of HH waste managed properly, odor from bin, drain clogging,	Compliance, Community, and Effect	Contractor, Municipality, Community
Demolishing of cultural heritage	Within 1 km of project site	No. of cultural heritage site fall under the area of intervention	Compliance, Community, and Effect	Contractor, Municipality, Community
Drainage	Project site & surrounding area	Solid waste in the drain, water flow, outlet, water pollution	Compliance, Community, and Effect	Contractor, City Corporation/ Municipality, Community
Sanitation /latrine	Project site	% of Kucha/semi pucca latrine, waste/sludge discharge, water supply, community health	Compliance, Community, and Effect	Contractor, Municipality, Community

Respective monitoring authorities shall maintain appropriate register in managing the monitoring information at each stage. The consultants will maintain a database for sectors, environmental screening and EMP.

5.4.6 Special Environmental Clauses (SECs) for Tender Document

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

Environmental Management Plan (EMP):

The Contractor shall carry out all mitigation and enhancement measures (including those related to mitigation of air/noise/water pollution; drainage/traffic congestion) as specified in the Environmental Management Plan (EMP), annexed to this Contract.

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, run away, 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.

Health and Safety:

- The Contractor shall observe and maintain standards of Health and Safety towards all of his employees not less than those laid down by the national standards or statutory regulations.
- Where appropriate, to prevent workers falling from heights, the Contractor shall make sure that every temporary floor openings shall either have railing of at least 900 mm height or shall be constantly attended; every floor hole shall be guarded by either a railing or a hinged cover, or constantly attended; every stairway floor opening shall be guarded by railing at least 900 mm high on the exposed sides; every ladder way floor opening or platform shall be guarded by a guard railing; every open sided floor or platform 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 shall provide and maintain in prominent and well-marked positions all necessary first-aid equipment, medical supplies and other related facilities. A sufficient number of trained personnel will be required to be available at all times to render first aid.
- 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.
- The Contractor shall report to the Engineer promptly and in writing particulars of any accident or unusual or unforeseen occurrences on the site, whether these are likely to affect progress of the work or not.

Disposal and Pollution:

- The Contractor shall not dispose any waste, 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, noxious 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 shall construct sanitary latrine or septic tank system or install portable cabin toilet 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 local government authority (Pourashava or City Corporation).

Earthworks:

- During excavation of trenches in natural soils, the Contractor shall make sure that the first 300 mm to 450 mm of topsoil be excavated and stored on one side of the trench and the rest of the excavated soil is stored separately/ on the other side; during back filling of trench, the topsoil should be placed on the top again.

5.4.7 Review and Approval

After receiving the completed Environment Screening, IEE or EIA report of the selected slum or community, NHA Environment Specialist will assess the adequacy of the mitigation measures and EMP. This assessment will be conducted through desk review and field visits and concentrated on the quality of the baseline information, identification of potential impacts, effectiveness and the adequacy of the mitigation measures, and monitoring plan. This report will be submitted to the PD for approval and further action.

5.5 Compliance Check by IDA

NHA will seek concurrence of the World Bank Team in view of their compliance with environment guidelines. IDA can ask for further clarification for strengthening the environmental documentation. In that case, NHA will take necessary action to improve or revise the document and resubmit to the IDA for re-examination.

5.6 External Environmental Audit

An independent environment evaluation will be carried out to ensure correctness of the sub-project wise environmental assessment and implementation of the environmental management plan (monitoring and mitigation). NHA will hire the services of a consulting firm to carry out the external monitoring/evaluation of the subprojects. The team will include an environmental specialist who will assess the implementation of environmental mitigation and monitoring activities and also evaluate impact on environment. Based on the evaluation result, NHA will take remedial measures (if

required) with IDA's concurrence. For the purposes of effective audit of the environmental performance of a project, following issues need to be considered:

- I. the analysis and interpretation of all monitoring and any audit data, to assist in the prevention and mitigation of impacts on the environment;
- II. the examination of all available information related to the investigation of the nature, and causes of actual, potential and cumulative environmental impacts and complaints/queries; and
- III. proposals/suggestions for:
 - a. remedial measures for the resolution of impacts
 - b. effective implementation of proposed mitigation measures
 - c. documentation and summary of audit findings
 - d. liaison and consultation of with the public and concerned groups on the effects of project works on the environmental audit.

The timing and frequency of the external monitoring will be decided by the NHA based on the number of the sub grant projects to be funded under PPSIP. The TOR for the Third Party monitoring Firm is included in Annex O.

6 Institutional Arrangements and Capacity Building

6.1 Overall Institutional and Management Structure

The proposed PPSIP is built on existing institutional arrangements within the National Housing Authority (NHA) under the Ministry of Housing and Public Works. The effective implementation of environmental safeguard and management in the PPSIP project will be achieved by setting up an efficient institutional framework where the NHA will design and implement subproject interventions and ensure environmental sustainability of those interventions. In addition, the proposed project would begin to expand the role of the NHA from that of the housing developer to an enabler and facilitator of community-driven solutions to improved and secure developments. The NHA will implement the PPSIP with the active engagement of Urban Resource Center (URC), City Corporations/Pourashavas' and community development committees (CDC). Table 6.1 shows the institutional arrangement for implementation of environmental safeguard and management. Following sections will discuss the role of different actors in the design and implementation of PPSIP:

6.2 National Housing Authority (NHA)

National Housing Authority is the implementing body of PPSIP project where the Project Management Unit (PMU) will be responsible for overall environmental management including implementation of mitigation measures and monitoring, and preparation of quarterly progress and monitoring reports. The PMU is staffed with a Project Director, Deputy Project Director, Environment Specialists, Social Specialist, Procurement Specialist and Financial Management Specialist. During implementation, Project Director with the help of an Environment Specialist at the PMU and NHA Divisional Offices will guide the implementation of the EMF. NHA also has to guide the consultants to conduct community consultations for project implementation and related environmental safeguard issues. Environment Specialist will ensure that government laws and WB guidelines are followed during implementation. It is clear that, for effective implementation of the project, a very efficient institutional linkage has to be developed. Therefore, two major bodies need to be included, which will be:

1. National Steering Committee (NSC) headed by the Secretary, MoHPW;
2. Technical Review Committee (TRC) headed by the PD. This committee will also work as national level environmental committee; and

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

6.3 City Corporation or Pourashava

The City Corporation or municipality or Pourashava will be responsible for environmental monitoring at the local level. From the review of organogram of Comilla City Corporation (CoCC), it is found that detail structure of organogram has not been finalized yet. Only name of the relevant department of City Corporation is given there. Therefore, detail analysis of organizational capacity is not possible. However it is presumable that employees from departments like Engineering, Health and Family Planning, Hygiene, Town Planning will be involved for environmental screening and monitoring

operations. Environmental management committee can be formed comprising of mayor, chief executive officer, district level environmental expert from NHA and officers from town planning wing, health and family planning wing, hygiene wing, engineering wing, etc.

The City corporation or district level Committee will be responsible for:

- Monitoring project intervention for environmental sustainability and coordinating during construction stage with collaboration of contractor and local government
- Conducting post project monitoring of environmental aspects and providing guidance to community for post-project monitoring

6.4 Consultant

A Consultant Team has been recruited to assist the NHA for overall design of the PPSIP including, community consultation, site selection, infrastructure design, and implementation. The specific role of the Consultant team will be as follows:

- Community consultation about project objective, scope and design
- Consultation with local communities for identifying potential environmental impacts because of project intervention
- Designing the interventions
- Conduct environmental screening and monitoring.
- Prepare reports

6.5 Urban Resource Centers (URCs)

During implementation, urban resource centers (URCs) will be established in each of the five towns under the project. The URC will provide technical assistance to selected communities through community mobilizers, community minded architects, engineers, social and environmental support, and financial specialists. The URCs will be overseen by the PMU, with key Consultant staff visiting frequently to monitor and supervise the quality of work. The first URC has been established in Comilla City Corporation to provide the technical and detailed design support to the selected communities, and liaise with key municipal officers. The staff for the URCs will be provided through consultancy assignments.

6.6 Community Groups

Implementation of PPSIP will be performed through community driven approach. So Community groups will play a major role for environmental assessment and monitoring. At the Community level, the Community Committee headed by local community head or leader will undertake the supervision and management of environmental concerns. The Community Level Committee will be responsible for the following activities:

- Participating to identify environmental impacts and priority
- Strong participation in environmental screening and monitoring (during and post construction compliance and effect monitoring) to be conducted by PMU, URC/Consultant, City corporation or pourashava
- Conduct community monitoring.

Table 6-1 Institutional Arrangement for Implementation of Environmental Safeguard

PPSIP Activities	Environmental Safeguard	Responsibilities/ Institutional Arrangement
Slum selection	Environmental Criteria/ attribute	PMU, URC/ Consultant, NHA Env Specialist, Pourashava, Community
Identification of Interventions	Intervention Identification and Description	PMU, URC/Consultant, Pourashava, Community
Designing of the Interventions	Engineering design and	PMU, URC/Consultant, Pourashava
Environmental Assessment	Environmental Screening 	NHA Divisional Offices, URC/Consultant, Pourashava, Community
	Initial Environmental Examination 	
	Environmental Impact Assessment	PMU, Env Specialist, URC/Consultant
Review and Selection of Interventions	Incorporate Environmental Mitigation Measures, Environmental Code of Practices (ECoPs), Health & Safety	PMU, NHA Env Specialist
Construction	Compliance Monitoring	Compliance: NHA Div. Office, URC/Consultant. Pourashava
	Community Monitoring	Community groups
Operation	Effect Monitoring	URC/Consultant, Env Specialist, Community
	Environmental Audit	PMU, NHA Env Specialist, Consultant
Reporting	Quarterly progress report, Monitoring report	PMU, NHA Env Specialist, URC/Consultant

6.7 Capacity Building through Training and Awareness

Capacity building of NHA is required for proper implementation of environmental safeguard and management. These could be done in two ways. One is by appointing environmental expert at local and district or city corporation level. For appointing environmental expert, advocacy for environmental management at the policy making level will be needed.

Another way is awareness building and training for existing staff at district and local level. Thus, awareness raising session and training session will be arranged to educate and train existing NHA professionals so that they can efficiently conduct environmental monitoring operations. The trained officials can be employed to conduct awareness-building and training for community members and those who would be involved in selection and implementation of PPSIP interventions. Capacity building of city corporation officials and community members will also be a must that will enhance the implementation of EMF. Table 6.2 suggests specific training plans for capacity building of each stakeholder involved in the PPSIP.

Table 6-2 List of suggested environmental training programs for capacity enhancement

Target Participants	Type of Training	Responsibility	Duration
Community Organization	Environmental awareness	PMU	1 day
	Environmental concerns and Community monitoring	PMU	2 days
Construction workers	Environmental Health and Safety	Contractor	0.5 day
PMU and NHA Divisional/Field Officers	Environmental Assessment and Monitoring	PMU	5 days
	Environmental Management Framework (EMF)		1 day
City Corporation	Environmental concerns and Environmental Monitoring	PMU	1 day

6.8 Risk Governance Structure

Four elements of governance by World Bank group are Transparency and information, Accountability, Legal framework and Public sector management.

Transparency and information: Ensuring the access to information for the various stakeholders through appropriate disclosure mechanism. The donor and the NHA will ensure the compliance in this respect.

Accountability: All the relevant stakeholders should be held responsible for their actions, appropriate monitoring protocol need to be in place. NHA will act as the highest authority in this regard.

Legal framework: Appropriate legal framework should be in place that controls the probable environmental degradation and reduce the consequences of inaction. Furthermore, the implementation of ECA and ECR need to be enforced by the legal system. DOE will act as a watchdog for this component.

Public sector management: changing the organizational structure of a sector agency to reflect new objectives, making budgets work better, sharpening civil-service objectives. In the process, NHA's appointed environmental expert will be responsible for public sector management and integration.

6.9 Grievance Redress System

A grievance or a Grievance Redress System (GRS) will be set up at local, district and national level to manage and monitor the PPSIP smoothly. At the local level the Chairman of Municipality or the Mayor of the City Corporation will act as the Grievance Redress Officer (GRO). At district level the

Deputy Commissioner (DC) will act as the GRO. At central level the Deputy Project Director (DPD) would act as the GRO. And Finally the Chairman of National Housing Authority (NHA) would be given the responsibility to act as the GRO. The structure and functions of the whole Grievance Redress System (GRS) is as follow:

- A complaint box and an online registration system would be developed for grievance registration.
- Any person (worker or inhabitant) may choose to submit his/her complaints by following any of the means stated above e.g. putting written complaint in the compliant box, sending an e-mail to the concerned e-mail address or through telephone conversation.
- The first step to put complaint would be to the local level GRO, that is either to the Municipality Chairman or to the City Corporation Mayor/ However, a person can directly complaint to any level of the GRS if he/she wishes to.
- Each person registering a complaint would have to fill up a registration form either written or online. A sample registration form is Annex P.
- Each of the complaints must be addressed within fifteen working days. 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 and then to the central level and finally to the national level GRO.
- Always the next level GRO would work as the appellate authority for the previous level. That is the DC would work as the appellate authority for complaints to Municipality Chairman or City Corporation Mayor. Same way, the DPD would work as the appellate authority for the district level complaints. And Chairman of the NHA would act as the supreme DRO.
- The NHA headed by the Chairman would be given the supreme authority to address any compliant.

Every level must prepare and send a monthly report on the nature and types of complaints to its next level and all the records would be saved in written form by the concerned level GRO.

7 Public Consultation and Disclosure

7.1 Public Consultation

Public consultation and acceptance is one of most important and difficult part of any development project. Although the main objective of this project is to improve the living situation of pro-poor settlements, there will be a particular degree of environmental impact. It is also important to know the community participation towards the problems of the locality. Which problem to address, who are the most affected groups, who are main stakeholders- such decisions should strongly reflect community views. The following section will outline the steps needs to be followed to disclose all the project related information and collect & incorporate public views into the overall project planning, implementation and monitoring stage. A summary of local problems identified through public consultation is attached in Annex Q.

7.1.1 Guidelines on Conducting Consultations

As discussed above, all the project related information needs to be disclosed to the community so that all the project affected persons are informed and take part in the development process. The different stages of the project will have different level of information dissemination. All the steps of the projects will be finalized after extensive discussion with local community and approval of the relevant stakeholders. The following key stakeholders will be considered for this project:

- All the households living in the project and surrounding area.
- Land owners and the tenants
- Local NGOs
- Officials of the local city corporation or municipalities
- UPPR officials
- Local government and political leaders

A range of participatory tools and methods will be used to accommodate people perception on different stages of the project. The methods can be outlined below:

Site specific environmental assessment

Site specific environmental assessment will be conducted to find out the current environmental state of the households in the project area. This will be carried out in the planning phase (pre-construction) of the project.

