Environmental Monitoring of Payra 1320 MW Thermal Power Plant Project

Quarterly Monitoring Report

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Submitted by

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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AQ	Air Quality
BBS	Bangladesh Bureau of Statistics
BCPCL	Bangladesh-China Power Company (Pvt.) Limited
BIWTA	Bangladesh Inland Water Transport Authority
BMD	Bangladesh Meteorological Department
BOD	Biological Oxygen Demand
BPDB	Bangladesh Power Development Board
BWDB	Bangladesh Water Development Board
CEGIS	Center for Environmental and Geographic Information Services
COD	Chemical Oxygen Demand
DGPS	Differential Global Positioning System
DO	Dissolve Oxygen
DoE	Department of Environment
DPHE	Department of Public Health Engineering
DSS	Dust Suppression System
DTW	Deep Tube Well
EC	Electric Conductivity
ECA	Environment Conservation Act /Ecological Critical Area
ECC	Environmental Clearance Certificate
ECR	Environment Conservation Rules
EMP	Environmental Management Plan
KV	Kilo Volt
KWh	Kilo Watt hour
MoA	Ministry of Agriculture
MoC	Ministry of Communication
MoCAT	Ministry of Civil Aviation and Tourism
MoEF	Ministry of Environment and Forestry
MoFL	Ministry of Fisheries and Livestock
MoPEMR	Ministry of Power, Energy and Mineral Resources
MoWR	Ministry of Water Resources

MoU	Memorandum of Understanding
MPA	Mongla Port Authority
MW	Mega Watt
NEMAP	National Environmental Management Action Plan
NEP	National Environmental Policy
NOx	Oxides of Nitrogen
NWPGCL	North-West Power Generation Company Limited
PPA	Payra Port Authority
PPM	Parts Per Million
Sox	Oxides of Sulfur
SPM	Suspended Particulate Matter
STW	Shallow Tube-Well
TDS	Total Dissolved Solid

CHAPTER 1

1. Introduction

1.1 Study Background

Planned and appropriate use of power is one of the pre-conditions for economic development of Bangladesh. There is a huge demand for electricity in our day-to-day life as well as in various sectors of the economy. The total power produced in the country is not enough to ensure adequate access to electricity. As of now, only 62 percent of the total population has access to electricity. Per capita electricity generation is only 321 kWh (BPDB, 2014), which is very low compared to that of other developing countries. In order to improve this situation, the Government has given the highest priority to power sector development and is committed to make electricity available to all by 2021. Several programmers have already been taken up to implement short, medium and long term plans for the balanced development of power sector to scale up electricity generation. FY 2013-14 (Till April2014), a total of 23,204 million-kilowatt hour (MkWh) net energy (10,804 MkWh in public sector and 12,399 MkWh in private sector including (IPP, SIPP, Rental and REB) was generated. Of the total generation, the public sector power plants generated 46.56 percent while private sector generated 53.44 percent. The share of gas, hydro, coal and oil based energy generation was 74.71 percent, 1.77 percent, 2.48 percent and 17.61percent respectively. On the other hand, in FY 2012-13, 38,213 million-kilowatt hour (MkWh) and in FY 2011-12, 35,199 million-kilowatt hour (MkWh) net energy were generated i.e. net energy generation growth in FY 2012-13 was 8.13 percent more than the FY 2011-12.

To meet up this, the Government of Bangladesh has formulated a Power System Master Plan (2010). Taking consideration of high dependency on natural gas (77% of power generation comes from natural gas based units), Power System Master Plan (PSMP 2010) recommends diversification of fuel used for electricity generation because present primary energy i.e. natural gas supply will decrease after 2017 and opt coal as a prime energy for electricity generation. The Master plan, targets composition of power supply as of 2030 is set at 50% for domestic and imported coal, 25% for domestic and imported (in the form of LNG) natural gas and 25% for other sources such oil, nuclear power and renewable energy. The coal based generation is the least cost option in consideration to present economy.

In Bangladesh, natural gas reserve is depleting and recent gas demands are increasing in other sectors. Hence Government of Bangladesh has decided to install new coal based power plants for future power generation expansion. With the objective of fuel diversification for sustainable power generation and reliable electricity supply, North-West Power Generation Company Limited (an Enterprise of Bangladesh Power Development Board) is installing new Payra 1320 MW Thermal Power Plant (hereinafter referred as Payra1320 MW power plant) in Patuakhali district covering areas of Dhankhali Union under Kalapara Upazila. The project location has been shown in the Figure 1-1 and Figure 1-2.

The Payra1320 MW power plant is a joint venture of North-West Power Generation Company Limited (NWPGCL) and CMC, China. The Payra1320 MW power plant will to some extent meet up electricity demand for the country which will improve the system reliably and reduce load shedding.

Proper location /sitting, its process and waste abatement and control are very important for an industry to be environmentally sound. In tackling environmental problems of the country, various environmental legislations have been made time to time in Bangladesh. Here, like in some other countries environmental issues are handled by various sectoral legislations. Policies, strategies adopted on environment conservation and on scrotal issues – all have given conservation, protection and preservation of the environment a paramount importance. Sustainable development is therefore the corner stone of the policies and procedures regarding Industrial or any other development activities in Bangladesh. As such this current project need to comply with all the relevant national legislation in general and in particular to the Environment Conservation Act, 1995 (ECA, '95) and Environment Conservation Rules, 1997 (ECR, '97). The environmental legislation encompasses laws relating to the protection of environmental health, the control of pollution, and conservation of wildlife and natural resources.

According to approved EIA Report by Department of Environment (DoE), current report presents the monthly environmental monitoring results of the Payra 1320 MW Thermal Power Plant.

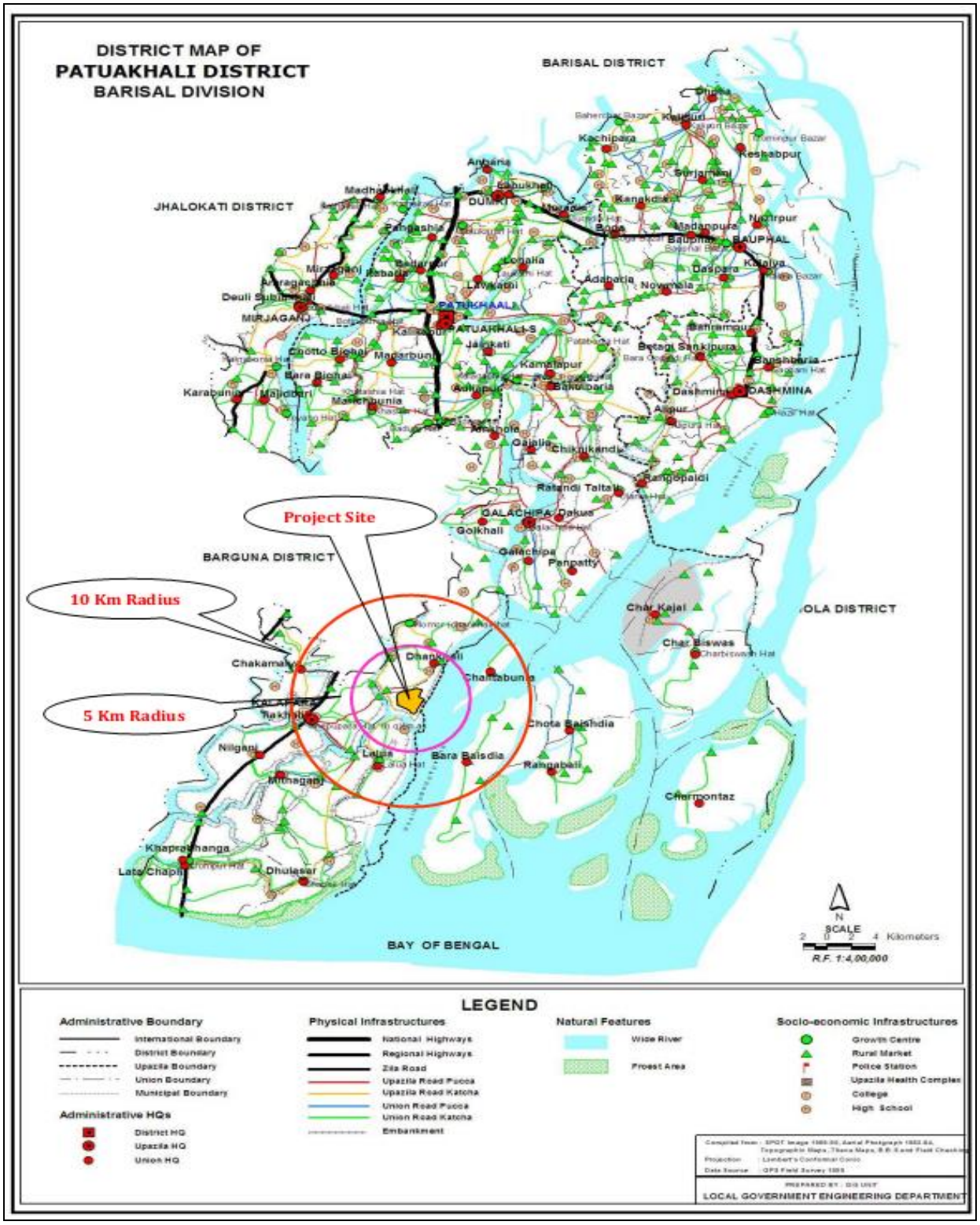


Figure 1-1: Project Site at Kalapara Upazila in Patuakhali District

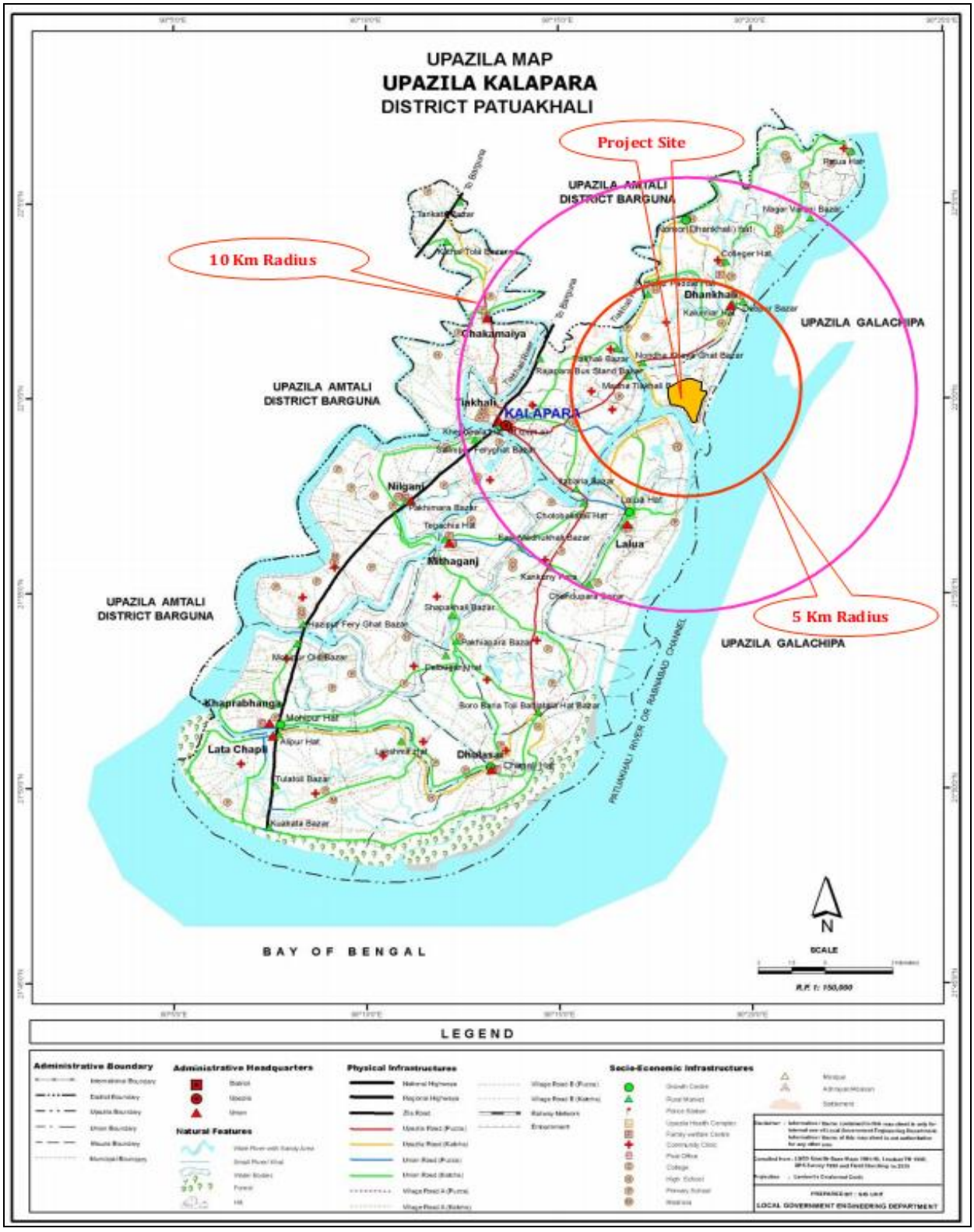


Figure 1-2: Power plant Site beside the Rabnabadh Channel, Kalapara Upazila

1.2 Importance of the project

The Payra 1320 MW power plant will add 1300MW electricity to our national grid that will improve our present electricity generation significantly and as well as trigger our national economic development. Besides, industrial development will be initiated after implementation. Additionally, it will create employment opportunity to the local people and improve transportation system in the project area, which will ultimately play an important role in poverty reduction and develop social safety net condition. Moreover, this coal based power plant will thereby play an important role in fuel diversification in electricity generation and reduce pressure on natural gas reserve.

1.3 Objective of Monitoring

- To characterize and monitor the environmental quality at project site;
- To obtain an environmental database which can be used to identify any short and long term environmental impacts of the Project;
- To verify the environmental impacts predicted in the EIA study;
- To monitor the performance and effectiveness of proposed environmental management plan and practiced mitigation measures;
- To identify environmental compliance of the project with regulatory requirements, Government standards and policies; and
- To provide suggestion and additional measures to achieve proposed Environmental Management Plan.

CHAPTER 2

2. Legal and Legislative Framework, Regulations and Policy Considerations

2.1 Applicable Policies and Legal Provision

All legal provisions relevant to environmental protection applicable to the planning, construction, operation and coal transportation were identified according to the approved EIA report. **Table 2-1** below summarizes all relevant legal provisions:

Table 2-1: National Legal provisions applicable to the Payra power plant for ensuring environmental protection

Issue	Bangladeshi Legislation or Regulation
Governance of Power Generation and Management System	a. Bangladesh Energy Regulatory Commission Act, 2003 b. Power System Master Plan, 2010 **c.** National Energy Policy
Coal Sourcing	a. Bangladesh Coal Policy (Draft) b. Master Plan on Coal Power Development, 2010 **c.** Import and Export Control Act, 1950
Coal Transportation	a. Terrestrial Water and Maritime Zones Act 1974 & Rules 1977 b. The Ferries Act, 1885 c. Ports Act, 1908 d. Bangladesh Merchant Shipping Ordinance 1983 e. The Prevention of the Interference with Aid to Navigable f. Waterways Ordinance, 1962 g. Payra Port Authority Act, 2013
Prevention of pollution, and Protection of Environment	a. Payra Port Authority Act, 2013 b. Ports Act, 1908 c. The Forests Act, 1927 d. Environment Conservation Act, 1995 and the Amendments thereafter e. Environment Conservation Rules, 1997 **f.** The Environment Court Act, 2000
Health and Safety	a. Fatal Accidents Act, 1855 b. Dock Laborers Act, 1934 c. Dangerous Cargoes Act, 1953 d. Imports and Exports (Control) Act, 1950 e. Public Safety Ordinance, 1953 f. The Explosives Act, 1884 **g.** Fire prevention and Extinguish Act, 2003
Procurement in	a. The Public Procurement Regulations, 2003 and Revisions

Issue	Bangladeshi Legislation or Regulation
Bangladesh	thereafter
Transport, Handling and Storage of Dangerous Goods	a. Environment Conservation Act, 1995 (Amendments thereafter) b. Ports Act, 1908 c. Petroleum Act, 1934 d. Dangerous Cargoes Act, 1953

2.2 National Environmental Legal Provisions in Connection with Setup, Operation and Maintenance

The Environment Conservation Act of 1995 is the key legislation in relation to environment protection in Bangladesh. This Act has been promulgated for environment conservation, standards, development, pollution control and abatement. It has repealed the Environment Pollution Control Ordinance of 1977. The Act has been subsequently amended in 2000, 2002, 2007 and latest amendments done up to year 2010. The main objectives of the Act are:

- Conservation and improvement of the environment and
- Control and mitigation of pollution of the environment

The main strategies of the Act can be summarized as:

- Declaration of ecologically critical areas and restriction on the operations and processes, which can or cannot be carried/initiated in the ecologically critical areas
- Regulations in respect of vehicles emitting smoke harmful for the environment
- Environmental clearance
- Regulation of the industries and other development activities' discharge permits
- Promulgation of standards for quality of air, water, noise and soil for different areas for different purposes
- Promulgation of a standard limit for discharging and emitting waste and
- Formulation and declaration of environmental guidelines

According to the law before setting up any new project/interventions by the Government/ non-government agencies/public, the proponents are required to obtain respective clearance from the Department of Environment. Under the Environment Conservation Rules 1997, the project promoter must obtain site clearance from the Director General of Department of Environment. An appeal procedure does exist for those promoters who fail to obtain clearance. The Department of Environment executes the Act under the leadership of the Director General.

Under the Environment Conservation Act, 1995 the first set of rules promulgated is the Environment Conservation Rules, 1997. The Rules have provided categorization of industries/ projects, hence identified types of environmental assessments needed against respective categories of industries/projects. The Environment Conservation Act (Amendment), 2000 provides responsibility for compensation in cases of damage to ecosystems: (1) The polluter pay

principle is included herein, (2) increased provision of punitive measures both for fines and imprisonment and (3) fixing authority on cognizance of offences.

The Bangladesh Environment Conservation Act (Amendment), 2002 elaborates on: (1) restriction on polluting automobiles, (2) restriction on the sale and production of environmentally harmful items like those that polythene bags, (3) assistance from law enforcement agencies for environmental actions, (4) break up of punitive measures and (5) authority to try environmental cases.

