

Annexes to the Environmental and Social Impact Assessment Report for Proposed Kutubdia LNG Terminal Project

Project Number: 50253-001
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BAN: Reliance Bangladesh LNG Terminal Limited

Prepared by Environmental Resources Management (ERM)

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Annex 1

References

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Annex 2

EHS Standards

EHS Standards

The relevant environmental standards (national as well as international) as applicable to the proposed Project are presented in the following tables:

Stack Emission Limits

Parameter	Unit	Bangladesh*	World Bank**
PM ₁₀	mg/Nm ³	150	50 (liquid fuel)
		-	N/A (natural gas)
SO ₂		-	Use less than 0.5% sulphur fuel (liquid fuel)
		-	N/A (natural gas)
NO _x	mg/Nm ³	-	400 mg/Nm ³ – Gas engines (dual fuel) 200 mg/Nm ³ Gas engine
	mg/Nm ³	40 ppm	51 (25 ppm) – natural gas (Gas Turbine)
Dry Gas, Excess O ₂ content	%		15 (natural gas)
	%		15 (liquid fuel)

Note:

* Schedule 11 (Standards for Gaseous Emission from Industries or Projects) of the Environmental Conservation Rules, 1997.

** Emission Guidelines for Combustion Engine, WB/IFC General EHS Guidelines

Ambient Air Quality Standards

Parameter	Bangladesh**		WHO***	
	(µg/m ³)	Annual (µg/m ³)	(µg/m ³)	Annual (µg/m ³)
SPM (24 hourly)	200	-	-	-
PM ₁₀ (24 hourly)	150	50	50	20
PM _{2.5} (24 hourly)	65	15	25	10
SO ₂ (24 hourly)	365	80	20	-
NO _x (24 hourly)	-	100	-	40
CO (8 hourly)	10,000	-	10,000	-

Note:

** The Bangladesh National Ambient Air Quality Standards have been taken from the Environmental Conservation Rules, 1997 which was amended on 19th July 2005 vide S.R.O. No. 220-Law/2005.

*** WHO Ambient Air Quality Guideline Values (2005 and 2000), which are also being referred in the World Bank and IFC's General EHS Guidelines (2007)

Standards for Inland Surface Water

Best Practice based classification		pH	BOD	DO	Total Coliform
			mg/l	mg/l	nos/100 ml
a.	Source of drinking water for supply only after disinfecting	6.5 – 8.5	2 or less	6 or above	50 or less
b.	Water use for recreational activity	6.5 – 8.5	3 or less	5 or more	200 or less
c.	Source of drinking water for supply after conventional treatment	6.5 – 8.5	6 or less	6 or more	5000 or less
d.	Water usable by fisheries	6.5 – 8.5	6 or less	5 or more	-
e.	Water usable by various process and cooling industries	6.5 – 8.5	10 or less	5 or more	5000 or less
f.	Water usable for irrigation	6.5 – 8.5	10 or less	5 or more	1000 or less

* The Bangladesh Standards for Inland Surface Water have been taken from Schedule 3 (Standards for Water) of the Environmental Conservation Rules, 1997.

Notes: In water used for pisciculture, maximum limit of presence of ammonia as Nitrogen is 1.2 mg/l.

Electrical conductivity for irrigation water – 2250 mmhoms/cm (at a temperature of 25°C); Sodium less than 26%; boron less than 0.2%.

Standards for Drinking water

SN	Parameter	Unit	ECR,1997*	WHO, 2011**
1	Aluminium	mg/l	0.2	
2	Ammonia (NH ₃)	mg/l	0.5	
3	Arsenic	mg/l	0.05	0.01
4	Barium	mg/l	0.01	
5	Benzene	mg/l	0.01	0.01
6	BOD5 20°C	mg/l	0.2	
7	Boron	mg/l	1.0	2.4
8	Cadmium	mg/l	0.005	0.003
9	Calcium	mg/l	75	
10	Chloride	mg/l	150 – 600*	
11	Chlorinated alkanes carbon tetrachloride	mg/l	0.01	
	1.1 Dichloroethylene	mg/l	0.001	
	1.2 Dichloroethylene	mg/l	0.03	
	Tetrachloroethylene	mg/l	0.03	
	Trichloroethylene	mg/l	0.09	
12	Chlorinated phenols- pentachlorophenol	mg/l	0.03	
	2.4.6 trichlorophenol	mg/l	0.03	
13	Chlorine (residual)	mg/l	0.2	
14	Chloroform	mg/l	0.09	
15	Chromium (hexavalent)	mg/l	0.05	
16	Chromium (total)	mg/l	0.05	0.05
17	COD	mg/l	4	
18	Coliform (faecal)/E. coli	n/100 ml	0	Must not be detectable in any 100 ml sample

SN	Parameter	Unit	ECR,1997*	WHO, 2011**
19	Coliform (total)	n/100 ml	0	
20	Color	Hazen unit	15	
21	Copper	mg/l	1	2
22	Cyanide	mg/l	0.1	
23	Detergents	mg/l	0.2	
24	DO	mg/l	6	
25	Fluoride	mg/l	1	1.5
26	Hardness (as CaCO ₃)	mg/l	200 – 500	
27	Iron	mg/l	0.3 – 1.0	
28	Kjeldahl Nitrogen (total)	mg/l	1	
29	Lead	mg/l	0.05	0.01
30	Magnesium	mg/l	30 – 35	
31	Manganese	mg/l	0.1	
32	Mercury	mg/l	0.001	0.006
33	Nickel	mg/l	0.1	0.07
34	Nitrate	mg/l	10	50
35	Nitrite	mg/l	<1	3
36	Odor	mg/l	Odorless	
37	Oil and grease	mg/l	0.01	
38	pH	mg/l	6.5 – 8.5	
39	Phenolic compounds	mg/l	0.002	
40	Phosphate	mg/l	6	
41	Phosphorus	mg/l	0	
42	Potassium	mg/l	12	
43	Radioactive materials (gross alpha activity)	Bq/l	0.01	
44	Radioactive materials (gross beta activity)	Bq/l	0.1	
45	Selenium	mg/l	0.01	0.04
46	Silver	mg/l	0.02	
47	Sodium	mg/l	200	
48	Suspended particulate matters	mg/l	10	
49	Sulphide	mg/l	0	
50	Sulphate	mg/l	400	
51	Total dissolved solids	mg/l	1000	
52	Temperature	°C	20-30	
53	Tin	mg/l	2	
54	Turbidity	JTU	10	
55	Zinc	mg/l	5	

* The Bangladesh Standards for Drinking Water have been taken from Schedule 3 (Standards for Water) of the Environmental Conservation Rules, 1997.

** Guidelines for Drinking Water Quality, WHO, 2011.

Effluent Standards/ Guidelines

Parameter	Unit	Bangladesh*	WB/IFC**
pH	-	6.0 to 9.0	6.0 to 9.0
Total Suspended Solids (TSS)	mg/l	150	50 mg/l
Oil and grease	mg/l	10	10 mg/l
Total residual chlorine	mg/l	-	0.2 mg/l
Chromium (total)	mg/l	0.5	0.5 mg/l
Copper	mg/l	0.5	0.5 mg/l
Iron	mg/l	2.0	1.0 mg/l
Zinc	mg/l	5.0	1.0 mg/l
Lead	mg/l	0.1	0.5 mg/l
Cadmium	mg/l	0.5	0.1 mg/l
Mercury	mg/l	0.01	0.005 mg/l
Arsenic	mg/l	0.2	0.5 mg/l
Temperature increase at the edge of the mixing zone	°C	40 (summer) 45 (winter)	Site specific requirement to be established by the EA. Elevated temperature areas due to discharge of once-through cooling water (e.g., 1 Celsius above, 2 Celsius above, 3 Celsius above ambient water temperature) should be minimized by adjusting intake and outfall design through the project specific EA depending on the sensitive aquatic ecosystems around the discharge point.

Note:

- * Schedule 10 (Standards for Waste from Industrial Units or Projects Waste) of the Environmental Conservation Rules, 1997.
- ** Effluent Guidelines, WB/IFC EHS Guidelines for Thermal Power Plants.

Standards for Sewage Discharge

Parameter	Unit	Standard Limit (Bangladesh)*
BOD	mg/l	40
Nitrate	mg/l	250
Phosphate	mg/l	35
Suspended Solid	mg/l	100
Temperature	°C	30
Coliform	No./100 ml	1000

Notes:

- (1) This limit shall be applicable to discharges into surface and inland waters bodies.
- (2) Sewage shall be chlorinated before final discharge.

* Schedule 9 (Standards for Sewage Discharge) of the Environmental Conservation Rules, 1997

Noise Level Standards/ Guidelines

Category of Area/ Receptor	Bangladesh*		WHO**	
	Day (dB(A))	Night (dB(A))	Day (dB(A))	Night (dB(A))
Silent Zone	50	40	55	45
Residential Area	55	45	55	45

Category of Area/ Receptor	Bangladesh*		WHO***	
	Day (dB(A))	Night (dB(A))	Day (dB(A))	Night (dB(A))
Mixed Area	60	50	-	-
Commercial Area	70	60	70	70
Industrial Area	75	70	70	70

Note:

* The Bangladesh National Ambient Noise Standards have been taken from Schedule 4 (Standards for Sound) of the Environmental Conservation Rules, 1997.

** Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.

*** As per IFC EHS noise level guidelines, Noise impacts should not exceed the levels presented in the above table or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

**** In Bangladesh standard day time is defined from 6.00 to 21.00 hrs and night time is from 21.00 to 6:00 hrs, whereas in WHO guidelines, day time is defined from 7.00 to 22.00 hrs and night time is from 22.00 to 7:00 hrs.

Annex 3

Sampling Plan with QA-QC Requirements

Sampling Plan with QA/QC Requirements

Document Stage: Final

October, 2017

Bangladesh: Liquefied Natural Gas (LNG) Terminal Project, Offshore Kutubdia Island

1 INTRODUCTION

As the first step, project screening and scoping exercise was undertaken to identify the parameters needed to be considered for the study and to outline the activities for collecting data on each parameter. As outcome of scoping and reconnaissance survey of the site, following data/ documents requires being collected during ESIA study for the proposed project.

1.1 BASIS FOR DATA COLLECTION

Environmental baseline data will be collected through primary baseline surveys and also based on information available through secondary sources. Literature surveys will be done and relevant information will be collected for environmental baseline. Baseline data will be collected during the post monsoon season in Bangladesh.

1.2 PRIMARY BASELINE DATA COLLECTION

ERM will work with a local subcontractor EQMS Consulting Limited, Dhaka (*hereinafter referred as "EQMS"*), to undertake the primary environmental sampling and monitoring. The testing of samples will be undertaken at the Analytical Laboratory of Enviro Consultants Limited (ECL)¹ at Dhaka – an associate of EQMS.

Table 1 provides an outline of the typical primary baseline information which would be collected and analysed. It will involve collection of baseline information on ambient air, surface and ground water, soil and sediment quality, noise levels and traffic volume.

Table 1 Framework for Primary Baseline Data Collection

No.	Components	Parameters
1.0	Ambient Air Quality	Respirable Particulate Matter (PM ₁₀ , PM _{2.5}), Sulphur Dioxide (SO ₂), Oxides of Nitrogen (NO _x), Carbon Monoxide (CO)
2.0	Ambient Noise	Noise levels. Results will be analysed for to work out Leq hourly, Leq day and Leq night
3.0	Road and Water way Traffic	Traffic count for different categories of vehicles / vessels
4.0	Surface Water Quality & Marine Water Quality	Physical, chemical, and biological parameters as per ECR 1997 including heavy metals
5.0	Ground water quality	Physical, chemical, and biological parameters as per ECR 1997 including heavy metals
6.0	Soil and Sediment Quality	Essential physio-chemical parameters

¹ Enviro Consultants Limited (ECL) is a reputed analytical laboratory in Bangladesh, with their office and laboratory being located at 8, Garden Rose (1st Floor), Monipuripara, Tejgaon, Dhaka-121 5, Bangladesh.