Environmental mapping

At the pre-construction stage, environmental mapping will be a useful and necessary task for the site specific assessment. Whole project area will be brought under a single portrait through environmental mapping. The map contains location of all environmental concerns, such as waste dumping sites, sanitation, drainage congestion, flooding, etc. and location of proposed interventions, such as roads, water sources, drains, waste disposal bins, improved housing blocks at the project area. Either the map will be provided by the UPPRP officials or a map will have to be prepared. A summary of baseline information on Narayanganj City Colony slum and Rishipara slum collected though environmental mapping has been provided in Annex R.

Focus Group Discussion with the local households

Both at the pre-construction and construction stage focus group discussions will be conducted with the local households. Representatives from the households will share their opinion and experiences regarding the project interventions. Their suggestions and thoughts will also be incorporated to make the project more "community centered".

Key informant interview

Key Informant Interview (KII) with the Government and NGO officials, community leaders, local participants and land owners during pre-construction, construction and post-construction stage is also a major part of public consultation. The NHA officials, city corporation/municipality officials and the NGO officials will play a major role in the successful implementation of the project. Interview with local participants, local politicians and land owners during the pre-construction, construction and post-construction stage of the project is very much important. Through the KIIs with all these officials and public representatives, various problems (e.g. land sharing, voluntary resettlement) could be minimized.

Public hearing and approval of the final design

This is mainly a pre-construction stage of public consultation. Objective of the project, all the plans and designs, probable impact of the interventions and so on will be openly discussed with the community people. If they think that the intervention will not put any adverse impact on their lives and agree with the plan, the project will be finalized. Table 7.1 will discuss the information dissemination and consultation framework for the proposed project.

7.2 Disclosure

NHA will follow the disclosure requirement of the World Bank on environmental documentation. After the clearance from the World Bank, the draft final version of the EMF will be posted in the website of NHA along with a Bangla summary version and will be kept in the offices for further comments and inputs from non-governmental organization, civil society and general public. Newspaper advertisement will be published in two national dailies (English and Bangla) about the disclosure and request for comments on EMF. It will be disclosed in English by World Bank and it will also be made available at the World Bank's Info Shop. The EMF will be finalized taking into consideration of the comments received on draft version and will be available in the NHA website.

Table7.1: Information dissemination and consultation framework

Project Stage	Project Stage	Information to be disclosed	Consultation Steps
Planning and design (Pre-construction) <ul style="list-style-type: none"> • Community Selection • Feasibility study and identification of suitable intervention with project model • Initial design • Identification of probable impact • Identification of mitigation measures • Identification of enhancement measures • Finalization of design and intervention through EMP • Review and approval 	Planning (Pre-project)	After the initiation of the project, an Environmental Management Framework (EMF) is developed by the environment assessment team to identify range of potential environmental impacts of the project. This will help the project design team to select the possible implementation areas and tentative interventions. Initially selected communities will be screened through a comprehensive list of negative environmental concerns. The final communities and development options will be selected based on the following criteria: <ul style="list-style-type: none"> – The validity of the project. – Current state of the environment of the proposed areas. – Major environmental concerns of the proposed areas (current) – Possible future environmental problems and risks might occur due to the implementation of slum up gradation measures. 	An initial environmental mapping session is conducted with the local community members. It helped identify the community views of the local problems and environmental issues to be addressed. The team also disseminated their views with local community and all these information are included in the EMF report.
	Project Planning and design	In this part the environmental assessment team will conduct a detail impact assessment of the proposed design intervention suggested by the planning team. The analysis of the assessment will be disclosed for all the PAPs which will contain the following information: <ul style="list-style-type: none"> – More detail current situation of the environment of the proposed areas. – All the potential environmental impact due to the design interventions. – A portfolio of the effected people and community groups – Residual environmental impacts and enhancement measures 	The IEE or EIA (if required) will be conducted through detail investigation of baseline, potential environmental impact and possible mitigation options in the selected community for selected development interventions. It needs to be assured that community holds a stake in perceiving and finalizing all the design intervention. Then community will identify the probable environmental impact they might face. The project team will also discuss their findings with local community and all the information will be disclosed publicly through the EIA report.
		After the analysis of the Environmental assessment team, the planning team will disclose a detail project report that which will incorporate the following information:	In this stage, the final IEE, EIA and EMP report (if required) will leave at public disclosure so that all the PAPs and related stakeholder can comment on

Project Stage	Project Stage	Information to be disclosed	Consultation Steps
		<ul style="list-style-type: none"> - The final design incorporating all the recommendation from the EIA report - The implementation mechanism of the project. - Detail outline of all the mitigation measures to be taken to reduce the unavoidable environmental impacts. - Time duration and cost of project implementation. - Mechanisms for financing the project. - Grievance Redress Mechanisms (GRM) <p>At the same time, the team will prepare an Environmental Management Plan for mitigating the residual impact. As well as monitoring mechanism need to be addressed at this stage.</p>	the final design. A public hearing needs to be organized and the project has to be approved and fully agreed by the relevant authority, organization and local community.
Implementation (During construction) <ul style="list-style-type: none"> • Implementation • Environmental Monitoring • During implementation monitoring 	Implementation	<p>In this stage, the implementing team will give regular update of the implementing progress. The reports should include the following information:</p> <ul style="list-style-type: none"> - Level of complacence with the recommendations proposed during the EIA. - Compensation update to the affected people. - Any unexpected reactions by any PAPs or stakeholders. 	Any compensation claims or disputes should be minimized though proper consultation with stakeholders.
Monitoring and Evaluation (Post construction) <ul style="list-style-type: none"> • Post-implementation monitoring • Environmental auditing • Reporting 	Monitoring and Evaluation	<p>After the project is completed, it has to be insured that all the proposed outcome is achieved, proper mitigation measures is taken to reduce the environmental impacts and the urban poor is benefited with a better living settlement. The project implementing team should report all the mitigation measures taken, the entire grievance settled and all the recommendation made in the EMF is incorporated.</p>	A two way monitoring mechanism will be in place. The project progress will be monitored by the respective government authorities. On the other hand a local level monitoring committee will be formed by the community leaders and inhabitants. The project implementation team will regularly consult with them to ensure effective progress.

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Annex A: List of Eligible Interventions and Tentative Activities for the Proposed PPSIP

Interventions Eligible for PPSIP & Tentative Activities for Different Phases of Implementation

1) Housing

- Pre-Construction
 - a) Community participation in planning
 - b) Land Selection
 - c) Identification of house type and materials
 - d) Design of housing
- Construction
 - Land preparation
 - e) Source of soil for land filling
 - f) Land filling
 - g) Demolishing of existing infrastructures and vegetation
 - Existing housing
 - Unsanitary latrines
 - h) Site cleaning
 - Construction works
 - i) Transportation of construction material
 - j) Construction of temporary shed
 - k) Processing of construction materials
 - l) Excavation for trench
 - Storage of construction machineries and equipments
 - a) Construction works of housing
 - b) Plumbing work for kitchen and bathroom
 - c) Plastering, Finishing and painting
 - d) Electric work
 - electrical wiring
 - dummy plate fixing/ electrical holders
 - electrical switches setup
 - laying electric pipes in the wall
 - e) Digging pit and connecting it with sewerage line
 - f) Provision of gas pipeline (if possible)
 - g) Ensuring proper safety and security
- Post-construction
 - a) Maintenance of houses
 - b) Provision of proper waste management

2) Water Supply- A. Pipe Water Supply

- Pre-Construction
 - a) Community participation in planning
 - b) Demand assessment preference for drinking water options
 - c) Design of water supply network following the land contour
 - d) Excavation of land for piped water, psf

- e) Transportation of pipes
- Construction
 - a) Land leveling
 - b) Installation of pipelines and other structures
 - c) Installation of overhead tank
 - d) Plumbing works
- Post-Construction
 - a) Maintenance of pipeline
 - b) Regular cleaning of storage tank/PSF/RWH
- 3) Water Supply- B.Tube-well/ Deep tube-well**
 - Pre-Construction
 - a) Community participation in planning
 - b) Site selection
 - c) Water quality testing
 - Construction
 - a) Boring of land
 - b) Site Cleaning
 - c) Installation of pipe
 - d) Installation of tube-well
 - e) Construction tube-well platform
 - f) Construction of overhead tank (in case of deep tube-well)
 - g) Digging of drain
 - Post-Construction
 - a) Water quality testing
 - b) Maintenance of platform and drain
 - c) Ensuring security to tube-well head
- 4) Water Supply- C.Rain water harvesting (RWH)**
 - Pre-Construction
 - a) Community participation in planning
 - b) Site selection
 - c) Design of RWH system
 - a) Design of special roof for RWH
 - Construction
 - a) Processing of construction materials
 - b) Construction of roof for RWH
 - c) Construction of collection unit
 - d) Installation of filtration system
 - e) Installation of pipe and tap
 - Post-Construction
 - a) Water quality testing
 - b) Checking Functionality of filter (sand filter)
 - c) Maintenance of rain water harvesting system
 - d) List of activities (Drainage)
 - Pre-Construction
 - a) Community participation in planning
 - b) Identifying existing broken, nonfunctional drain

- c) Identifying proper outlet of drains
- d) Selecting type of drains
- e) Designing the layout of drainage network following the contour line
- Construction
 - a) Excavation of land
 - b) Site cleaning
 - c) Connecting drains with city corporation drainage network (if exists)
 - d) Connecting drains with proper outlet channel
- Post-Construction
 - a) Regular maintenance of drains

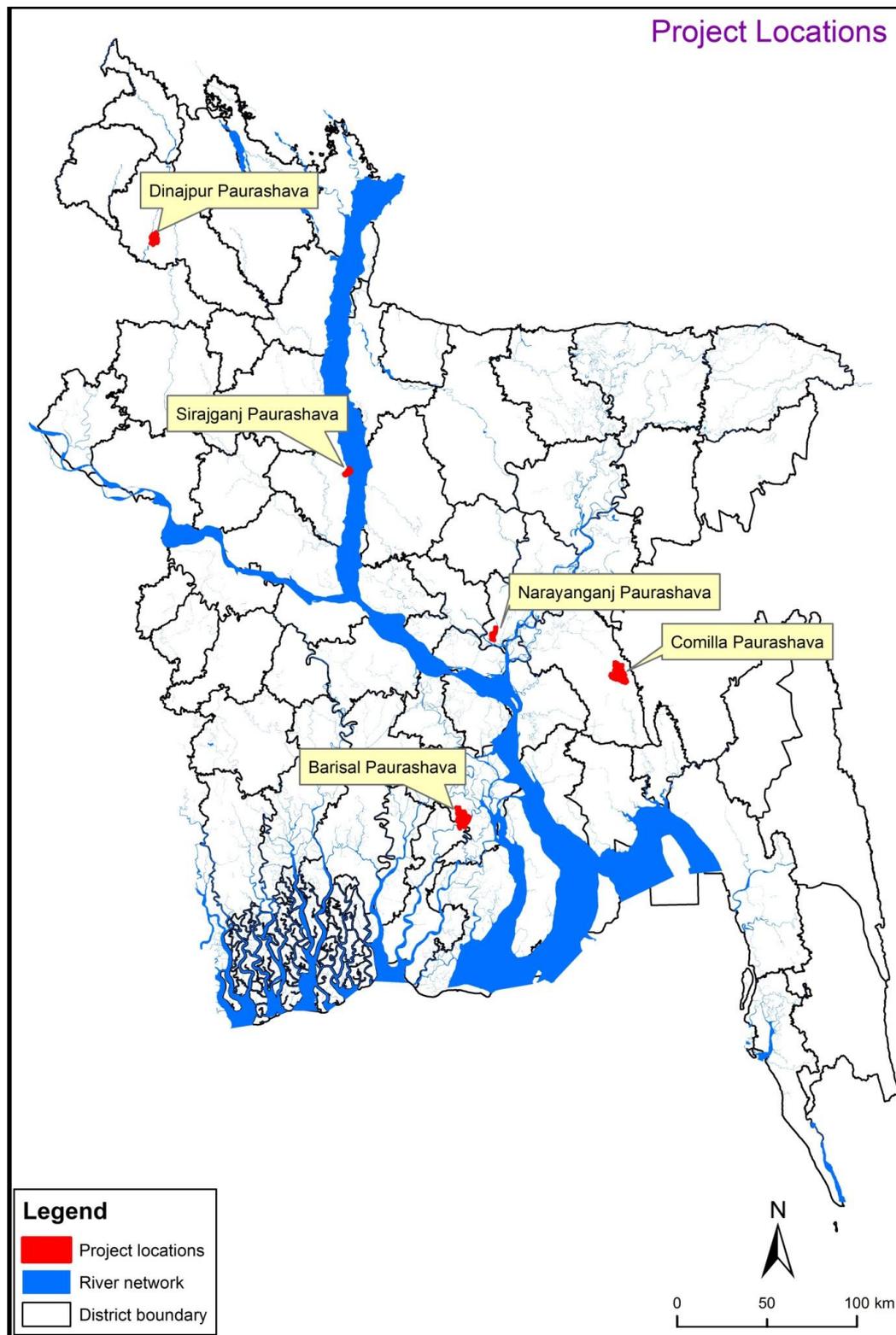
5) Sanitation

- Pre-Construction
 - a) Community awareness and participation
 - b) Demolishing of existing unsanitary latrines
 - c) Identifying sites and types of latrines
 - d) Design of latrines (individual/ community)
- Construction
 - a) Transportation of construction material
 - b) Construction of temporary shed
 - c) Digging of land
 - d) Site Cleaning
 - e) Processing of construction materials
 - f) Identification of sewer disposal site/ option
 - g) Construction works
 - h) Digging pit
 - i) Construction of septic tank
- Post-Construction
 - a) Ensuring proper safety and security
 - b) Establishing connectivity with CC central sewage line/ post processing option
 - c) Regular maintenance of latrines

6) Solid Waste Management

- Pre-Construction
 - a) Community awareness and preference
 - b) Waste Collection
 - c) Development of solid waste management plan and system
 - Composting
 - 3R (reduce, reuse, recycle) practicing
- Construction
 - a) Transportation of waste
 - b) Provision of in-situ temporary storage like dustbin, garbage can etc.
- Post-Construction
 - a) Proper management of waste

Annex B: Selected Five Pilot Pourashavas



Brief Description of 5 Pilot Towns

Barisal: The area of Barisal Sadar Upazila is 317.60 sq. km, and the geographical location of this Upazila is 22°37' to 22°43' north latitudes and 90°18' to 90°23' east longitudes. Total population of the Upazila is 463032 consists of 243290 male and 219742 female. Kirtankhola, Kalijira, Nayabhangha and Tentulia are the main rivers in the Upazila (Banglapedia, 2012). The area of Barisal City Corporation is 24.91 sq. km and it is located in between 22°38' to 22°45' north latitudes and 90°16' to 90°32' east longitudes. Moreover, the total population of the City Corporation is 224389 consists of 123402 male and 100987 female (Banglapedia, 2012). Kirtankhola is the main river in the City Corporation. Permanent 31.3%, Semi-permanent 27.1%, temporary 41.6% houses are found in Barisal City Corporation (BBS, 2011).