The Environmental Rules are not explicit for various oil and gas exploration interventions. Rather, this is covered under the broader heading of "exploration, extraction and distribution of mineral resources" under the 'Red' category projects.

So far the Rule has been updated three times - February and August 2002 and April 2003.

2.3 Policy Guidance

Under the study a number of sectoral national policies have been reviewed to identify the guiding principles which are relevant to the coal based thermal power plant installation, operation and maintenance activities. The sectoral policies will include energy, environment, water, forest, transport, import; fisheries etc.

Analysis of the relevant policies is summarized in **Table 2-2**.

Table 2-2: Summary of the Relevant Polices

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
Agricultural Policy, 1999			
Agricultural Policy, 1999	Preserve and develop land productivity	Bangladesh-China Power Company (Pvt.) Limited Should: take appropriate measures to prevent loss of land fertility in and around Project site during the project implementation period. If not, then compensate the loss.	Extension Department, Soil Resource Development Institute
Agricultural Policy, 1999	Section 2.1 Objective; Preserve existing biodiversity of different crops	Bangladesh-China Power Company (Pvt.) Limited Should take appropriate measures to prevent loss of any indigenous crop variety of the project site Viz. preserve the indigenous crop verity. If not, then compensate the loss.	MoA, Bangladesh Rice Research Institute (BRRI), BARC
Agricultural Policy, 1999	Section 12.1 Land Use; Appropriate measures will be taken in the light of the Land Use Policy, to stop the trend of shifting agricultural land into to other due to its use for non-agricultural purposes.	Bangladesh-China Power Company (Pvt.) Limited must follow the appropriate land acquisition procedure as per the GOB	MoA, MoFL
Environment Policy 1992			
Environment Policy,1992	Section 3.2.1 Industry; Adoption of corrective measures by polluting industries in phases	Bangladesh-China Power Company (Pvt.) Limited must comply with the Government regulation.	MoEF, MoFL, MoPEMR, DoE and other relevant government agencies
Environment Policy 1992	Section 3.2.4 Industry; Encourage development of environmentally sound and	Bangladesh-China Power Company (Pvt.) Limited should use economically viable and	MoEF, MoFL, DoE

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
	appropriate technology and initiatives on research and extension in the fields of Industry. Balance such initiatives with the best use of labor and provision of proper Wages.	environmental friendly technology Provide analysis of alternatives in the EIA report	
Environment Policy 1992	Section 3.3.1 Health; Prevent activities, which are harmful to public health in all spheres, including development	Bangladesh-China Power Company (Pvt.) Limited should take all appropriate measures to prevent risky activities that may affect the Public.	MoEF, LGED, DPHE, Local Administration
Environment Policy 1992	Section 3.3.5 Health; Ensure healthy workplace for workers	Bangladesh-China Power Company (Pvt.) Limited should take all appropriate measures to ensure healthy workplace for the workers	DoE, DPHE
Environment Policy 1992	Section 3.4.1 Energy and Fuel Reduce and discourage the use of those fuels which pollute the environment and increase the use of environmentally sound and less harmful fuels	Bangladesh-China Power Company (Pvt.) Limited must use the fuels in their machinery and vehicles that reduce pollution in the environment	MoEF, DoE, MoPEMR, Local Government Institutes
Environment Policy 1992	Section 3.4.2 Energy and Fuel reduce the use of fuel wood, agricultural residues etc. to meet energy need and increase the use of alternative energy sources	Bangladesh-China Power Company (Pvt.) Limited should use materials other than fuel wood and agricultural residue	MoPEMR
Environment Policy 1992	Section 3.4.5 Energy and Fuel Conserve country's fossil fuel reserves and renewable sources of energy	Bangladesh-China Power Company (Pvt.) Limited should: Consider the provision for long term aspects	MoPEMR
Environment	Section 3.4.6 Energy and Fuel; Conduct EIA	Bangladesh-China Power Company (Pvt.)	MoEF

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
Policy 1992	before implementing the projects for extraction of fuel and mineral resources	Limited should conduct EIA	
Environment Policy 1992	Section 3.5.1 Water development; Ensure environmentally sound utilization of all water resources	Bangladesh-China Power Company (Pvt.) Limited should: Ensure conservation of freshwater resources	MoEF
Environment Policy 1992	Section 3.5.5 Water development keep the rivers, canals, ponds, lakes, haors, baors and all other water bodies and water resources free from pollution	Bangladesh-China Power Company (Pvt.) Limited should: Make sure that the nearby water bodies and resources are not polluted due to project activities.	MoEF
Environment Policy 1992	Section 3.6.2 Prevent land erosion, preserve and increase soil fertility, and expand activities for conservation and environmentally sound management of newly accreted land	Bangladesh-China Power Company (Pvt.) Limited should take appropriate measures to prevent land erosion in the project site.	MoEF, MoFL
Environment Policy 1992	Section 3.7.2 Forest; Include tree plantation programme in all relevant development activities	Bangladesh-China Power Company (Pvt.) Limited should: Carry out afforestation in and around the project site	MoEF, FD
Environment Policy 1992	Section 3.7.3 Forest; Stop shrinkage and depletion of forest land and forest resources	Bangladesh-China Power Company (Pvt.) Limited should: Take appropriate measures minimize the deforestation around the site	MOEF, FD
Environment Policy 1992	Section 3.7.5 Forest Conserve wildlife and biodiversity	Bangladesh-China Power Company (Pvt.) Limited should: Take appropriate measures to prevent loss of the biodiversity and undertake compensatory measures in case of inevitable damage if any	MoEF, FD

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
Environment Policy 1992	Section 3.7.6 Forest; Conserve and develop wetlands and protect migratory birds	Bangladesh-China Power Company (Pvt.) Limited must: avoid activities which cause huge damage to wetlands and destroy the any fish sanctuary or species habitat of conservation significance	MoEF, MoWR, FD
Environment Policy 1992	Section 3.8.2 Fisheries; Prevent activities that diminish the wetlands natural habits of fish	Bangladesh-China Power Company (Pvt.) Limited should: Take appropriate measure, so that the nearby fish habitats are not threatened due to project activities, viz. do not discharge untreated waste water into the river	WET, EIA Report
Environment Policy 1992	Section 3.11.2 Transport and Communication; Ensure that vehicles and people using roads, rails, air and inland waterways do not pollute the environment and take steps to protect health of the workers running these transports	Bangladesh-China Power Company (Pvt.) Limited should: Use the vehicles (which are going to be used during the operation of the project) which cause less pollution to the environment. Take necessary measures to protect health of the workers running transports	MoEF, MoC, Roads and Highway Department, Railway Authority, Inland Water Transport Authority
Environment Policy 1992	Section 3.11.3 Transport and Communication; Control activities in inland ports and dockyards which cause pollution of water and the local environment	Bangladesh-China Power Company (Pvt.) Limited should: Need to consider this provision while importing and transporting the coals	MoEF, MoC, Roads and Highway Department, Port Authority, Inland Water transport Authority
Environment Policy 1992	Section 3.12.1 Integrate environmental consideration into all housing and urban	Bangladesh-China Power Company (Pvt.) Limited should: While setting up the	MoEF

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
	planning activities and research	proposed location town, consider the integrated environmental aspects	
Energy Policy 1996			
Energy Policy 1996	Section 1.2 Objective (iv); Ensure sustainable operation of the energy utilities	Bangladesh-China Power Company (Pvt.) Limited should: Ensure that the project activities do not hamper the sustainable of operations of energy utilities in the Proposed location	MoPEMR, Power Development Board, Rural Electrification Board
Energy Policy 1996	Section 1.2 Objective (v); Rational use of total energy sources	Bangladesh-China Power Company (Pvt.) Limited should: Ensure the coal are used rationally	MoPEMR Hydrocarbon Unit
Energy Policy 1996	Section 1.2 Objective (vi); Ensure environmentally sound sustainable energy development program causing minimum damage to the environment	Bangladesh-China Power Company (Pvt.) Limited must: Consider this provision while implementing the project viz. ensure minimum damages caused to the environment	MoPEMR
Energy Policy 1996	Sectio1. 9 Environmental Conservation issues will be considered for all type of fuels and in each and every step of fuel cycle; namely, exploration, appraisal, extraction, conversion, transportation and consumption.	Bangladesh-China Power Company (Pvt.) Limited Should: Need to consider this Provision during their project cycle.	MoPEMR
Energy Policy 1996	Section 7.3 Technology Assessment, Necessary arrangements are to be made to select appropriate technologies i.e. conversion, efficiency, transferability, adaptability, environmental effects, cost	Bangladesh-China Power Company (Pvt.) Limited should: Consider these (Mentioned) factors while selecting the technologies.	MoPEMR

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
	should be considered while selecting technologies		
Energy Policy 1996	Promote use of economically viable environment friendly technology is to be promoted	Bangladesh-China Power Company (Pvt.) Limited should: Use economically viable and environmental friendly technology	MoPEMR
Energy Policy 1996	Discourage use of fuel wood	Bangladesh-China Power Company (Pvt.) Limited should: Use materials other than fuel wood	MoPEMR
Energy Policy 1996	Section 1.9 (g) Encourage the use of lead free petrol	Bangladesh-China Power Company (Pvt.) Limited should: Use lead free petrol	MoPEMRF
Land Use Policy 1994			
Land Use Policy 2010	Section 2 (e) Objective Ensure the land use in Harmony with the natural environment.	Bangladesh-China Power Company (Pvt.) Limited should: Follow the Government's land use plan	MoFL and DoE
Land Use Policy 2010	Section 2 (i) Objective; Conserve the natural forest	Bangladesh-China Power Company (Pvt.) Limited must: Compensate for destroying the natural forest, viz. plantation on the other nearby areas, Reforestation and plantation on the annulled forest area.	MoFL, Forest Department
Land Use Policy 2010	Section 2 (i) Objective; Prevent river bank erosion	Bangladesh-China Power Company (Pvt.) Limited should: Prevent activities that may cause river bank erosion	MoFL and MoWR
Land Use Policy 2010	Section 2 (h) Objective; Prevent the land pollution	Bangladesh-China Power Company (Pvt.) Limited should: Take appropriate measures to prevent/ reduce the land pollution	MoFL and DoE
Land Use Policy	Section 3.4 Land Use; Maintaining a balanced	Bangladesh-China Power Company (Pvt.)	MoFL, MoWR, Forest

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
2010	ecosystem	Limited should: Proper authorization to utilizing the area (project site) from the concerned authority, via, seek authorization from the Forest Department for utilizing the forest land	Department and others
The Forest Policy 1994			
Forest Policy 1994	Conserve the natural forest (protected, reserved and unclassified state forest)	Bangladesh-China Power Company (Pvt.) Limited should: Take appropriate measures to mitigate adverse impact (due to project activities) on the forest of the power plant location area	MoEF, FD
Forest Policy 1994	Restoration of natural forest to preserve biodiversity and wildlife	Bangladesh-China Power Company (Pvt.) Limited should: Carry out afforestation and reforestation of forests cleared during the project activity	MoEF, FD
Forest Policy 1994	Without proper authorization, forest land Cannot be used for non-forest purpose.	Bangladesh-China Power Company (Pvt.) Limited should: Seek for permission from the Forest Department for using the forest area for non-forest purpose	MoEF, FD
The Tourism Policy 1992			
Tourism Policy 1992	Section 5 (3): Development, preservation and maintenance of tourism resources of the country	Bangladesh-China Power Company (Pvt.) Limited need: To look into the matter so that any tourism resource nearby the powerplant are not affected due to the project activities	MoCAT
Tourism Policy 1992	Section 7: Restoration and maintenance of archaeological and historical sites	Bangladesh-China Power Company (Pvt.) Limited must: Not destroy any archaeological and historical sites of the	MoCAT

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
		with the power plant location of the Power Plant	
Tourism Policy 1992	Section 8: Conservation of wildlife	Bangladesh-China Power Company (Pvt.) Limited need to consider this provision	MoEF
The Fisheries Policy 1998			
Fisheries Policy 1998	Section 9.10; Protect natural water bodies and marine biodiversity.	Bangladesh-China Power Company (Pvt.) Limited must: Consider this provision and take appropriate measure to reduce adverse impact on the water bodies	MoFL, Fisheries Department
Fisheries Policy 1998	9.10.2 Control activities which may have adverse effect on the fish resources	Bangladesh-China Power Company (Pvt.) Limited must: Control the activities which may have adverse impact on the fish resources	MoFL, Fisheries Department
Fisheries Policy 1998	9.10.6 Implement laws to prevent discharge of untreated waste into water bodies.	Bangladesh-China Power Company (Pvt.) Limited must comply with these laws	MoFL, Fisheries Department
The Water Policy 1999			
Water Policy 1999	Section 4.8 Water and Industry; a) Zoning regulation will be established for location of new industries in consideration of fresh and safe water availability and effluent discharge possibilities.	Bangladesh-China Power Company (Pvt.) Limited must: Follow the zoning regulation of the Government	MoFL, MoWR
Water Policy 1999	b) Effluent disposal will be monitored by relevant Government agencies to prevent water pollution	Bangladesh-China Power Company (Pvt.) Limited must: Allow the monitoring authority to monitor their effluent discharge	MoWR
Water Policy 1999	c) Standards of effluent disposal into common water courses will set by WARPO in	Bangladesh-China Power Company (Pvt.) Limited need to comply with the polluter	DoE/MoWR

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
	consultation with DoE	pay principle under the national legislation	
Water Policy 1999	d) Industrial polluters will be required under law to pay for the cleanup of water body Polluted by then.	Bangladesh-China Power Company (Pvt.) Limited need to comply with the polluter pay principle under the national legislation	DoE/MoWR
Water Policy 1999	Section 4.12 Water and Environment; d) Protect against degradation and resuscitate natural water bodies such as lakes, ponds, Heels, khals, tanks, etc. affected by man-made Intervention or other causes.	Bangladesh-China Power Company (Pvt.) Limited should: Consider this provision while implementing the project	MoWR
Water Policy 1999	i) Enforce the 'polluter pay' principle in the development of regulatory guidelines for all regulatory actions designed to protect public health and the environment	Bangladesh-China Power Company (Pvt.) Limited need to follow the regulatory Guidelines.	DoE
The Industrial Policy 1999			
Industrial Policy 1999	Objective (p); To take appropriate measures for preventing	Bangladesh-China Power Company (Pvt.) Limited need to consider the provision during implementation of the project activities	DoE, MoPEMR
The Housing Policy 1999			
Housing Policy 1999	Section 4.7; Initiate planning to produce more forest products used to build infrastructures and attention be given to environmental management	Bangladesh-China Power Company (Pvt.) Limited should: Carry out afforestation and Reforestation activities to restore degraded lands	MoHPW/MoHFW
Housing Policy 1999	Section 4.9; While implementing any new housing project, need to consider the local	Bangladesh-China Power Company (Pvt.) Limited should: Consider the provision while implementing the	MoHFW/MoC

Title and Scope	Relevant Provisions to the Project Activities	Obligations of Bangladesh-China Power Company (Pvt.) Limited (BCPCL)	Requirement of BCPCL
	building modes, upholding and conservation of the cultural heritage	township under the project activities	
Housing Policy 1999	Section 5.1.3 Land; Ensure that the minimum land acquired for any development project/programmer	Bangladesh-China Power Company (Pvt.) Limited should: Adopt the principle during land acquisition	MoHPW Bangladesh-China Power Company (Pvt.) Limited
Biodiversity Strategy and Action Plan (BSAP)			
BSAP	Strategy 2: Conserve ecosystems, species and genetic pool of the country to ensure that the present and future well-being of the country and its people are secure	Bangladesh-China Power Company (Pvt.) Limited should: • Create an inventory of all the species of flora and fauna in the area. • Conduct EIA and SIA reports.	MoEF/ DoE
BSAP	Strategy 3: Restore ecosystems and rehabilitate endangered species	Bangladesh-China Power Company (Pvt.) Limited should: • Construct ETP to restrict amount of pollution • Create buffer zones in and around the project site • Carry on afforestation and reforestation activities on abandoned site	MoEF/ DoE
BSAP	Strategy 10: Ensure wise use of wetland resources environment pollution and maintaining the ecological balance	Bangladesh-China Power Company (Pvt.) Limited should: Consider the provision while implementing the project.	MoWR/ MoEF

Law and Policy relevant to Occupational health and safety

A. National Policy Framework

The constitution of Bangladesh adapted on the November 4th 1972 recognizes productivity as a basic need for economic development and covers the right to work and reasonable wages, Medicare and, disease and disablement. And thus it is assumed the health and safety of industrial workers has been taken care of.

The Occupational Health and Safety Services in Bangladesh, is still in the developmental stage. In Bangladesh Occupational Health and Safety generally refers mainly to needs of workers of industries or some manufacturing process but does not completely cover all recognized occupations of the country.

In the Fifth Five Year Plan (1997-2002) for the labor and manpower sector the objectives relatable to OSH are:

a. "To ensure fair wages, welfare and social protection of workers under the structural adjustment programs adopted by the government."
b. "To initiate steps to protect children from economic exploitation."

To achieve the objectives of the Fifth Five Year Plan (1997-2002) for the labor and manpower sector the strategies relatable to OSH that were to be pursued are: "Review of existing labor related laws, rules, regulations and directives and adoption of necessary modifications."

a. "Stress on gradual elimination of child labor and protection of children from economic exploitation and hazardous work."

In the labor sector the OSH relatable programs that were to be undertaken under the Fifth Five Year Plan included- Strengthening of Inspectorate of Factories and Establishments in terms of manpower and resources so as to enable them to "enforce various labor laws/rules concerning working hours, working condition, safety, and maternity benefits in different mills, shops and factories, etc."

In the Fifth Five Year Plan (1997-2002) for the health population and family welfare sector some scope for further development in the sector against the background that 'with increased urbanization and industrialization, the number of burn and trauma cases due to traffic and industrial accidents, unsafe use of chemicals, fire, etc., has been increasing every year'. The following needs have been identified:

a. Need to establish hospitals near major highways, traffic black spots and industrial
areas with trauma and burn units to treat burn and trauma cases in time.
b. Promote industrial and occupational health through IEC activities so as to raise awareness of industrial workers and protect them from industrial hazards.