2 *PROPOSED MONITORING PLAN*

The scope of primary monitoring to generate primary data has been formulated and is presented in **Table 2** including the following

- Parameters to be monitored
- Locations to be monitored
- Frequency of monitoring

The rationale for selection of primary locations for baseline data collection is presented in **Table 2** while the monitoring locations are indicated in **Figure 1**.

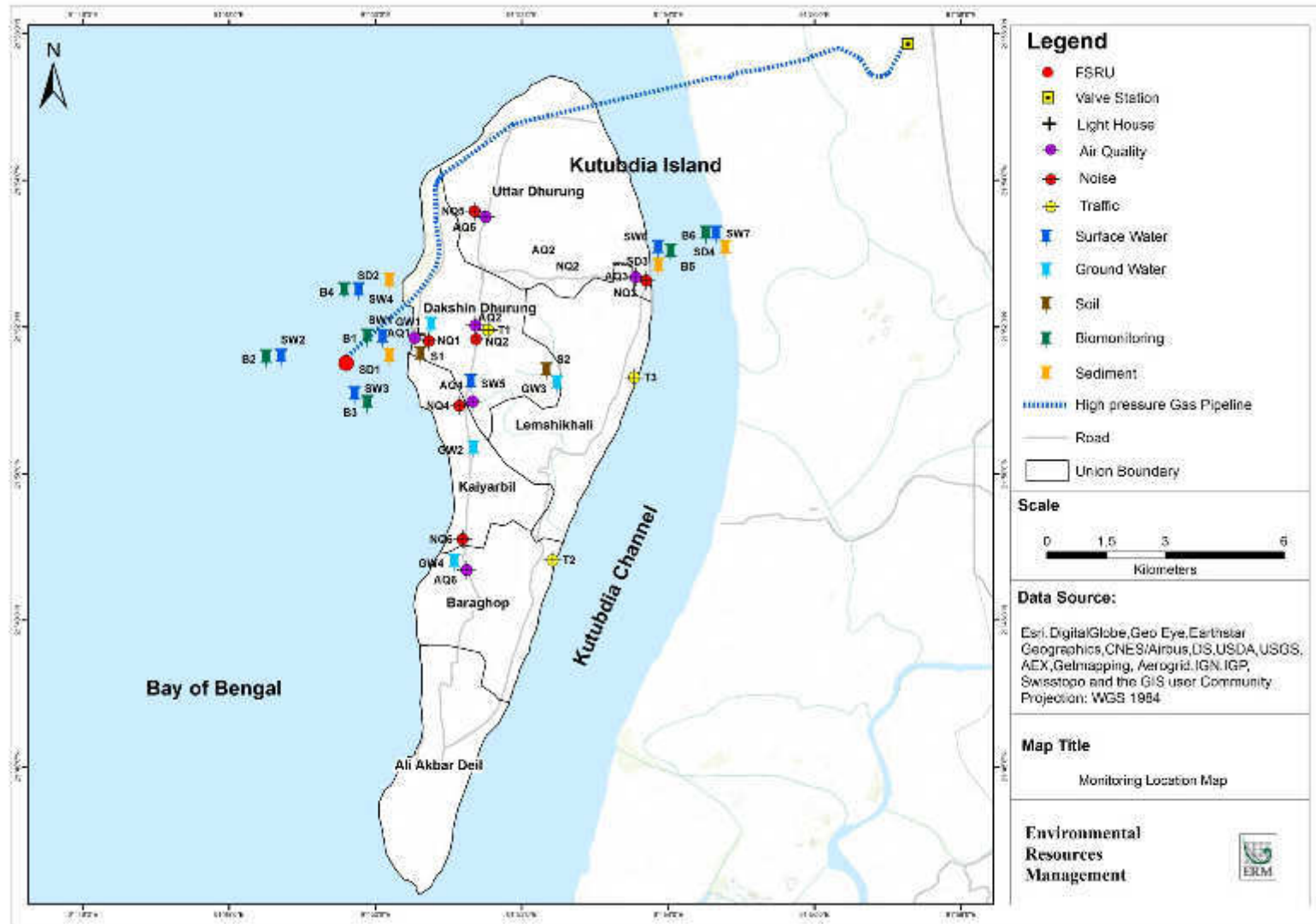
Table 2 Methodology for Primary Baseline Data Collection

S.N.	Items	Frequency	Sampling Details	Rationale for Collection of Data
1.1	Air quality Respirable Particulate Matter (PM ₁₀ , PM _{2.5}), Sulphur Dioxide (SO ₂), Oxides of Nitrogen (NO _x), Carbon Monoxide (CO)	6 weeks, once a week at each location during post monsoon season (October-November, 2016)	6 locations (Refer Figure 4.2)	<p>Primary air pollutants that are expected to be emitted from the Project activities include PM₁₀, PM_{2.5}, SO₂, NO_x, CO.</p> <p>Monitoring of ambient air quality is important to establish the baseline levels of air pollutants in ambient air before the commencement of the Project. The baseline data collected would be later compared with the ambient air quality data to be collected during construction and operation phases of the Project to identify the contribution of the Project in releasing air pollutants in the local air environment.</p> <p>The rationale for selection of monitoring locations is as following: AQ1 (Lighthouse): The location is selected at the nearest settlement to the landfall point AQ2 (Dakshin Dhurung): Location crosswind to the landfall point near the approach road AQ3 (Lemshikhali): Location crosswind to the landfall point AQ4 (Kaiyarbil): Location cross wind to landfall point AQ5 (Uttar Dhurung): Location upwind to the landfall point; also this settlement is in proximity to the pipeline crossing route AQ6 (Boroghop): Location downwind to the landfall point</p>
1.2	Marine and Inland Surface water quality monitoring for physical, chemical, and biological parameters	Once during post monsoon season (November, 2016)	6 marine water samples from Bay of Bengal and <i>Kutubdia</i> Channel and one inland surface sample taken from <i>Kutubdia</i> Island in one season. (Refer Figure 4.2). Surface and mid depth water samples were collected from the	<p>Marine and inland water quality analysis was conducted to establish the baseline level of physicochemical factors of water. The baseline data collected would be later compared with the water quality data to be collected during the construction and operation phases of the Project components to identify the contribution of the Project in releasing pollutants to the marine water.</p> <p>Four locations for marine water samples collection in the Bay of Bengal near the Project components were selected to cover the entire stretch of footprints of marine facilities viz. FSRU, pipeline from FSRU to landfall point. One location was selected (SW1) in proximity to the landfall point. Another location was selected at a distance of 3,000 m west of the landfall point (SW2) at the sea near the proposed FSRU location. Two other locations (SW3 and SW4) were selected north west and south west of the landfall point and the offshore</p>

S.N.	Items	Frequency	Sampling Details	Rationale for Collection of Data
			Bay of Bengal water near offshore Project components.	<p>pipeline (subsea).</p> <p>Two locations were selected at <i>Kutubdia</i> Channel near the pipeline likely entry point (SW6) at the channel (near <i>Kutubdia</i> Island) and likely exit point (SW7) in <i>Banskhali Upazila</i>.</p> <p>One location was selected (SW5) at the major inland water channel within the island (<i>Pilat Kata khal</i>)</p>
1.3	Ground water quality monitoring for physical, chemical, and biological parameters as per ECR 1997 including heavy metals	Once during post monsoon season (November, 2016)	4 samples taken in one season. (Refer Figure 4.2)	<p>Groundwater quality analysis was conducted to establish the baseline level of physicochemical factors of groundwater which could be compared with the water quality data to be collected during the construction and operation phases of the Project to identify the contribution of the Project in releasing pollutants to the groundwater.</p> <p>Groundwater in the area is collected mostly through tube wells. Samples were collected from shallow tube wells in <i>Dakshin Dhurung</i>, <i>Kaiyarbil</i>, <i>Lemshikhali</i> and <i>Boroghop</i> Unions of <i>Kutubdia</i> Island to understand the groundwater quality of the <i>Kutubdia</i> Island.</p>
1.4	Meteorology	Data for one year (2015) was collected and analyzed	Secondary data from BMD for the <i>Kutubdia</i> Station was collected.	Meteorological data was collected from the Bangladesh Meteorological Station within the <i>Kutubdia</i> Island. The data is important to understand the pre-dominant meteorological conditions which affect in dispersal of air pollutants at the area.
1.5	Noise (At receptors such as settlements/ hospitals etc.) ambient noise levels	Once over 24 hours during post monsoon season (October, 2016)	At 6 locations, 24 hour measurements recorded at each location. (Refer Figure 4.2)	<p>Monitoring of ambient noise levels is important to establish the baseline levels on the island. These baseline noise levels may be compared with noise monitoring to be conducted during Project implementation phase to assess the impact of the Project activities on the baseline noise environment.</p> <p>Noise monitoring was conducted at 6 locations within <i>Kutubdia</i> Island to assess the baseline noise levels. The locations covered residential areas (Light House, <i>Ali Fakir Deil</i>; <i>Kata Para</i>, <i>Lemshikhali</i>; <i>Ismail Haji Para</i>, <i>Kaiyarbil</i>; <i>Uttar Masjid Para</i>, <i>Uttar Dhurung</i>); mixed (<i>Dakshin Dhurung</i> union complex, <i>Pachar Para</i>) and Silent Zone (<i>Kutubdia Upazila</i> Health Complex).</p>

S.N.	Items	Frequency	Sampling Details	Rationale for Collection of Data
2.0	Soil and Sediment Quality for essential physio-chemical parameters	Once during post monsoon season (November, 2016)	2 soil samples from Kutubdia Island. 4 sediment samples, from Bay of Bengal and Kutubdia Channel (Refer <i>Figure 4.2</i>)	Soil samples were collected from agricultural lands of <i>Ali Fakir Deil</i> and <i>Darbar</i> village to understand physical properties of the soil and baseline levels of nutrients. The baseline soil quality may be compared with the soil quality at the time of the Project implementation phase. Marine sediment samples were collected at four locations <i>viz.</i> two from the Bay of Bengal and two from Kutubdia Channel. The sediment samples collected from Bay of Bengal was meant to assess the baseline marine sediment quality status which may be compared with the future sediment quality levels to be assessed during construction and operation stages of the jetty and deployment of FSRU, erection of offshore pipeline (subsea). Marine sediment samples were also collected from two locations on the <i>Kutubdia</i> Channel to assess likely impact of construction and operation of gas pipeline that is expected likely to pass through the stretch of <i>Kutubdia</i> Channel.
3.0	Traffic Survey <ul style="list-style-type: none"> ▪ Road Traffic ▪ Waterway Traffic 	Once during post monsoon season (November, 2016)	Road traffic in the nearby road to the Project Site and Waterway traffic in the <i>Kutubdia</i> Channel for 24 hrs in a week day. (Refer <i>Figure 4.2</i>)	Road traffic survey was conducted at the approach road to the site i.e. road connecting <i>Ali Fakir Deil</i> with <i>Uttar Dhurung</i> Road to assess the existing traffic density on this road. River traffic densities were surveyed at two major ferry ghats (<i>Boroghop Ferry Ghat</i> and <i>Darbarghat Ferry Ghat</i>) which are used for connecting <i>Kutubdia</i> Island with the main land.
4.0	Ecological Survey <ul style="list-style-type: none"> ▪ Terrestrial survey including vegetation and habitat mapping, ▪ Terrestrial wildlife surveys (avifauna, herpetofauna and mammal surveys) ▪ Aquatic survey including plankton, benthos and fish ▪ Fishery Survey ▪ Migratory birds 	Once during post monsoon season (November, 2016)	One time survey of terrestrial and freshwater aquatic ecology including wildlife.	Baseline ecological surveys were conducted at the aquatic and terrestrial habitats in proximity to the <i>Kutubdia</i> Island. The surveys were conducted to identify the major habitats, pre-dominant flora and faunal community structure that may get impacted due to the implementation of the proposed Project.

Figure 1 Monitoring Location Map



3.1 PROJECT INCEPTION

Based on understanding of the project, ERM formalised the Monitoring Plan and mobilized a project team and completed all logistic arrangements.

3.2 PRIMARY ENVIRONMENTAL MONITORING STUDY

Approach

The approach followed includes:

- Preparation of Monitoring Plan.
- Review of QA/QC Plan of the sub-contractor.
- Mobilizing ERM team along with sub-contractor's team which will also include survey of the selected monitoring locations and reviewing changes as required.
- Set up of monitoring stations.
- Internal QA/QC for monitoring reports.