Comilla: Comilla is a district of Chittagong division, located in the eastern region of Bangladesh. It is situated at 23.4583°N and 91.1833°E. The total area of Comilla Sadar Upazila is 187.71 sq km and the area of Comilla City Corporation (CCC) is 53.04 sq km. The total population of this city corporation is five lac (Comilla City Corporation, 2013). There are approximately 47.3% of permanent buildings, 30.6% of semi-permanent buildings and 22.1% temporary houses in CCC (BBS, 2011). Majority of the poor communities of this city corporation prefer to live near water bodies. Maximum poor people are day laborer, rickshaw puller, carpenter etc. Maintamoti Shalban Bihar, Rupban Mura, Kotbari etc. are some famous archaeological places of Comilla City Corporation.

Dinajpur: Dinajpur Municipality located in the northern part of Bangladesh and it falls under the district of Dinajpur. Total area of the upazila is 354.34 square kilometer (Banglapedia, 2012). The Dinajpur Sadar Upazila is located in between 25°28' and 25°48' north latitudes and in between 88°34' and 88°46' east longitudes. Total population of the municipality is 1, 86,727. The percentage of temporary, permanent and semi-permanent households of the municipality is respectively 25.8, 28.8 and 45.4 (BBS, 2011).

Narayanganj: Narayanganj sadar upazilla is located between 23°33' and 23°57' N latitudes and 90°26' and 90°45' E longitudes. Total area of this upazilla is around 687.76 sq km. The area is bounded by Narsingdi and Gazipur districts on the north, Munshiganj district on the south, Brahmanbaria and Comilla districts on the east, Dhaka district on the west (Banglapedia, 2012). Total population is about 286330 and number of household is 66045. Among the total households, permanent, semi-permanent, and temporary houses are around 47%, 33%, and 20% respectively (BBS, 2011).

Sirjaganj: Sirjaganj sadar upazila has an area of 325.77 sq. km. It is bounded by kazipur upazila on the north, kamarkhanda and belkuchi upazilas on the south, sarishabari, kalihati and bhuapur upazilas on the east, Kamarkhanda, raiganj and dhunat upazilas on the west. Major rivers of this upazila are Jamuna and Ichamati. Sirajganj Pourashava is located in Sirajganj Sadar Upazila. Its area is 28.49 sq. km. Total population of the municipality is 158913 persons. Total number of household is 35556. Here 12.4 % houses are permanent, 32% of the houses are semi permanent and 55.6% houses are temporary. There are in total 15 wards in this municipality. In the north eastern part of the municipality urban poor communities and slums are located. People living in these slums are ultra poor and mostly victims of river bank erosion.

Annex C: Identification of Site Specific PPSIP Interventions and Alternatives

Section I: Identification of Site Specific Interventions

1. Project site (location):
2. Ownership of land for intervention:
 - a. Government owned
 - b. Private land (need acquisition)
3. Assess existing infrastructure and environmental condition and identify new interventions

Existing Environmental Conditions and Infrastructures	Current Scenario	Briefly Describe Proposed Interventions for Upgrading the Slum
❖ Houses (Conditions /problems)		
❖ Water Supply Sources (Name) Availability Adequacy Quality (problems)		
❖ Sanitation Type Common or Individual Condition (problems)		
❖ Waste Management Dumping of Solid Waste Dumping of Liquid Waste		
❖ Walkway Connection with road (Y/N) and Distance from pucca road Type (1. Pucca, 2. Semi pucca, 3. Katcha) Condition (problems)		
❖ Disaster Management Any River Flooding (Y/N) Last occurrence of flood (depth) Duration of flood Water logging (Y/N) Fire hazard (Y/N)		

❖ Drainage (Y/N) Types of drainage (0. No drainage, 1. surface runoff/2. built canal) Has outlet/connected with municipal drain Condition (problems)		
❖ Public Space/ community building complex Children's playground (Y/N) Distance of playground Community meeting space (Y/N) How far is the community space?		
❖ Flora and Fauna List of fruit tree? List of medicinal tree? Practice of kitchen garden? (Y/N) Chicken/duck/ pigeon (no) Cattle (no) Others. (specify)		
❖ Water body in and around the slum? (Y/N) Pond, river, canal, etc. Fish culture at pond? (Y/N) Usage of water body?		

Section II: Analysis of Alternatives

4. Preliminary Analysis of Alternatives

Identification and Analysis of Alternatives (location/design /route)	Advantage	Disadvantages
❖ <u>Housing:</u> Alternative 1: Alternative 2: Alternative 3:		

Preliminary Decision:

❖ <u>Water Supply</u> Alternative 1: Alternative 2: Alternative 3:		
Preliminary Decision:		
❖ <u>Sanitation/Toilet</u> Alternative 1: Alternative 2: Alternative 3:		
Preliminary Decision:		
❖ <u>Waste Management</u> Alternative 1: Alternative 2: Alternative 3:		
Preliminary Decision:		
❖ <u>Walkway/Footpath/Road</u> Alternative 1: Alternative 2: Alternative 3:		
Preliminary Decision:		
❖ <u>Drainage</u> Alternative 1: Alternative 2: Alternative 3:		
Preliminary Decision:		
❖ <u>Community building complex</u> Alternative 1: Alternative 2: Alternative 3:		

Preliminary Decision:

5. Interventions/development to be funded outside the community:

() Connecting road:

() Drains/Outlets:

() Waste management/ disposal:

() Others: _____

6. Additional interventions proposed for environmental enhancement

() Re-excavate/drain out/protection of a pond/ water body.

() Tree plantation

() Maintain an open space to be used as play ground

() Biogas plant/Improved cook stove

() Pond sand filter

() Rain water harvesting

() Training/ awareness/campaign

()

()

7. Location of intervention (attach location map):

8. Estimated cost of intervention :

9. (Mil. BDT)

10. Schedule of implementation:

a) Duration:

b) Tentative start date:

c) Tentative completion date:

11. Review and Approval:

Interventions identified by (Name, _____
signature & date):

Interventions reviewed and _____
approved by

Annex D: Environmental Screening Checklist

Part A: General Description

Screening Date :

Location of the slum/community :

Number of people/households to be benefited :

Type of interventions and brief description:

- Housing
- Drainage system
- Solid Waste Management
- Toilet/Community Toilet:
- Water Supply:
- Pathways : Connecting road
- Others:

.....
.....
.....

Brief Description of Physical Works:

.....
.....
.....

Baseline Description of affected Environment:

i. Description of physical chemical environment (soil, air, water, etc.) :

.....
.....
.....

ii. Description of Biological Environment (habitats and Communities, Flora :
ecologically sensitive areas, presence of threatened or protected species, etc.)

.....
.....
.....

i. Description of Socio-economic Environment e.g. historical sites, aesthetic aspects,
public health, infrastructure:

.....
.....
.....

Part B: Environmental Screening Checklist

Environmental issues	Yes	No	Remarks
1. Encroach onto an important natural habitat or protected area?	<input type="checkbox"/>	<input type="checkbox"/>	
2. Disturbance or harm of historical or culturally important site?	<input type="checkbox"/>	<input type="checkbox"/>	
3. Adverse effects or destruction of designated wetlands?	<input type="checkbox"/>	<input type="checkbox"/>	
4. Development interventions in high risk (climatic/disaster) area?	<input type="checkbox"/>	<input type="checkbox"/>	
5. Presence of emission intensive large industries in and around the project area?	<input type="checkbox"/>	<input type="checkbox"/>	
6. Drainage, water logging or congestion in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	
7. Deforestation or cutting down of trees and vegetation?	<input type="checkbox"/>	<input type="checkbox"/>	
8. Over exploitation of ground water in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	
9. Adverse effects on groundwater quality?	<input type="checkbox"/>	<input type="checkbox"/>	
10. Adverse effects on surface water quality or flow?	<input type="checkbox"/>	<input type="checkbox"/>	
11. Involve destruction of top soil?	<input type="checkbox"/>	<input type="checkbox"/>	
12. Conversion or degradation of agricultural land?	<input type="checkbox"/>	<input type="checkbox"/>	
13. Increased noise due to every day construction activities?	<input type="checkbox"/>	<input type="checkbox"/>	
14. Functional operating system for waste management?	<input type="checkbox"/>	<input type="checkbox"/>	
15. Increase of wind-blown dust i.e. fine aggregate, from storage?	<input type="checkbox"/>	<input type="checkbox"/>	
16. Use or transportation of any toxic or hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	

Decision of EA Category and Further Assessment⁶:

Environmental Category	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C
Need Further Evaluation:			
Need IEE	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Need EIA	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Review and Approval (Name, signature & date):

Prepared by:

Reviewed & Approved by:

⁶ For questions 1 to 3, if any of the answer is 'Yes', EA Category of the subproject interventions will be 'A' and an EIA will be recommended to carry out directly. For questions 4 to 16, if any of the answer is 'Yes', Category will 'B' and an IEE will be required.

Annex E: Initial Environmental Examination (IEE)

Part A: General Description

Date :

Location of the slum/community :

Number of people/households to be benefited :

Section A: General Information (Proposed subprojects/ interventions)

Type of the interventions	Number/Length/Dimension of the interventions	Brief description of the design
Housing		
Multipurpose Community Building		
Drainage		
Sanitation (toilet)		
Water Supply		
Pathway/Connecting Road		
Solid Waste Management		
Others		

Section B: Assessment of Negative Impacts of the Proposed Interventions

SI #	Environmental Issues/ Parameters	Impact assessment		Location (for Affected Environment)	Baseline/ Current Situation (for Affected Environment)	Describe or Quantify the Impacts	Suggested Mitigation/ Enhancement Measures
		Yes/No	Scale ⁷				
A. Site Preparation, Debris Removal, Site Restoration (Pre & During Construction)							
	Water stagnation/ drainage congestion/water logging situation/affect storm run-off						
	Loss of fertile top soil/ Damage of cultivable land for land filling/ excavation						
	Removal of debris/ toilet affect health and safety						
	Soil instability/ possibility of damage/erosion						
	Improper disposal of solid and liquid wastes from the construction sites						
	Require to cut/destroy tree/homestead garden						
	Encroach /filling up water						

⁷ Scale (Magnitude): 1 = Low impact, 2 = Medium impact, H = High impact

SI #	Environmental Issues/ Parameters	Impact assessment		Location (for Affected Environment)	Baseline/ Current Situation (for Affected Environment)	Describe or Quantify the Impacts	Suggested Mitigation/ Enhancement Measures
		Yes/No	Scale ⁷				
	body /Obstruction of natural connection between river and wetlands						
	Affect culture or capture fishery						
	Increased windblown dust from materials						
	Noise pollution						
	Health risk to labors involved in project activities						
	Land filling/ plinth level raising						
	Contamination of surface water from surface run-off						
	Land loss						
	Loss employment/income						

B. Assessing Impacts of the Proposed Interventions:

SI #	Environmental Issues/ Parameters	Impact Assessment			Location (for Affected Environment)	Baseline/ Current Situation (for Affected Environment)	Describe or Quantify the Impacts	Suggested Mitigation/ Enhancement Measures
		Yes/No	Stage ⁸	Scale ⁹				
Housing/Multi-purpose Community Building (During and Post-Construction)								
	Water stagnation/drainage congestion/water logging situation/affect storm run-off							
	Loss of fertile top soil/ Damage of cultivable land (area in decimal)							
	Require to cut/destroy tree							
	Negative or significant effect on designated wetlands or water body							
	Negative effect on locally important or valued ecosystem							

⁸ Stage: 1 = pre-construction, 2 = post construction

⁹ Scale (Magnitude): 1 = Low impact, 2 = Medium impact, H = High impact

SI #	Environmental Issues/ Parameters	Impact Assessment			Location (for Affected Environment)	Baseline/ Current Situation (for Affected Environment)	Describe or Quantify the Impacts	Suggested Mitigation/ Enhancement Measures
		Yes/No	Stage ⁸	Scale ⁹				
	Possibility of damage/erosion							
	Unstable plinth slope							
	Increased windblown dust from materials							
	Health risk to labors involved in project activities							
	Obstruction of natural connection between river and wetlands							
	Affect culture or capture fishery							
	Improper disposal of solid and liquid wastes from the construction sites							
	Temporary removal of houses/resettlement							
Drainage System: Length of drain =		Type of drain= pipe/concrete/ covered/uncovered/semi-covered			Outlet identified= Yes/No			
	Draining out to a canal/							

SI #	Environmental Issues/ Parameters	Impact Assessment			Location (for Affected Environment)	Baseline/ Current Situation (for Affected Environment)	Describe or Quantify the Impacts	Suggested Mitigation/ Enhancement Measures
		Yes/No	Stage ⁸	Scale ⁹				
	water body							
	Chance of clogging from solid waste disposal during operation							
	Chance of backflow (due to high elevation or high water level at the discharge point)							
	Chance to pollute the water body during operation							
	Chance of affecting the culture or capture fishery							
	Chance of overflow							
	Receiving industrial waste water from catchment area							
Toilet / Community Toilet: Type: Pour flush/ Others _____ # of toilets: _____								
	Chance of releasing waste water/excreta to a water body							
	Microbial contamination to the groundwater from the pits							

SI #	Environmental Issues/ Parameters	Impact Assessment			Location (for Affected Environment)	Baseline/ Current Situation (for Affected Environment)	Describe or Quantify the Impacts	Suggested Mitigation/ Enhancement Measures
		Yes/No	Stage ⁸	Scale ⁹				
	Odor?							
Water Supply: GW/ Surface water; # of tube-wells _____; Distribution pipeline Yes/No								
	Water stagnation/drainage congestion/water logging situation							
	Arsenic contamination							
	Microbial contamination from an adjacent pit toilet							
Pathways/Connecting roads: Concrete/Brick								
	Affect drainage, storm water flow							
	Loss of agricultural / housing land							
	Loss of top soil							
	Instable slope/ erosion from surface run off							
	Dust pollution							