Labor Policy:

- Undertake effective new labor policy on the basis of tripartite negotiation
- Link wages with productivity
- Quick disposal of Industrial dispute
- Stop child labor and provide workers with education, healthcare, and better working facilities

B. **LEGISLATIONS RELATING TO OCCUPATIONAL HEALTH AND SAFETY**

The Department of Inspection for Factories and Establishments under the Ministry of Labor and Employment administers and enforces 42 labor laws. The following legislations have provisions relating to occupational health, hygiene of workers, occupational diseases, industrial accidents, protection of women and young persons in dangerous occupations, and also cover conditions of work, working hours, welfare facilities, holidays, leave, etc.

Sl#	Legislation	Enforcing agency
1.	The Factories Act, 1965 and the Factories Rules 1979	Department of Inspection for Factories and Establishment
2.	Dock laborers' Act 1934	Department of Inspection for Factories and Establishment
3.	Dock laborers' Regulations 1948	Department of Inspection for Factories and Establishment
4.	Tea Plantation Laborers' Ordinance 1962 and the rules there under	Department of Inspection for Factories and Establishment
5.	The Workmen's Compensation Act 1923 as amended in 1980 and 1983	Department of Inspection for Factories and Establishment
6.	The Shops and Establishments Act 1965	Department of Inspection for Factories and Establishment
7.	Employment of Children Act 1938	Department of Inspection for Factories and Establishment
8.	The Maternity Benefit Tea Estates Act 1950	Department of Inspection for Factories and Establishment
9.	The Maternity Benefit Act 1939	Department of Inspection for Factories and Establishment
10.	The Maternity Benefit Rules 1953	Department of Inspection for Factories and Establishment
11.	The Boilers Act 1923	Chief Inspector of Boilers under Ministry of Industry
12.	Nuclear Safety and Radiation Control Act 1993	Atomic Energy Commission Bangladesh

C. ILO Convention regarding OSH:

Until now 31 ILO conventions have been ratified by Bangladesh. The ILO convention C 155 and C161 are concerned with the Occupational Safety and Health and the Occupational

Health Services respectively. The aim of the policy of the convention C155 is to prevent occupational accidents and injury to health and illnesses by identification and minimizing the causes of hazards in the working environment. The aim of the convention C161 is to establish and maintain a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work. Although these conventions are not yet ratified in Bangladesh but many of the recommendations of these conventions have been practiced to some extent through the implementations of existing various laws and regulations. In the Factory Act 1965 and Factory Rules 1979 and in some other laws and regulations there are various chapters that are relatable to OSH. But by the existing laws and regulations qualitative inspections regarding safety and health in the working is possible but could not be monitored in terms of quantitative standard values and permissible limits.

For ratification of ILO convention No. C 155 and C161 the motivation of all the parties, policy makers, employers and employees is required.

D. IFC's Performance Standard on Labor and Working Condition

IFC's Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of fundamental rights of workers.

The requirements set out in this performance standard have been in part guided by a number of international conventions and instruments, including those of the International Labor Organization (ILO) and the United Nations (UN). Its objectives are following

- To promote the fair treatment, non-discrimination and equal opportunity of workers.
- To establish, maintain and improve the worker-management relationship.
- To promote compliance with national employment and labour laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties and workers in the client's supply chain.
- To promote safe and healthy working conditions and the health of the workers.
- To avoid the use of forced labor.

CHAPTER 3

3. Methodology

3.1 Project Area

Payra 1320MW power plant is located at Latitude: 22° 59' 58" (N) and Longitude: 90° 17' 58" (E) adjacent to the Kazol River as well as upstream of Rabnabadh Channel at Dhankhali Union, Kalapara Upazila, Patuakhali District of Bangladesh. The site is spread across the Mouza: Modhupara, Char Nisanbaria and Nisanbaria. Plant site is about 8km away from Kalapara Upazila and 39km away from Patuakhali district.

The Payra 1320 MW power plant site stretches about 2.5 km from north to south and 2.3 km. from east to west. This open site is capable of meeting the land-use demand of the Payra 1320 MW (2× 660MW) ultra-supercritical coal-fired power plants, as well as the need for further expansion. The project location with respect to Bangladesh is presented in **Figure3-1** and the geographic location of the Payra 1320 MW site has been shown in **Figure 3-2**.

The priority economic activities are agriculture, fisheries and plantation. According to different environmental policy and regulations of Bangladesh, plant site is away from any notified eco sensitive area like Natural Park, wild life sanctuary, buildings of archaeological importance etc.

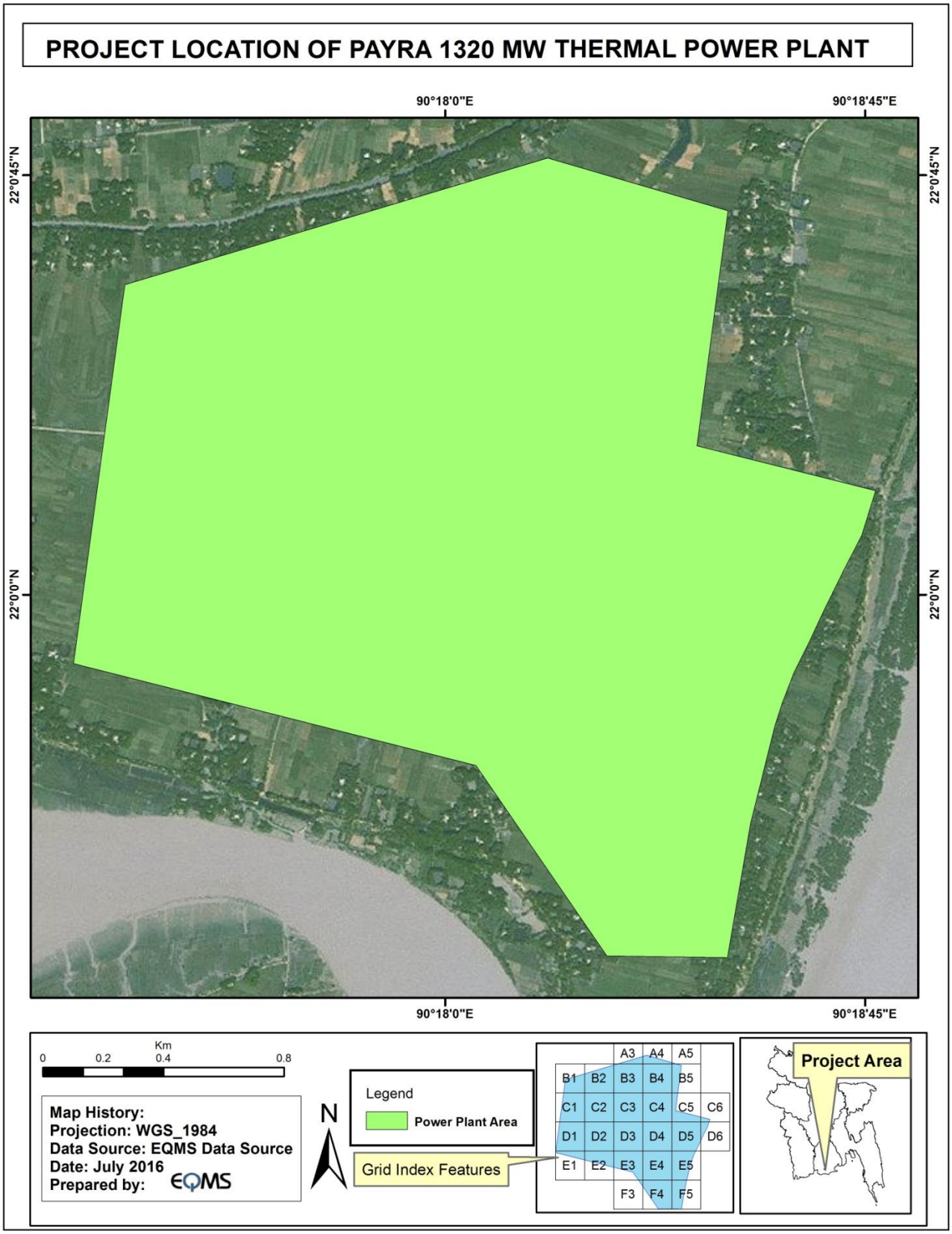


Figure3-1: Project Location Map

3.2 Environmental quality monitoring

According to the approval of Environmental Impact Assessment (EIA) report Memo No: DoE/Clearance/5310/2014/485on 08 October 2016, a number of physical environmental parameters required to monitor during the construction period of the Payra 1320 MW power plant. Among them, air quality has been measured quarterly and noise level and water quality have been measured on monthly basis.

3.3 Methods of Environmental Monitoring

3.3.1 Air Quality Monitoring

The ambient air quality monitoring sampling locations have been adopted from the approved EIA report of payra 1320 MW power plant. The existing ambient air quality of the study area was monitored during the construction period of the power plant. The ambient status of major air pollutants viz. Particulate Matter (SPM, PM_{10} and $PM_{2.5}$), Sculpture Dioxide (SO_2), Oxides of Nitrogen (NO_x), and Carbon Monoxide (CO) have been assessed by monitoring air quality at six locations. All the parameters were monitored on 24-hourly basis during the study period.

Respirable Dust Sampler (Model-Lata Envirotech APM 250 combined PM10 and PM2.5 sampler) has been used to collect the air sample. The particulate and gaseous samples collected during the monitoring have been analyses as per the procedures specified in **Table 3 1.**

Table 3-1: Methodology for Analysis of Ambient Air Quality

Sl.	Parameter	Analysis procedure
1.	SPM	Gravimetric method
2.	PM_{10}	Gravimetric method
3.	$PM_{2.5}$	Gravimetric method
4.	SO_2	Colorimetric method at 560nm using spectrophotometer (West-Geake method)
5.	NO_x	Colorimetric method at 540 nm using spectrophotometer (Jacob and Hochheiser method)
6.	CO	Digital CO meter

The geographical locations and setting of the ambient air quality monitoring locations has been listed in **Table 3-2** presented in **Figure 3-2**.

Table 3-2: Ambient Air Quality Sampling Locations

Sl.	Sampling Station	Station Code	GPS Coordinate	Location Setting
1.	Project site (Nishanbari)	AQ1	21°59'36.71"N 90°18'3.29"E	Village and Rural Setting
2.	Londa Kheya Ghat	AQ2	22° 0'40.67"N 90°16'43.35"E	Village and Rural Setting
3.	Dhankhali Union Complex	AQ3	22° 2'17.32"N 90°19'23.42"E	Village and Rural Setting
4.	Tiakhali village	AQ4	21°59'16.74"N 90°16'32.70"E	Village and Rural Setting
5.	Lalua village	AQ5	21°58'26.19"N 90°18'0.26"E	Village and Rural Setting
6.	Nishanbari village	AQ6	22° 0'27.59"N 90°18'36.73"E	Village and Rural Setting

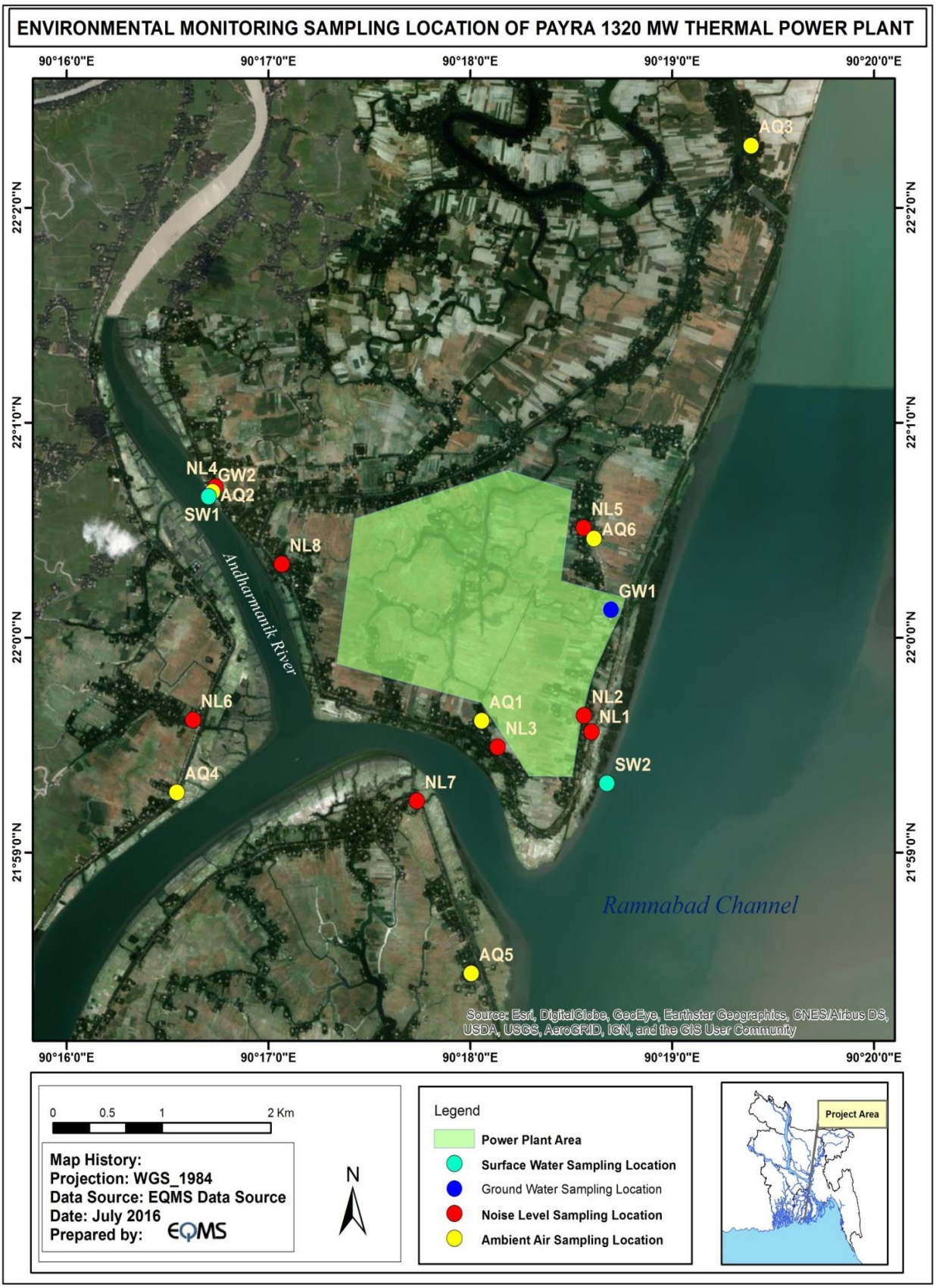


Figure3-2: Location Map of Samplaning Points

3.3.2 Noise Level Monitoring

Ambient noise levels have been monitored on monthly basis during the construction phase. Noise data logger (REED Sound Level Meter SE-322, Korea) has been used to monitor of ambient noise levels. Eight (8) noise level sampling locations have been selected from the approved EIA report of Payra 1320 MW power plant. Detail list of sampling location have been shown in **Table 3-3** and **Figure 3-2**. Noise level was measured for 1 hour at every location on different time.

Table 3-3: Sensitive Noise Location

Sl.	Code	Location	GPS Coordinate	Location setting
1.	**NL1**	Char Nishanbari Primary School	21°59'33.66"N90°18'35.96"E	Silent
2.	**NL2**	Char Nishanbari Mosque	21°59'38.18"N90°18'33.69"E	Silent
3.	**NL3**	Rofiqure Mia's House, Nishanbari Village	21°59'29.40"N90°18'8.05"E	Residential
4.	**NL4**	Londa Kheya Ghat	22° 0'42.08"N90°16'44.23"E	Commercial
5.	**NL5**	Monir Hossain's House, Nishanbari village	22° 0'30.58"N90°18'33.61"E	Residential
6.	**NL6**	Salam Uddin's House, Tiakhali village	21°59'36.98"N90°16'37.53"E	Residential
7.	**NL7**	Akber Mia's House, Lalua	21°59'14.37"N90°17'44.09"E	Residential
8.	**NL8**	Sabder Ali's House, Madhupara	22° 0'20.47"N90°17'3.90"E	Residential

3.3.3 Water Quality Monitoring

Water sampling and analysis was undertaken to understand the overall baseline water quality characteristics of the surface and groundwater of the study area. Samples were taken from sampled water bodies and different groundwater sources from the study area. Surface water sampling was based on the identification of major surface water bodies such as the Rabnabadh Channal and Andharmanik River adjacent to the project site. Groundwater sampling locations were selected to obtain a representative water sample from various zones within the study area. The samples were collected from existing tube wells (hand-pumps being used by the villagers). A total of 4 samples comprising of Two (2) surface water and two (2) ground water samples were collected. Detail of the sampling location is provided in **Table 3-4**and depicted in

Figure3-2**.**

Table 3-4: Details of Surface and Ground Water Sampling Locations

Sl.	Sampling location	Sampling water	Sampling Code	GPS Coordinate	Type of Source
1.	Londa Kheya Ghat (Andharmanik river adjacent to the project area)	Surface water	SW1	22°0'39.33"N 90°16'42.21"E	Andharmanik River
2.	Rabnabadh Channel (adjacent to the project area)	Surface water	SW2	21°59'30.18"N 90°18'45.26"E	Rabnabadh Channel
3.	Project site	Ground water	GW1	22° 0'7.74"N 90°18'41.78"E	Tubewell
4.	Londa Kheya Ghat	Ground water	GW2	22° 0'40.22"N 90°16'42.73"E	Tubewell

The samples were analyzed for parameters covering bacteriological and physico-chemical characteristics which include certain heavy metals and trace elements.

Water samples were collected as grab water sample in a standard sampling bottle and 250 ml sterilized clean PET bottle for complete physio-chemical and bacteriological tests respectively.

The samples were analyzed as per standard procedure/method given in Standard Method for Examination of Water and Wastewater Edition 20, published by APHA as well as using on site field test kit. Details of the analysis method and protocol are presented in Table.