Finalisation of Monitoring Plan

The initial Monitoring Plan, as was presented in our proposal, was further refined and finalised. The finalised plan as specified in the preceding section specifies all the locations selected for the air, noise, traffic, soil, water, and sediment sampling locations. Maps showing monitoring locations for each component have also been included.

Review of Sub-contractor's QA/QC Plan

ERM has reviewed the QA/QC plan submitted by the Sub-contractor and has further strengthened it as required with respect to the Project. Details are presented in *Enclosure B* of this document.

Mobilizing ERM team along with sub-contractors team

ERM team was mobilized along with Sub-contractors team for survey of the monitoring locations, collection of details of these locations and identify any requirement for change in the locations due to settings, unavailability of access / electricity¹, opposition by locals or any other obstacles.

¹ It was observed during the site visits that power supply is available in Kutubdia for only a few hours during the day and only in limited areas (near Boroghob) and so cannot be relied upon for proper operation of air quality samplers. So provisions for use of two DG sets for running of air samplers were included in the Monitoring Plan. At the same time, during installation of air quality monitoring stations it was also ensured that adequate distance and proper orientation is maintained between the air sampler and the DG set to sufficiently eliminate possibilities of local interference on ambient air quality due to operation of the DG Set.

The Monitoring Plan presented as part of this document has been updated to include all such revisions that were necessary.

Internal QA/QC for Sampling Program

ERM team has also monitored the setup of the monitoring stations and was present through the installation for QA/QC purpose. In addition the team will be conducting visits from time to time to inspect the QA/QC of the monitoring being carried out.

Internal QA/QC for monitoring reports

ERM will share a reporting format with the sub-contractor for the monitoring report. Sub-contractors will share the data report post completion of monitoring for the post monsoon season. Post the submission of the monitoring results by the sub-contractors ERM team will technically review the Reports and do a QA/QC of the data results. In case of any errors/irregularities ERM will coordinate with the sub-contractor to get it rectified. The draft monitoring reports will also be shared with the client. Any comments from the client will be duly addressed.

Submission of Final Environmental Monitoring Report

ERM will prepare a Draft Environmental Monitoring Report based on test results received from the Laboratory and submit to the client (Reliance Power).

After incorporating the suggestions/ comments if any, the Environmental Monitoring report will be finalized and submitted to the Client and for onward use in the ESIA Report.

3.3 QUALITY ASSURANCE & QUALITY CONTROL

Quality assurance is the definite programme for laboratory operation that specifies the measures required to produce reliable data of known precision and accuracy. This programme is defined in documented laboratory quality system.

Field Sampling, Field Measurement, Laboratory Analysis and Reporting

Overall the key elements of the QA/QC Programme will ensure that:

1) Field Sampling

- All sampling is done by trained personnel.
- Calibrated equipments are in use. Microbiological containers are all sterilised. Containers are kept in ice box / Thermocol box for preservation purpose. Field data sheets are used to enter the field data. Blank samples are done once before starting of project. Special care is

taken for marine sample collection with all necessary safety arrangements.

- All details are noted in field data sheet. Separate notes are kept regarding the location details like topography, land pattern etc.
- Water and sediment samples will be transported in person to retain the perfect environment of safe transportation.
- Samples for gaseous air pollutants like SO₂ and NO_x are preserved and sent to laboratory at Dhaka once in the week depending upon the current situation at field.
- Parameters e.g. pH, temperature, dissolved oxygen will be done on site with instruments.

2) Field Measurement and Analysis

- All instruments are well maintained, calibrated and calibration certificates are available in the Laboratory
- Data collected by the sampler is reviewed by the concerned Chemist.

3) Laboratory Analysis and Result Preparation

- All data in sampling site is recorded (As per Chain of Custody).
- Instrumental details are also kept in records.
- All analysis are done by trained personnel and by methods published in international, regional or national standards.
- Detection limits of all equipments are also kept in records.
- Draft reports are prepared and verified. If required cross verifications and repeat analysis is performed.

4) Result Review and Validation

- Reviewing the data generated
- Validating the data

The key aspects of this QA Plan – QC Procedure are specified in a tabular manner as follows:

S.N.	QA PLAN	QC PROCEDURE
A. Field Sampling		
1	Site Selection	Selection of sampling location is done through joint site visits of the Consultants team and Laboratory personnel
2	Manpower Selection	Checking training records
3	Equipment Status	Checking conditions and calibration status
4	Field Data Sheet, Container, Preservative, PPEs	Checking and recording of COC in different stages
5	Collection, Preservation and Transportation	As per Standard Operating Procedure
B. Laboratory Analysis		
6	Samples and field Sheet collected is reviewed by concerned chemist	As per Chain of Custody
7	Sample preservation and	As per Standard Operating Procedure

S.N.	QA PLAN	QC PROCEDURE
	Preparation	
8	Sample allocation	Checking training records
9	Method Selection and Analysis	As per SOP and Standard Test Methods
10	Calibration of Instrument	Checking of calibration
11	Verification of Result	By Laboratory in Charge
12	Repeat Analysis	5% of total samples/ as an when required by verification
13	Replicate Analysis	5% of total samples/ as an when required by verification
14	Retained Sample Analysis	5% of total samples/ as an when required by verification
15	Spiking of CRMs	5% of total samples/ as an when required by verification
C.	<i>Report Generation</i>	
16	Data Collection	Review and validation
17	Report Preparation	Checking all the criteria as per requirement

3.3.1 Chain of Custody (COC) Procedure

Steps of Custody procedure is mentioned here under

- Selection of sampling instruments, containers and safety gadgets
- Blank sampling and pre maintenance of instruments done
- Selection and allocation of team members
- Selection of sampling location is done in consultation with the customer
- Field sampling
- Field measurement and analysis
- Preservation and safe transportation of samples
- Laboratory analysis and data generation
- Data review and validation
- Report preparation

A sample Chain of Custody format is enclosed as *Enclosure 3A*.

Photo-documentation of the primary surveys is presented under *Enclosure 3C* while sample sheets for the QA-QC documentation maintained are presented as *Enclosure 3D*.

3.4 HEALTH AND SAFETY MANAGEMENT

ERM will follow its Global Health and Safety Management System and ensure ERM's H&S standards are fully complied with. During field survey and monitoring every project team member and the subcontractor will be oriented towards field survey specific H&S Management System. Also a copy of the internal safety plan document will be issued for reference.

The ERM site coordinator / Project Manager will ensure that all the team members visiting to the site as well the subcontractor follow the health and safety plan. This coordinator will be experienced and trained ERM professional and may be on the role basis depending on who is present at the site at that moment.

The monitoring sub-contractor will be given a Health & Safety briefing at site prior to commencing site-work. The field personnel will be informed about the possible H&S risks and use of appropriate PPE shall be enforced during field survey and monitoring. The overall Health and Safety Guidelines to be followed by the subcontractor is placed at **Enclosure 3B**.

ERM has a global vehicle guideline and travel advice system that is followed as part of H&SMS. **Travel Risk Assessment** (TRA) will be filled by each team member going to the field. The filled form will be kept in the Office with both PM (Project Manager) and PIC (Partner in Charge).

The Vehicle guideline will be followed by ERM in hiring vehicle for travelling to the site as well for movement in the area on work. The purpose of the Vehicle Safety Guideline is to help ensure that ERM employees have formally considered the potential risks of vehicle transportation while on company business and that the risks are managed effectively.

4.1 DELIVERABLES

Key deliverables of the study will be as follows:

- Sampling Plan (Present Submittal)
- Draft and Final Monitoring Report

Note: The draft reports will be submitted to Reliance Power for review. One set of consolidated comments will be addressed within 2 weeks in case of each draft deliverable.

4.2 SCHEDULE

Based on the information available at this stage, the tentative Schedule for environmental monitoring has been prepared and is presented in the following **Table 3**.

Table 3 **Monitoring Schedule**

Component	October, 2016				November, 2016			
	1 st Week (Week Starting on 2 nd October)	2 nd Week (Week Starting on 9 th October)	3 rd Week (Week Starting on 16 th October)	4 th Week (Week Starting on 23 rd October)	1 st Week (Week Starting on 1 st November)	2 nd Week (Week Starting on 6 th November)	3 rd Week (Week Starting on 13 th November)	4 th Week (Week Starting on 20 th November)
Ambient Air Quality								
Micro Meteorology ¹								
Ambient Noise								
Traffic Survey								
Soil Sampling and Analysis								
Ground Water Sampling and Analysis								
Surface Water Sampling and Analysis								
Marine Water Sampling and Analysis								
Marine Sediment Sampling and Analysis								
Biomonitoring and Analysis								

¹ Data will be collected from the Met Station of BMD located within Kutubdia Island during the entire sampling period

Enclosure 3A

Sample Chain of Custody (COC) Format

ESIA Study for LNG Terminal / FSRU at Kutubdia

CHAIN OF CUSTODY FORM – AIR QUALITY

Name of Monitoring Agency			
Name of Client			
Purpose of Sampling			
Sample Identification Code			
Type of Sample			
Quantity of Sample			
Sample Transportation Date			
Relinquished By			
Signature and Date			
Received By			
Signature and Date			
Observation			
- SO ₂ and NO _x sample containers labelled and in proper condition	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Remarks:
- SO ₂ and NO _x sample containers received in ice box	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Remarks:
- Filter paper samples received in labelled zip lock packets	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Remarks:
Date of Delivery of Samples to Lab			
Signature and Date			

ESIA Study for LNG Terminal / FSRU at Kutubdia

CHAIN OF CUSTODY FORM – WATER / SOIL / SEDIMENT QUALITY

Name of Monitoring Agency	
Name of Client	
Purpose of Sampling	
Sample Identification Code	
Type of Sample	
Quantity of Sample	
Sampling Location	
Date and Time of Sample Collection	
Signature and Date	
Date of Delivery of Samples to Lab	
Signature and Date	
Observation	

Enclosure 3B

Health and Safety Guidelines for Subcontractors

**HEALTH & SAFETY GUIDELINES DURING SAMPLING, SAMPLE PREPARATION
AND SAMPLE TRANSPORTATION**

SN	Statement of General Guideline	Action/Arrangements (What are you going to do?)
1.1	Ensure applicable PPEs are used in work place.	Site in-charge or supervisor will ensure the personal safety at work place and record the same
1.2	Ensure transportation in absolutely safe manner	Each and every crude (unprepared) sample should be transported through vehicle / public transport only. Site In-charge will ensure the availability of vehicle for sample transportation.
1.3	Safe driving practices to be ensured.	Ensure speed of vehicle does not exceed 20km/hr or as per guidelines while driving through industrial / congested areas. Use safety belt at all times while driving car. Talking or listening of music on mobile phone is strictly prohibited while driving.
1.4	Ensure vehicle used is in proper condition and well maintained.	Periodical servicing to be done in order to keep the vehicle in good condition. Tyre pressure, condition, braking system, headlight also to be checked periodically.
1.5	Ensure safe practices while using machines / instruments.	Safety guards on moving parts of machines to be fitted and insulation to be made on the hot parts of machines while in use.
1.6	Ensure good electrical practices.	Site in-charge will ensure proper electrical wiring connections and fittings of equipments. Proper earthing should be done for each machine if applicable. Ensure proper illumination and ventilation in work areas.
1.7	Ensure area around sampling zone is safe. There should be no movement of vehicles, no loose wires safely approachable workplace.	Site in-charge or supervisor will ensure the personal safety at work place. A risk assessment to be done before starting any new site and keep it recorded.
1.8	Prevent accidents and cases of work-related ill health by managing the health and safety risks in the workplace. Avoid overtime / extra duties beyond permissible limit. Be alert always.	Permissible limit of working within a week is 48hrs and maximum 16 hours of work at a stretch. Please report to site in-charge if violated.
1.9	Provide clear instructions and information, and adequate training, to ensure employees are competent to do their work. Ensure adequate manpower is available during night shift. Ensure safe area for resting during idle time.	Site in-charge will assess the risks and will impart safety training before execution of job. No workforce will be moved without knowledge of personal safety aspects. All newly joined employees should get safety training before attending any job.
1.10	Engage and consult with employees on day-to-day health and safety conditions. Intimate superior of any safety deviation which comes to the notice.	Supervisors / Site In-charge will discuss on health and safety conditions with his team and will inform higher management if any nonconformity observed.