SI #	Environmental Issues/ Parameters	Impact Assessment			Location (for Affected Environment)	Baseline/ Current Situation (for Affected Environment)	Describe or Quantify the Impacts	Suggested Mitigation/ Enhancement Measures
		Yes/No	Stage ⁸	Scale ⁹				
	Noise pollution							
	Soil erosion/sedimentation to the water body							
	Damage of natural drainage system							
	Risk of accident							
Solid Waste Management								
	Blockage of drains							
	Odor from disposal site							
	Contamination of groundwater by leachate							
	Burning of wastes							

Section C: Environmental Management Plan (EMP): Please identify the mitigation measures for any of the “Yes” answer provided in Section B)

1. Summary of Environmental Mitigation Measures

Name of the intervention	Potential Environmental Impacts	Location	Mitigation measures	Estimated Mitigation cost	Stage of application (pre, during, post)

2. Restoration of Abandoned Slum (for Voluntary Resettlement)

Restoration Activities	Location	Implementation Schedule	Person Responsible	Estimated Restoration cost

3. Monitoring Plan

Interventions for Mitigation	Monitoring Time	Person Responsible

Decision:

-
1. ___ Interventions will be implemented with mitigation/ enhancement measures
 2. ___ Interventions will be implemented without mitigation/ enhancement measures
 3. ___ Site restoration plan will be implemented
 4. ___ A further assessment/EIA will be required.
-

Prepared by

Approved by

Name :

Designation :

Signature :

Date :

Name :

Designation :

Signature :

Date :

Annex F: TOR for EIA

TERMS OF REFERENCES

For

Environmental Impact Assessment of PPSIP

Background

The Ministry of Housing and Public Works (MoHPW) would implement the Pro-Poor Slum Integration Project (PPSIP) through the National Housing Authority (NHA). The NHA requires to conduct Environmental Impact Assessment (EIA) study for sites that require relocation and development of a new site for providing slum upgrading interventions as per World Bank guideline. The objective of the EIA study is assessment of environmental impacts and preparation of environmental management plan for implementing the sub-projects without harming the environment. The EIA study should be conducted according to following scope of works.

Scope of work

1. Carry out detail field investigation of required parameters of environmental and social baseline
2. Determine the potential impacts due to the project through identification, analysis and evaluation on sensitive areas (natural habitats; sites of historic, cultural and conservation importance), settlements and villages/agricultural areas or any other identified Important Environmental and social Component.
3. Determine cumulative environmental impacts of the project that may occur inside and outside the project area.
4. Distinguish between significant positive and negative impacts, direct and indirect impacts, immediate and long-term impacts, and unavoidable or irreversible impacts.
5. Identify feasible and cost effective mitigation measures for each impact predicted as above to reduce potentially significant adverse environmental impacts to acceptable levels.
6. Determine the capital and recurrent costs of the measures, and institutional, training and monitoring requirements to effectively implement these measures. The Consultant is required to identify all significant changes likely to be generated by the project.
7. Prepare an estimate of financial costs on the mitigation and enhancement measures that the project is likely to require, and financial benefits, if any;
8. Describe alternatives that were examined in the course of developing the proposed project and identify other alternatives that would achieve the same objectives. The concept of alternatives extends to the siting and design, technology selection, rehabilitation/construction techniques and phasing, and operating and maintenance procedures. When describing the impacts, indicate which are irreversible or unavoidable and which may be mitigated. To the extent possible, quantify the costs and benefits of each alternative, incorporating the estimated costs of any mitigating measures. Include the alternative of not constructing the project to demonstrate environmental conditions without it.
9. Prepare a detailed Environmental Management Plans along with a plan to monitor the implementation of mitigating measures and the impacts of the project of other inputs (such as training and institutional strengthening) needed to conduct it during construction and operation. Include in the plan an estimate of capital and operating costs and a description of other inputs (such as training and institutional strengthening) needed to implement the plan.
10. Ensure to address Occupational health and safety for the construction workers in the EMP;
11. Develop Environmental monitoring plan for regular monitoring of the project at the preconstruction, construction and operational stage.

EIA Study Team

A multi-disciplinary team will be engaged for conducting the EIA. The suggested multi-disciplinary EIA team for the PPSIP:

- Environmental Specialist
- Slum Upgrading Specialist
- Urban Development Specialist
- Infrastructure Specialist
- Sociologist
- Economist
- Land Tenure Specialist
- RS/GIS specialist
- Jr. Environmental Specialist/Engineer
- Jr. Socio-economist
- Surveyor and field researcher

Management of the EIA process

The consultant will manage the overall EIA process and will be responsible for the compilation and presentation of the EIA Report. The consultant will plan, coordinate and execute all activities of the EIA process and will assist the authority in the planning and execution of the public scoping meeting and public hearing if required.

Duration

It envisaged that the draft EIA can be completed within a period of ----- months after approval of the Terms of Reference by the authority.

EIA Submission

- Electronic copies of the EIA report
- 8 Copies of EIA report with copies signed

Suggested Outline of the EIA Report

Executive Summary

Introduction: This section will include (i) purpose of the report and (ii) extent of the environmental screening and IEE study.

Policy, Legal and Administrative Framework: This section will describe relevant environmental policies, rules and administrative procedures that need to be followed.

Description of Proposed Slum Upgrading Interventions: This section will provide a brief but clear picture about (i) type of interventions; (ii) category of interventions; (iii) need for project; (iv) location (use maps showing general location, specific location, and project site); (v) size or magnitude of operation;(vi) proposed schedule for implementation.

Description of pre-construction, construction, post-construction and operation and maintenance and benefit realization activities, including technical details of earthworks, fuel and water use, discharges, wastes, and pollution prevention equipment.

Methodology of EIA

Description of the Slum and Environmental Baseline: To describe baseline environment of a slum, determine appropriate boundaries for the potentially impacted area. Determine environmental components and parameters to be characterized, focusing on:

- Sub-project/activity siting, design, construction, operation, decommissioning and abandonment
- Sources of effects of potential impacts
- Existing and proposed infrastructure

- Quality of life

This baseline section will provide sufficient information on the existing environmental and social baseline resources in the area affected by the project, including the following:

- Physical Resources: (e.g. atmosphere (e.g. air quality and climate), topography and soils, surface water & groundwater, geology/seismology. (ii) Ecological Resources: (e.g. fisheries – culture and capture, aquatic biology, social forests, rare or endangered species, protected areas, etc.)
- Economic Development: (e.g. industries, infrastructure facilities, transportation, land use, power sources and transmission, agricultural development, mineral development, and tourism facilities)
- Social and Cultural Resources: (e.g. population and low income communities (e.g. numbers, locations, composition, employment), health facilities, education facilities, socio-economic conditions (e.g. community structure, family structure, social well-being), physical or cultural heritage, current use of lands and resources for traditional purposes by Indigenous Peoples, structures or sites that are of historical, archaeological, paleontological, or architectural significance.

Potential Environmental Impacts of Slum Upgrading interventions:

- Assess future without project scenario reflecting expected changes in the baseline environment over sub-project/activity life such as urbanization, infrastructure development, etc.
- Develop methodologies to obtain adequate characterization information for each of the identified items within the bounded areas. Methodologies can include secondary data and primary (field) data collection as appropriate.
- Screen each preconstruction, construction, operation-phase and abandonment / decommissioning sub-project/activity and each unplanned, accidental, disaster and future event, for its potential beneficial and adverse impacts to each identified environmental component / parameter. Impact significance should be categorized as low, medium or high and beneficial, adverse or neutral/mixed/unknown.
- Consider secondary impacts.
- Discuss for each potentially significant identified impact whether the impacts is reversible or irreversible, its scale and duration, and any synergy or cumulative effects with other sub-project/activity impacts.

Evaluation of impacts:

This section will describe economic, numeric or descriptive evaluation of impacts.

Environmental Management Plan: The environmental management plan (EMP) will include mitigation and enhancement plan, compensation and contingency plan as well as monitoring plan. The EMP should also include tentative cost of implementation of the plan. The EIA study should identify, devise and describe mitigation measures to a) Reduce, offset or compensate to insignificant levels where impacts identified as significant and adverse, and b) Enhance sub-project/activity benefits and other valued environmental components. The EMP should indicate the monitoring reporting arrangements and procedures for corrective action if monitoring shows environmental problems.

Public Consultation and Information Disclosure: Include adequate consultation with potentially affected people and other relevant stakeholders in the beginning and at the end in the EIA process, to provide opportunity for them to communicate their views and concerns to the sub-project/activity design. Document the public views and concerns and responses to them as part of the EIA report.

Conclusions and Recommendations: This section will include conclusions and recommendations.

List of References

Annexes:

Annex G: Impact Screening and Assessment Guidelines for Physical Cultural Resources

Impact Screening and Assessment Guideline for Physical Cultural Resources (PCR)

(Ref: Physical Cultural Resources Safeguard Policy Guidebook, World Bank, 2009)

As stated in the World Bank PCR Safeguard Policy Guidebook, The PCR policy applies to projects having any one or more of the following three features:

- (i) Projects involving significant excavations, demolition, movement of earth, flooding or other major environmental changes
- (ii) Projects located within or in the vicinity of a recognized PCR conservation area or heritage site
- (iii) Projects designed to support the management or conservation of PCR

The sub-projects under the PPSIP MGSP will involve some excavation works, movement of earth and temporary flooding. The Pourashavas and City Corporations have religious institutions (mosques, temples, Buddhist temples), few sites of archaeological importance, public libraries, cinema halls, community centers, which can be considered PCRs. However, the sub-project area of influence may or may not intersect these regions (since the sub-projects are generic in nature, actual locations of most of them still undetermined). Therefore a generic impact assessment of Physical Cultural Resources is outlined in this section.

Guidance on identification of PCR

In the context of PPSIP, the probable examples of PCR may be the following:

1. Human made: Religious buildings such as temples, mosques, churches, exemplary indigenous or vernacular architecture Buildings, or the remains of buildings of architectural or historic interest, Historic or architecturally important townscapes Archaeological sites (unknown or known, excavated or unexcavated), Commemorative monuments
2. Natural: historic trees, natural landscapes of outstanding aesthetic quality
3. Combined man-made or natural: Sites used for religious or social functions such as weddings, funerals, or other traditional community activities (community centres), burial grounds, family graves, cultural landscapes
4. Movable: registered or unregistered artifacts in temples or mosques, paintings, statues of important historical figures, religious artifacts, cultural artifacts etc.

Assessment of probable impacts due to activities:

Below is a list of project activities or features under the context of MGSP which may commonly give rise to negative impacts on PCR, divided into two periods: construction phase and operational phase.

Construction phase:

1. Establishment of work camps:
 - Vandalism, theft and illegal export of movable PCR, and of pieces of monumental PCR accessible directly or indirectly to migrant laborers,
 - Desecration of sacred sites.
2. Excavation, construction and soil compaction:
 - Direct physical damage to natural, manmade and buried PCR on site

3. Construction traffic:

- Vibration, soil, air and water pollution causing damage to natural or manmade PCR on site.
- Noise pollution can interfere with the use and enjoyment of PCR such as tourist destinations, historic buildings, religious establishments and cemeteries.

4. Mobilization of heavy construction equipment:

- Damage to natural or manmade PCR on site
- Soil compaction, damaging buried PCR (archaeological) onsite, and damaging pipelines and drains serving built PCR in the vicinity.

5. Flooding and Inundation:

- Submergence or destruction of human-made, natural or buried PCR.
- Barrier to access of all types of PCR.
- Raised water table can lead to damage to all types of PCR.
- Damage to aesthetics of scenic landscapes.

6. Waste disposal or landfill:

- Burial or damage to natural, buried or underwater PCR.

Operation phase:

1. New and upgraded Roads:

- Increased human traffic enjoying improved access to PCR of public interest leading to increased wear and damage, sacrilege of sacred sites, theft and vandalism of movable and, breakable PCR.
- New highways cutting off access to living-culture PCR by residents of settlements on other side of the highway.
- Increased air pollution and vibration from traffic causing damage to man-made PCR, particularly monuments and buildings.
- Increased noise pollution interfering with enjoyment of people in tourist destinations, historic buildings, religious establishments and cemeteries.
- In scenic areas, obtrusive highways having a negative visual impact on the landscape.
- Roads and bridges which themselves constitute PCR being damaged by increased traffic.
- Positive impacts may also occur, through the discovery of hitherto unknown sites and artifacts and generation of tourism.

2. Induced development:

- Induced development leading to increased wear and damage, sacrilege of sacred sites, theft and vandalism of movable and breakable PCR, and damage to the aesthetics of scenic landscapes and townscapes.

3. Urban development:

- Changes in demography or settlement patterns leading to decay of inner cities and abandonment and neglect of older residential areas containing built PCR such as vernacular architecture.
- Developments which are out-of-character with their surroundings diminishing the aesthetic value of the townscape, decline in property values and ultimately, neglect of built PCR in the area.
- Damage to the aesthetics of scenic landscapes and townscapes.

Guidelines for ToR for the PCR component:

In case of a sub-project which is not expected to have any impacts on PCR, it may be sufficient to include procedures for chance finds (Annex G). In case of Category “B” project where there may be a likely impact on PCR due to activities carried out under any of the sub-projects, the ToR may be tailor-made to the specific requirements. The ToR is expected to include potential major PCR issues, the likely impacts on PCR, the PCR impact areas, which will set boundaries for collecting the PCR baseline data along with any specialized PCR knowledge or skills required. In projects such as the PPSIP, since the subproject locations are not yet determined, it will not be possible at this stage to identify the PCR impact areas and the type of PCR data that should be collected. In such cases, the ToR should require the EA team to establish these parameters at the beginning of the assignment, and propose provisions for identifying and managing PCR during project implementation. The EA report for the corresponding sub-projects should be modified accordingly to incorporate the issues related to PCR in those cases. The investigations and findings with respect to PCR should form an integrated part of the EA report since OP 4.11 does not call for a separate report. Therefore the ToR for consultants for the generic EA assessment of sub-projects would still be valid with a few additional assignments on behalf of the consultants with respect to PCR:

- Regulatory environment: (Identification of any regulations and guidelines which will govern the conduct of the assessment) This section should also list any relevant national acts or regulations pertaining to the safeguarding of PCR
- Background information: (description of the physico-chemical, ecological and socioeconomic environment) All registered and unregistered, movable or immovable PCRs in the sub-project areas need to be identified in this part preferably using visual identification, consulting with local people. The report should have descriptions and visual illustrations of the PCRs.
- Impact assessment: (the consultant will identify the likely biophysical and social impacts in sufficient detail to be able to design suitable mitigation measures). Impacts on all types of PCR should be considered, both natural and man-made, registered and unregistered, movable and immovable.
- Analysis of alternatives: (the consultant will include PCR aspects when considering alternative projects or project locations)
- Environmental Management Plan including institutional arrangement for implementation and monitoring: (The ToR should state that mitigating measures arising from PCR impacts should be agreed to by the concerned and affected parties before they are submitted as recommendations in the EMP.)
- Public Participation (The ToR should point out the importance of the consultative process for the physical cultural resources component)

Chance Find Procedures

(Ref: The World Bank Operational Manual, 1999 OP4.11)

Works could impact sites of social, sacred, religious, or heritage value. “Chance find” procedures would apply when those sites are identified during the design phase or during the actual construction period and the related activity will not be eligible for financing under the project.