Table 3-5: Method for Water Analysis

Sl.	Parameter	Unit	Test method (APHA)
1.	Temperature	˚C	Digital thermometer
2.	Total Dissolved Solids	mg/l	Digital TDS meter
3.	EC	µmhos/*cm*	Digital EC meter
4.	DO	mg/l	Digital DO meter
5.	pH	--	Digital pH meter
6.	Salinity	ppt	Digital Salinity meter
7.	Arsenic (As)	mg/l	3114.C
8.	Chloride (Cl^-)	mg/l	4110.B
9.	Fecal Coliform	mg/l	Lab Analysis
10.	Iron (Fe)	mg/l	3113.B
11.	Lead (Pb)	mg/l	3113.B
12.	Oil and Grease	mg/l	Lab Analysis

13.	Total Coliform	0 CFU (N/100mL)	9222.B
14.	Turbidity	10 NTU	Turbidity Meter

The quality of surface water was compared with the standards for Inland Surface Water, Environment Conservation Rules (ECR), and 1997-Schedule 3 whereas the groundwater was compared with the Drinking Water Standard ECR Schedule-3, 1997. The standards have been presented along with the monitoring results of surface and groundwater for comparison.

3.3.4 Occupational health and safety

To study the labor and working conditions of Payra Coal Power Plant Project observational method was used. Monitoring team physically stayed in the construction camp for few days; from ***19th July to 21stJuly,*** and observed labor and working conditions of the proposed project. During observation several informal discussions were also conducted with workers of three workers' shed.

For both observation and informal discussion, a checklist with the compliance of "Performance Standards-2 on Labor and Working Conditions" formulated by International Finance Corporation (IFC) was followed.

CHAPTER 4

4. Result and Discussion

4.1 Air Quality Monitoring Result and Discussion

4.1.1 Ambient Air Quality in the Study Area

The monitored ambient air quality is summarized in **Table 4-1**. (Overleaf)

Table 4-1: Ambient Air Quality in the Study Area

Sl.	Sampling location	Ambient air pollution concentration in µg/m³										CO* ppm	
		$PM_{2.5}$		PM_{10}		SPM		SO_2		NOx			
		July-18	Baseline-14	July-18	Baseline-14	July-18	Baseline-14	July-18	Baseline-14	July-18	Baseline-14	July-18	Baseline-14
1.	AQ1	26.5	9.13	62.7	53.63	118.8	86.32	5.1	2.52	15.3	7.50	<2	<2
2.	AQ2	14.9	15.63	57.6	89.53	107.2	112.11	4.1	3.76	11.2	13.16	<2	<2
3.	AQ3	11.8	12.46	43.1	65.72	73.3	98.74	3.1	3.01	7.5	11.32	<1	<2
4.	AQ4	10.6	11.31	47.2	75.45	70.5	78.54	2.9	2.65	7.8	8.43	<1	<2
5.	AQ5	11.5	10.56	44.8	68.56	71.2	82.67	3.4	3.06	9.6	9.65	<1	<2
6.	AQ6	11.8	9.21	40.4	57.32	66.4	75.72	4.2	2.87	10.8	7.85	<1	<2
Duration (hours)		**24**		**24**		**8**		**24**		**24**		**8**	
Weather Condition		**Sunny**											
Bangladesh Standard* (*according to Environmental Conservation Rules' 1997 and subsequent amendment in 2005*)		**65**		**150**		**200**		**365**		**100**		**10**	
WHO ambient air quality Guideline Values (2005 and 2000), which are also being referred in the World Bank and IFCs General EHS Guidelines		**25**		**50**		**-**		**20**		**-**		**9**	
Method of analysis		*Gravimetric*		*Gravimetric*		*Gravimetric*		*West- Geake*		*Jacob and Hochheiser*		*Indicator tube*	

Source: Air quality analysis done by EQMS Consulting Limited, 2018
Date of analysis: 23th – 28th July 2018
Note:
** CO concentrations and standards are 8-hourly only.*
*** The Bangladesh National Ambient Air Quality Standards have been taken from the Environmental Conservation Rules, 1997 which was amended on 19thJuly 2005 vide S.R.O. No. 220-Law/2005.*

4.1.2 Analysis and Discussion of Result

SPM

The 8-hourly SPM concentration in ambient air in the study area was recorded in the range of 66.4– 118.8 **µg/m³**. During the monitoring period, the maximum SPM concentration was reported from Project area (AQ1) as 106.41**µg/m³**. SPM concentrations at this location are primarily due to traffic movement. SPM level of all locations were reported below the National Ambient Air Quality Standards of Bangladesh but AQ1 and AQ2 higher than the baseline value.

PM_{10}

The 24-hourly PM_{10} concentration in ambient air in the study area was recorded in the range of 40.4 – 62.7 **µg/m³**. During the monitoring period, the maximum PM_{10} concentration was reported from Project area as 62.7 **µg/m³**. PM_{10} level at all monitoring locations were reported below the NAAQS but AQ1 (62.7 µg/m³) higher than the baseline value.

$PM_{2.5}$

The 24-hourly $PM_{2.5}$ concentration in ambient air in the study area was recorded in the range of 10.6 – 26.5 **µg/m³**. During the monitoring period, the maximum $PM_{2.5}$ concentration was reported from Project area as 26.5 **µg/m³**. All the monitoring locations result was within the 24-hourly National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$ in Bangladesh.

SO_2

The 24-hourly SO_2 concentration was recorded in the range of 2.9– 5.1 **µg/m³**. Concentration of SO_2 is reported low at residential area due to their rural setting. During the monitoring period, the maximum SO_2 concentration is reported at Project Site 5.1 **µg/m³**. SO_2 concentrations at all the monitoring locations were reported well below 365 **µg/m³**, which is National Ambient Air Quality Standard (NAAQS) for SO_2 in Bangladesh but all monitoring locations higher than the baseline value.

NOx

The 24-hourly NOx concentration was recorded in the range of 7.5–15.3 **µg/m³**. Concentrations of NOx were reported due to their rural setting, whereas at AQ2, the levels are slightly higher due to the traffic movement. During the monitoring period, the maximum NOx concentration is reported at Project Sites 15.3 **µg/m³**. There are no stipulated standards for 24-hourly NOx concentration in Bangladesh. The annual Bangladesh standard values for NOx are 100µg/m³ and present concentrations at all the locations are well below these values but all monitoring locations higher than the baseline value.

CO

CO concentrations are reportedly low at all the monitoring locations while comparing with the Bangladesh Standards (10 ppm).

4.2 Noise Level Monitoring Result and Discussion

Summary results Noise level monitoring results shown in**Table 4-2**.

Table 4-2: Noise Level Monitoring Results

Location	*Average Noise level [dB(A)]*				*Applicable Standard * [dB(A)]*	
	Leq_{day}	Leq_{night}	L_{max}	L_{min}	*Day*	*Night*
NL1	70.1	45.3	73.6	53.6	50	40
NL2	65.2	43.9	74.7	51.0	50	40
NL3	62.5	40.6	72.8	52.1	55	45
NL4	62.1	49.6	85.7	56.8	70	60
NL5	64.3	42.7	69.9	52.7	55	45
NL6	53.9	41.0	59.6	55.8	55	45
NL7	53.2	40.9	54.9	51.0	55	45
NL8	57.6	42.3	71.1	59.2	55	45

Source: Field Survey by EQMS (19th - 27th July, 2018)

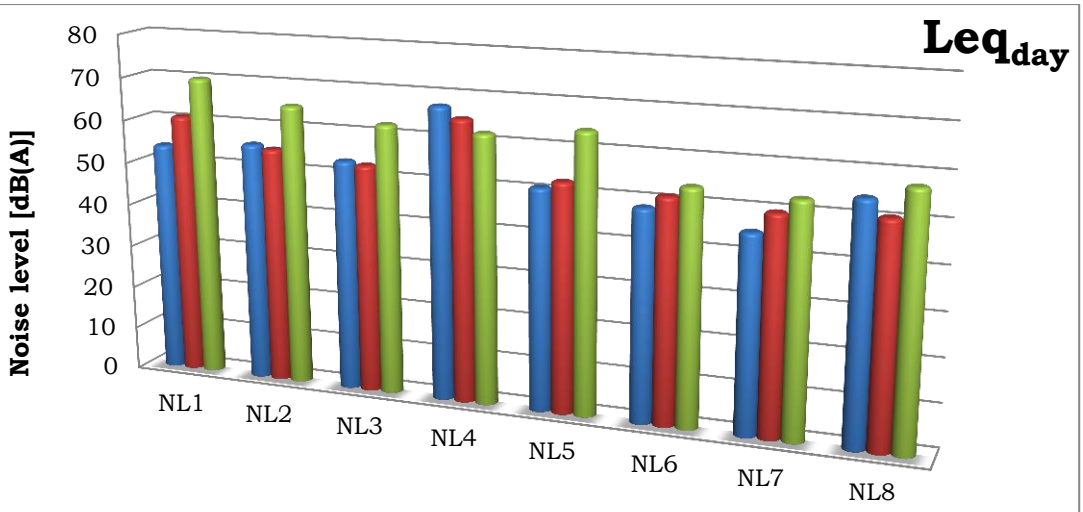
**Environmental Conservation Rules, 1997 (Schedule 4) (subsequent amendment in 2006)*

Due to an absence of heavy industries, large urban development or other significant noise sources, the background noise level at the project area is low till date of data collection.

According to Bangladesh Environmental Quality Standard ECR'97 categorizations current project area falls into residential area zone.

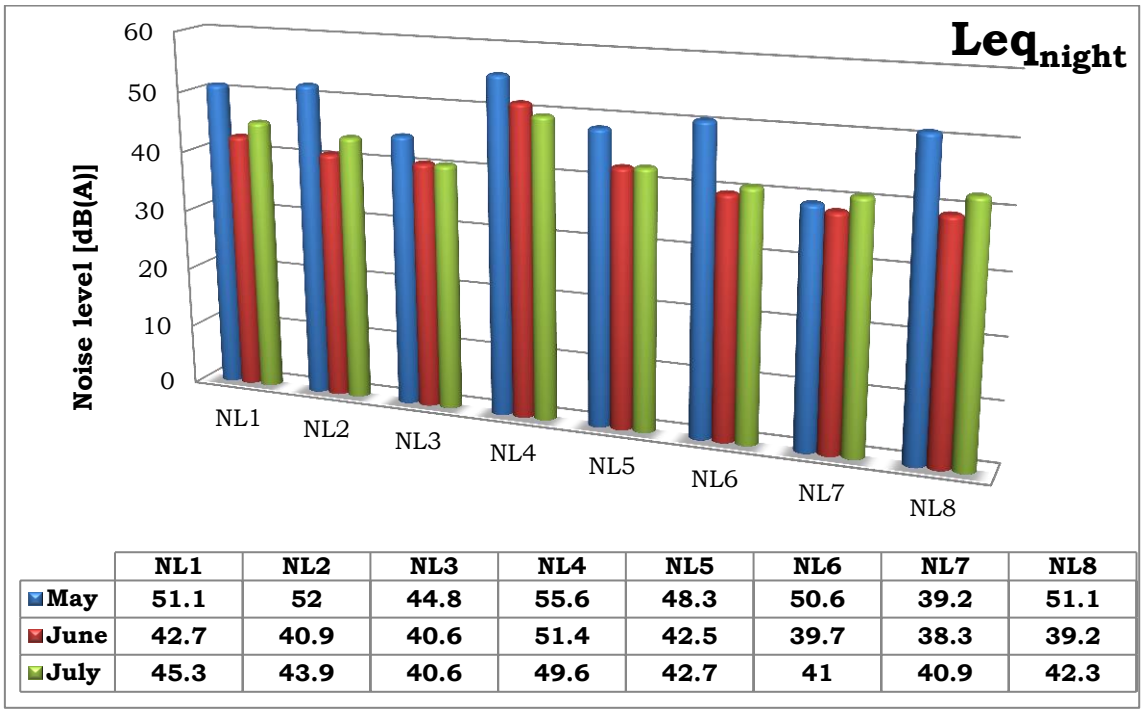
Table 4-2 shows that the average day time noise level at NL1, NL2, NL3, NL5 and are location are slightly higher than the national standard. The main reason is due to and sample collection area resides in front of the school whereas the other locations average day time noise is well within the standard limit of ECR'97. Besides, average night time noise level of all locations is well within the standard limit of ECR'97 (*subsequent amendment in 2006*).

Comparison of the ambient noise level monitoring in ***3rd Quarter (May - July 2018)*** presented in **Figure 4-1**and **Figure 4-2.**



	NL1	NL2	NL3	NL4	NL5	NL6	NL7	NL8
May	53.9	55.7	53.5	67.5	51.1	48.6	45.3	54.5
June	61	54.9	52.9	65	52.8	51.5	49.9	50.8
July	70.1	65.2	62.5	62.1	64.3	53.9	53.2	57.6

Figure 4-1: Summary of the ambient noise recorded at day time in May to July -2018



	NL1	NL2	NL3	NL4	NL5	NL6	NL7	NL8
May	51.1	52	44.8	55.6	48.3	50.6	39.2	51.1
June	42.7	40.9	40.6	51.4	42.5	39.7	38.3	39.2
July	45.3	43.9	40.6	49.6	42.7	41	40.9	42.3

Figure 4-2: Summary of the ambient noise recorded at night time in May to July -2018

4.3 Surface Water Monitoring Result and Discussion

The surface water Quality was compared with the Bangladesh ECR standard for best practice based classification criteria. **Table 4-3** shows the analysis results. All the analyzed water quality parameters are within the acceptable limit of Bangladesh water quality standard (ECR, 1997).

Table 4-3: Surface Water Quality Analysis

SL.	Characteristics	Unit	May -2018				June-2018				July-2018				Bangladesh Standard					
			SW1		SW2		SW1		SW2		SW1		SW2		Source of drinking water for supply only after disinfecting	Water usable for recreational activity	Source of drinking water for supply after conventional treatment	Water usable by fisheries	Water usable by variousprocess and coolingindustries	Water usable for irrigation
			May-18	Baseline -14	May-18	Baseline -14	Jun-18	Baseline -14	Jun-18	Baseline -14	July-18	Baseline -14	July-18	Baseline -14						
1.	EC	µmhos /cm	2.24	86	0.60	92	330	86	200	92	180	86	160	92	-	-	-	-	-	-
2.	DO	mg/l	2.5	6.9	1.8	7.1	5.4	6.9	6.8	7.1	6.3	6.9	6.8	7.1	6 or above	5 of more	6 or above	5 of more	5 of more	5 of more
3.	Iron	mg/l	0.4	0.53	0.4	0.46	0.70	0.53	0.77	0.46	0.47	0.53	0.39	0.46	-	-	-	-	-	-
4.	Lead	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01		<0.01	-	-	-	-	-	-
5.	Oil and Grease	mg/l	<2	<2	BDL	<2	Less than 5	<2	Less than 5	<2	Less than 5	<2	Less than 5	<2	-	-	-	-	-	-
6.	pH	-	7.99	6.9	8.36	7.1	8.22	6.9	8.28	7.1	8.52	6.9	8.36	7.1	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
7.	Temperature	°C	27.6	28.5	28.2	28.3	29.4	28.5	29.0	28.3	28.1	28.5	28.2	28.3	-	-	-	-	-	-
8.	TDS	mg/l	1120	75	300	70	160	75	100	70	90	75	80	70	-	-	-	-	-	-
9.	BOD	mg/l	2.1	2.0	2.5	<0.05	1.9	2.0	1.7	<0.05	1.5	2.0	1.8	<0.05	2 or less	3 or less	6 or less	6 or less	10 or less	10 or less
10.	Turbidity	NTU	14	17	21	15	17	17	22	15	12	17	16	15	-	-	-	-	-	-
11.	Salinity	ppt	1.04	2.3	0.31	1.5	0.14	2.3	0.07	1.5	0.09	2.3	0.07	1.5	-	-	-	-	-	-

Source: Laboratory Analysis, EQMS wet laboratory
Sampling Date: 20th-21st May, 2018, 29th-30thJune, 2018, 20th-21st July, 2018
Analysis date: 29th May 2018, 6thJuly 2018) and 29th July, 2018
** Bangladesh Environment Conservation Rules, 1997- Schedule 3 (Standards for inland surface water)*

Comparison of the data with the surface water quality standards of government of Bangladesh reveal the fact that water of the water bodies is suitable for Source of drinking water for supply after conventional treatment, Water usable by fisheries, Industrial process and cooling industries.

4.4 Water Monitoring Result and Discussion

The results of two groundwater samples collected from the tube-wells in project site and Londa Gheya Ghat (Table 4-4).

Shallow tube-wells (200-400 feet) of the project area contain arsenic contamination. Peoples in this area use surface water for their domestic purposes and use deep tube-wells (900-1000 feet) water for drinking.

In ***May to July, 2017***, Groundwater samples were collected by EQMS Consulting Limited (Monitoring team) from shallow tube wells in the project area. The result of the groundwater field samples and the GoB standards for potable water (ECR, 1997) are shown in **Table 4-4.** The concentration levels of pH, As, Fe, Chloride, Fecal Coliform, Conductivity, Lead, DO, TDS and Total Coliform for tube well were found within the acceptable limit set by the DOE, GoB for drinking water. According to the overall water quality data, practically moderate quality and quantity of ground water is available in and around the project site.

Table 4-4: Ground Water Quality Analysis Result

Sl.	Parameters	May -2018				June-2018				July-2018				Bangladesh Standard
		GW1		GW2		GW1		GW2		GW1		GW2		
		May-18	Baseline-14	May-18	Baseline-14	June-18	Baseline-14	June-18	Baseline-14	July-18	Baseline-14	July-18	Baseline-14	
1.	Arsenic	Less than 0.010	<0.05	Less than 0.010	<0.05	<0.05	<0.05	<0.05	<0.05	Less than 0.010	<0.05	Less than 0.010	<0.05	*0.05 mg/l*
2.	Chloride	166.2	163.68	152.1	145.37	151.36	163.68	167.19	145.37	140.19	163.68	135.35	167.19	*150-600 mg/l*
3.	Conductivity	1050	280	1080	260	1070	280	1070	260	1020	280	1040	1070	--
4.	Fecal Coliform	0	0	0	0	0	0	0	0	0	0	0	0	*0 CFU (N/100mL)*
5.	Iron	0.29	0.65	0.18	0.58	0.23	0.65	0.18	0.58	0.32	0.65	0.24	0.18	*0.3-1.0 mg/l*
6.	Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*0.05 mg/l*
7.	pH	8.49	6.8	8.41	7.0	8.61	6.8	8.43	7.0	8.42	6.8	8.37	8.43	*6.5-8.5*
8.	Temperature	28.8	26.9°C	28.9	27.6°C	28.4	26.9°C	27.9	27.6°C	27.2	26.9°C	27.5	27.9	*20-30 °C*
9.	Total Coliform	0	0	0	0	0	0	0	0	0	0	0	0	*0 CFU (N/100mL)*
10.	Total Dissolved Solids	530	380	540	340	540	380	540	340	510	380	520	540	*1000 mg/l*

Source: Laboratory Analysis, EQMS Wet laboratory
Sampling Date: 20th-21st May, 2018, 29th-30thJune, 2018, 20 th-21st July 2018
Analysis date: 29th May 2018, 6thJuly2018 and 28th July 2018

4.5 Occupational Health and Safety

Occupational health and safety (OHS) programs are a legal requirement and every workplace must have an OHS program to help prevent accidents and injuries. An effective program will also help deal with any incidents that do occur.