SN.	DOs	DO NOT's
2.1	Move / walk on the left side of the road	Starting work without having PPEs
2.2	Cross only at zebra crossing or demarked crossings	Using alcohol and drugs on duty
2.3	Use helmet for bike and seatbelt for cars	Listening to music using headphones in work place
2.4	Stop driving if you need to speak over phone	Working when you are feeling unwell or dizzy
2.5	Always be alert while crossing the road	Usage of bicycle for transportation of samples
2.6	Use Torch in early morning or night hours	Touching any moving parts of equipments

PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR ACTIVITY

SN.	Activity Details	PPE Required
1	Sampling	Reflective Jacket, Appropriate Gloves for Safe Working, Safety Helmet, Safety Goggles, Safety Shoes, Nose Mask and Life Jacket (Sampling in Vessels)
3	Sample Preparation	Reflective Jacket, Appropriate Gloves for Safe Working, Safety Goggles, Safety Shoes, Nose Mask.
4	Ambient Air Monitoring	Reflective Jacket, Appropriate Gloves for Safe Working, Safety Helmet, Safety Goggles, Safety Shoes, Nose Mask, Ear Plug and Harness Belt.
5	Water Sampling (Chemical/Microbiological)	Life Jacket, Safety Shoes, Light Shoes, Head Cap, Nose Mask, Sterile Gloves, Appropriate Gloves for Safe Working
6	Traffic Survey	Reflective Jacket, Safety Shoes, Nose Mask, Ear Plug
7	Analysis at Laboratory	Protective Apron, Appropriate Gloves for Safe Working, Safety Shoes, Safety Goggles, Nose Mask, Emergency Shower and Eye Wash.

Enclosure 3C

Photo Documentation - Primary Surveys

Photo documentation – Air & Noise Monitoring and Traffic Surveys





Enclosure 3D

QA/QC - Documentation

ESIA Study for LNG Terminal / FSRU at Kutubdia

CHAIN OF CUSTODY FORM

Name of Monitoring Agency	ERMS Consulting Limited	
Name of Client	ERM India private Limited	
Purpose of Sampling	Baseline Monitoring	
Sample Identification Code	AQ1-1, AQ2-1, AQ3-1, AQ4-1, AQ5-1, AQ6-1	
Type of Sample	Ambient Air Quality	
Quantity of Sample	Filter papers in zip lock packets - 6 Nos SO ₂ Samples in plastic containers - 6 Nos NO _x Samples in plastic containers - 6 Nos.	
Sample Transportation Date	11.10.2016	
Relinquished By	Tofazzal Hossain, ERMS Consulting Limited 11.10.16	
Signature and Date	T Hossain 11.10.16	
Received By	Tauhidul Hasan, ERMS Consulting Limited	
Signature and Date	Tauhidul 12.10.16	
Observation	SO ₂ and NO _x Samples as well as all filter papers were in good condition	
- SO ₂ and NO _x sample containers labelled and in proper condition	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Remarks:
- SO ₂ and NO _x sample containers received in ice box	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Remarks:
- Filter paper samples received in labelled zip lock packets	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Remarks:
Date of Delivery of Samples to Lab	12-10-2016	
Signature and Date	Omitosh Sanken, Enviro Consultants Limited 12/10/16	

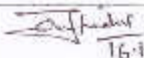
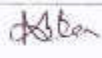
ESIA Study for LNG Terminal / FSRU at Kutubdia

CHAIN OF CUSTODY FORM

Name of Monitoring Agency	EQMS Consulting Limited	
Name of Client	ERM India Private Limited	
Purpose of Sampling	Baseline Monitoring	
Sample Identification Code	AQ1-2, AQ2-2, AQ3-2, AQ4-2, AQ5-2, AQ6-2	
Type of Sample	Ambient Air Quality	
Quantity of Sample	Filter papers in zip lock packets - 6Nos. SO ₂ samples in plastic containers - 6Nos. NO _x samples in plastic containers - 6Nos.	
Sample Transportation Date	15-10-2016	
Relinquished By	Tofazzal Hossain, EQMS Consulting Limited	
Signature and Date	<i>Tofazzal Hossain</i> 15-10-16	
Received By	Taufe'dul Hasan, EQMS Consulting Limited	
Signature and Date	<i>Taufe'dul Hasan</i> 16-10-16	
Observation	SO ₂ and NO _x samples as well as filter papers were in good condition	
- SO ₂ and NO _x sample containers labelled and in proper condition	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Remarks:
- SO ₂ and NO _x sample containers received in ice box	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Remarks:
- Filter paper samples received in labelled zip lock packets	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Remarks:
Date of Delivery of Samples to Lab	16-10-2016	
Signature and Date	<i>Omitesh Sarker</i> 16/10/16 Omitesh Sarker, Enviro Consultants Limited	

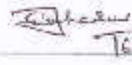

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	ERM Consulting Limited
Name of Client	ERM India Private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SW1
Type of Sample	Marine Water Quality
Quantity of Sample	<ul style="list-style-type: none"> - Turbidity and SS Sample in 500ml plastic bottle - TOC sample in 500ml Amber glass bottle with H₂SO₄ - TPH Sample in 500ml glass bottle with H₂SO₄ - PAH Sample in 500ml glass bottle with Sodium thiosulfate - Heavy metal Sample in 1 Liter plastic bottle with HNO₃
Sampling Location	500m towards the sea from the proposed LNG terminal at Kutubdia in Cox's Bazar
Date and Time of Sample Collection	16.11.16 16.11.16 (2:05 PM)
Signature and Date	 16.11.16
Date of Delivery of Samples to Lab	20.11.16
Signature and Date	
Observation	Samples were received in standard sampling bottle with respective preservative in ice box.

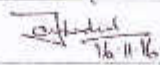

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EGMS Consulting Limited
Name of Client	ERM India Private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SW2
Type of Sample	Marine water Quality
Quantity of Sample	<ul style="list-style-type: none"> - Turbidity and SS Sample in 500ml plastic bottle - TOC Sample in 500 ml Amber glass bottle with H₂SO₄ - TPH Sample in 500 ml glass bottle with H₂SO₄ - PAH Sample in 500ml glass bottle with sodium Thiosulfate - Heavy metal Sample in 1 litre plastic bottle with HNO₃
Sampling Location	500 m towards the sea from proposed LNG Terminal at Kutubdia, in Cox's Bazar
Date and Time of Sample Collection	16-11-16 (4:02 PM)
Signature and Date	 16-11-16
Date of Delivery of Samples to Lab	20-11-16
Signature and Date	 20-11-16
Observation	Samples were received in standard sampling bottle with respective preservative in ice box.


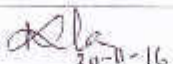
ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EBMS Consulting Limited
Name of Client	ERM India Private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SW3
Type of Sample	Marine water quality
Quantity of Sample	<ul style="list-style-type: none"> - Turbidity and SS Sample in 500ml plastic bottle - TOC Sample in 500ml Amber glass bottle with H₂SO₄ - TPH Sample in 500ml glass bottle with H₂SO₄ - PAH Sample in 500 ml glass bottle with Sodium thioarsalide - Heavy metal Sample in 1 litre plastic bottle with HNO₃
Sampling Location	1500 m South West towards the sea from the proposed LNG terminal at Kutubdia in Cox's Bazar
Date and Time of Sample Collection	16-11-16 (3:15 PM)
Signature and Date	 16-11-16
Date of Delivery of Samples to Lab	20-11-16
Signature and Date	 20-11-16
Observation	<p>samples were received in standard sampling bottle with respective preservative in ice box.</p>

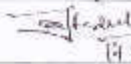
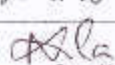
ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EAMS Consulting Limited
Name of Client	ERM India private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	BW4
Type of Sample	Marine Water Quality
Quantity of Sample	<ul style="list-style-type: none"> - Turbidity and SS Sample in 500ml plastic bottle - TOC Sample in 500ml Amber dark bottle with H₂SO₄ - TPH Sample in 500ml glass bottle with H₂SO₄ - PAH Sample in 500ml glass bottle with Sodium thiosulfate. - Heavy metal Sample in 1 Liter plastic bottle with HNO₃
Sampling Location	1500m North west towards the sea from the proposed LNG Terminal at Kutubdia in Cox's Bazar
Date and Time of Sample Collection	16.11.16 (4:51 PM)
Signature and Date	 16.11.16
Date of Delivery of Samples to Lab	20.11.16
Signature and Date	 20.11.16
Observation	Samples were received in standard sampling bottle with respective preservative in ice box.

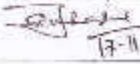

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EAMS Consulting Limited
Name of Client	ERM India private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SW5
Type of Sample	Inland Surface water Quality
Quantity of Sample	<ul style="list-style-type: none"> - Sample Collected in 4 litre gallon. - Oil and Grease Sample collected in dark bottle.
Sampling Location	Pilat Katakhal
Date and Time of Sample Collection	17-11-16 (4:20 pm)
Signature and Date	 17-11-16
Date of Delivery of Samples to Lab	20-11-16
Signature and Date	 20-11-16
Observation	Samples were received in standard sampling bottle with respective preservative in ice box.

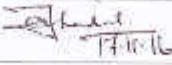

ESIA Study for LNG Terminal/PSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EQMS Consulting Limited
Name of Client	ERM India Private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SW6
Type of Sample	Inland Surface water Quality
Quantity of Sample	<ul style="list-style-type: none"> - Turbidity and SS Sample in 500 ml plastic bottle - TOC Sample in 500 ml Amber glass bottle with thiosy - TPH Sample in 500 ml glass bottle with thiosy - PAH Sample in 500 ml glass bottle with sodium thiosulfate - Heavy metal Sample in 1 Litre plastic bottle with HNO₃
Sampling Location	300 m towards the kutubdia channel from left ^{right} bank near to the Dhunung ghat
Date and Time of Sample Collection	17-11-16 (11:45 Am)
Signature and Date	 17-11-16
Date of Delivery of Samples to Lab	20-11-16
Signature and Date	
Observation	Samples were received in standard sampling bottle with respective preservative in ice box.



ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EDMS Consulting Limited
Name of Client	ERM India Private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SW7
Type of Sample	Inland Surface water Quality
Quantity of Sample	<ul style="list-style-type: none"> - Turbidity and SS Sample in 500 ml plastic bottle - TOC Sample in 500 ml Amber glass bottle with H₂SO₄ - TPH Sample in 500 ml glass bottle with H₂SO₄ - PAH Sample in 500 ml glass bottle with sodium thiosulfate - Heavy metal Sample in 1 litre plastic bottle with HNO₃
Sampling Location	Boat towards the Kutubdia channel from left bank near to the chumra ghat
Date and Time of Sample Collection	17-11-16 (1:35 PM)
Signature and Date	 17-11-16
Date of Delivery of Samples to Lab	20-11-16
Signature and Date	 20-11-16
Observation	Samples were received in standard sampling bottle with respective preservative in ice box.

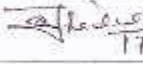

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	ERM Consulting Limited
Name of Client	EFM India private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	GW1
Type of Sample	Ground water
Quantity of Sample	<ul style="list-style-type: none"> - physicochemical sample in 2 litre bottle. - Bacteriological sample in autoclavable bottle - Heavy metal sample in 1 litre plastic bottle with HNO₃
Sampling Location	Tube wells under from Ali Fakir dal village Dakshin Dharmung Union
Date and Time of Sample Collection	17.11.16 (2.55 PM)
Signature and Date	 17-11-16
Date of Delivery of Samples to Lab	20.11.16
Signature and Date	 20-11-16
Observation	Samples were received in standard sampling bottle with respective preservative and the samples were preserved in ice box.