- (1) Cultural property includes monuments, structures, works of art, or sites of significant points of view, and are defined as sites and structures having archaeological, historical, architectural, or religious significance, and natural sites with cultural values. This includes cemeteries, graveyards and graves.
- (2) The list of negative subproject attributes which would make a subproject ineligible for support includes any activity that would adversely impact cultural property.
- (3) In the event of finding of properties of cultural value during construction, the following procedures for identification, protection from theft, and treatment of discovered artifacts should be followed and included in standard bidding document.
 - (a) Stop the construction activities in the area of the chance find;
 - (b) Delineate the discovered site or area;
 - (c) Secure the site to prevent any damage or loss of removable objects.
 - (d) Notify the supervisory Engineer who in turn will notify the responsible local authorities;
 - (e) Responsible local authorities and the relevant Ministry would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures.
 - (f) Decisions on how to handle the finding shall be taken by the responsible authorities and the relevant Ministry. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance), conservation, restoration and salvage.
 - (g) Implementation of the authority decision concerning the management of the finding shall be communicated in writing by the relevant Ministry.
 - (h) Construction work could resume only after permission is given from the responsible local authorities and the relevant Ministry concerning safeguard of the heritage.
- (4) These procedures must be referred to as standard provisions in construction contracts. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered.
- (5) Relevant findings will be recorded in World Bank Supervision Reports and Implementation Completion Reports will assess the overall effectiveness of the project’s cultural property mitigation, management, and activities, as appropriate.

Annex I: List of Archaeological Sites and Environmentally Sensitive Areas

Table : List of Archaeological Sites in the five municipalities

District	Monuments/Sites
Comilla	ShalbanVihara
	Loticot Mura
	AnandaRajar's palace
	Kotila Mura
	Charpatra Mura
	Rupban Mura
	Itakhola Mura
	Bairagir's Mura
	Balagajir Mura
	Chandi Mura
	Chila Mura
	Hatigara
	Pacca Mura
	Ujirpur Mound
	RupbanKannyar Mura
	Kotbari Mura
	BhojRajar palace
	Palace & Temple of Queen Mainamati
	Mainamati Mound
	SataraRatna Temple
Bara Kamta Mound	
Chitoddha Mosque	
Arjuntala Mosque	
Barisal	NasratGazi Mosque
	Kashba Mosque
	Sarkar's Math
	Kamalapur Mosque
	North Karapur Mia Bari Mosque
	CollectoratBhaban
Dinajpur	Sura Mosque
	Ancient Mosque (Nayabad)
	Kantanagar Temple
	SitaKot Bihar

District	Monuments/Sites
	Ghoraghat Fort
	BaroPaiker Gar
	ArunDhap
	ChorChakravorty's Mound
	KanchirHari
	BaigramMandir
	Badal Pillar
	Gopalgonj Temple
Narayanganj	Folk Arts and Crafts Museum
	Panam City
	KadamRasuldargah
	Dulalpur bridge
	Bangla bari
	Sonakanda fort
	Tomb of Sultan GiasuddinAzam Shah
	Baba Saleh Mosque
	Hajiganj Fort
	Bandar Shahi Mosque
Sirajganj	RabindraKuthi Bari
	Tomb and mosque of KhawjaPirSaheb of Enayetpur
	homestead of Behula
	Shiva Mandir
	Elliot Bridge or Lohar Poll
	NabaratnaMandir

Annex J: List of Environmentally Sensitive Areas

List of Ecologically Critical Areas of Bangladesh

Sl. No.	Name of Wetland	District	Area (ha.)
1	Strip of 10 km. outside the Sundarbans Reserved Forest	Khulna, Bagerhat, Satkhira	762, 034
2	Sea Front of Cox's Bazar and Teknaf	Cox's Bazar	10465
3	St Martin's Island	Cox's Bazar	590
4	Sonadia Island	Cox's Bazar	4916
5	Hakaluki Haor	Moulvibazar	18383
6	Tanguar Haor	Sunamganj	9727
7	Marjat Baor	Jhenaidaha	200
8	Gulshan Lake	Dhaka city	20

List of Protected Area

Sl. No.	National Category	Location	Area (ha.)	Established
1	Bhawal National Park	Gazipur	5022.00	11-5-1982
2	Madhupur National Park	Tangail/ Mymensingh	8436.00	24-2-1982
3	Ramsagar National Park	Dinajpur	27.75	30-4-2001
4	Himchari National Park	Cox's Bazar	1729.00	15-2-1980
5	Lawachara National Park	Moulavibazar	1250.00	7-7-1996
6	Kaptai National Park	Chittagong Hill Tracts	5464.00	9-9-1999
7	NijhumDweep National Park	Noakhali	16352.23	8-4-2001
8	Medhakachhapia National Park	Cox's Bazar	395.92	8-8-2008
9	Satchari National Park	Habigonj	242.91	15-10-2005
10	Khadimnagar National Park	Sylhet	678.80	13-04-2006
11	Baroiyadhala National Park	Chittagong	2933.61	06-04-2010
12	Kuakata National Park	Patuakhali	1613.00	24-10-2010
13	Nababgonj National Park	Dinajpur	517.61	24-10-2010
14	Singra National Park	Dinajpur	305.69	24-10-2010
15	Kadigarh National Park	Mymensingh	344.13	24-10-2010
16	Altadighi National Park	Naogaon	264.12	24-12-2011
17	Birgonj National Park	Dinajpur	168.56	24-12-2011
10	Khadimnagar National Park	Sylhet	678.80	13-04-2006
11	Baroiyadhala National Park	Chittagong	2933.61	06-04-2010
12	Kuakata National Park	Patuakhali	1613.00	24-10-2010
13	Nababgonj National Park	Dinajpur	517.61	24-10-2010
14	Singra National Park	Dinajpur	305.69	24-10-2010
15	Kadigarh National Park	Mymensingh	344.13	24-10-2010
16	Altadighi National Park	Naogaon	264.12	24-12-2011
17	Birgonj National Park	Dinajpur	168.56	24-12-2011
18	Rema-Kalenga Wildlife Sanctuary	Hobigonj	1795.54	7-7-1996
19	Char Kukri-Mukri Wildlife Sanctuary	Bhola	40.00	19-12-1981
20	Sundarban (East) Wildlife Sanctuary	Bagerhat	31226.94	6-4-1996
21	Sundarban (West) Wildlife	Satkhira	71502.10	6-4-1996

Sl. No.	National Category	Location	Area (ha.)	Established
	Sanctuary			
22	Sundarban (South) Wildlife Sanctuary	Khulna	36970.45	6-4-1996
23	Pablakhali Wildlife Sanctuary	Chittagong Hill Tracts	42087.00	20-9-1983
24	Chunati Wildlife Sanctuary	Chittagong	7763.97	18-3-1986
25	Fashiakhali Wildlife Sanctuary	Cox's Bazar	1302.43	11-4-2007
26	Dudpukuria-Dhopachari Wildlife Sanctuary	Chittagong	4716.57	6-4-2010
27	Hajarikhil Wildlife Sanctuary	Chittagong	1177.53	6-4-2010
28	Sangu Wildlife Sanctuary	Bandarban	2331.98	6-4-2010
29	Teknaf Wildlife Sanctuary	Cox's Bazar	11615.00	24-03-2010
30	Tengragiri Wildlife Sanctuary	Barguna	4048.58	24-10-2010
31	Dudhmukhi Wildlife Sanctuary	Bagerhat	170.00	29-01-2012
32	Chadpai Wildlife Sanctuary	Bagerhat	560.00	29-01-2012
33	Dhangmari Wildlife Sanctuary	Bagerhat	340.00	29-01-2012
34	Sonarchar Wildlife Sanctuary	Patuakhali	2026.48	24-12-2011
35	National Botanical Garden	Dhaka	84.21	1961
36	Baldha Garden	Dhaka	1.37	1909
37	Madhabkunda Eco-Park	Moulavibazar	265.68	2001
38	Sitakunda Botanical Garden and Eco-park	Chittagong	808	1998
39	Dulahazara Safari Parks	Cox's Bazar	600	1999

Environmental Code of Practices for the PPSIP Intervention

❖ Housing & Multi-purpose Building:

General:

- Houses should be built with proper environmental guidelines to reduce the negative impacts upon the intervention area.
- Land must not be selected in disaster prone areas or near ecologically and/ or culturally important sites as well as near a natural forest

Pre-Construction:

- People of the project area must have a clear idea about the project
- Housing designs must be finalized prioritizing the peoples' choice.
- During land preparation, top soil must be salvaged.
- Collect earth/soil from dry pond/canal/borrow pits or where the top soil had already been lost.

Construction:

- Construction materials must be selected to ensure the least possible negative impact on the environment.
- Safety measures (e.g. shed on the warehouse, storehouse, proper drainage system in the warehouse) must be followed.
- Proper steps must be taken to protect the inhabitants from air, noise and dust pollution during house construction
- Transportation vehicles for transporting construction materials must be selected with caution. These vehicles must not produce any air and noise pollution beyond tolerable limit
- Using semi-permeable construction materials for the basement of the housing.
- Construction shed must be covered as well as must have a concrete floor.
- Demolished houses and debris must be managed in a proper way

Post-Construction:

- The inhabitants need to be empowered for proper maintenance of the built houses.
- Properly maintain the constructed houses

❖ Water Supply Tube-well

General:

- No negative environmental impact must be allowed through the interventions of water supply.
- Assess the demand-supply deficit of water supply in intervention area
- Water supply interventions must be decided upon prior consultation with the community people. Maintain 250 m distance between two adjacent wells.

Pre-Construction:

- If there are construction activities near a water body then the people and construction worker should be informed before initiating the activities that they should not use the water.
- Alternative water supply options have to be ensured during installation of main water supply options.

Construction:

- There should be alternative sources of water if the construction of new water supply procedures create temporary disturbance in water
- The digging of soil should follow the proper design to avoid the pollution and water logging.
- During construction stage interventions such as digging soil for pipe installation must not create any temporary water logging
- Materials used for water supply must be long lasting and of high quality
- There should be alternative sources of water if the construction of new water supply procedures create temporary disturbance in water supply in the project area
- To recharge the ground water, natural water flow must be protected
- Use of van or cart instead of motorized vehicles to supply water

Post-Construction:

- Proper maintenance must be ensured to keep the system functioning
- Water of the reservoir should be cleaned regularly
- Conduct water quality test for arsenic and bacterial contamination, and salinity

❖ Drainage System**General**

- There should be good drainage system along the road in order to release the surface water in a safe distant place. Therefore, the adjacent locality, water body and crop lands will be protected from pollution.

Pre-Construction:

- Surrounding people should be informed before construction of the drain.
- Construction activities should be identified based on natural flow of the stream.
- Identify appropriate location for the outlet
- The people along the drainage line as well as the people of upstream and downstream should be informed before construction of the drain.

Construction:

- During the construction of a drain, there should be installation of erosion and sediment control equipments.
- There should be installation of all the safety or flood warning signs during the construction of a drain.
- Ensure installation of all the safety or flood warning signs.
- Construct culvert, properly maintain natural slope

Post-Construction:

- There should be regular monitoring of the drainage due to sedimentation.
- Campaigns to create awareness among the inhabitants about proper use of drainage
- Ensure proper disposal of waste and avoid clogging of drains

❖ Sanitation (Toilet/Community Toilet)**General:**

- Development of a sanitation system for the inhabitants in the project area that will be environment friendly and sustainable
- Installation of hygienic latrine proportionately for all the people in the intervention area.

Pre-Construction:

- Involve the community in designing sanitation system
- Involve community in selecting and deciding the types of latrines and places of latrines to be installed
- Maintain safe distance (minimum 10 m) between latrine and tube well or other water sources.
- Maintain 3 feet distance between ground water table and bottom of latrine pit.
- Sufficient ventilation should be ensured in latrine superstructure.
- People and construction worker should be aware of the defecation place before initiating the construction activities.
- Demolished latrines, and the excreta must be managed properly (proper treatment and dumping of the excreta)
- Dumping zone of the excreta must be selected earlier
- Manage the debris of demolished latrines
- Manage human excreta of the demolished latrines either by decomposing or by disposing those in a safe place
- Use specially designed vehicles to carry out the excreta from the construction site

Construction:

- Keep noise and soil pollution within tolerable limit
- Installing both public and private toilets.
- Installation of hygienic latrine instead of pit latrine to stop the microbial contamination to the ground water.

Post-Construction:

- Proper maintenance of the newly created latrines both by the community and by the auditing authority
- Sensitize the community about the health impacts of improper sanitation practices
- Ensure a functional monitoring system in the project site.
- When pit is full, minimize over handling of excreta carrying containers and maximize the container size. Specially designed vehicles must be used to carry out the excreta from the intervention site.

❖ **Solid Waste Management**

General

- This code of practice describes procedures of collection, handling and separation, storage and processing, transfer and transport, and disposal of solid waste. However, there are construction wastes as well as domestic wastes.
- Encourage 3R (Reduce, Reuse, and Recycle)
- Encourage making compost of perishable wastes and use it in the kitchen garden

Pre-Construction:

- Types of waste generated in the site should be identified.
- People and construction worker should be aware of the disposal of waste and the management

of disposal site.