The occupational health and safety service in Bangladesh is still in the developmental stage. Here the occupational health & safety refers mainly to needs of workers of industries or some manufacturing processes but does not completely cover all occupations of the country. The main laws related to occupational health & safety in this country is the Factory Act 1965 and the Factory Rule of 1979. There are a number of other laws and regulations that are also have some provisions related to occupational health and safety. These laws have provisions on occupational hygiene, occupational diseases, industrial accidents, protection of women and young persons in dangerous occupations and also cover conditions of work, working hours, welfare facilities, holidays, leave etc. But most of the laws are lacking in standard values and not specific rather general in nature.

4.5.1 Scope

Occupational Health and Safety covers safe and healthy accommodation along with work environment. Safe and healthy accommodation is the most important and broad issue. Other health and safety issues are also included.

Safe and Healthy Accommodation

- Types of accommodation
- Standards for workers' accommodation
- General living facilities
- Drainage
- Heating, air conditioning, ventilation and light
- Water
- Waste water and solid waste
- Room/dormitories facilities
- Sanitary and toilet facilities
- Shower/bathroom and other sanitary facilities
- Canteen- cooking and laundry facilities
- Standards for nutrition and food safety

Other Health and Safety Issues

- Health and Safety on Site

- Medical Facilities
- Leisure, Social and Telecommunication facilities
- Security on Workers' Accommodation
- Consulting and Grievance Mechanism
- Workers' rights, rules and regulations on workers' accommodation

4.5.2 Relevant Law and Policy

A. National Policy Framework

The constitution of Bangladesh adapted on the April 4th 1972 recognizes productivity as a basic need for economic development and covers the right to work and reasonable wages, medicare and, disease and disablement. And thus it is assumed the health and safety of industrial workers has been taken care of.

The Occupational Health and Safety Services in Bangladesh, is still in the developmental stage. In Bangladesh Occupational Health and Safety generally refers mainly to needs of workers of industries or some manufacturing process but does not completely cover all recognized occupations of the country.

In the Fifth Five Year Plan (1997-2002) for the labour and manpower sector the objectives relatable to OSH are:

a. "To ensure fair wages, welfare and social protection of workers under the structural adjustment programs adopted by the government."
b. "To initiate steps to protect children from economic exploitation."

To achieve the objectives of the Fifth Five Year Plan (1997-2002) for the labour and manpower sector the strategies relatable to OSH that were to be pursued are:

b. "Review of existing labour related laws, rules, regulations and directives and adoption of necessary modifications."
c. "Stress on gradual elimination of child labour and protection of children from
economic exploitation and hazardous work."

In the labour sector the OSH relatable programmes that were to be undertaken under the Fifth Five Year Plan included- Strengthening of Inspectorate of Factories and Establishments in terms of manpower and resources so as to enable them to "enforce various labour laws/rules concerning working hours, working condition, safety, and maternity benefits in different mills, shops and factories, etc."

In the Fifth Five Year Plan (1997-2002) for the health population and family welfare sector some scope for further development in the sector against the background that 'with increased urbanization and industrialization, the number of burn and trauma cases due to traffic and industrial accidents, unsafe use of chemicals, fire, etc., has been increasing every year'. The following needs have been identified:

d. Need to establish hospitals near major highways, traffic black spots and industrial
areas with trauma and burn units to treat burn and trauma cases in time.
e. Promote industrial and occupational health through IEC activities so as to raise
awareness of industrial workers and protect them from industrial hazards.

Labour Policy:

- Undertake effective new labour policy on the basis of tripartite negotiation
- Link wages with productivity
- Quick disposal of Industrial dispute
- Stop child labour and provide workers with education, healthcare, and better working facilities

B. **LEGISLATIONS RELATING TO OCCUPATIONAL HEALTH AND SAFETY**

The Department of Inspection for Factories and Establishments under the Ministry of Labour and Employment administers and enforces 42 labour laws. The following legislations have provisions relating to occupational health, hygiene of workers, occupational diseases, industrial accidents, protection of women and young persons in dangerous occupations, and also cover conditions of work, working hours, welfare facilities, holidays, leave, etc.

	Legislation	**Enforcing agency**
1	The Factories Act, 1965 and the Factories Rules 1979	Department of Inspection for Factories and Establishment
2	Dock laborers' Act 1934	Department of Inspection for Factories and Establishment
3	Dock laborers' Regulations 1948	Department of Inspection for Factories and Establishment
4	Tea Plantation Laborers' Ordinance 1962 and the rules thereunder	Department of Inspection for Factories and Establishment
5	The Workmen's Compensation Act 1923 as amended in 1980 and 1983	Department of Inspection for Factories and Establishment
6	The Shops and Establishments Act 1965	Department of Inspection for Factories and Establishment
7	Employment of Children Act 1938	Department of Inspection for Factories and Establishment
8	The Maternity Benefit Tea Estates Act	Department of Inspection for

	1950	Factories and Establishment
9	The Maternity Benefit Act 1939	Department of Inspection for Factories and Establishment
10	The Maternity Benefit Rules 1953	Department of Inspection for Factories and Establishment
11	The Boilers Act 1923	Chief Inspector of Boilers under Ministry of Industry
12	Nuclear Safety and Radiation control Act 1993	Atomic Energy Commission Bangladesh

E. ILO Convention regarding OSH:

Until now 31 ILO conventions have been ratified by Bangladesh. The ILO convention C 155 and C161 are concerned with the Occupational Safety and Health and the Occupational Health Services respectively. The aim of the policy of the convention C155 is to prevent occupational accidents and injury to health and illnesses by identification and minimizing the causes of hazards in the working environment. The aim of the convention C161 is to establish and maintain a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work. Although these convention are not yet ratified in Bangladesh but many of the recommendations of these conventions have been practiced to some extent through the implementations of existing various laws and regulations. In the Factory Act 1965 and Factory Rules 1979 and in some other laws and regulations there are various chapters that are relatable to OSH. But by the existing laws and regulations qualitative inspections regarding safety and health in the working is possible but could not be monitored in terms of quantitative standard values and permissible limits.

For ratification of ILO convention No. C 155 and C161 the motivation of all the parties, policy makers, employers and employees is required.

F. IFC's Performance Standard on Labour and Working Condition

IFC's Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of fundamental rights of workers.

The requirements set out in this performance standard have been in part guided by a number of international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN). Its objectives are following

- To promote the fair treatment, non-discrimination and equal opportunity of workers.

- To establish, maintain and improve the worker-management relationship.
- To promote compliance with national employment and labour laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties and workers in the client's supply chain.
- To promote safe and healthy working conditions and the health of the workers.
- To avoid the use of forced labor.

4.6 GAP ASSESSMENT TO THE APPLICABLE REFERENCE FRAMEWORK

4.6.1 APPLICABLE STANDARD

This section reviews the performance of the Project with respect to the Applicable Standards. In terms of IFC performance standard (PS) EQMS review the following PS standards

- PS2: Labor and Working Conditions;

The findings are categorized as per the following definitions:

Table 4-5: IFC PS Alignment Definitions

Rating	Definition
Aligned	Information available indicates that the Project fulfills the requirement and/or is aligned with intended outcome of the requirement.
Partially Aligned	Information available indicates that the Project partially fulfills the requirement and/or is partially aligned with intended outcome of the requirement.
Not Aligned	Information available indicates that the Project does not fulfill the requirement.
Insufficient Information for the assessment	There is insufficient information to make an assessment of the level of alignment.
Not Applicable	The requirements do not apply to the Project at the current time.

The gap assessment with respect to applicable standards primarily focuses on the construction phase environmental and social management and monitoring plan (ESMMP) developed as part of the ESIA study, Project level environmental, health, safety and social policies, procedures and plans as being developed by NWPGCL and the NEPC contractor as well as their implementation on ground. Furthermore, the aspects related to the operation phase of the Project and linked management plans have been referred in order the operation phase.

Methodology

To study the labor and working conditions of Payra Coal Power Plant Project observational method was used. Monitoring team physically stayed in the construction camp for few days; from 17th July to 21st July, and observed labor and working conditions of the proposed project. During observation several informal discussions were also conducted with workers of three workers' shed.

For both observation and informal discussion a checklist with the compliance of "Performance Standards-2 on Labor and Working Conditions" formulated by International Finance Corporation (IFC) was followed.

Table 4-6: Gap Assessment to the IFC Performance Standards (2012) of the Project

S. No	Requirement	Observation/Gap	Level of Compliance	Recommendation	Comparison to Previous Report
1	<u>Types of Workers Accommodation</u> There is a large variety of workers' living facilities. These can be classified in a number of ways. According to IFC's typology of workers' accommodation, in construction camp workers' camp lies in temporary and extractives in nature. Where accommodation services are provided to workers covered by the scope of this Performance Standard, the client will put in place and implement policies on the quality and management of the accommodation and provision of basic services. This also	Temporary sheds for all labors and employees has been developed. Available sheds are 1. Sheds for NEPC staffs within the project site 2. Sheds for mechanic and engineer of NDE 3. Sub-contractor labor shed under NDE within the project site 4. Subcontractor labor shed Under NEPC within the project site **NEPC Chinese Employees' Accommodation** The NEPC employees (Chinese) and workers (Chinese) are housed in inside the project site; 1. Inside the project boundary. At present several sheds were observed. Currently, about 96 Chinese workers are living in the camp. **NDE Employees' Accommodation**	**Aligned**	Clear labor construction camp guidelines to be formulated and shared with BCPCL to meet the IFC guideline on worker's accommodation. EPC contractors; NEPC, NDE and others also should take into consideration the observations highlighted in the report.	No additional accommodation facilities have been developed since last quarterly.

includes the applicable requirements of the IFC Guidelines on Worker Accommodation.	Employees of NDE are housed in three separate accommodation camps adjacent to the construction camp. Sheds are known by followings; 1. 1 no shed 2. 2 no shed 3. 3 no shed (Bat-tola) **Subcontractor Labors' Shed Under NDE** All subcontractor labors' sheds have been shifted to project site. There are 13 numbers of labors sheds have been observed during field visit. **Subcontractor Labors' Shed Under NEPC** All subcontractor labors' shed under NEPC have been established within project site. There are 18 numbers of sheds have been observed during field visit. Moreover, Bangladesh police and answer VDP, who are giving security to the workers, are housed in a separate shed outside of the project site.		

2	General Construction Standards *Building Construction* Quality of material, construction methods, resistance to earthquakes. *General health, safety and security* Requirements on health and safety are often an important part of building standards and might include provisions on occupation density, minimal air volumes, ventilation, the quality of the flooring (slip-resistant) or security against intrusion. *Fire safety* Requirements on fire safety are common and are likely to apply to housing facilities of any type. This can include provision on fire extinguishers, fire alarms, number and size of staircases and	General construction standards followed by the EPC contractors and subcontractors are describing as follows; **NEPC Chinese Employees' Accommodation** 1. Shed inside the project area was built with good materials as well as shed is resistant to earthquakes. 2. Density is very high in the shed. (100 workers against 13 rooms) At least 8 workers live in a single room. Double deck bunks are available in every room. 3. As all rooms are air conditions air volumes and ventilation are not mandatory. 4. Concrete floors are slip resistant. 5. Available security against intrusion was observed during visit. 6. Sufficient fire extinguishers have been found in the shed. 7. Electricity, plumbing, water and sanitation all are designed compliance with national and IFC standard.	**Aligned**	NEPC should minimize the numbers of double deck bunks in subcontractor labor sheds. NDE and its subcontractors are suggested to install fire extinguishers in every sheds immediately.	No visible changes have been observed compared to previous report.

emergency exits, restrictions on the use of certain building materials. *Electricity, plumbing, water and sanitation* National design and construction standards often include very detailed provisions on electricity or plumbing fixtures/fittings, water and sanitation connection/equipment	**NDE Employees' Accommodation** 1. All sheds; 1, 2 and 3, were built with good materials as well as sheds are resistant to earthquakes. 2. Minimal density observed. In shed 1 there are 35 security guards and work assistants against 15 rooms. In shed 2 there are 48 operators, helpers and mechanics against 12 rooms. Lastly in shed 3, there are 10 cook, supervisors, electrician etc. against 4 rooms. 3. Air volumes and ventilation are seen sufficient. 4. Concrete floors are slip resistant. 5. Available security against intrusion was observed during visit. 6. No fire extinguisher was seen. 7. Electricity, plumbing, water and sanitation all are designed compliance with national and IFC standard. **Subcontractor Labors' Shed Under NDE** 1. All sheds; 13 numbers of sheds were built with good		

materials as well as sheds are resistant to earthquakes.
2. Minimal density observed. Highest 4 persons are sharing each room.
3. Air volumes and ventilation are seen sufficient.
4. Concrete floors are slip resistant.
5. Available security against intrusion was observed during visit.
6. No fire extinguisher was seen.
7. Electricity, plumbing, water and sanitation all are designed compliance with national and IFC standard.

Subcontractor Labors' Shed Under NEPC

1. All 18 Sheds inside the project area was built with good materials as well as shed is resistant to earthquakes.
2. Density is very high in the shed. (80 to 110 workers against 20 rooms). In some rooms, workers sleep on concrete floor.
3. air volumes and ventilation are available.
4. Concrete floors are slip

		resistant. 5. Available security against intrusion was observed during visit. 6. Fire extinguishers have not been found in the shed. 7. Electricity, plumbing, water and sanitation all are designed compliance with national and IFC standard.			
3	*General Living Facilities* Ensuring good standards in living facilities is important in order to avoid safety hazards and to protect workers from diseases and/or illness resulting from humidity, bad/stagnant water (or lack of water), cold, spread of fungus, proliferation of insects or rodents, as well as to maintain a good level of morale. The location of the facilities is important to prevent exposure to wind, fire, flood and other natural hazards.	Cleaning facilities were not found regular basis in all workers' sheds. Sub-contractor labors sheds under both NEPC and NDE, were observed messy.	**Partially Aligned**	Both EPCs are suggested to employ sufficient numbers of cleaners and monitor the sheds periodically. BCPCL should monitor the cleaning condition of the labor's sheds.	Situation deteriorated compared to the previous quarterly.

	Some requirements need to be followed; 1. Living facilities are located to avoid flooding and other natural hazards. 2. Where possible, living facilities are located within a reasonable distance from the worksite. 3. Transport from the living facilities to worksite is safe and free. 4. The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.				
3.1	*Drainage* The presence of stagnant water is a factor of proliferation of potential disease vectors such as mosquitoes, flies and others, and must be avoided. Client need to	It was found that all sheds are built with proper drainage system. Stagnant water or water logging wasn't seen during field visit.	**Aligned**	BCPCL and EPC contractors should be careful as drainage system is kept in good condition and clean. NDE labour shed side should be clean up in a regular basis.	No changes have been observed.

	consider 1. The building site is adequately drained to avoid the accumulation of stagnant water.				
3.2	*Heating, air conditioning, ventilation and light* Heating, air conditioning and ventilation should be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time. Followings are required 1. For facilities located in cold weather zones, the temperature is kept at a level of around 20 degrees Celsius notwithstanding the need for adequate ventilation. 2. For facilities located	Well air conditioning system was found in NEPC workers shed. All the requirements are met by the NEPC. NDE provides sufficient numbers of electric fans in every shed. Moreover, artificial lighting is available in all sheds. 24 hours electricity service is not provided in subcontractors' labor sheds. Electric supply from generator is supplied for specific time period. In the case of ventilation all sheds were followed the window area against room area.	**Aligned**	BCPCL as well as NDE and NEPC should take proper action for ensuring 24 hours electricity supply for all workers sheds. Sufficient fan should be provided at the labor shed as soon as possible.	No visible improvement

	in hot weather zones, adequate ventilation and/or air conditioning systems are provided. 3. Both natural and artificial lighting are provided and maintained in living facilities. It is best practice that the window area represents not less than 5% to 10% of the floor area. Emergency lighting is provided.				
3.3	*Water* Special attention to water quality and quantity is absolutely essential. To prevent dehydration, water poisoning and diseases resulting from lack of hygiene, workers should always have easy access to a source of clean water. An adequate supply of potable water must be available in the same buildings where	Adequate Tap water and tube-well water are available in every worker's shed for drinking, cleaning and other purposes. Tap water is not drinkable hence workers have to collect drinking water from other source. Workers only do their cleaning activities with the tap water. According to the workers, they don't get uninterrupted tap water supply. During the field visit, it was observed that almost all taps become obsolete and out of service. For this reason, all water drains out and wastes. NEPC must take necessary action regarding this issue.	**Partially Aligned**	Existing taps must be repaired or changed to prevent water waste. Permanent solution for the drinking water is required immediately. BCPCL is suggested to take it into account.	Improvement has been observed compared to previous but more improvement is desirable.

bedrooms or dormitories are provided. Drinking water must meet local or WHO drinking water standards and water quality must be monitored regularly. Depending on the local context, it could either be produced by dedicated catchment and treatment facilities or tapped from existing municipal facilities if their capacity and quality are adequate. Following requirements should be considered. 1. Access to an adequate and convenient supply of free potable water is always available to workers. Depending on climate, weather conditions and accommodation standards, 80 to 180 liters per person per	Observing the hardship in getting drinking water, NEPC has set up a water tank for its subcontractors' labors. This water is drinkable.		

	day are available. 2. Drinking water meets national/local or WHO drinking water standards. 3. All tanks used for the storage of drinking water are constructed and covered as to prevent water stored therein from becoming polluted or contaminated.				
3.4	*Wastewater and solid waste* Wastewater treatment and effluent discharge as well as solid waste treatment and disposal must comply with local or World Bank effluent discharge standards and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest	Rubbish containers 30 metres from each shelter on a wooden, metal, or concrete stand were found in each sheds. Waste bucket or dust bin was found in every labor sheds' kitchen. It is observed that wastewater, food and any other waste materials were adequately discharged. Waste is kept in rubbish containers and vacant regularly. Chance of pollution is very low. In NDE sub-contractor shed, it was observed that waste is not managed or disposed properly. Though proper waste management infrastructure is developed but	**Partially Aligned**	A training program can be arranged for NDE and NEPC subcontractors' labor for increasing conciseness regarding the importance of waste management. Client should follow the IFC guidelines and maintain the requirements described in this section.	No visible improvement

vectors. Depending on the local context, treatment and disposal services can be either provided by dedicated or existing municipal facilities. As follows 1. Wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent – and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities. 2. Specific containers for rubbish collection are provided and emptied on a regular basis. Standards range from providing an	labors were not seen using rubbish containers. Waste was seen disposed adjacent place to kitchen. Chance of pollution is very high. It is observed that Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements and/or good practice.		

adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers protected from insects and rodents. In addition it is best practice to locate rubbish containers 30 metres from each shelter on a wooden, metal, or concrete stand. Such containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odours associated with decaying organic materials.

3. Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements

	and/or good practice. Where warranted, pest and vector monitoring should be performed on a regular basis.				
4	*Room and Dormitory Facilities* The standards of the rooms or dormitory facilities are important to allow workers to rest properly and to maintain good standards of hygiene. Overcrowding should be avoided particularly. This also has an impact on workers' productivity and reduces work related accidents. It is generally acknowledged that rooms/dormitories should be kept clean and in a good condition. Exposure to noise and odor should be minimised. In addition, room/dormitory	**NEPC Chinese Employees Room and Dormitory Facilities** During field visit, facilities observed; 1. Rooms are kept in good conditions. 2. Rooms are built with easily cleanable flooring. 3. Sanitary facilities are located within the same buildings; Total 20 numbers of toilets. 4. Followed standard flooring range (4 to 5.5 sq. metres) and minimum ceiling height (2.10 metres) 5. Standard range of room sharing is not considered. 6 to 8 persons are sharing each room. Double deck bunks are applied for all workers. 6. Lockable door and adequate furniture are provided. **NDE Mechanics and Engineers' Room Facilities** 1. Rooms are kept in good conditions.	**Partially Aligned**	BCPCL may monitor the rooming facilities periodically.	No improvement was observed

design and equipment should strive to offer workers a maximum of privacy. Resorting to dormitories should be minimised and single or double rooms are preferred. Dormitories and rooms must be single-sex. Following benchmarks need to be followed. 1. Rooms/dormitories are kept in good condition. 2. Rooms/dormitories are aired and cleaned at regular intervals. 3. Rooms/dormitories are built with easily cleanable flooring material. 4. Sanitary facilities are located within the same buildings and provided separately for men and women. 5. Density standards are expressed either in terms of minimal volume per resident or of minimal floor space.	2. Rooms are built with easily cleanable flooring. 3. Sanitary facilities are located within the same buildings. 4. Followed standard flooring range (4 to 5.5 sq. metres) and minimum ceiling height (2.10 metres) 5. Standard range of room sharing is considered. 4 to 5 workers share single room. 6. Lockable door and adequate furniture are provided. **NDE Subcontractor Labour Shed's Room Facilities** 1. Rooms are kept in good conditions. 2. Rooms are built with easily cleanable flooring. 3. Sanitary facilities are located outside the sheds; 40 toilets. 4. Followed standard flooring range (4 to 5.5 sq. metres) and minimum ceiling height (2.10 metres) 5. Standard range of room sharing is considered. 3 to 4 workers share single room. 6. Lockable door and adequate furniture are provided.		

Usual standards range from 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface). 6. A minimum ceiling height of 2.10 metres is provided. 7. In collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers are allowed to share the same room. Standards range from 2 to 8 workers. 8. All doors and windows should be lockable, and provided with mosquito screens where conditions warrant. 9. There should be mobile partitions or curtains to ensure privacy. 10. Every resident is provided with adequate furniture such as a table, a chair, a mirror and a bedside	**NEPC Subcontractor Labour Shed's Room Facilities** 1. Rooms are kept in good conditions. 2. Rooms are built with easily cleanable flooring. 3. Sanitary facilities are located within the same buildings; Total 20 numbers of toilets in each sheds. 4. Followed standard flooring range (4 to 5.5 sq. metres) and minimum ceiling height (2.10 metres) 5. Standard range of room sharing is not considered. 6 to 8 persons are sharing each room. Double deck bunks are applied for all workers. 6. Lockable door and adequate furniture are provided.		

	light. 11. Separate sleeping areas are provided for men and women, except in family accommodation.		

4.1	*Bed Arrangements and Storage Facilities* The provision of an adequate numbers of beds of an appropriate size is essential to provide workers with decent, safe and hygienic conditions to rest and sleep. Here again, particular attention should be paid to privacy. Consideration should be given to local customs so beds could be replaced by hammocks or sleeping mats for instance. Benchmarks are... 1. A separate bed for each worker is provided. The practice of "hot-bedding" should be avoided. 2. There is a minimum space between beds of 1 metre. 3. Double deck bunks are not advisable for fire safety and hygiene reasons, and their use	**NEPC Chinese Employees Bed Arrangements and Storage Facilities** During field visit, facilities observed 1. A separate bed for each worker is provided. 2. Minimum space between beds (1 metre) is not maintained all the time. 3. All the beds are double deck bunks. 4. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding. 5. Standard requirement for storage facility was absent. (475-litre big lockers and 1 metre of shelf unit) 6. Separate storage for work boots and other personal protection equipment wasn't visible during field visit. **NDE Mechanics and Engineers' Bed Arrangements and Storage Facilities** 1. A separate bed for each	**Partially Aligned**	NEPC, NDE and Subcontractor are suggested to provide separate bed, mattress and storage facilities to all workers. EPC contractors (NDE, NEPC) should follow the requirements as much as possible considering national and local context. Subcontract labor shed need to be monitored periodically whether all requirements are considered.	No improvement

is minimised. Where they are used, there must be enough clear space between the lower and upper bunk of the bed. Standards range from to 0.7 to 1.10 metres. 4. Triple deck bunks are prohibited. 5. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding. 6. Bed linen is washed frequently and applied with repellents and disinfectants where conditions warrant (malaria). 7. Facilities for the storage of personal belongings for workers are provided. Standards vary from providing an individual cupboard for each worker to providing 475-litre big lockers and 1 metre of shelf unit. 8. Separate storage for	worker is provided. 2. Minimum space between beds (1 metre) is not maintained all the time. 3. Double deck bunk and triple deck bunk were not seen during observation. 4. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding. 5. Standard requirement for storage facility was absent. (475-litre big lockers and 1 metre of shelf unit) 6. Separate storage for work boots and other personal protection equipment wasn't visible during field visit. **Subcontractor Labour Shed's Bed Arrangements and Storage Facilities** 1. A separate bed for each worker is not provided. Most of them sleep together in floor. 2. Minimum space between beds (1 metre) is not		

work boots and other personal protection equipment, as well as drying/airing areas may need to be provided depending on conditions.	maintained all the time. 3. Each worker is not provided with a comfortable mattress, pillow, cover and clean bedding. 4. Standard requirement for storage facility was absent. (475-litre big lockers and 1 metre of shelf unit) 5. Separate storage for work boots and other personal protection equipment wasn't visible during field visit.		

5	*Sanitary and Toilet Facilities* It is essential to allow workers to maintain a good standard of personal hygiene but also to prevent contamination and the spread of diseases which result from inadequate sanitary facilities. Sanitary and toilet facilities will always include all of the following: toilets, urinals, washbasins and showers. Sanitary and toilet facilities should be kept in a clean and fully working condition. Facilities should also be constructed of materials that are easily cleanable and ensure privacy. Sanitary and toilet facilities are never shared between male and female residents, except in family accommodation. Where necessary,	**NEPC Chinese Employees' Sanitary and Toilet Facilities** 1. Sanitary and toilet facilities are constructed with easily cleanable materials. 2. Sanitary and toilet facilities are cleaned frequently and kept in working condition. 3. Adequate privacy 4. Sanitary and toilet facilities are not shared between men and women. One female employee was seen and her sanitary and toilet facility are attached to her living room. **NDE Mechanics and Engineers' Sanitary and Toilet Facilities** 1. Sanitary and toilet facilities are constructed with easily cleanable materials. 2. Cleaned frequently and kept in working condition. 3. Moderate privacy was observed. Ceiling was	**Partially Aligned**	NDE and NEPC should monitor the subcontractor labors' shed. Subcontract labor shed's toilet facilities are really a matter of concerned issue. No visible cleaning facilities were observed. Unhygienic situation arisen and consequences to uncomfortable to workers. Communicable disease may break out. Proper monitoring is required for making subcontractor follow the standard requirements.	Situation deteriorated

	specific additional sanitary facilities are provided for women. Required benchmarks are… 1. Sanitary and toilet facilities are constructed of materials that are easily cleanable. 2. Sanitary and toilet facilities are cleaned frequently and kept in working condition. 3. Sanitary and toilet facilities are designed to provide workers with adequate privacy, including ceiling to floor partitions and lockable doors. 4. Sanitary and toilet facilities are not shared between men and women, except in family accommodation.	absent. **Subcontractor Labor Shed's Sanitary and Toilet Facilities** 1. Sanitary and toilet facilities are constructed with easily cleanable materials. 2. Not cleaned frequently and kept in working condition. Very bad situation was observed in NDE sub-contractor labors' sheds. 3. Moderate privacy was observed. Ceiling was absent. 4. Doors of toilet observed out of date.		
5.1	*Toilet Facilities* Toilet arrangements are essential to avoid	**NEPC Chinese Employees' Toilet Facilities** 1. Standards range. In the	**Aligned**	Same as compared to previous quarterly report.

any contamination and prevent the spread of infectious disease. Benchmarks should be followed. 1. An adequate number of toilets are provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. For urinals, usual standards are 1 unit to 15 persons. 2. Toilet facilities are conveniently located and easily accessible. Standards range from 30 to 60 meters from rooms/dormitories. Toilet rooms shall be located so as to be accessible without any individual passing through any sleeping room. In addition, all toilet rooms should be well-lit, have good ventilation or external windows, have sufficient hand wash basins and be	shed, 20 toilets for 100 workers. 2. Toilet facilities are conveniently located and easily accessible. 3. Good ventilation and sufficient hand wash basins are provided. **NDE Mechanics and Engineers' Toilet Facilities** 1. Standards range (1 unit to 15 persons to 1 unit per 6 persons and for urinals, usual standards are 1 unit to 15 persons) was considered providing toilet and urinal facilities. (6 toilets are provided for more than 40 persons) 2. Toilet facilities are conveniently located and easily accessible. 3. Good ventilation and one hand wash basins are provided. **Subcontractor Labour Shed's Toilet Facilities** 1. Standards range (1 unit		

	conveniently located. Toilets and other sanitary facilities should be ("must be" in cold climates) in the same building as rooms and dormitories.	to 15 persons to 1 unit per 6 persons and for urinals, usual standards are 1 unit to 15 persons) was considered providing toilet and urinal facilities. (40 toilets are provided for more than 324 persons) 2. Toilet facilities are conveniently located and easily accessible. 3. Good ventilation and one hand wash basins are not provided.			
5.2	*Shower/Bathrooms and Other Sanitary Facilities* Showers/bathrooms and other sanitary facilities Hand wash basins and showers should be provided in conjunction with rooms/dormitories. These facilities must be kept in good working condition and cleaned frequently. The flooring for shower facilities should be of hard washable	**NEPC Chinese Employees' shed** 1. Shower/bathroom flooring is made of concrete. 2. Hand wash facilities including basin and soap were found adequate. 3. Adequate numbers of shower/bathroom facilities are provided. (within the standard limit) 4. Conveniently located. **NDE Employees' Shed** 1. Concrete floor	**Partially Aligned**	Subcontractor labors' under NDE are facing problem showering in open place. Water reservoir system isn't good. Water becomes unusable after reserving. This need to be taken into consideration otherwise, communicable disease may spread. BCPCL need monitor these issues	Situation improved compared to previous report

materials, damp-proof and properly drained. Adequate space must be provided for hanging, drying and airing clothes. Suitable light, ventilation and soap should be provided. Lastly, hand washing, shower and other sanitary facilities should be located within a reasonable distance from other facilities and from sleeping facilities in particular. Benchmarks 1. Shower/bathroom flooring is made of anti-slip hard washable materials. 2. An adequate number of hand wash facilities is provided to workers. Standards range from 1 unit to each 15 persons to 1 unit per 6 workers. Hand wash facilities should consist of a tap and a basin, soap and hygienic means of	2. Hand wash facilities including basin and soap were found inadequate comparing to standards. (One unit was visible during field visit) 3. One common shower place was found. One tube-well is set up there. Moreover 6 shower rooms are also available. Comparing to the standard range it's enough. 4. Conveniently located. **Subcontractor Labors' Shed** 1. Hand wash facilities are absent there. 2. They do their shower in an open place. Water reservoir system wasn't good. 3. Conveniently located.		regularly.

	drying hands. 3. An adequate number of shower/bathroom facilities are provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. 4. Showers/bathrooms are conveniently located. 5. Shower/bathroom facilities are provided with an adequate supply of cold and hot running water.				
6	*Canteen, Cooking and Laundry Facilities* Good standards of hygiene in canteen/dining halls and cooking facilities are crucial. Adequate canteen, cooking and laundry facilities and equipment should also be provided. When caterers are contracted to manage kitchens and canteens, special	**NEPC Chinese Employees' Canteen, Cooking and Laundry Facilities** 1. Canteen and cooking facilities are built in adequate and easy to clean materials. 2. Found clean and sanitary condition. 3. Laundry facilities were visible. **NDE Mechanics and Engineers' Canteen, Cooking and Laundry Facilities**	**Partially Aligned**	Cleanliness must be ensured.	Same as compared to last quarterly report.

attention should be paid to ensure that contractors take into account and implement the benchmarks below and that adequate reporting and monitoring mechanisms are in place. When workers can individually cook their meals, they should be provided with a space separate from the sleeping areas. Facilities must be kept in a clean and sanitary condition. In addition, canteen, kitchen, cooking and laundry floors, ceilings and walls should be made of easily cleanable materials. 1. Canteen, cooking and laundry facilities are built in adequate and easy to clean materials. 2. Canteen, cooking and laundry facilities	1. Canteen and cooking facilities are built in adequate and easy to clean materials. 2. Moderately clean and sanitary condition found. 3. Laundry facilities compliance to national standards were visible. **Subcontractor Labors Shed's Canteen, Cooking and Laundry Facilities** 1. Canteen and cooking facilities are built in adequate and easy to clean materials. 2. Moderately clean and sanitary condition found. 3. Laundry facilities compliance to national standards were visible		

	are kept in a clean and sanitary condition. 3. If workers can cook their own meals, kitchen space is provided separate from sleeping areas.			
6.1	*Laundry Facilities* Providing facilities for workers to wash both work and non-work related clothes is essential for personal hygiene. The alternative is for the employer to provide a free laundry service. Benchmarks are… 1. Adequate facilities for washing and drying clothes are provided. Standards range from providing sinks or tubs with hot and cold water, cleaning soap and drying lines to providing washing machines and dryers.	National standard applicable in all sheds. Moreover, NEPC manage international standards for its workers.	**Aligned**	Same compared to previous report.

	2. When work clothes are used in contact with dangerous substance (for example, application of pesticide), special laundry facilities (washing machines) should be provided.				
6.2	*Canteen and Cooking Facilities* Canteen and cooking facilities should provide sufficient space for preparing food and eating, as well as conform to hygiene and safety requirements. 1. Canteens have a reasonable amount of space per worker. Standards range from 1 square meter to 1.5 square meters. 2. Canteens are adequately furnished. Standards range from providing tables,	*NEPC Chinese Employees' Canteen Cooking Facilities.* 1. Adequate space. 2. Tables, benches, individual drinking cups and plates are available. 3. Places for food preparation are designed to permit good food hygiene practices. 4. Sufficient number of washbasins designated for cleaning hands. 5. Wall surfaces adjacent to cooking areas are made of fire resistant materials. 6. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment	**Partially Aligned**	BCPCL should monitor as all the requirements are maintained properly.	More improvements are required.

benches, individual drinking cups and plates to providing special drinking fountains. 3. Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation. 4. Kitchens are provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying. 5. Wall surfaces adjacent to cooking areas are made of fire resistant materials. Food preparation tables are also equipped with a smooth durable	are provided. 7. Food waste and other refuse are seen to be deposited in waste bin and removed from the kitchen frequently to avoid accumulation. *NDE Mechanics and Engineers' Canteen Cooking Facilities.* 1. Adequate space. 2. Tables, benches, individual drinking cups and plates are available. In 2 no shed of NDE, lack of plates and glass observed. Workers living in 2 no shed also validate the observation. 3. Places for food preparation are designed to permit good food hygiene practices. 4. Washbasins for cleaning hands were provided. 5. wall surfaces adjacent to cooking areas are made of fire resistant materials. 6. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment		

washable surface. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures and all walls and ceilings have a smooth durable washable surface. 6. All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials. 7. Wall surfaces adjacent to cooking areas are made of fire resistant materials. Food preparation tables are equipped with a smooth, durable, easily cleanable, non-corrosive surface made	are provided. 7. Food waste and other refuses are not seen to be deposited separately. *Subcontractor Labours Shed*'s *Canteen Cooking Facilities.* 1. Adequate space. 2. Tables, benches, individual drinking cups and plates are available. 3. Places for food preparation are designed to permit good food hygiene practices. 4. Washbasins for cleaning hands were provided. 5. Wall surfaces adjacent to cooking areas are made of fire resistant materials. 6. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided. 7. Food waste and other refuses were seen to be deposited separately.		

	of non-toxic materials. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures have a smooth, durable and washable surface. 8. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided. 9. Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation.				
7	*Standards for Nutrition and Food Safety* When cooking for a number of workers, hygiene and food safety are absolutely	Meals are not planned by trained nutritionist. In the case of all sheds separate cooks make meals. Food and meal are selected on the basis of worker's choice.	**Partially Aligned**	The WHO 5 keys to safer food can be followed emphasizing workers' health. Concerned authority should make	Same as previous report.

critical. In addition to providing safe food, providing nutritious food is important as it has a very direct impact on workers' productivity and wellbeing. An ILO study demonstrates that good nutrition at work leads to gains in productivity and worker morale, prevention of accidents and premature deaths and reductions in health care costs. 1. The WHO 5 keys to safer food or an equivalent process is implemented. 2. Food provided to workers contains an appropriate level of nutritional value and takes into account religious/cultural backgrounds; different choices of food are served if workers have different cultural/ religious backgrounds.	All requirements of the WHO 5 keys to safer food are not maintained in all the sheds. Most vulnerable situation found in subcontract labor shed. All requirements of WHO are absent there. Foods are served according to workers' different cultural and religious backgrounds.		management plan and implement as well as monitor it regular basis.