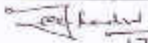

ESIA Study for LNG Terminal/PSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOI/SEDIMENT QUALITY

Name of Monitoring Agency	EDMS Consulting Limited
Name of Client	ERM India private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	GW2
Type of Sample	Ground water
Quantity of Sample	<ul style="list-style-type: none"> - physicochemical Sample in 2 Litre bottle - Bacteriological Sample in autoclave bottle - Heavy metal Sample in 1 litre plastic bottle with HNO₃
Sampling Location	Tubacoll water from Baitul Sherif Madrasa complex Kalayabul Union
Date and Time of Sample Collection	17-11-16 (3:40 PM)
Signature and Date	 17/11/16
Date of Delivery of Samples to Lab	20-11-16
Signature and Date	 20-11-16
Observation	samples received in standard sampling bottle with respective preservative and the samples were preserved in ice box.

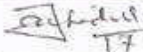

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EBHS Consulting Limited
Name of Client	ERM India private limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	GW3
Type of Sample	Ground water
Quantity of Sample	<ul style="list-style-type: none"> - Physico-chemical Sample in 2 litre bottle - Bacteriological sample in autoclaved bottle - Heavy metal sample in 1 litre plastic bottle with HNO₃
Sampling Location	Tubwell water from Darbar village, Lemshikhal Union
Date and Time of Sample Collection	17.11.16 (3.30 PM)
Signature and Date	 17.11.16
Date of Delivery of Samples to Lab	20.11.16
Signature and Date	 20.11.16
Observation	Samples were received in standard sampling bottle with respective representative of the samples were preserved in ice box.

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	ERMS Consulting Limited
Name of Client	ERM India private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	GW4
Type of Sample	Ground water
Quantity of Sample	<ul style="list-style-type: none"> - Physicochemical sample in 2 litre bottle - Bacteriological sample in autoclaved bottle - Heavy metal sample in 1 litre plastic bottle with HNO₃
Sampling Location	Tubewell Water from Uttar Mogdil village, Baraghop Union
Date and Time of Sample Collection	17.11.16 (5.15 PM)
Signature and Date	 17.11.16
Date of Delivery of Samples to Lab	20.11.16
Signature and Date	 20.11.16
Observation	Samples were received in standard sampling bottle with respective preservative in ice box.

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EGMS Consulting Limited
Name of Client	ERM India private limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	S1
Type of Sample	Soil Sample
Quantity of Sample	Sample collected in plastic 'Jay'
Sampling Location	Agricultural land near embankment from Ali Fakir die village
Date and Time of Sample Collection	19.11.16
Signature and Date	<i>[Signature]</i> 19.11.16
Date of Delivery of Samples to Lab	22.11.16
Signature and Date	<i>[Signature]</i> 22/11/2016
Observation	



ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EBMS Consulting Limited
Name of Client	ERM India private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	S2
Type of Sample	Water Soil Sample
Quantity of Sample	Sample collected in plastic jar
Sampling Location	Agricultural land of Danbar village
Date and Time of Sample Collection	19.11.16
Signature and Date	<i>[Signature]</i> 19.11.16
Date of Delivery of Samples to Lab	22.11.16
Signature and Date	<i>[Signature]</i> 22/11/2016
Observation	



ESIA Study for LNG Terminal/PSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EGMS Consulting Limited
Name of Client	ERM India private limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SD1
Type of Sample	Sediment Marine Sediment Sample and Benthos Sample
Quantity of Sample	Sample Collected in plastic jar
Sampling Location	500 m towards the sea from the seashore at Kutubdia, Cox's Bazar
Date and Time of Sample Collection	18.11.16 (10.30 Am)
Signature and Date	 18.11.16
Date of Delivery of Samples to Lab	22.11.16
Signature and Date	 22/11/2016
Observation	

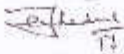

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

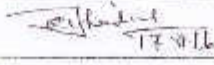
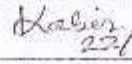
Name of Monitoring Agency	EOMS Consulting Limited
Name of Client	ERM India private limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SD2
Type of Sample	Marine Sediment and Benthos Sample
Quantity of Sample	Sample collected in plastic jar
Sampling Location	500 m North West towards the sea from proposed LNG Terminal at Kutubdia
Date and Time of Sample Collection	18. 11. 16 (10: 55 AM)
Signature and Date	 18. 11. 16
Date of Delivery of Samples to Lab	22. 11. 16
Signature and Date	 23/11/2016
Observation	

ESIA Study for LNG Terminal/FSRU at Kutubdia

CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EEMS Consulting Limited
Name of Client	ERM India private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	S03
Type of Sample	Kutubdia channel Sediment and Benthos Sample
Quantity of Sample	Sample collected in plastic Jar
Sampling Location	300m towards the Kutubdia Channel from right bank near to the Dherninghat
Date and Time of Sample Collection	17-11-16 (12:20 PM)
Signature and Date	 17-11-16
Date of Delivery of Samples to Lab	22-11-16
Signature and Date	 22/11/2016
Observation	.

ESIA Study for LNG Terminal/FSRU at Kutubdia
CHAIN OF CUSTODY FORM WATER/SOIL/SEDIMENT QUALITY

Name of Monitoring Agency	EBMS Consulting Limited
Name of Client	ERM India private Limited
Purpose of Sampling	Baseline Monitoring
Sample Identification Code	SD4
Type of Sample	Kutubdia channel Sediment and Benthos Sample
Quantity of Sample	Sample collected in plastic jar
Sampling Location	300m towards the Kutubdia channel from left bank near to the Chemara shal
Date and Time of Sample Collection	17-11-16 (2.05 pm)
Signature and Date	 17/11/16
Date of Delivery of Samples to Lab	22-11-16
Signature and Date	 22/11/2016
Observation	

Annex 4

Ambient Air Quality Monitoring Results

Ambient Air Quality Monitoring Results

Location	Monitoring Date	Concentration ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀	PM _{2.5}	SO _x	NO _x
AQ 1(Light House, Ali Fakir Deil)	02-Oct-16	65.62	26.41	3.98	12.76
	11-Oct-16	53.22	19.23	3.02	10.42
	16-Oct-16	60.42	21.53	3.18	14.58
	23-Oct-16	57.35	23.25	4.13	15.72
	29-Oct-16	52.19	20.18	3.34	12.42
	04-Nov-16	55.43	18.67	4.2	14.09
AQ2 (Pachar Para, Dakshin Dhurung)	04-Oct-16	76.31	34.72	5.47	21.63
	11-Oct-16	62.24	30.55	4.9	18.25
	16-Oct-16	66.71	32.15	5.21	23.43
	23-Oct-16	69.21	39.42	4.98	22.67
	29-Oct-16	60.12	36.37	5.48	24.76
	04-Nov-16	63.53	30.79	5.97	20.41
AQ3 (Kata Para, Lemshikhali)	05-Oct-16	70.54	39.66	4.34	18.41
	12-Oct-16	57.34	35.23	4.05	12.53
	17-Oct-16	63.29	37.54	4.27	14.76
	25-Oct-16	65.43	32.12	4.32	16.45
	30-Oct-16	58.76	28.35	3.26	13.67
	05-Nov-16	62.98	34.25	4.53	15.43
AQ4 (Ismail Haji Para, Kaiyabil)	07-Oct-16	82.5	40.95	5.61	24.24
	12-Oct-16	67.65	32.43	4.23	17.34
	17-Oct-16	74.24	42.13	5.21	21.43
	25-Oct-16	70.23	40.24	4.78	25.51
	30-Oct-16	69.34	35.24	4.01	20.56
	05-Nov-16	72.67	37.43	5.14	25.35
AQ5 (Uttar Masjid Para, Uttar Dhurung)	08-Oct-16	85.43	47.71	5.75	29.14
	14-Oct-16	76.23	43.23	5.13	32.34
	21-Oct-16	70.45	40.43	4.78	27.53
	27-Oct-16	77.28	46.43	5.02	26.85
	01-Nov-16	72.34	39.54	4.67	23.56
	06-Nov-16	78.34	44.67	5.36	30.23
AQ6 (Uttar Mogdil Para, Boroghop)	10-Oct-16	67.32	35.32	4.03	23.63
	14-Oct-16	63.57	30.12	3.28	24.53
	21-Oct-16	68.34	34.23	4.14	26.32
	27-Oct-16	56.74	28.43	3.52	20.14
	01-Nov-16	60.21	33.25	3.11	18.54
	06-Nov-16	63.25	35.76	4.24	24.13

Annex 5

Ambient Noise Monitoring Results

Ambient Noise Monitoring Results

Hourly Leq						
Hour	NL1	NL2	NL3	NL4	NL5	NL6
1:00-1:59 AM	43.4	46.5	43.9	43.9	42.2	44.5
2:00-2:59 AM	43.7	43.9	43.9	44.3	42.1	44.4
3:00-3:59 AM	44.0	46.4	44.6	43.9	42.7	43.8
4:00-4:59 AM	44.1	44.9	46.3	44.3	42.0	45.0
5:00-5:59 AM	44.8	46.0	47.5	44.6	43.1	44.7
6:00-6:59 AM	46.2	49.7	49.2	50.8	45.7	51.3
7:00-7:59 AM	47.1	51.8	50.0	53.0	44.6	54.1
8:00-8:59 AM	46.7	52.6	48.8	54.2	45.1	56.0
9:00-9:59 AM	47.2	56.5	49.1	55.2	46.5	54.5
10:00-10:59 AM	48.1	52.2	48.6	56.9	47.3	55.2
11:00-11:59 AM	47.8	53.8	48.9	55.3	48.3	55.2
12:00-12:59 PM	47.6	56.6	48.9	56.3	46.7	56.2
13:00-13:59 PM	48.7	56.4	51.1	55.4	47.8	54.5
14:00-14:59 PM	49.1	56.1	48.9	54.6	47.5	54.1
15:00-15:59 PM	48.9	55.8	48.6	55.5	48.1	54.9
16:00-16:59 PM	48.4	54.2	50.4	55.4	46.9	55.1
17:00-17:59 PM	47.6	52.5	51.9	54.7	46.2	55.4
18:00-18:59 PM	47.8	50.7	52.6	52.2	42.5	56.1
19:00-19:59 PM	48.1	48.9	46.5	51.9	42.5	52.6
20:00-20:59 PM	45.9	47.9	44.4	49.2	44.8	47.3
21:00-21:59 PM	44.3	45.2	45.3	48.3	45.5	45.2
22:00-22:59 PM	44.4	46.3	43.7	44.9	44.7	44.9
23:00-23:59 PM	43.7	46.3	44.0	44.6	42.6	44.2
00:00-00:59 AM	43.6	46.3	43.8	44.9	42.5	45.5