- The location of disposal site should have impermeable soil condition in order to stop the contamination of ground water by leachate.
- There should be buffer area between the disposal site and water body in order to reduce the contamination of surface water by leachate.
- Adequate distance should be maintained between the disposal site and the residential area in order to stop the contamination of residential area by leachate.

Construction:

- There should be complete waste collection service as uncollected wastes blocked the drainage and sewage system.
- Waste should be collected in sealed bag as during the waste collection time there are air, water and soil pollution.
- The vehicles which collect waste should have cover because during waste collection it spreads dust and litter along the roadways.
- The transfer station should have ventilation and air filtration during loading and unloading of waste.

Post-Construction:

- Regularly clear the dumping site
 - There should be odor control system as well as aerobic condition during composting of waste at disposal site.
 - Entrance of flood water should be blocked through raising the edge of the disposal site in order to stop the spread of waste in the area.
-

Annex L: Environmental Compliance Monitoring

Interventions/ Mitigation Measures/ Environmental Problems to be monitored	Progress			Need for further monitoring		Monitoring period (time & date)	Responsible community person
	Completed	Not Completed	In Progress	Yes	No		

Summary of monitoring findings:

<p>Prepared by</p> <p>Name :</p> <p>Designation :</p> <p>Signature :</p> <p>Date :</p>	<p>Reviewed by</p> <p>Name :</p> <p>Designation :</p> <p>Signature :</p> <p>Date :</p>
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Annex M: Community Monitoring

Interventions/ Mitigation Measures/ Environmental Problems to be monitored	Progress			Need for further monitoring		Monitoring period (time & date)	Responsible community person
	Completed	Not Completed	In Progress	Yes	No		
Housing							
Water Supply							
Road							
Sanitation							
Solid Waste							
Drainage							

Summary of monitoring findings:

<p>Prepared by</p> <p>Name :</p> <p>Designation :</p> <p>Signature :</p> <p>Date :</p>	<p>Reviewed by</p> <p>Name :</p> <p>Designation :</p> <p>Signature :</p> <p>Date :</p>
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Annex N: Environmental Effect Monitoring

Monitoring date:

Completion date:.....

Name and location of the slum:.....

Section A: General Information (Name/location/description of the s/interventions and brief descriptions of the specific site)

Name of the interventions	Brief description of the Design	Brief Description of Baseline Environment

Section B: Environmental Effect Monitoring (identify environmental issues, parameters, mitigation measures needed to be monitored from the ES & IEE)

Monitoring Environmental Issues/ Parameters/ Effectiveness of Mitigation Measures	Baseline Situation	Current situation			Describe or Quantify the Impacts (for improvement & deterioration)	For any adverse impact, Suggest Mitigation Measures	Cost of Implementation
		+	-	0			

Summary of monitoring findings:

Prepared by

Name :

Designation :

Signature :

Date :

Reviewed by

Name :

Designation :

Signature :

Date :

Annex O: TOR for Third Party Environmental Audit

Terms of Reference (ToR)

For External Audit of Pro-Poor Slum Integration Project (PPSIP)

The government of Bangladesh would receive financial assistance from the World Bank for carrying out the Pro-Poor Slum Integration Project (PPSIP). The Ministry of Housing and Public Works (MoHPW) would implement this project through the National Housing Authority (NHA). The NHA will carry out the functions of program management, coordination, monitoring, knowledge management, finance and capacity building.

BACKGROUND

The NHA intends to ensure that the proposed infrastructure takes environmental concerns into account, in accordance with GoB regulations and WB operational policies. The details of the sub-projects to be implemented under PPSIP will be finalized during project implementation phase and therefore, the exact locations, size and extent of the sub-projects will remain unknown during preparation phase. Therefore, a framework approach has been adopted for EA of the PPSIP; a detailed Environmental Management Framework (EMF) has been developed for effective environmental management of all sub-projects to be implemented under PPSIP. The EMF provides guidelines for selection and environmental screening and management of sub-projects. During implementation of the sub-projects (both construction and operational phases), the NHA will be responsible for implementation of sub-project specific EMP/ ECoP, as well as preparation of progress and environmental monitoring reports. In order to ensure proper environmental management of PPSIP, a third party consulting firm will be given the responsibility to independently monitor the overall performance of environmental management of PPSIP, including compliance with relevant GoB and WB regulations and the provision of the EMF developed for the project.

A. OBJECTIVES OF THE CONSULTANCY SERVICES

The main objective of the consultancy services under this terms of reference (ToR) is to allow a third party team to monitor performance of the overall environmental management of the PPSIP; specifically, the third party will monitor compliance of the project activities with the Environment and Safeguards documents, including the relevant GoB regulations, WB operational policies, and provisions of the EMF developed for the PPSIP.

B. SCOPE OF WORK

The consultant will work with the concerned experts/ officials of the World Bank, the NHA to monitor and assess environmental management issues of the PPSIP. The Consultant will carry out the tasks in accordance with accepted professional standards, utilizing sound engineering, economic, financial, and management practices. For all sub-projects to be implemented at the selected slums, the third party Consulting firm will monitor the following:

- Sub-projects are selected and approved by the NHA following the standard practice in line with the feasibility study (if carried out)/ city master plan (if present).
- Sub-project description is prepared properly, and sub-project “environmental screening” and “analysis of alternatives” are carried out properly by the NHA following the formats and guidelines provided in the EMF.

- Decision regarding environmental assessment of the sub-project is taken by NHA following the provisions of the relevant GoB regulations (ECR 1997) and WB operational policies.
- Environmental assessment (EA) of the sub-projects (i.e., IEE/ EIA/ EMP) is prepared following the EMF, and satisfying the relevant provisions of the GoB and WB; and necessary environmental clearance/ approval are taken from the DoE and WB for sub-project execution.
- Specific environmental requirements/ clauses are included in the bidding document and they are being met.
- The sub-project activities meet the EMP and ECoP requirements.
- Implementation and effectiveness of the mitigation and enhancement measures specified in the EMP.
- Actual and predicted changes to the environment, so that immediate actions could be taken to mitigate unanticipated impacts.
- Actual and predicted impacts, so that better prediction/ assessment of impacts could be made in the future;
- Environmental monitoring is carried out in the field as outlined in the EMP, monitoring and progress reports are regularly prepared; the monitoring reports are recorded and evaluated, and adequate feedbacks are provided to the field management.

In addition, for any observation of non-compliance, the third party consultant will provide specific recommendations for improvement of environmental management.

C. DELIVERABLES

The consultant shall prepare the reports as described below. The reports will be provided in soft and hard copies (five hard copies).

(i) Inception Report

The consultant will submit an inception report based on the initial findings, describing the work program at the end of third week after commencement of work. The consultant will identify any constraint and suggest solutions, together with any action required by NHA/ WB to facilitate the successful implementation of the work.

(ii) Quarterly Report

The consultant will submit quarterly reports, summarizing monitoring activities (as outlined in the scope of works). The reports will summarize the sub-project specific monitoring outcomes for each slum separately. A comparison of monitoring outcomes of same/similar sub-projects carried out in different slums should be provided, so that lessons learned and best practices could be replicated.

(iii) Final/ Completion Report

This report will be prepared at the end of the project. It will be a comprehensive report on the consultancy services throughout the contract. This report will summarize the major findings, constraints, lessons learnt; and provide recommendation for proper environmental management and monitoring in future projects. The Table of Contents of the Report will be submitted for the clearance by NHA/ WB ---- months before completion of the contract. The draft report will be provided to NHA --- month before completion of the contract.

D. TEAM COMPOSITION

Professional Staff Input:

Team Leader (Environmental Management Specialist): Must have at least Master's Degree in environmental engineering/ management/ science/Urban Planning from a reputed university with at least 20 years of experience in urban infrastructure including slum upgrading projects, some of which should be in projects funded by multilateral financial institutions;

Environmental Specialist (1): Must have at least Master's Degree in environmental engineering/ urban Planning from a reputed university with at least 10 years of experience in urban infrastructure/ slum upgrading related projects, some of which should be in projects funded by multilateral financial institutions.

Civil Engineers (2): Must have B.Sc. degree in civil engineering from reputed university with at least 8 years of experience in urban infrastructure related projects.

Junior Field Engineers (5): Must have B.Sc. degree in civil/ water resources/ environmental engineering from a reputed university with at least 2 years of experience in urban infrastructure related projects.

Socio-economic Specialist (1): Must have at least Master's degree in social science or related discipline from a reputed university with at least 8 years of experience in socio-economic issues of urban infrastructure related projects.

Ecologist (1): Must have at least M.Sc. degree in biological science or related discipline from a reputed university with at least 8 years of experience in biological / ecological issues of urban infrastructure related projects.

Support Staff:

The Consultant will provide necessary support staff (draftsmen, surveyors, enumerators and office support staff) needed in order to carry out their tasks and fulfill their responsibilities effectively.

E. SUPPORT SERVICES

The Consultant will include cost of office accommodation, operating costs for vehicles and communication services for effectively conducting their assignment.

Annex P: Grievance redress register

(To be maintained at the office of Chairman/ Mayor, Deputy Commissioner, Deputy Director of Project and Chairman of NHA for all grievances reported/registered).

Name of the Grievance Registration Office:

SI No.	Detail of Complain Received			Name of the Compliant	Complete Address	For Office Use Only		
	Date	Compliant number	Form of Compliant			Name of the concerned GRO	Action Taken	Date of Final Disposal
Petitioner's Copy								
Complaint no.:				Code:				

Annex Q: Consultations Carried out in Comilla & Narayanganj

The project team initially selected four Districts (five communities from each district) for Urban Slum Development Project: Comilla, Shirajganj, Barishal, and Narayanganj. However, environmental baseline study was conducted in two districts Narayanganj and Comilla. The EMF preparation team made an initial visit to Tikkharchar, Robidashpara, Mofizabad Colony, Godarmar Slum, Dolls House and Bou Bazar in Comilla and Narayanganj to understand an overall scenario of the selected slums, their baseline situation, and related problems. The detail environmental mapping session was conducted later on at phase two with the participation of the local community. Base map of City Colony and Rishipara slum of Narayanganj City Corporation; and Tikkacharchar slum at Comilla district was collected from local community development committee. The meeting helped to identify the local problems, environmental issues and impacts of the communities. The detailed environmental mapping helped to identify resources and activity pattern on the map as well the environmental condition of the visited slums. The detailed of the field visits are attached as Annex R.

Public Consultations in Comilla:

Venue: Tikkarchar (north and south) Slum, Comilla

Date: 04 January, 2014

Types of Stakeholders/ Participants: Dwellers of Tikkarchar (north and south) slum, UPPR members and consultants, community architect team, professionals of C3ER, BRAC University

Different types of stakeholders attended the meeting. Besides the slum residents, UPPR members were also attended the meeting. As UPPR members are engaged in development works of Tikkarchar (north and south) slum, they are considered as the stakeholders. Participants are mainly slum dwellers and involved in different occupations. More than 15% participants are carpenter. more than 10% participants are rickshaw puller in Tikkarchar (north and south) slum. Other participants are working as day laborer, EPZ worker, driver, vendor, hawker, domestic worker, etc.

Public Consultations in Narayanganj:

Venue: Rishipara Slum, Narayanganj City Corporation, Narayanganj

Date: 03 January, 2014 & 07 January, 2014

Types of Stakeholders/ Participants: Slum Dwellers, UPPR consultants, professionals of C3ER, BRAC University

In consultation meeting, main participants were: slum dwellers and UPPR members. People in this slum are engaged in various professions. In Narayanganj, male members work as rickshaw puller, laborer at salt manufacturing factories, small traders, garments worker, musician, etc. Female members work as small traders, garments worker and domestic workers. Besides the slum dwellers.

Opinions of the local participants/slum dwellers during consultation:

- In the rainy season, slum area next to mora gang gets flooded.
- During heavy shower, some areas inside the get flooded
- Water stays few days and doesn't drain out easily
- Children has skin disease and diarrhea.
- We do have access to water, but water quality is not good.
- In some tube wells, water is very turbid.
- In some tube-well, iron content is very high.
- Toilet condition is very bad. Often surrounding area excreta gets dirty by overflow of excreta.
- We received toilet support from other project. But need to share with other slum community.
- My family is big, toilet is unsanitary, toilet pit gets filled up very quickly.
- Emptying the toilet pit is extremely cumbersome work. We don't get support from the municipality.
- We don't have access to municipal water supply.
- Drains are not working. These are blocked by solid waste.
- Solid wastes in our slum are not getting collected by municipal truck.
- We dump our wastes next to our house.
- There is no playground for our children.
- Roads and footpaths are Brocken.
- Often road get flooded by storm sewerage.
- Drain doesn't have cover which often cause accident
- Municipal wastes are being dumped next to the slum.
- I don't have land and living on others land.
- We don't have electricity connection. Get the power from the neighbor.
- Don't have gas for cooking, sometimes use others gas stove.
- I use fuel wood for cooking, which is very expensive.
- I don't have drain and can't drain out wastewater from kitchen.
- We live on other's land and there is always fear of eviction.
- Municipality doesn't provide support in emptying the toilet pit and excrete from the toilets pollute the pond water. Some people use pond water for cooking, washing and other family purposes.
- My income is very low and cannot repair my house.
- Sometimes I need to purchase clean bottled water as water quality often gets deteriorated. I cannot afford it

Summary of environmental issues prevailing in the slums (EMF team's observation)

Tikkar Char:

- This community is protected with the embankment created by the BWDB.
- All the households are created in the side of the embankment which is protect them from the overflow of the river water
- Excessive rainfall results water logging problem
- More than 15% households are illegally settled on the government land
- The community often face fire incidents for the congested household structure

Mofizabaad Colony

- The land tenure issue is a major problem for this community. Around 42 families were promised to get the land ownership but only 15 families have land rights so far.
- The people of the community are not concerned about the environmental issues
- All the latrines in the areas are connected with the nearby pond which create water pollution
- The community people specially the Bengalis always are in fear of eviction

Rabidaspara

- As a minority community these peoples are facing constant force from outside to sell their land as they live a very high value land
- The power practitioners always try to grab their land forcefully
- This is a low income community
- To stop encroachment the community people built a toilet in a very unhygienic area
- The community has severe sanitation and waste management problem

GodarMa'r Colony

- This community is on a private land
- Located near a waste dumping ground
- Latrines of the area are located near the landfill site

Dolls house

- The house type of this community is in very poor condition
- Living environment of this community is very unhygienic
- No provision of proper latrines facility
- Community people generally depends on nearby households to get their dirking water

Public consultation in Comilla and Narayanganj



Photo 01: Public consultation meeting at Tikkarchar (north and south) Slum



Photo 02: Public consultation meeting at Tikkarchar (north and south) Slum



Photo 03: Public consultation meeting at Tikkarchar (north and south) Slum, Comilla



Photo 04: Public consultation meeting at Narayanganj.