	3. Food is prepared by cooks. It is also best practice that meals are planned by a trained nutritionist.				
8	*Medical facilities* Access to adequate medical facilities is important to maintain workers' health and to provide adequate responses in case of health emergency situations. The availability or level of medical facilities provided in workers' accommodation is likely to depend on the number of workers living on site, the medical facilities already existing in the neighboring communities and the availability of transport. However, first aid must always be available on site. *First aid facilities* Providing adequate	Client provided medical facilities were found during the field visit. Moreover, no medical staffs/workers were employed and no first aid kits were found. Both NEPC and NDE have health and safety officer but no monthly incident report is kept.	**Partially Aligned**	Accident/incident report must be prepared by designated personnel. Fast aid facilities must be available in all work stations. BCPCL should take it into account and make all EPC contractors to follow the requirements.	Improved but more improvement is desirable.

first aid training and facilities can save lives and prevent minor injuries becoming major ones. *Other medical facilities* Depending on the number of workers living on site and the medical services offered in the surrounding communities, it is important to provide workers with additional medical facilities. Special facilities for sick workers and medical services such as dental care, surgery, a dedicated emergency room can, for instance, be provided. 1. A number of first aid kits adequate to the number of residents are available. 2. First aid kits are adequately stocked. Where possible a 24/7			

	fist aid service/facility is available. 3. An adequate number of staff/workers are trained to provide first aid. 4. Where possible and depending on the medical infrastructures existing in the community, other medical facilities are provided (nurse rooms, dental care, minor surgery).			

9	*Leisure, Social and Telecommunication Facilities* Basic leisure and social facilities are important for workers to rest and also to socialize during their free time. This is particularly true where workers' accommodation is located in remote areas far from any communities. Where workers' accommodation is located in the vicinity of a village or a town, existing leisure or social facilities can be used so long as this does not cause disruption to the access and enjoyment of local community members. But in any case, social spaces should also be provided on site. Exercise and recreational facilities will increase workers'	Place for rest and religious observance were found. Minimal provision for leisure was observed.	**Partially Aligned**	Authority may consider managing recreational facilities for workers. Lack of entertainment facilities may cause many anti-social activities. Proponent should be concerned regarding this issue. Providing TV, Caram board, chess board in every shed may be a good choice. Establishing separate club for workers is also a good suggestion. EPC contractors; NDE and NEPC, are suggested to follow the requirement.	No improvement was observed.

welfare and reduce the impact of the presence of workers in the surrounding communities. In addition, it is also important to provide workers with adequate means to communicate with the outside world, especially when workers' accommodation is located in a remote location or where workers live on site without their family or are migrants. Consideration of cultural attitudes is important. Provision of space for religious observance needs to be considered, taking account of the local context and potential conflicts in certain situations. Benchmarks 1. Basic collective social/rest spaces are provided to workers.			

Standards range from providing workers multipurpose halls to providing designated areas for radio, TV, cinema. 2. Recreational facilities are provided. Standards range from providing exercise equipment to providing a library, swimming pool, tennis courts, table tennis, educational facilities. 3. Workers are provided with dedicated places for religious observance if the context warrants. 4. Workers have access to public phones at affordable/ public prices (that is, not inflated). 5. Internet facilities can also be provided, particularly where large numbers of expatriates/Third Country Nationals (TCNs) are accommodated.			

10	*Health and Safety on Site* The company or body in charge of managing the workers' accommodation should have the prime responsibility for ensuring workers' physical wellbeing and integrity. This involves making sure that the facilities are kept in good condition (ensuring that sanitary standards or fie regulations are respected for instance) and that adequate health and safety plans and standards are designed and implemented. 1. Health and safety management plans including electrical, mechanical, structural and food safety have been carefully designed and are implemented. 2. The person in charge	Workers were found using small scale of PPE during work. In some cases, workers were found not using gloves or boots or helmets, which may occur accident any time. Except NEPC no fire extinguisher practice was observed. Following observation were also noted 1. No designed health and safety management plans including electrical, mechanical, structural and food safety have been implemented. 2. No records are kept on outbreak of any contagious diseases, food poisoning and other important casualties. 3. No trained staffs/workers for providing first aid. 4. No specific fire safety plan is prepared except NEPC. 5. No client provided medical facilities were found. 6. No prepared emergency plans on health and fire safety was observed.	**Partially Aligned**	NDE subcontractor labors were found not using PPE during working period. Training and consciousness program on using PPE is also required for workers. Proponent BCPCL and EPC contractors; NDE and NEPC, are suggested to meet the requirements.	Not improved

	of managing the accommodation has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and other important casualties. 3. An adequate number of staff/workers is trained to provide first aid. 4. A specific fire safety plan is prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills. 5. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk and concerns relating to HIV/AIDS and of other health risk related activities is			

	provided to workers. It is best practice to develop a clear policy on this issue. 6. Workers have access to adequate preventive measures such as contraception (condoms in particular) and mosquito nets. 7. Workers have easy access to medical facilities and medical staff. Where possible, female doctors/nurses should be available for female workers. 8. Emergency plans on health and fire safety are prepared. Depending on the local context, additional emergency plans are prepared as needed to handle specific occurrences (earthquakes, floods, tornadoes).			
11	*Security of Workers' accommodation* Ensuring the security	Proponent BCPCL as well as EPC contractors; NDE and NEPC have separate security plan and numbers of guards. As	**Aligned**	Improved

	of workers and their property on the accommodation site is of key importance. To this end, a security plan must be carefully designed including appropriate measures to protect workers against theft and attacks. 1. A security plan including clear measures to protect workers against theft and attack is implemented. 2. A security plan including clear policies on the use of force has been carefully designed and is implemented. 3. Security staff have been checked to ensure that they have not been implicated in any previous crimes or abuses. Where appropriate, security staffs from both genders are recruited. 4. Security staff have a	per the plan, security guards were seen doing their duty during field visit. A good numbers of members of Ansar VDP, 22 in numbers, are working currently in the project site. Routinely, 2 Ansars guard each shed. A unit of Bangladesh police was also seen working in the project area.		

	clear mandate and have received clear instruction about their duties and responsibilities, in particular their duties not to harass, intimidate, discipline or discriminate against workers. 5. Security staffs have received adequate training in dealing with domestic violence and the use of force. 6. Security staffs have a good understanding about the importance of respecting workers' rights and the rights of the communities. 7. Body searches are only allowed in specific circumstances and are performed by specially trained security staff using the least-intrusive means possible. Pat down searches on female workers can only be performed by female security staff.			

	8. Security staff adopt an appropriate conduct towards workers and communities. 9. Workers and members of the surrounding communities have specific means to raise concerns about security arrangement and staff.				
12	*Grievance Mechanism* Grievance mechanism for workers where they can raise reasonable workplace concerns. 1. Mechanisms for workers' consultation have been designed and implemented. It is best practice to set up a review committee which includes representatives elected by workers. 2. Processes and mechanisms for workers to articulate	There is no formal on-site grievance mechanism for workers. Workers in proponent and EPC contractors convey their grievance to their own upper designated workers. During informal meetings with workers, they confirmed that they are quite happy with the existing informal mechanism.	**Partially aligned**	The Project should establish channels for management and workers to communicate and for the workers to place their concerns as well as suggestions. The grievance process should be made accessible for construction workforce and should enable workforce to raise anonymous complaints.	No improvement

their grievances are provided to workers. Such mechanisms are in accordance with PS2/PR2. 3. Workers subjected to disciplinary proceedings arising from behaviour in the accommodation should have access to a fair and transparent hearing with the possibility to contest decisions and refer the dispute to independent arbitration or relevant public authorities. 4. In case conflicts between workers themselves or between workers and staff break out, workers have the possibility of easily accessing a fair conflict resolution mechanism. 5. In cases where more serious offences occur, including serious physical or mental abuse, there are mechanisms to ensure			The grievance records should be properly documented, tracked and reviewed for redressal of the Grievances.

	full cooperation with the police authority (where adequate).		

CHAPTER 5

5. Conclusion

The Project is now at the site development stage and various development activities are in progress. The land development activities of the Project area for are ongoing. There are some environmental compliance measures in environmental management plan that should be at place during this pre-construction stage. From the first quarter environmental monitoring of assessment, some recommendations have been made and it is important to consider these measures to properly implement the proposed Environmental Management Plan.

ANNEX A: ENVIRONMENTAL MONITORING PHOTOGRAPHS

Ambient Air sampling at Londa Kheya Ghat

Ambient Air sampling at Dhankhali Union Complex

Ambient Air sampling at Tiakhali village

Ambient Air sampling at Lalua village

Ambient Air sampling at Nishanbari village

Ambient Air sampling at Project Site

	
Noise Level Monitoringat Char Nishanbari Mosque	***Noise Level Monitoringat Char Nishanbari Primary School***
	
Noise Level Monitoring at Rafique Mia's House, Nishanbari Village	***Noise Level Monitoring at Londa Kheya Ghat***
	
Noise Level Monitoring at Akber Mia's House, Lalua	***Noise Level Monitoring at Salam Uddin's House, Tiakhali village***

	
Noise Level Monitoring at MonirHossain's House, Nishanbari village	***Noise Level Monitoring at Sabder Ali's House, Madhupara***
	
Ground Water collection at Project Area	***Ground Water collection at Londa kheya Ghat***
	
Surface Water Collection at Rabnabadh Channel	***Surface Water Collection at Andharmanik River***

ANNEX-B: HEALTH SAFETY MONITORING PHOTOGRAPHS

NEPC Workers with PPE

NDE Workers without PPE during working at height

Waste Busket at NCPC worker Shed

Bins for collecting Waste at project side

Fire Extinguisher in Project Site

Construction Material without Caution Tape

NDE Employees' labor Shed Waste Condition

NDE Employees' labor Shed Kitchen Condition

NDE Employees' Labor Shed Condition

NDE Employees' Labor Shed Sanitary Conditions

Tap Water For NEPC Subcontractors' Shed

NEPC Subcontractors' Shed

NEPC Subcontractors Labors Sheds' Bed Facilities

Canteens At NDE employee shed

Bed Bug Controlling Mechanism by labour

Fire Extinguisher in NEPC Subcontractor Labor Shed

Subcontractor Labors' Sheds of NDE

Distinct place for religious observance

NDE Subcontractor Labors' Bathing Facility

NDE Subcontractor Labors' Canteen Facility

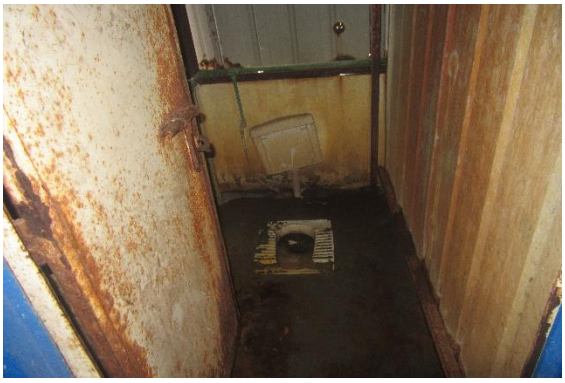
NDE Employees' Toilet Facilities

Basin facilities for Subcontractor Labors of NDE

LPG bottle in the labour shed of NEPC

NEPC Workers Shower and Laundry Facilities

NEPC Subcontractor labors' toilets facility



Toilet facility (NEPC)

Fuel Storage

NEPC Chinese employee shed

No Bericades for keeping waste Materials

ANNEX C: CHECKLIST ON WORKERS' ACCOMMODATION

General regulatory framework	Y	N	N/A	Comments
Have the international/national/local regulatory frameworks been reviewed?				
Are mandatory provisions on workers' accommodation identified?				

Assessing the need for workers' accommodation

Availability of the workforce

General regulatory framework	Y	N	N/A	Comments
Has there been an assessment of workers' availability in the neighboring communities?				
Has there been an assessment of the skills and competencies of the local workforce and how do those skills and competencies fit the project's need?				
Has there been an assessment of the possibility of training a local workforce in order to fulfill the project's needs?				
Availability of housing				
Has there been a comprehensive assessment of the different type of housing available in the surrounding communities prior to building any workers' accommodation?				
For a larger project: is that assessment included in the Environmental and Social Impact Assessment?				
Has there been an assessment of the impact on the communities of using existing housing opportunities?				
Have measures to mitigate adverse impacts on the local housing market been identified and included in the Environmental and Social Action Plan (ESAP) or other relevant action plan?				
Assessing impacts of workers' accommodation on communities				
Has a community impact assessment been carried out as part of the Environmental and Social Assessment of the overall protect with a view to mitigate the negative impacts of the	√			

General regulatory framework	Y	N	N/A	Comments
workers' accommodation on the surrounding communities and to enhance the positive ones?				
Have the potential health and safety impacts and consequences of land acquisition and involuntary resettlement occurring during the construction phase of the workers' accommodation been included in the assessment?	√			
Have the impacts of workers1 accommodation on community infrastructures, services and facilities been included in the assessment?	√			
Have the impacts on local community's businesses and local employment been included in the assessment?	√			
Have general impacts of workers' accommodation on communities' health, (notably the increased risk of road accidents and of communicable diseases), and community social cohesion been included in the assessment?	√			
Does the assessment include appropriate mitigation measures to address any adverse impacts identified?	√			
Types of workers' accommodation				
Has consideration been given to provision of family accommodation?		√		
Are individual accommodations comprising bedrooms, sanitary and cooking facilities provided as part of the family accommodation?		√		
Are adequate nursery/school facilities provided?		√		
Standards for workers' accommodation				
National/local standard	√			International Standard
Have the relevant national/local regulations been identified and implemented	√			
General living facilities				
Is the location of the facilities designed to avoid flooding or other natural hazards?	√			
Are the living facilities located within a	√			Very close to worksite.

General regulatory framework	Y	N	N/A	Comments
reasonable distance from the worksite?				
Is transport provided to worksite safe and free?		√		
Are the living facilities built using adequate materials, kept in good repair and kept clean and free from rubbish and other refuse?	√			
Drainage				
Is the site adequately drained?	√			Adequately drained in most cases
Heating, air conditioning, ventilation and light				
Depending on climate are living facilities provided with adequate heating, ventilation, air conditioning and light systems including emergency lighting?	√			Fans, windows and lights are available
Water				
Do workers have easy access to a supply of clean/ potable water in adequate quantities?	√			
Does the quality of the water comply with national/local requirements or WHO standards?	√			
Are tanks used for the storage of drinking water constructed and covered to prevent water stored therein from becoming polluted or contaminated?	√			
Is the quality of the drinking water regularly monitored?	√			
Wastewater and solid waste				
Are wastewater, sewage, food and any other waste materials adequately discharged in compliance with local or World Bank standards and without causing any significant impacts on camp residents, the environment or surrounding communities?	√			
Are specific containers for rubbish collection provided and emptied on a regular basis?	√			
Are pest extermination, vector control and disinfection undertaken throughout the living facilities?	√			Small scale

General regulatory framework	Y	N	N/A	Comments
Rooms/dormitories facilities				
Are the rooms/dormitories kept in good condition?	√			
Are the rooms/dormitories aired and cleaned at regular intervals?	√			Small Scale
Are the rooms/dormitories built with easily cleanable flooring material?	√			
Are the rooms/dormitories and sanitary facilities located in the same buildings?	√			Exceptions found in NDE subcontractors Labors' Sheds
Are residents provided with enough space?	√			Exceptions found in subcontractors labors' shed
Is the ceiling height high enough?	√			
Is the number of workers sharing the same room/dormitory minimized?	√			Not all cases
Are the doors and windows lockable and provided with mosquito screens when necessary?	√			
Are mobile partitions or curtains provided?		√		
Is suitable furniture such as table, chair, mirror, bedside light provided for every worker?	√			
Are separate sleeping areas provided for men and women?			√	No women are available
Bed arrangements and storage facilities	√			
Is there a separate bed provided for every worker?	√			
Is the practice of "hot-bedding" prohibited?	√			
Is there a minimum space of 1 metre between beds?	√			Not All Cases
Is the use of double deck bunks minimized?	√			Only Chinese Workers use double bunks
When double deck bunks are in use, is there enough clear space between the lower and upper bunk of the bed?	√			
Are triple deck bunks prohibited?	√			
Are workers provided with comfortable mattresses, pillows and clean bed linens?	√			Exceptions found in subcontractors labors'