Annex 6

Checklist of Flora in the Study Area

Checklist of Flora in the Study Area

SN	Scientific Name	Bengali Name	Family
	Trees		
1	<i>Acacia auriculiformis</i>	Akashi	Mimosaceae
2	<i>Acacia mangium</i>	Akashi	Mimosaceae
3	<i>Acacia nilotica</i>	Babul, Baul	Mimosaceae
4	<i>Albizia lebeck</i>	Sirish	Mimosaceae
5	<i>Alstonia scholaris</i>	Chatim	Apocynaceae
6	<i>Areca catechu</i>	Supari	Arecaceae
7	<i>Artocarpus heterophyllus</i>	Kathal	Moraceae
8	<i>Avicennia alba</i>	Dulia baen	Verbenaceae
9	<i>Avicennia officinalis</i>	Baro baen	Verbenaceae
10	<i>Avicennia officinalis</i>	Baro baen	Verbenaceae
11	<i>Bambusa vulgaris</i>	Bangla bans	Poaceae
12	<i>Bombax ceiba</i>	Simul tula	Bombacaceae
13	<i>Borassus flabellifer</i>	Tal	Arecaceae
14	<i>Calophyllum inophyllum</i>	Hundal	Clusiaceae
15	<i>Casuarina equisetifolia</i>	Jaw, Popan	Casuarinaceae
16	<i>Ceriops decandra</i>	Goran	Lythraceae
17	<i>Citrus aurantifolia</i>	Kagazi lebu	Rutaceae
18	<i>Citrus limon</i>	Lebu	Rutaceae
19	<i>Cocos nucifera</i>	Narkel	Arecaceae
20	<i>Dalbergia sissoo</i>	Sishoo	Fabaceae
21	<i>Delonix regia</i>	Krisnachura	Caesalpiniaceae
22	<i>Dillenia indica</i>	Chalta	Dilleniaceae
23	<i>Eucalyptus camaldulensis</i>	Eucalyptus	Myrtaceae
24	<i>Excoecaria agallocha</i>	Geowa	Euphorbiaceae
25	<i>Ficus benghalensis</i>	Bat	Moraceae
26	<i>Ficus religiosa</i>	Asath, Jil	Moraceae
27	<i>Gmelina arborea</i>	Gamar	Verbenaceae
28	<i>Lepisanthes rubiginosa</i>	Aul	Sapindaceae
29	<i>Leucaena leucocephala</i>	Ipil, Telikorai	Mimosaceae
30	<i>Magnolia champaca</i>	Chapa	Magnoliaceae
31	<i>Mangifera indica</i>	Aam	Anacardiaceae
32	<i>Melia azederach</i>	Ghora nim	Meliaceae
33	<i>Mimusops elengi</i>	Bakul	Sapotaceae
34	<i>Phoenix sylvestris</i>	Khejur	Arecaceae
35	<i>Pithecellobium dulce</i>	Natai,	Mimosaceae
36	<i>Pongamia pinnata</i>	Kerenja	Fabaceae
37	<i>Saraca asoca</i>	Asok	Caesalpiniaceae
38	<i>Senna siamea</i>	Minjiri	Caesalpiniaceae
39	<i>Spondias pinnata</i>	Amra	Anacardiaceae
40	<i>Sterculia foetida</i>	Keron	Sterculiaceae
41	<i>Swietenia mahagoni</i>	Mehagoni	Meliaceae

SN	Scientific Name	Bengali Name	Family
42	<i>Syzygium cumini</i>	Butigajam	Myrtaceae
43	<i>Tamarindus indica</i>	Tetul	Caesalpiniaceae
44	<i>Terminalia arjuna</i>	Arjun	Combretaceae
45	<i>Terminalia catappa</i>	Katbadam	Combretaceae
46	<i>Thespesia populnea</i>	Correa Balai	Malvaceae
47	<i>Ziziphus mauritiana</i>	Barai	Rhamnaceae
	Shrubs		
1	<i>Bougainvillea spectabilis</i>	Baganbilas	Nyctaginaceae
2	<i>Calotropis gigantea</i>	Akand	Asclepiadaceae
3	<i>Calotropis procera</i>	Akand	Asclepiadaceae
4	<i>Carica papaya</i>	Cokia, Papa	Caricaceae
5	<i>Carissa carandas</i>	Kormocha	Apocynaceae
6	<i>Clerodendrum inerme</i>	Bandulpata	Verbenaceae
7	<i>Gardenia jesminoides</i>	Gondoraj	Rubiaceae
8	<i>Hibiscus rosa-sinensis</i>	Latkonjaba	Malvaceae
9	<i>Lantana camara</i>	Khutus kanta	Verbenaceae
10	<i>Lawsonia inermis</i>	Methi	Lythraceae
11	<i>Pandanus foetidus</i>	Angjadakanta	Pandanaceae
12	<i>Ricinus communis</i>	Veron, Verenda	Euphorbiaceae
13	<i>Rosa centifolia</i>	Golap	Rosaceae
14	<i>Suaeda maritima</i>	Sagorsuda	Chenopodiaceae
15	<i>Vitex negundo</i>	Nishinda	Verbenaceae
16	<i>Woodfordia fruticosa</i>	Rangkat	Lythraceae
	Herbs and Climbers		
1	<i>Ipomoea pes-caprae</i>	Chhagol kuri	Convolvulaceae
2	<i>Alternanthera sessilis</i>	Sachishak	Amaranthaceae
3	<i>Alternanthera philoxeroides</i>	Helencha,	Amaranthaceae
4	<i>Amaranthus spinosus</i>	Kantamairra	Amaranthaceae
5	<i>Bacopa monnieri</i>	Brammishak	Scrophulariaceae
6	<i>Boerhavia repens</i>	Punarnava	Nyctaginaceae
7	<i>Celosia argentea</i>	Thenthenna	Amaranthaceae
8	<i>Centella asiatica</i>	Thankuni	Apiaceae
9	<i>Colocasia esculenta</i>	Kachu	Araceae
10	<i>Cucurbita maxima</i>	Mistikumra	Cucurbitaceae
11	<i>Cynodon dactylon</i>	Dublakher	Poaceae
12	<i>Cyperus compressus</i>	Chancha	Cyperaceae
13	<i>Cyperus rotandus</i>	Nagarmutha	Cyperaceae
14	<i>Eclipta prostrata</i>	Kalakeccha,	Asteraceae
15	<i>Enhydra fluctuans</i>	Hinchashak	Asteraceae
16	<i>Hydrilla verticillata</i>	Kureli	Hydrocharitacea
17	<i>Hygrophila auriculata</i>	Alicha	Acanthaceae
18	<i>Hygroryza aristata</i>	Jonglidhan	Poaceae
19	<i>Lemna perpusilla</i>	Guri fena	Lemnaceae
20	<i>Mimosa pudica</i>	Lajjabati	Mimosaceae

SN	Scientific Name	Bengali Name	Family
21	<i>Musa paradisiaca</i>	Attakola	Musaceae
22	<i>Ocimum basilicum</i>	Tulsi	Lamiaceae
23	<i>Ocimum tenuiflorum</i>	Tulsi	Lamiaceae
24	<i>Phragmites karka</i>	Nolkhagra	Poaceae
25	<i>Phyllanthus niruri</i>	Vuiamla	Euphorbiaceae
26	<i>Pistia stratiotes</i>	Futihena	Araceae
27	<i>Porteresia coarctata</i>	Dhani ghas	Poaceae
28	<i>Saccharum spontaneum</i>	Kasful,	Poaceae
29	<i>Sesuvium portulacastrum</i>	Sagornunia	Aizoaceae
30	<i>Eichhornia crassipes</i>	Kachuripana	Pontederiaceae
31	<i>Abutilon indicum</i>	Junka	Malvaceae
32	<i>Aeluropus lagopoides</i>	Nona Kher	Poaceae
33	<i>Centrostachys aquatica</i>	Thuas	Amaranthaceae
34	<i>Spirodela polyrhiza</i>	Fena	Lemnaceae

Annex 7

Details of Floral Survey

Details of Floral Survey

Grid No.	Land Use Types	Trees	Shrubs	Herbs
G1	Agricultural	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> <i>Acacia nilotica</i> , <i>Albizia lebbek</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i> , <i>Bambusa vulgaris</i> , <i>Borassus flabellifer</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Mangifera indica</i> , <i>Phoenix sylvestris</i> , <i>Samanea saman</i> , <i>Tamarindus indica</i>	<i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Ricinus communis</i>	<i>Celosia argentea</i> , <i>Centella asiatica</i> , <i>Colocasia esculenta</i> , <i>Cyperus rotandus</i> , <i>Mimosa pudica</i>
	Homestead plantation	<i>Samanea saman</i> , <i>Acacia auriculiformis</i> , <i>Eucalyptus sp.</i> , <i>Pongamia pinnata</i> , <i>Acacia nilotica</i> , <i>Ziziphus mauritiana</i> , <i>Switenia mahogani</i> , <i>Casuarina equisetifolia</i> , <i>Phoenix sylvestris</i> , <i>Mangifera indica</i> , <i>Tamarindus indica</i> , <i>Areca catechu</i>	<i>Bougainvillea spectabilis</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Clerodendrum inerme</i> , <i>Hibiscus rosa-sinensis</i> , <i>Lantana camara</i> , <i>Lawsonia inermis</i> , <i>Rosa centifolia</i> ,	<i>Amaranthus spinosus</i> , <i>Boerhavia repens</i> , <i>Celosia argentea</i> , <i>Colocasia esculenta</i> , <i>Cucurbita maxima</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Eclipta prostrata</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Nelumbo nucifera</i> , <i>Ocimum tenuiflorum</i> , <i>Phragmites karka</i>
	Casuarina plantation	<i>Casuarina equisetifolia</i>	<i>Calotropis procera</i>	-
G2	Agricultural	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> <i>Acacia nilotica</i> , <i>Albizia lebbek</i> , <i>Alstonia scholaris</i> , <i>Bambusa vulgaris</i> , <i>Borassus flabellifer</i> , <i>Cocos nucifera</i>	<i>Calotropis procera</i> , <i>Lantana camara</i> , <i>Ricinus communis</i>	<i>Celosia argentea</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i>
	Homestead plantation	<i>Samanea saman</i> , <i>Acacia auriculiformis</i> , <i>Azadirachta indica</i> , <i>Eucalyptus sp.</i> , <i>Pongamia pinnata</i> , <i>Switenia mahogani</i> , <i>Casia siamea</i> , <i>Gmelina arborea</i> , <i>Casuarina equisetifolia</i> , <i>Phoenix sylvestris</i> , <i>Areca catechu</i> , <i>Borassus flabellifer</i>	<i>Calotropis procera</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i> , <i>Vitex negundo</i> , <i>Woodfordia fruticosa</i>	<i>Colocasia esculenta</i> , <i>Cucurbita maxima</i> , <i>Cynodon dactylon</i> , <i>Cyperus compressus</i> , <i>Eclipta prostrata</i> , <i>Enhydra fluctuans</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Ocimum basilicum</i>
	Casuarina plantation	<i>Casuarina equisetifolia</i>	-	-
G3	Agricultural	<i>Acacia auriculiformis</i> , <i>Acacia nilotica</i> , <i>Albizia lebbek</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Cocos nucifera</i> , <i>Mangifera indica</i>	<i>Calotropis procera</i> , <i>Carica papaya</i> ,	<i>Cynodon dactylon</i> , <i>Musa paradisiaca</i> , <i>Ocimum basilicum</i>
	Homestead plantation	<i>Samanea saman</i> , <i>Acacia auriculiformis</i> , <i>Acacia manjiam</i> , <i>Eucalyptus sp.</i> , <i>Pongamia pinnata</i> , <i>Acacia nilotica</i> , <i>Ziziphus mauritiana</i> , <i>Casia siamea</i> , <i>Gmelina arborea</i> , <i>Casuarina equisetifolia</i> , <i>Phoenix sylvestris</i> , <i>Bambusa sp.</i> , <i>Cocos nucifera</i> , <i>Mangifera indica</i> , <i>Tamarindus indica</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i>	<i>Bougainvillea spectabilis</i> , <i>Calotropis gigantea</i> , <i>Carica papaya</i> , <i>Gardenia jesminoides</i> , <i>Hibiscus rosa-sinensis</i> , <i>Lantana camara</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i>	<i>Amaranthus spinosus</i> , <i>Boerhavia repens</i> , <i>Celosia argentea</i> , <i>Centella asiatica</i> , <i>Colocasia esculenta</i> , <i>Cucurbita maxima</i> , <i>Cynodon dactylon</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Ocimum tenuiflorum</i> , <i>Phragmites karka</i> , <i>Phyllanthus niruri</i>
	Casuarina plantation	<i>Casuarina equisetifolia</i> , <i>Acacia auriculiformis</i>	-	-
G4	Agricultural	<i>Acacia auriculiformis</i> , <i>Bambusa vulgaris</i>	<i>Calotropis procera</i>	<i>Cynodon dactylon</i> , <i>Celosia argentea</i>