Photo 05: Public consultation meeting Narayanganj.



Photo 06: Consultation meeting at Narayanganj.

Annex R: Baseline Environment of Other Slums

Description of the Baseline Environment (Narayanganj City Colony)

Physical Environment

Location of the study area

Narayanganj City Colony is situated in Narayanganj City Corporation. Narayanganj City Colony is located at 23°37' 23.8" north latitudes and 90°31' 1.6" east longitudes. The slum is surrounded by Shitalakha river.

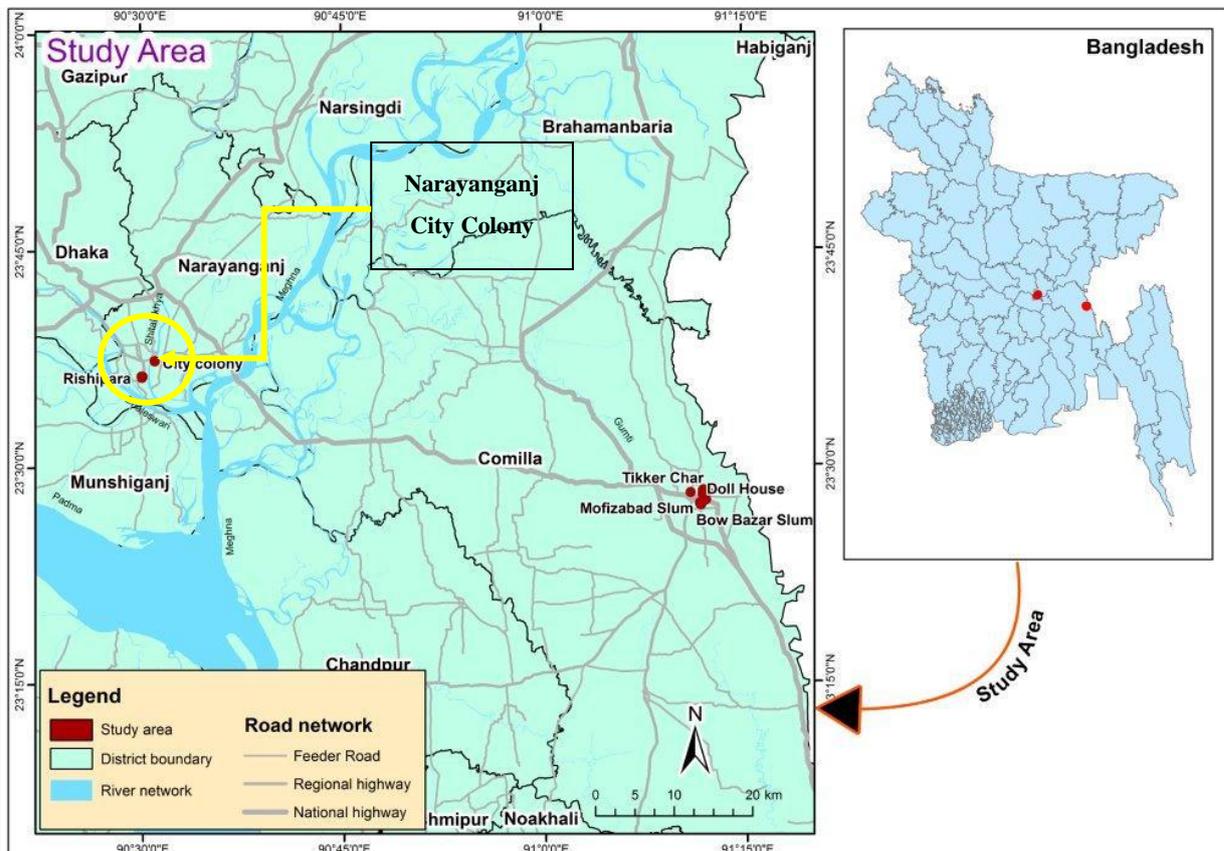


Figure: Location of Narayanganj City Colony, Narayanganj

Bio-ecological Zoning

Narayanganj City Colony is a part of Brahmaputra-Jamuna floodplain. The main river course of this floodplain is strongly braided. It consists of several interconnecting channels, which erode and form new lands on a large scale during each flooding season (Brammer, 1996). The Brahmaputra-Jamuna floodplain possesses a unique variety of plants and equally enjoys different varieties of faunal species.

Climate

After creating the “theissen polygon” it has been found that the meteorological station-11111 of Dhaka is the most significant station for Narayanganj City Corporation. As a part of the respective area, the climatic condition of Narayanganj City Colony does not vary significantly within this geographical area. The annual mean temperature of this region varies from 18.81°C to 28.77°C. The mean annual rainfall is 2046.66 mm.

Land type

Before the construction of any kind of urban infrastructural development, physiographic characteristics, like area of flooding, need to be taken into account. As for example, low-lying areas need to be avoided as these areas are generally prone to flood and water-logging problems. Different land types (inundation land type) can also be identified through the analysis of DEM from IWM.

Soil

As the Narayanganj City Colony is situated in Brahmaputra-Jamuna floodplain, its soil is non-calcareous gray floodplain soils and non-calcareous dark gray floodplain soils. So the soil of Narayanganj City Colony is similar to the respective upazila.

Surface water

During the field trip, it was revealed that, Narayanganj City Colony is bounded by the Shitalakha river.

Ground water

In Narayanganj City Colony, it is observed that most of the households are dependent on tube well for drinking water supply.

Water pollution

After the field visit in Narayanganj City Colony, it was seen that a number of households use the nearby area of ponds for dumping solid and liquid waste. Besides, open defecation in the drain is a common picture which finally reaches the pond. So, people who use the pond water are facing water born diseases.

Air Pollution

Air pollution is found in Narayanganj City Colony, as many households of the slum use firewood for cooking instead of kerosene and gas. Most of the kitchens are in front of the house. So, smokes easily enter inside the room which creates suffocation for children and elder persons. Apart from that, slum dwellers of the area usually dump their solid and liquid waste in the open space like in the pond and drain which creates odor pollution.

Noise Pollution

The quality of an environment is also deteriorated by noise pollution. During the field visit it is observed the problem of noise pollution in Narayanganj City Colony slum as the area is located beside the cement factory.

Biological Environment

Flora and Fauna

After detail field survey, the specific list of the biological environment of the Narayanganj City Colony slum is addressed. Most of the household have fruit trees (i.e. mango, jackfruit, star fruit, Syzygium cumini (Jam), guava etc.) as well as medicinal tree (i.e. Tulsi tree). Similarly, some of the households have domestic animal such as chicken, duck, etc. Moreover, the inhabitants reported that several types of birds are found in this area such as magpie, crow, pigeon, dove etc.

Environmental Sensitive areas (ESA)/Protected Areas (EPA)

There are no protected ecologically critical areas, cultural and historical places in and around Narayanganj City Colony.

Socio-Economic Environment

Demography

One of the main objectives of the Pro-Poor Slum Integration Project (PPSIP) is to improve the quality of life and overall living conditions of the poor (underprivileged) people (community). In relation to this, population characteristics such as total population, Population density etc. need to be collected from field survey and BBS to recognize the overall condition of the study area. It is usually seen that the population density remains high in all the city corporation areas of Bangladesh.

Livelihood

The slum dwellers are traditionally engaged with cleaning services since 100 years back. So, based on their cast and tradition, they are doing services in the city corporation as a cleaner.

House Type

There are three major types of houses are found in the city colony slum during the field survey. Most of the houses are pucca, few are semi pucca and other is tin shade. The roof of pucca houses are concrete based while the roof of semi pucca houses are tin based.

Land Tenure

There are total 52 households in the city colony. It is built on Khas land of Narayanganj City Corporation. Paurashava arranged the land and made houses for their living. The settlement is around 100 years old.

Water Supply and Sanitation Status

In the study area, slum dwellers depend on three major sources of water, (i) tap water supplied by City Corporation i.e. WASA; (ii) hand tube well and (iii) nearby pond. Among the all three sources, major activities like drinking, bathing, washing and household activities fully depend on tap water. Others, who have personal hand tube well, can use those intensively for their daily activities. People, who live near the pond especially the eastern part of the colony, use pond water for bathing, washing and household activities. But they collect drinking water from the taps.



Figure: Slum dwellers are using tap water

A common place with a number of taps is located in the southwestern part of the slum, from where the community people collect water for their daily activities. Beside the taps, one hand tube well is also there. Figure A2.2 shows the slum inhabitants are collecting tap water from the common place which is not too much far from their house. In addition to that, the slum is located just besides the Narayanganj City Corporation (old Paurashava Bhaban) building. So, water in terms of availability and adequacy is ensured here. Dwellers are happy with the quality of water and it is free of cost. But the major problem is, water collection point is open and it is near the main road. So, the community peoples especially the women and adolescent girls, hesitant to take bath in such an open place.



Figure: Sanitation facilities at Narayanganj City Colony

Two types of latrines are observed there. One is sanitary latrines (total number is 3) which are linked with septic tank. Other type is improved latrines (total number is 4) which are linked with open water body. Out of total 52 households, only 4 households have individual latrine. So, rest of the people of this slum depends on 3 sanitary latrines which are not adequate for them. On the other hand, water is

not available inside the shared latrines which is opposite for personal latrines. Overflow of latrines during any flood or heavy rainfall is a common phenomenon in the colony. Dumping of sewerage sludge from individual latrines to the pond through drain, pollute the quality of water and creates water born diseases there. Open defecation by the children is practiced there which further creates bad odor in the surrounding environment. As the common latrines are shared by the community people so management is done by them. In that case, they collect money from each dweller and assign one person to clean it up when it becomes filled. In addition to that, as those are shared so management of those throughout the year is poor. Sometime it is difficult to use those especially in the rainy season. On the other hand, individual latrines are managed by the latrine owners.

Solid Waste Management

In Narayanganj City Colony there is no prescribed waste dumping zone for the slum dwellers. Hence, in practice people dump their solid waste in the open dumping area which is close to the water body as well as main road. Household waste also contains liquid waste which they directly dump into the drain. Besides, the road side dumping area, some places are also identified where they dump their solid waste in an unplanned way. Collection of solid waste from the slum is done by the city corporation. For liquid waste, when the drains become blocked, the community people take initiatives to clean it. Open dumping also create bad odor.



Figure: Solid and liquid waste dumping scenario in Narayanganj City Colony

At present water logging is not a serious problem in the study area. So, the overall drainage condition of the slum is moderate. All drains are established by the city corporation. In the slum area water logging happens in the peak hours when maximum users use water from the common water sources.

Health Care

In the slum area, no specified health care center is found inside the colony. So, the people who become sick rely on the outside health care center (either private or government). The common health related problems in the study area are cold fever and asthma.

Education

Despite of having a number of school going children, the access to education is not adequate here. Schools are far from the slum area which sometime hinders send their children to school. As they are an oppressed community because of their livelihood, sometimes children feel shy and other children

harass them because their parents are doing cleaning services. These entire situations de-motivate their children to go school which results in drop out. The dropped out students may get addicted to drugs. So, the slum parents are looking forward to get assistance to establish one school inside the slum.

Access to Information

People of this slum have good access to information from TV, radio, mobile and newspaper. They do not have internet and computer.

Energy

The only source of electricity for the slum community is Power Development Board (PDB). The current energy consumption pattern of slum community was satisfactory. Electricity bill is paid by the individual households. On the other hand, they use firewood, kerosene and Gas for cooking purposes.



Figure: Wood fuel are used for cooking in Narayanganj City Colony

Hazard and Climate Change

Natural Hazard and Risk

In this particular study information for several hazards needs to be collected. The significant hazards for Bangladesh are flood, storm surge, drought, salinity and earthquake. However, the risk from drought and salinity is not relevant for this particular slum up gradation project.

The map above shows that part of Narayanganj City Colony is under flood free zone (Figure A2.6).

Description of the Baseline Environment (Rishipara)

Physical Environment

Location of the study area

Rishipara is situated in Narayanganj City Corporation. Rishipara is located at 23°26' 20" north latitudes and 90°30' 2.4" east longitudes. The slum is surrounded by Shitalakha river.

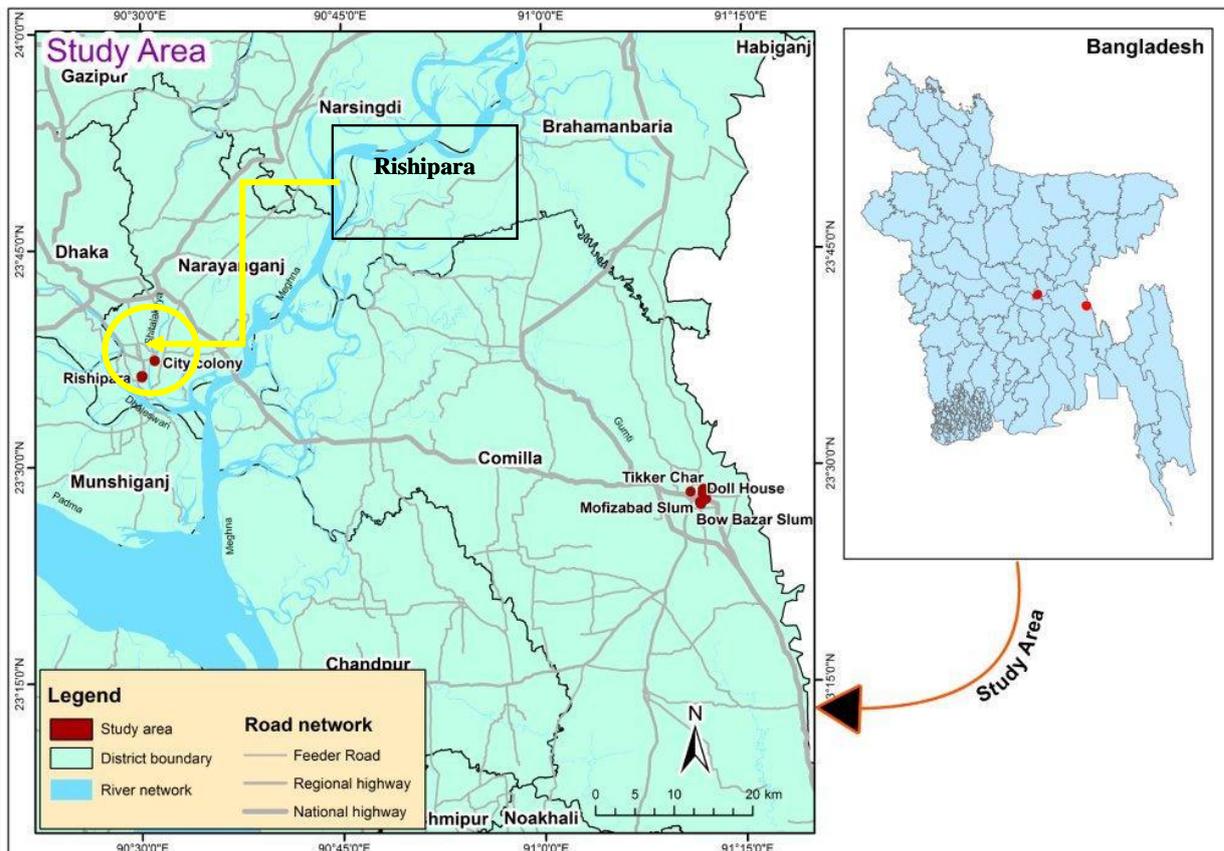


Figure: Location of Rishipara, Narayanganj

Bio-ecological Zoning

Rishipara is a part of Brahmaputra-Jamuna floodplain. The main river course of this floodplain is strongly braided. It consists of several interconnecting channels, which erode and form new lands on a large scale during each flooding season (Brammer, 1996). The Brahmaputra-Jamuna floodplain possesses a unique variety of plants and equally enjoys different varieties of faunal species.