General regulatory framework	Y	N	N/A	Comments
				sheds
Are the bed linen washed frequently and applied with adequate repellents and disinfectants (where conditions warrant)?	√			
Are adequate facilities for the storage of personal belongings provided?		√		
Are there separate storages for work clothes and PPE and depending on condition, drying/airing areas?		√		They keep these here and there in the living room
Sanitary and toilet facilities				
Are sanitary and toilet facilities constructed from materials that are easily cleanable?	√			
Are sanitary and toilet facilities cleaned frequently and kept in working condition?	√			Exception found in Sub contractor labor shed
Are toilets, showers/bathrooms and other sanitary facilities designed to provide workers with adequate privacy including ceiling to floor partitions and lockable doors?	√			
Are separate sanitary and toilet facilities provided for men and women?		√		No women are available
Toilet facilities				
Is there an adequate number of toilets and urinals?	√			
Are toilet facilities conveniently located and easily accessible?	√			
Showers / bathrooms and other sanitary facilities				
Is the shower flooring made of anti-slip hard washable materials?	√			
Is there an adequate number of hand wash basins and showers / bathrooms facilities provided?	√			
Are the sanitary facilities conveniently located?	√			
Are shower facilities provided with an adequate supply of cold and hot running water?	√			No hot water
Canteen, cooking and laundry facilities				
Are canteen, cooking and laundry facilities built with adequate and easy to clean materials?	√			

General regulatory framework	Y	N	N/A	Comments
Are the canteen, cooking and laundry facilities kept in clean and sanitary condition?	√			
If workers cook their own meals, is kitchen space provided separately from the sleeping areas?		√		Found at sub-contractor labor shed
Laundry facilities				
Are adequate facilities for washing and drying clothes provided?	√			National Standard
Canteen and cooking facilities				
Are workers provided with enough space in the canteen?	√			
Are canteens adequately furnished?	√			
Are kitchens provided with the facilities to maintain adequate personal hygiene are places for food preparation adequately ventilated and equipped?	√			
Are kitchen floor, ceiling and wall surfaces adjacent to or above food preparation and cooking areas built in non-absorbent, durable, non-toxic, easily cleanable materials?	√			
Are wall surfaces adjacent to cooking areas made of fie-resistant materials and food preparation tables equipped with a smooth, durable, non-corrosive, non-toxic, washable surface?	√			
Are adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment provided?	√			
Are there adequate sealable containers to deposit food waste and other refuse?	√			
Is refuse frequently removed from the kitchen to avoid accumulation?	√			
Standards for nutrition and food safety				
Is there a special sanitary process such as the WHO "5 keys to safer food" implemented in relation to food safety?	√			Couldn't be measured
Does the food provided contain appropriate nutritional value?	√			Couldn't be measured

General regulatory framework	Y	N	N/A	Comments
Does the food provided take into account workers' religious/cultural backgrounds?	√			
Medical facilities				
Are first aid kits provided in adequate numbers?		√		Very small amount
Are first-aid kits adequately stocked?	√			
Is there an adequate number of staff/workers trained to provide first aid?	√			
Are there any other medical facilities/services provided on site? If not, why?		√		
Leisure, social and telecommunications facilities				
Are basic social collective spaces and adequate recreational areas provided to workers?	√			Small amount
Are workers provided with dedicated places for religious observance?	√			
Can workers access a telephone at an affordable/public price?			√	
Are workers provided with access to internet facilities?			√	
Managing workers' accommodation Management and staff				
Are there carefully designed worker camp management plans and policies especially in the field of health and safety (including emergency responses), security, workers' rights and relationships with the communities?	√			
Where contractors are used, have they clear contractual management responsibilities and duty to report?	√			
Does the person appointed to manage the accommodation has the required background, competency and experience to conduct his mission and is he/ she provided with the adequate responsibility and authority to do so?	√			
Is there enough staff to ensure the adequate implementation of housing standards (cleaning, cooking and security in particular)?	√			
Are staff members recruited from surrounding communities?	√			Some staffs found

General regulatory framework	Y	N	N/A	Comments
Have the staffs received basic health and safety training?				Not found
Are the persons in charge of the kitchen particularly trained in nutrition and food handling and adequately supervised?				Not found
Charging fees for accommodation and services				
Are the renting arrangements fair and transparent?		√		**No rent**
Are workers provided with adequate information about payment made?		√		**No rent**
Where appropriate, are renting arrangements and regulations clearly included in workers' employment contracts?		√		**No rent**
Are food and other services provided for free or reasonably priced, that is, not above the local market price?		√		
Is the payment in kind for accommodation and services prohibited?	√			
Health and safety on site				
Have health and safety management plans including electrical, mechanical, structural and food safety been designed and implemented?	√			
Has the accommodation manager a duty to report to the health authority specific diseases, food poisoning or casualties?	√			
Is there an adequate number of staff/workers trained in providing first aid?	√			Small Scale
Has a specific and adequate fire safety management plan been designed and implemented?	√			
Is guidance on alcohol, drug and HIV/AIDS and other health risk-related activities provided to workers?	√			Small Scale
Are contraception measures (condoms in particular) and mosquito nets (where relevant) provided to workers?			√	
Do workers have an easy access to medical facilities and medical staff, including female		√		Only First Aid

General regulatory framework	Y	N	N/A	Comments
doctors/nurses where appropriate?				
Have emergency plans on health and fire safety been prepared?	√			
Depending on circumstances, have specific emergency plans (earthquakes, floods, tornadoes) been prepared?		√		
Security on workers' accommodation				
Has a security plan including clear measures to protect workers against theft and attack been designed and implemented?	√			
Has a security plan including clear provisions on the use of force been designed and implemented?	√			
Have the backgrounds of security staff been checked for previous crimes or abuses?	√			
Has the recruitment of security staff from both genders been considered?		√		Only Male
Have security staffs received clear instruction about their duty and responsibility?	√			
Have security staffs been adequately trained in dealing with domestic violence and the use of force?	√			
Are body searches only performed in exceptional circumstances by specifically trained security staff of both genders?			√	
Do security staffs have a good understanding about the importance of respecting workers' rights and the rights of the surrounding communities and adopt appropriate conduct?	√			
Do workers and communities have specific means to raise concerns about security arrangements and staff?	√			
Workers' rights, rules and regulations on workers' accommodation				
Are limitations on workers' freedom of movement limited and justified?	√			

General regulatory framework	Y	N	N/A	Comments
Is an adequate transport system to the surrounding communities provided?		√		
Is the practice of withholding workers' ID papers prohibited?	√			
Is freedom of association expressly respected?	√			
Are workers' religious, cultural and social backgrounds respected?	√			
Are workers made aware of their rights and obligations and provided with a copy of the accommodations' internal rules, procedures and sanction mechanisms in a language or through a media they understand?	√			
Are house regulations nondiscriminatory, fair and reasonable?	√			
Is a fair and non-discriminatory procedure to implement disciplinary procedures, including the right for workers to defend themselves, set up?	√			
Consultation and grievance mechanisms				
Have mechanisms for workers' consultation been designed and implemented?		√		Not found
Are workers provided with processes and mechanisms to articulate their grievances in accordance with PS2/PR2?		√		Not found
Have workers subjected to disciplinary proceedings arising from conduct in the accommodation had access to a fair and transparent hearing with the possibility to appeal the decision?		√		
Are there fair conflict resolution mechanisms in place?		√		
In cases where serious offences occur, are there mechanisms to ensure full cooperation with police authorities?				
Management of community relations				
Have community relation management plans addressing issues around		√		

General regulatory framework	Y	N	N/A	Comments
community development, community needs, community health and safety and community social and cultural cohesion been designed and implemented?				
Do community relation management plans include the setting up of liaison mechanisms to allow a constant exchange of information and consultation of the surrounding communities?		√		
Is there a senior manager in charge of implementing the community relation management plan?		√		
Is there a senior manager in charge of liaising with the surrounding communities?		√		
Are the impacts generated by workers' accommodation periodically reviewed, mitigated or enhanced?		√		
Are community representatives provided with easy means to voice their opinions and lodge complaints?		√		
Is there a transparent and efficient process for dealing with community grievances, in accordance with PS1/PR10?		√		

ANNEX D: LABORATORY ANALYSIS REPORT

SL No: 020383

Ref: EQMS/Ambient Air/3701/2018

EQMS ENVIRONMENTAL LABORATORY

Test Results of Ambient Air Quality Analysis

Project Name : Payra 1320 MW Thermal Power Plant Project.
Description of Sample : Ambient Air Quality, Sampling Location: AQ1 - AQ6
Sample Collector : Collected by EQMS Personnel (Toffazal Hossain)
Sampling Date : 23th to 28th July, 2018, Date of Analysis : 10th August, 201

Description of Analysis:

Location	Sampling Date	Ambient Air Pollutants Concentration in µg/m³					CO ppm
		SPM	PM_{10}	$PM_{2.5}$	SO_2	NOx	
AQ1	23.07.2018	118.8	62.7	26.5	5.1	15.3	<2
AQ2	24.07.2018	107.2	57.6	14.9	4.1	11.2	<2
AQ3	25.07.2018	73.3	43.1	11.8	3.1	7.5	<1
AQ4	26.07.2018	70.5	47.2	10.6	2.9	7.8	<1
AQ5	27.07.2018	71.2	44.8	11.5	3.4	9.6	<1
AQ6	28.07.2018	66.4	40.4	11.8	4.2	10.8	<1
Duration (hr)		8	24	24	24	24	1
ECR, 1997 and amendment in 2006 Standard (Schedule-2)		**200**	**150**	**65**	**365**	**100**	**9**
Method of Analysis		Gravimetric	Gravimetric	Gravimetric	West-Geake	Jacob & Hochheiser	CO Meter

Note:
*Regular Checkup and calibration of the equipments are done by the manufacturers and EQMS personnel to avoid any error

Legend:
*SPM -Suspended Particulate Matter, PM_{10} -Particulate Matter of a diameter of 10 micron or less, $PM_{2.5}$ - Particulate Matter of a diameter of 2.5 micron or less, **SOx** -Sulphur Di-Oxide, **NOx** -Oxides of Nitrogen, **CO** - Carbon Monoxide*

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Analyzed By:
Md. Abdur Rab
Chemist
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Checked by:
Kazi Farhad Iqubal
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SL No: 020382

Ref: EQMS/Ground Water/3501/2018

EQMS WET LABORATORY

Test Results of Ground Water Quality Analysis

Project Name : Payra 1320 MW Thermal Power Plant Project
Description of Sample: Water Quality,
Sampling Location : GW1and GW2
Sample Collector : Collected by EQMS Personnel (Toffazal Hossain)
Sampling Date : *20th - 21st May, 2018,*
Date of Analysis : *29th May 2018*

Description of Analysis:

Parameter	Unit	GW1	GW2	Bangladesh Standards
Arsenic	*mg/l*	Less than 0.010	Less than 0.010	*0.05*
Chloride	*mg/l*	166.2	152.1	*150-600*
Conductivity	--	1050	1080	--
Fecal Coliform	*CFU (N/100mL)*	0	0	*0*
Iron	*0.3-1.0*	0.29	0.18	*0.3-1.0*
Lead	*0.05*	<0.05	<0.05	*0.05*
pH	*6.5-8.5*	8.49	8.41	*6.5-8.5*
Temperature	*20-30 °C*	28.8	28.9	*20-30 °C*
Total Coliform	*0 CFU (N/100mL)*	0	0	*0*
Total Dissolved Solids	*1000*	530	540	*1000*

Note: BDL=Below Detection Level

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SL No: 020381

Ref: EQMS/Ground Water/3601/2018

EQMS WET LABORATORY

Test Results of Ground Water Quality Analysis

Project Name : Payra 1320 MW Thermal Power Plant Project.
Description of Sample: Water Quality,
Sampling Location : GW1and GW2
Sample Collector : Collected by EQMS Personnel (Toffazal Hossain)
Sampling Date : *29th-30th June 2018*
Date of Analysis : *6th July 2018*

Description of Analysis:

Parameter	Unit	GW1	GW2	Bangladesh Standards
Arsenic	*mg/l*	<0.05	<0.05	*0.05*
Chloride	*mg/l*	151.36	167.19	*150-600*
Conductivity	--	1070	1070	--
Fecal Coliform	*CFU (N/100mL)*	0	0	*0*
Iron	*0.3-1.0*	0.23	0.18	*0.3-1.0*
Lead	*0.05*	<0.05	<0.05	*0.05*
pH	*6.5-8.5*	8.61	8.43	*6.5-8.5*
Temperature	*20-30 °C*	28.4	27.9	*20-30 °C*
Total Coliform	*0 CFU (N/100mL)*	0	0	*0*
Total Dissolved Solids	*1000*	540	540	*1000*

Note: BDL=Below Detection Level

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SL No: 020380

Ref: EQMS/Ground Water/3701/2018

EQMS WET LABORATORY.

Test Results of Ground Water Quality Analysis

Project Name : Payra 1320 MW Thermal Power Plant Project.
Description of Sample: Water Quality,
Sampling Location : GW1and GW2
Sample Collector : Collected by EQMS Personnel (Toffazal Hossain)
Sampling Date : *20 th-21st July, 2018*
Date of Analysis : *09th August, 2018*

Description of Analysis:

Parameter	Unit	GW1	GW2	Bangladesh Standards
Arsenic	*mg/l*	Less than 0.010	Less than 0.010	*0.05*
Chloride	*mg/l*	140.19	135.35	*150-600*
Conductivity	--	1020	1040	--
Fecal Coliform	*CFU (N/100mL)*	0	0	*0*
Iron	*0.3-1.0*	0.32	0.24	*0.3-1.0*
Lead	*0.05*	<0.05	<0.05	*0.05*
pH	*6.5-8.5*	8.42	8.37	*6.5-8.5*
Temperature	*20-30 °C*	27.2	27.5	*20-30 °C*
Total Coliform	*0 CFU (N/100mL)*	0	0	*0*
Total Dissolved Solids	*1000*	510	520	*1000*

Note: BDL=Below Detection Level

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SL No: 020379

Ref: EQMS/Noise Level /3709/2018

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level Analysis

Project Name : Payra 1320 MW Thermal Power Plant Project.
Description of Sample: Noise Level
Sample Collector : Collected by EQMS Personnel (Toffazal Hossain)
Monitored by : EQMS Consulting Limited (EQMS Monitoring Team)
Sampling Date : *19th - 27th July, 2018*
Date of Analysis : 10th August, 2018
Monitoring Location:

NL1	: Char Nishanbari Primary School
NL2	: Char Nishanbari Mosque
NL3	: Rofiqure Mia's House, Nishanbari Village
NL4	: Londa Kheya Ghat
NL5	: Monir Hossain's House, Nishanbari village
NL6	: Salam Uddin's House, Tiakhali village
NL7	: Akber Mia's House, Lalua
NL8	: Sabder Ali's House, Madhupara

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SL No: 020378

Description of Analysis:

Location	Leq_{day}	Leq_{night}	Day	Night
NL1	70.1	45.3	60	[illegible]
NL2	65.2	43.9	60	50
NL3	62.5	40.6	60	[illegible]
NL4	62.1	49.6	60	[illegible]
NL5	64.3	42.7	60	50
NL6	53.9	41.0	60	50
NL7	53.2	40.9	60	50
NL8	57.6	42.3	60	50
Standard (ECR'1997) & Noise Pollution (Control) Rules 2006				
Silent area			50	40
Residential area			55	45
Mixed area			60	50
Commercial Area			70	60
Industrial area			75	70
World Bank/IFC Standard				
Residential; Institutional; Educational			55	45
Industrial			70	70

Collected by:
Toffazzal Hossain
Field Coordinator
EQMS Consulting Limited

Analyzed By:
Md. Jahidul Islam
Assistant Consultant
EQMS Consulting Limited

Checked by:
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SL No: 020377

Ref: EQMS/Noise Level /3509/2018

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level Analysis

Project Name : Payra 1320 MW Thermal Power Plant Project.
Description of Sample: Noise Level
Sample Collector : Collected by EQMS Personnel (Toffazal Hossain)
Monitored by : EQMS Consulting Limited (EQMS Monitoring Team)
Sampling Date : *18th-21st May, 2018*
Date of Analysis : *29th May, 2018*
Monitoring Location:

NL1	: Char Nishanbari Primary School
NL2	: Char Nishanbari Mosque
NL3	: Rofiqure Mia's House, Nishanbari Village
NL4	: Londa Kheya Ghat
NL5	: Monir Hossain's House, Nishanbari village
NL6	: Salam Uddin's House, Tiakhali village
NL7	: Akber Mia's House, Lalua
NL8	: Sabder Ali's House, Madhupara

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SL No: 020376

Description of Analysis:

Location	Leq_{day}	Leq_{night}	Day	Night
NL1	53.9	51.1	60	50
NL2	55.7	52.0	60	50
NL3	53.5	44.8	60	50
NL4	67.5	55.6	60	50
NL5	51.1	48.3	60	50
NL6	48.6	50.6	60	50
NL7	45.3	39.2	60	50
NL8	54.5	51.1	60	50
Standard (ECR'1997) & Noise Pollution (Control) Rules 2006				
Silent area			50	40
Residential area			55	45
Mixed area			60	50
Commercial Area			70	60
Industrial area			75	70
World Bank/IFC Standard				
Residential; Institutional; Educational			55	45
Industrial			70	70

Collected by:
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Field Coordinator
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SL No: 020375

Ref: EQMS/Noise Level /3609/2018

EQMS ENVIRONMENTAL LABORATORY

Test Results of Noise Level Analysis

Project Name : Payra 1320 MW Thermal Power Plant Project.
Description of Sample: Noise Level
Sample Collector : Collected by EQMS Personnel (Toffazal Hossain)
Monitored by : EQMS Consulting Limited (EQMS Monitoring Team)
Sampling Date : *29th-30th June, 2018*
Date of Analysis : *4th July 2018*
Monitoring Location:

NL1	: Char Nishanbari Primary School
NL2	: Char Nishanbari Mosque
NL3	: Rofiqure Mia's House, Nishanbari Village
NL4	: Londa Kheya Ghat
NL5	: Monir Hossain's House, Nishanbari village
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SL No: 020374

Description of Analysis:

Location	Leq_{day}	Leq_{night}	Day	Night
NL1	61.0	42.7	60	50
NL2	54.9	40.9	60	50
NL3	52.9	40.6	60	50
NL4	65.0	51.4	60	50
NL5	52.8	42.5	60	50
NL6	51.5	39.7	60	50
NL7	49.9	38.3	60	50
NL8	50.8	39.2	60	50
Standard (ECR'1997) & Noise Pollution (Control) Rules 2006				
Silent area			50	40
Residential area			55	45
Mixed area			60	50
Commercial Area			70	60
Industrial area			75	70
World Bank/IFC Standard				
Residential; Institutional; Educational			55	45
Industrial			70	70

Collected by:
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Field Coordinator
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Analyzed By:
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