Grid No.	Land Use Types	Trees	Shrubs	Herbs
	Homestead plantation	<i>Samanea saman</i> , <i>Acacia auriculiformis</i> , <i>Acacia manjiam</i> , <i>Eucalyptus</i> sp., <i>Pongamia pinnata</i> , <i>Acacia nilotica</i> , <i>Ziziphus mauritiana</i> , <i>Leucaena leucocephala</i> , <i>Swietenia mahogani</i> , <i>Tectona grandis</i> , <i>Casia siamea</i> , <i>Gmelina arborea</i> , <i>Casuarina equisetifolia</i> , <i>Cocos nucifera</i> , <i>Mangifera indica</i> , <i>Tamarindus indica</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i>	<i>Calotropis gigantea</i> , <i>Carica papaya</i> , <i>Lantana camara</i> , <i>Ricinus communis</i>	<i>Boerhavia repens</i> , <i>Celosia argentea</i> , <i>Cynodon dactylon</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i>
G5	Agricultural	<i>Borassus flabellifer</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Mangifera indica</i>	<i>Calotropis gigantea</i>	<i>Celosia argentea</i> , <i>Colocasia esculenta</i> , <i>Cucurbita maxima</i> , <i>Cynodon dactylon</i> , <i>Mimosa pudica</i>
	Homestead plantation	<i>Samanea saman</i> , <i>Acacia auriculiformis</i> , <i>Acacia mangium</i> , <i>Acacia nilotica</i> , <i>Sterculia foetida</i> , <i>Swietenia mahogani</i> , <i>Syzygium cuminii</i> , <i>Tamarindus indica</i> , <i>Terminalia arjuna</i> , <i>Thespesia populnea</i> , <i>Phoenix sylvestris</i> , <i>Bambusa</i> sp., <i>Cocos nucifera</i> , <i>Mangifera indica</i> , <i>Tamarindus indica</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i>	<i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Carissa carandas</i> , <i>Clerodendrum inerme</i> , <i>Gardenia jesminoides</i> , <i>Hibiscus rosa-sinensis</i> , <i>Lantana camara</i> , <i>Lawsonia inermis</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i> , <i>Suaeda maritima</i> , <i>Vitex negundo</i> , <i>Woodfordia fruticosa</i>	<i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Amaranthus spinosus</i> , <i>Bacopa monnieri</i> , <i>Celosia argentea</i> , <i>Centella asiatica</i> , <i>Colocasia esculenta</i> , <i>Cucurbita maxima</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Eclipta prostrata</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Ocimum tenuiflorum</i> , <i>Phragmites karka</i> , <i>Abutilon indicum</i> , <i>Alternanthera sessilis</i> , <i>Heliotropium curassavicum</i> , <i>Monochoria hastata</i>
G6	Agricultural	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> , <i>Acacia nilotica</i> , <i>Albizia lebeck</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i> , <i>Bambusa vulgaris</i> , <i>Borassus flabellifer</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Mangifera indica</i> , <i>Phoenix sylvestris</i> , <i>Samanea saman</i> , <i>Tamarindus indica</i>	<i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Carissa carandas</i> , <i>Clerodendrum inerme</i> , <i>Rosa centifolia</i> , <i>Suaeda maritima</i> , <i>Vitex negundo</i> , <i>Woodfordia fruticosa</i>	<i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Amaranthus spinosus</i> , <i>Bacopa monnieri</i> , <i>Celosia argentea</i> , <i>Centella asiatica</i> , <i>Colocasia esculenta</i> , <i>Cucurbita maxima</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Eclipta prostrata</i>
	Homestead plantation	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> , <i>Albizia lebeck</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i> , <i>Casuarina equisetifolia</i> , <i>Citrus aurantifolia</i> , <i>Citrus limon</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Delonix regia</i> , <i>Dillenia indica</i> , <i>Eucalyptus camaldulensis</i> , <i>Ficus benghalensis</i> , <i>Ficus religiosa</i> , <i>Gmelina arborea</i> , <i>Mangifera indica</i> , <i>Saraca asoca</i> , <i>Cassia siamea</i> , <i>Samanea saman</i> , <i>Spondias pinnata</i> , <i>Sterculia foetida</i> , <i>Swietenia mahogani</i> , <i>Syzygium cuminii</i> , <i>Tamarindus indica</i> , <i>Terminalia arjuna</i> , <i>Thespesia populnea</i> , <i>Ziziphus mauritiana</i>	<i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Carissa</i> , <i>Vitex negundo</i> , <i>Woodfordia fruticosa</i> , <i>Carandas</i> , <i>Clerodendrum inerme</i> , <i>Lawsonia inermis</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i> , <i>Suaeda maritima</i> ,	<i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Amaranthus spinosus</i> , <i>Bacopa monnieri</i> , <i>Celosia argentea</i> , <i>Centella asiatica</i> , <i>Colocasia esculenta</i> , <i>Cucurbita maxima</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Ocimum tenuiflorum</i> , <i>Phragmites karka</i> , <i>Abutilon indicum</i> , <i>Alternanthera sessilis</i>
	Casuarina plantation	<i>Casuarina equisetifolia</i>	-	<i>Ipomea flos-aquae</i>
G9	Agricultural	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> , <i>Acacia nilotica</i> , <i>Albizia lebeck</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i> , <i>Bambusa vulgaris</i> , <i>Borassus flabellifer</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Mangifera indica</i> , <i>Phoenix sylvestris</i> , <i>Samanea</i>	<i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Carissa</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i>	<i>Celosia argentea</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Musa paradisiaca</i> , <i>Ocimum tenuiflorum</i>

Grid No.	Land Use Types	Trees	Shrubs	Herbs
		<i>saman, Tamarindus indica</i>		
	Homestead plantation	<i>Samanea saman, Acacia auriculiformis, Acacia mangiam, Azadirachta indica, Eucalyptus sp., Pongamia pinnata, Acacia nilotica, Ziziphus mauritiana, Swietenia mahogani, Tectona grandis, Casia siamea, Gmelina arborea, Casuarina equisetifolia, Bambusa sp., Cocos nucifera, Mangifera indica, Tamarindus indica, Areca catechu, Borassus flabellifer, Artocarpus heterophyllus</i>	<i>Calotropis gigantea, Calotropis procera, Carica papaya, Hibiscus rosa-sinensis, Lantana camara, Lawsonia inermis, Ricinus communis, Rosa centifolia, Vitex negundo, Woodfordia fruticosa</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Amaranthus spinosus, Bacopa monnieri, Celosia argentea, Centella asiatica, Colocasia esculenta, Cucurbita maxima, Cynodon dactylon, Cyperus rotandus, Mimosa pudica, Musa paradisiaca, Ocimum tenuiflorum, Phragmites karka, Eichhornia crassipes, Abutilon indicum, Alternanthera sessilis</i>
	Casuarina plantation	<i>Casuarina equisetifolia</i>	-	<i>Celosia argentea, Cynodon dactylon</i>
G10	Agricultural	<i>Acacia auriculiformis, Acacia mangium, Acacia nilotica, Albizia lebbeck, Alstonia scholaris, Areca catechu, Artocarpus heterophyllus, Cocos nucifera, Dalbergia sissoo, Mangifera indica, Phoenix sylvestris, Samanea saman, Tamarindus indica</i>	<i>Calotropis gigantea, Calotropis procera, Carica papaya, Lantana camara, Ricinus communis, Rosa centifolia</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Celosia argentea, Centella asiatica, Colocasia esculenta, Cynodon dactylon, Mimosa pudica, Musa paradisiaca, Ocimum tenuiflorum</i>
	Homestead plantation	<i>Acacia auriculiformis, Acacia mangium, Acacia nilotica, Albizia lebbeck, Alstonia scholaris, Areca catechu, Artocarpus heterophyllus, Cocos nucifera, Eucalyptus camaldulensis, Ficus benghalensis, Ficus religiosa, Gmelina arborea, Leucaena leucocephala, Mangifera indica, Melia azedarach, Mimosa pudica, Phoenix sylvestris, Pithecellobium dulce, Pongamia pinnata, Samanea saman, Spondias pinnata, Swietenia mahogani, Syzygium cumini</i>	<i>Bougainvillea spectabilis, Calotropis gigantea, Calotropis procera, Carica papaya, Carissa carandas, Clerodendrum inerme, Gardenia jasminoides, Hibiscus rosa-sinensis, Lantana camara, Lawsonia inermis, Pandanus foetidus, Ricinus communis, Rosa centifolia, Vitex negundo, Woodfordia fruticosa</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Amaranthus spinosus, Bacopa monnieri, Boerhavia repens, Celosia argentea, Colocasia esculenta, Cucurbita maxima, Cynodon dactylon, Cyperus compressus, Cyperus rotandus, Eclipta prostrata, Mimosa pudica, Musa paradisiaca, Ocimum basilicum, Ocimum tenuiflorum, Phragmites karka, Phyllanthus niruri</i>
	Riparian vegetation	<i>Dalbergia sissoo, Alstonia scholaris, Syzygium cumini, Cocos nucifera</i>	<i>Lantana camara, Ricinus communis, Suaeda maritima</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Porteresia coarctata, Saccharum spontaneum, Sesuvium portulacastrum</i>
G11	Agricultural	<i>Acacia auriculiformis, Acacia mangium, Acacia nilotica, Albizia lebbeck, Alstonia scholaris, Areca catechu, Artocarpus heterophyllus, Bambusa vulgaris, Borassus flabellifer, Cocos nucifera, Dalbergia sissoo, Mangifera indica, Phoenix sylvestris, Samanea saman, Tamarindus indica</i>	<i>Calotropis gigantea, Calotropis procera, Carica papaya, Carissa, Ricinus communis</i>	<i>Celosia argentea, Cynodon dactylon, Cyperus rotandus, Musa paradisiaca</i>

Grid No.	Land Use Types	Trees	Shrubs	Herbs
	Homestead plantation	<i>Samanea saman, Acacia auriculiformis, Acacia manjiam, Azadirachta indica, Eucalyptus sp., Pongamia pinnata, Acacia nilotica, Ziziphus mauritiana, Switenia mahogani, Tectona grandis, Casia siamea, Gmelina arborea, Casuarina equisetifolia, Phoenix sylvestris, Cocos nucifera, Mangifera indica, Tamarindus indica, Areca catechu, Borassus flabellifer, Artocarpus heterophyllus</i>	<i>Bougainvillea spectabilis, Calotropis gigantean, Calotropis procera, Carica papaya, Carissa carandas, Clerodendrum inerme, Gardenia jesminoides, Hibiscus rosa-sinensis, Lantana camara, Ricinus communis, Rosa centifolia, Vitex negundo, Woodfordia fruticosa</i>	<i>Alternanthera sessilis, Boerhavia repens, Celosia argentea, Colocasia esculenta, Cucurbita maxima, Cynodon dactylon, Cyperus compressus, Cyperus rotandus, Eclipta prostrata, Mimosa pudica, Musa paradisiaca, Ocimum basilicum, Ocimum tenuiflorum, Phragmites karka, Phyllanthus niruri</i>
G12	Agricultural	<i>Acacia auriculiformis, Acacia mangium, Acacia nilotica, Bambusa vulgaris, Borassus flabellifer, Cocos nucifera, Dalbergia sissoo, Mangifera indica, Phoenix sylvestris, Samanea saman, Tamarindus indica</i>	<i>Calotropis procera, Carica papaya, Gardenia jesminoides, Hibiscus rosa-sinensis, Lantana camara, Ricinus communis, Rosa centifolia</i>	<i>Celosia argentea, Colocasia esculenta, Cyperus compressus, Cyperus rotandus, Mimosa pudica, Musa paradisiaca, Ocimum basilicum, Ocimum tenuiflorum</i>
	Homestead plantation	<i>Samanea saman, Acacia auriculiformis, Acacia manjiam, Azadirachta indica, Eucalyptus sp., Pongamia pinnata, Acacia nilotica, Ziziphus mauritiana, Leucaena leucocephala, Switenia mahogani, Tectona grandis, Casuarina equisetifolia, Phoenix sylvestris, Bambusa sp., Cocos nucifera, Mangifera indica, Tamarindus indica, Areca catechu, Borassus flabellifer, Artocarpus heterophyllus</i>	<i>Calotropis gigantea, Calotropis procera, Carica papaya, Carissa carandas, Hibiscus rosa-sinensis, Lantana camara, Lawsonia inermis, Ricinus communis, Rosa centifolia, Vitex negundo, Woodfordia fruticosa</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Celosia argentea, Centella asiatica, Colocasia esculenta, Cucurbita maxima, Cynodon dactylon, Cyperus rotandus, Eclipta prostrata, Mimosa pudica, Musa paradisiaca, Ocimum tenuiflorum, Phragmites karka, Abutilon indicum, Alternanthera sessilis</i>
	Casuarina plantation	<i>Casuarina equisetifolia</i>	-	-
	Riparian Vegetation	<i>Alstonia scholaris, Syzygium cumini, Cocos nucifera</i>	<i>Lantana camara, Ricinus communis,</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Porteresia coarctata, Saccharum spontaneum, Sesuvium portulacastrum</i>
G15	Agricultural	<i>Acacia auriculiformis, Acacia mangium, Acacia nilotica, Albizia lebbeck, Alstonia scholaris, Areca catechu, Artocarpus heterophyllus, Bambusa vulgaris, Borassus flabellifer, Cocos nucifera, Dalbergia sissoo, Mangifera indica, Phoenix sylvestris, Samanea saman, Tamarindus indica</i>	<i>Calotropis gigantea, Calotropis procera, Carica papaya, Lantana camara, Ricinus communis, Rosa centifolia</i>	<i>Alternanthera sessilis, Celosia argentea, Centella asiatica, Colocasia esculenta, Cucurbita maxima, Cynodon dactylon, Cyperus rotandus, Eclipta prostrata, Mimosa pudica, Musa paradisiaca, Ocimum tenuiflorum, Phragmites karka, Alternanthera sessilis</i>
	Homestead plantation	<i>Acacia auriculiformis, Acacia mangium, Acacia nilotica, Areca catechu, Artocarpus heterophyllus, Bambusa vulgaris, Casuarina equisetifolia, Ceriops decandra, Cocos nucifera, Dalbergia sissoo, Delonix regia, Dillenia indica, Eucalyptus camaldulensis, Ficus benghalensis, Ficus religiosa, Gmelina arborea, Leucaena leucocephala, Mangifera indica, Phoenix sylvestris, Pithecellobium dulce, Samanea saman, Spondias pinnata, Swietenia mahagoni,</i>	<i>Hibiscus rosa-sinensis, Lantana camara, Calotropis gigantea, Calotropis procera, Carica papaya, Carissa carandas, Ricinus communis, Rosa centifolia, Vitex negundo, Woodfordia fruticosa</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Celosia argentea, Centella asiatica, Cynodon dactylon, Cyperus rotandus, Eclipta prostrata, Mimosa pudica, Musa paradisiaca, Ocimum tenuiflorum, Phragmites karka, Abutilon indicum, Alternanthera sessilis</i>