Climate

After creating the “theissen polygon” it has been found that the meteorological station-1111 of Dhaka is the most significant station for Narayanganj City Corporation. As a part of the respective area, the climatic condition of Rishipara does not vary significantly within this geographical area. The annual mean temperature of this region varies from 18.81°C to 28.77°C. The mean annual rainfall is 2046.66 mm.

Land type

Before the construction of any kind of urban infrastructural development, physiographic characteristics, like area of flooding, need to be taken into account. As for example, low-lying areas need to be avoided as these areas are generally prone to flood and water-logging problems. Different land types (inundation land type) can also be identified through the analysis of DEM from IWM.

Soil

As the Rishipara slum area is situated in Brahmaputra-Jamuna floodplain, its soil is non-calcareous gray floodplain soils and non-calcareous dark gray floodplain soils. So the soil of Rishipara is similar to the respective upazila.

Surface water

During the field trip, it was revealed that, R is bounded by the Shitalakha river.

Ground water

In Rishipara, it is observed that most of the households are dependent on tube well and deep tube well for drinking water supply. The inhabitants reported that sometimes they faced water scarcity problem during dry season.

Water pollution

After the field visit in Rishipara slum, it was seen that a number of households use the nearby d for dumping solid and liquid waste which increase the susceptibility of the occurrence of water born disease.

Air Pollution

Air pollution is found in Rishipara slum as the inhabitants usually use firewood; sawdust and kerosene for cooking purposes. Many dwellers cook inside the house, so smoke is deposited on the wall of houses. Also, smoke causes discomfort in breathing. Apart from that, slum dwellers of the area usually dump their solid and liquid waste in the open space and drain which creates odor pollution.

Noise Pollution

The quality of an environment is also deteriorated by noise pollution. There is no significant noise pollution in Rishipara slum as the area is not located beside the factory or the high way.

Biological Environment

Flora and Fauna

After detail field survey, the specific list of the biological environment of the Rishipara slum is addressed. Most of the household have fruit trees (i.e. mango, jackfruit, guava etc.). Similarly, some of the households have domestic animal such as chicken, duck etc. Moreover, the inhabitants reported that several types of birds are found in this area such as sparrow, crow, pigeon, etc.

Environmental Sensitive areas (ESA)/Protected Areas (EPA)

There are no protected ecologically critical areas, cultural and historical places in and around Rishipara slum.

Socio-Economic Environment

Demography

One of the main objectives of the Pro-Poor Slum Integration Project (PPSIP) is to improve the quality of life and overall living conditions of the poor (underprivileged) people (community). In relation to this, population characteristics such as total population, Population density etc. need to be collected from field survey and BBS to recognize the overall condition of the study area. It is usually seen that the population density remains high in all the city corporation areas of Bangladesh.

Livelihood

In Rishipara, most of people are rickshaw puller, van puller, day labor, domestic worker, small businessman factory worker etc.

House Type

After the field visit, it is seen that houses in the Rishipara are constructed in an unplanned manner. And maximum households are semi pucca or made of tin. In many cases house plinths are pucca and they are of differential height. Wall is made of brick or tin or bamboo. Provision of light and ventilation inside the houses are poor.

Land Tenure

In Rishipara, maximum numbers of the inhabitants have been living for many years in the government Khas land. Some people live in their own houses those are economically solvent than the others. Apart from that, some peoples live in a rented house for the poor economic condition.

Water Supply and Sanitation Status

There are five deep tube wells and WASA water supply is also available in the slum. There is couple of hand tube wells, installed by local inhabitants. Tube wells are distributed throughout the slum area. 24 hour water supply is available by WASA connection. Besides deep tube wells are active for ten to twelve hours a day. Still people complain about not enough water for daily activities. There is problem of free riding as some people collect water without paying for it. Some have complained about having to walk longer than others to collect water. This is because water sources are not designated for inhabitants in a planed manner. Rather they collect water from one of the sources by paying to the respective meter owners and they select a particular source on the basis of personal relationship and negotiation. Those who cannot afford to pay for deep tube well they collect water from WASA water supply. People use deep tube well water for drinking, cooking and washing.



Figure: Tubewell and deep tube well water supply at Rishipara

People complained about two water quality problems. Firstly, during rainy season collection point of WASA supply goes under water. Secondly sometimes water supply mains are leaked and water is polluted by sewage water from sewerage line. Then people have to repair the leak. People also complained about deterioration of taste of WASA water due to chlorination. It was also observed that base of tube wells are submerged in water because of poor drainage condition.



Figure: Sanitation facilities at Rishipara

There are two types of latrines found in the slum: shared latrines and individual latrine. All the latrines are pit latrine. Individual latrines provided by UNDP project are twin pit latrines. However water supply is not available in any of the latrines. Shared latrines are separated for female and male slum dwellers.

Solid Waste Management

There is a dustbin provided by Narayanganj City Corporation for solid waste collection. But there was evidence of unplanned household waste dumping in the slum. Liquid wastes are directly disposed off in drains besides houses. Solid wastes are also dumped in open space, drains especially in the open channel or drain situated in the middle of the slum.

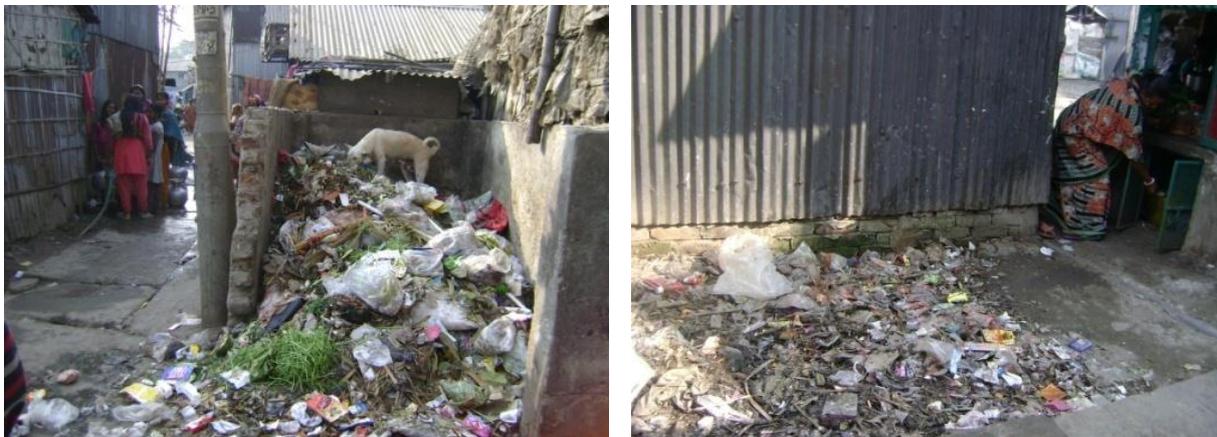


Figure: Solid waste dumping scenario in Rishipara

There are both covered drains and open drainage channel in the slum. Covered drains are situated beside houses and used by slum dwellers as walk ways. Open channel is more prone to waste dumping. However all the drains are subject to liquid and solid waste dumping and hence get blocked. During rainy season these blocked drains causes water logging inside the slum. Another problem of drainage is filled up retention ponds. Previously two parcels of low land worked as retention bodies before the runoff from slum is drained out to river. But owner of land has filled up one piece of land. This has caused to delay in draining out of rain water. Another fact is surrounding area of the slum is flood free high land. But construction in neighboring land has rendered this slum into lower elevation, thus causing water logging problem.



Figure: Drainage system at Rishipara

Health Care

There is no designated health care centre inside the slum. One banner of “Surjer Hashi Clinic” was found though. Common diseases reported by slum dwellers include common cold, fever, diarrhea, skin diseases etc. These diseases usually break out during rainy season and children are more likely to fall victim of them. Slum dwellers also said that jaundice and typhoid are not common as they mostly drink tube well water.

Education

There is a BRAC school inside Rishipara slum. Many of the slum children go to this school. Also Muslim children go to moqtob. This moqtob is situated in the mosque inside the slum.

Access to Information

About 70% slum dwellers do not have any media access to information. Mobile, television, radio, newspaper etc. are seen within the rest 30% houses of Rishipara.

Energy

Electricity is found majority of households every house in Rishipara slum. For cooking purposes people use fire wood, saw dust and kerosene. They also use waste fabric from garments factories. Some families use “Bondhu Chula” provided by NGOs.



Figure: Women cooking using waste garment fabric and “Bondhu Chula” in Rishipara

Hazard and Climate Change

Natural Hazard and Risk

In this particular study information for several hazards needs to be collected. The significant hazards for Bangladesh are flood, storm surge, drought, salinity and earthquake. However, the risk from drought and salinity is not relevant for this particular slum up gradation project.

The map above shows that part of Rishipara is under flood free zone (Figure A3.7).

Public Consultation Attendance Sheet

Date: 23/11/13

Sl	Name	Signature
১.	মওদেলোম্মার হোসেন	মওদেলোম্মার
২.	দুলাল মিঠা	দুলাল
৩.	কুনসুম	কুনসুম
৪.	আহমিনা	আহমিনা
৫.	হোসেন আরা	হোসেন আরা
৬.	নাজিউ	নাজিউ
৭.	বিনা	বিনা
৮.	আরশিমা	আরশিমা
৯.	কুনসুম	কুনসুম
১০.	বাবমিঠা	বাবমিঠা
১১.	নিদামিঠা	নিদামিঠা
১২.	হারু মিঠা (বুধ)	হারু মিঠা
১৩.	সোবহান মিঠা	সোবহান মিঠা
১৪.	আলী মিঠা	আলী
১৫.	বেগমার মিঠা	বেগমার মিঠা
১৬.	মাহান মিঠা	মাহান
১৭.	অশ্বিন মিঠা	অশ্বিন
১৮.	জহির মিঠা	জহির
১৯.	ইজাজ মিঠা	ইজাজ
২০.	সাব্বুয়াত	সাব্বুয়াত


 Dr. Md. Sajidur Rahman
 23.11.13

Date: 23/11/13

Sl	Name	Signature
1	शशिना	शशिना
2	काशी	काशी
3	मीना	मीना
4	सुखदास	सुखदास
5	काशी	- काशी
6	सुखदास	सुखदास
7	सुखदास	सुखदास
8	सुखदास	सुखदास
9	सुखदास	- सुखदास
10	सुखदास	सुखदास
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12	सुखदास	सुखदास
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19	सुखदास	सुखदास
20	सुखदास	सुखदास

Roufa
Roufa Khanum
23/11/13

Date: 24/11/13

Sl	Name	Signature
୧.	ଆକାଶ ବିଧା	ଆକାଶ
୨.	ଦେବୁ ବିଧା	ଦେବୁ
୩.	ଜାକିର ବିଧା	ଜାକିର
୪.	ତ୍ରିଲୋଚୀ	ତ୍ରିଲୋଚୀ
୫.	ଦୋହ	ଦୋହ
୬.	ଦୋହର ଦେବୀ	ଦୋହର
୭.	ସମ୍ପଦ	ସମ୍ପଦ
୮.	ସୋନାମାଳୀ ଦେବୀ	ସୋନାମାଳୀ
୯.	ବାବୁନ ବିଧା	ବାବୁନ
୧୦.	ନୁରୁ ବିଧା	ନୁରୁ
୧୧.	ଅନୁଭବ	ଅନୁଭବ
୧୨.	ଅକ୍ଷୟ	ଅକ୍ଷୟ
୧୩.	ନାଥୁର ବିଧା	ନାଥୁର
୧୪.	ଦୀପକ	ଦୀପକ
୧୫.	ଦେବୁ ବିଧା	ଦେବୁ
୧୬.	ସୁନୀଲ ବିଧା	ସୁନୀଲ
୧୭.	ସୋନିକା ବିଧା	ସୋନିକା
୧୮.	ସୁନିକା	ସୁନିକା
୧୯.	ସୁନୀଲ ବିଧା ଦେବୀ	ସୁନୀଲ
୨୦.	ଅର ବିଧା	ଅର

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... ୧୨୩

Date: 24/11/13

Sl	Name	Signature
২০.	আনোয়ার	আনোয়ার
২১.	রিয়া	রিয়া
২৩.	রাফি	রাফি
২৪.	অমর	অমর
২৫.	নাজমা	নাজমা
২৬.	হোসাইয়া	হোসাইয়া
২৭.	হুমায়রা	হুমায়রা
২৮.	জাহান্নারা	জাহান্নারা
২৯.	আনোয়ার	আনোয়ার
৩০.	নারিন	নারিন
৩১.	তৌফিক	তৌফিক
৩২.	সায়মিন	সায়মিন
৩৩.	মনোয়ারা	মনোয়ারা
৩৪.	সায়মিন	সায়মিন
৩৫.	অনামিকা	অনামিকা
৩৬.	সানিভা	সানিভা
৩৭.	নারী	নারী
৩৮.	মানমা	মানমা
৩৯.	হুমায়রা	হুমায়রা
৪০.	সায়মিন	সায়মিন

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