Grid No.	Land Use Types	Trees	Shrubs	Herbs
		<i>Syzygium cuminii</i>		
G16	Agricultural	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> <i>Acacia nilotica</i> , <i>Albizia lebeck</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i> , <i>Bambusa vulgaris</i> , <i>Borassus flabellifer</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Mangifera indica</i> , <i>Phoenix sylvestris</i> , <i>Samanea saman</i> , <i>Tamarindus indica</i>	<i>Hibiscus rosa-sinensis</i> , <i>Lantana camara</i> , <i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Ricinus communis</i>	<i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Cyperus rotandus</i> , <i>Ocimum tenuiflorum</i> , <i>Phragmites karka</i>
	Homestead plantation	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> , <i>Alstonia scholaris</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Delonix regia</i> , <i>Dillenia indica</i> , <i>Eucalyptus camaldulensis</i> , <i>Ficus benghalensis</i> , <i>Ficus religiosa</i> , <i>Gmelina arborea</i> , <i>Mangifera indica</i> , <i>Melia azedarach</i> , <i>Phoenix sylvestris</i> , <i>Pithecellobium dulce</i> , <i>Pongamia pinnata</i> , <i>Cassia siamea</i> , <i>Samanea saman</i> , <i>Swietenia mahagoni</i> , <i>Syzygium cuminii</i> , <i>Tamarindus indica</i> , <i>Terminalia arjuna</i> , <i>Ziziphus mauritiana</i>	<i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Carissa carandas</i> , <i>Hibiscus rosa-sinensis</i> , <i>Lantana camara</i> , <i>Lawsonia inermis</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i> , <i>Suaeda maritima</i> , <i>Vitex negundo</i> , <i>Woodfordia fruticosa</i>	<i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Amaranthus spinosus</i> , <i>Bacopa monnieri</i> , <i>Celosia argentea</i> , <i>Centella asiatica</i> , <i>Colocasia esculenta</i> , <i>Cucurbita maxima</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Eclipta prostrata</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Ocimum tenuiflorum</i> , <i>Phragmites karka</i> , <i>Abutilon indicum</i> , <i>Alternanthera sessilis</i>
	Riparian Vegetation	<i>Samanea saman</i> , <i>Acacia auriculiformis</i> , <i>Alstonia scholaris</i> , <i>Syzygium cumini</i> , <i>Cocos nucifera</i>	<i>Lantana camara</i> , <i>Ricinus communis</i> ,	<i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Porteresia coarctata</i> , <i>Saccharum spontaneum</i> , <i>Sesuvium portulacastrum</i>
G18	Agricultural	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> <i>Acacia nilotica</i> , <i>Albizia lebeck</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i> , <i>Bambusa vulgaris</i> , <i>Borassus flabellifer</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Mangifera indica</i> , <i>Phoenix sylvestris</i> , <i>Samanea saman</i> , <i>Tamarindus indica</i>	<i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> , <i>Lantana camara</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i> , <i>Suaeda maritima</i> , <i>Vitex negundo</i>	<i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Amaranthus spinosus</i> , <i>Celosia argentea</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Eclipta prostrata</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Ocimum tenuiflorum</i> , <i>Phragmites karka</i> , <i>Abutilon indicum</i> , <i>Alternanthera sessilis</i>
	Homestead plantation	<i>Samanea saman</i> , <i>Acacia auriculiformis</i> , <i>Acacia mangium</i> , <i>Azadirachta indica</i> , <i>Eucalyptus sp.</i> , <i>Acacia nilotica</i> , <i>Ziziphus mauritiana</i> , <i>Leucaena leucocephala</i> , <i>Swietenia mahagoni</i> , <i>Tectona grandis</i> , <i>Casia siamea</i> , <i>Gmelina arborea</i> , <i>Casuarina equisetifolia</i> , <i>Phoenix sylvestris</i> , <i>Bambusa sp.</i> , <i>Cocos nucifera</i> , <i>Mangifera indica</i> , <i>Tamarindus indica</i>	<i>Hibiscus rosa-sinensis</i> , <i>Lantana camara</i> , <i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i> , <i>Vitex negundo</i> , <i>Woodfordia fruticosa</i>	<i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Celosia argentea</i> , <i>Centella asiatica</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Eclipta prostrata</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Ocimum tenuiflorum</i> , <i>Phragmites karka</i> , <i>Abutilon indicum</i> , <i>Alternanthera sessilis</i>
G22	Agricultural	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> <i>Acacia nilotica</i> , <i>Albizia lebeck</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Artocarpus heterophyllus</i> , <i>Bambusa vulgaris</i> , <i>Borassus flabellifer</i> , <i>Cocos nucifera</i> , <i>Dalbergia sissoo</i> , <i>Mangifera indica</i> , <i>Phoenix sylvestris</i> , <i>Samanea saman</i> , <i>Tamarindus indica</i>	<i>Hibiscus rosa-sinensis</i> , <i>Lantana camara</i> , <i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Ricinus communis</i> , <i>Rosa centifolia</i> ,	<i>Celosia argentea</i> , <i>Centella asiatica</i> , <i>Cynodon dactylon</i> , <i>Cyperus rotandus</i> , <i>Eclipta prostrata</i> , <i>Mimosa pudica</i> , <i>Musa paradisiaca</i> , <i>Ocimum tenuiflorum</i> , <i>Abutilon indicum</i> , <i>Alternanthera sessilis</i>
	Homestead plantation	<i>Acacia auriculiformis</i> , <i>Acacia mangium</i> , <i>Albizia lebeck</i> , <i>Alstonia scholaris</i> , <i>Areca catechu</i> , <i>Artocarpus</i>	<i>Bougainvillea spectabilis</i> , <i>Calotropis gigantea</i> , <i>Calotropis procera</i> , <i>Carica papaya</i> ,	<i>Alternanthera sessilis</i> , <i>Alternanthera philoxeroides</i> , <i>Amaranthus spinosus</i> , <i>Bacopa monnieri</i> , <i>Boerhavia</i>

Grid No.	Land Use Types	Trees	Shrubs	Herbs
		<i>heterophyllus, Casuarina equisetifolia, Cocos nucifera, Dalbergia sissoo, Delonix regia, Dillenia indica, Eucalyptus camaldulensis, Ficus benghalensis, Ficus religiosa, Gmelina arborea, Mangifera indica, Melia azedarach, Phoenix sylvestris, Pithecellobium dulce, Pongamia pinnata, Saraca asoca, Cassia siamea, Samanea saman, Spondias pinnata, Swietenia mahagoni, Syzygium cuminii, Tamarindus indica, Terminalia arjuna, Ziziphus mauritiana</i>	<i>Carissa carandas, Hibiscus rosa-sinensis, Lantana camara, Lawsonia inermis, Pandanus foetidus, Ricinus communis, Rosa centifolia, Vitex negundo, Woodfordia fruticosa</i>	<i>repens, Celosia argentea, Colocasia esculenta, Cucurbita maxima, Cynodon dactylon, Cyperus compressus, Cyperus rotandus, Eclipta prostrata, Mimosa pudica, Musa paradisiaca, Ocimum basilicum, Ocimum tenuiflorum, Phragmites karka, Phyllanthus niruri</i>
	Riparian Vegetation	<i>Acacia auriculiformis, Alstonia scholaris, Syzygium cumini, Cocos nucifera</i>	<i>Lantana camara, Ricinus communis, Suaeda maritima</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Sesuvium portulacastrum</i>
	Mangrove Plantation	<i>Avicennia alba, Avicennia officinalis</i>	<i>Suaeda maritima</i>	<i>Porteresia coarctata, Saccharum spontaneum, Sesuvium portulacastrum</i>
G24	Agricultural	<i>Acacia auriculiformis, Acacia mangium, Acacia nilotica, Albizia lebbeck, Alstonia scholaris, Areca catechu, Artocarpus heterophyllus, Bambusa vulgaris, Borassus flabellifer, Cocos nucifera, Dalbergia sissoo, Mangifera indica, Phoenix sylvestris, Samanea saman, Tamarindus indica</i>	<i>Calotropis procera, Carica papaya, Carissa carandas, Hibiscus rosa-sinensis, Lantana camara, Ricinus communis</i>	<i>Celosia argentea, Colocasia esculenta, Cucurbita maxima, Cynodon dactylon, Cyperus rotandus, Eclipta prostrata, Mimosa pudica, Musa paradisiaca</i>
	Homestead plantation	<i>Acacia auriculiformis, Acacia mangium, Albizia lebbeck, Alstonia scholaris, Areca catechu, Artocarpus heterophyllus, Casuarina equisetifolia, Cocos nucifera, Dalbergia sissoo, Delonix regia, Dillenia indica, Eucalyptus camaldulensis, Ficus benghalensis, Ficus religiosa, Melia azedarach, Phoenix sylvestris, Pithecellobium dulce, Pongamia pinnata, Saraca asoca, Cassia siamea, Samanea saman, Swietenia mahagoni, Syzygium cuminii, Tamarindus indica, Terminalia arjuna, Ziziphus mauritiana</i>	<i>Bougainvillea spectabilis, Calotropis gigantean, Calotropis procera, Carica papaya, Carissa carandas, Hibiscus rosa-sinensis, Lantana camara, Lawsonia inermis, Ricinus communis, Rosa centifolia, Vitex negundo, Woodfordia fruticosa</i>	<i>Alternanthera sessilis, Alternanthera philoxeroides, Amaranthus spinosus, Bacopa monnieri, Boerhavia repens, Celosia argentea, Colocasia esculenta, Cucurbita maxima, Cynodon dactylon, Cyperus compressus, Cyperus rotandus, Eclipta prostrata, Ocimum tenuiflorum, Phragmites karka, Phyllanthus niruri</i>
	Mangrove Plantation	<i>Avicennia officinalis, Sonneratia apetala</i>	<i>Suaeda maritima</i>	<i>Sesuvium portulacastrum</i>
	Mangrove Plantation	<i>Avicennia officinalis</i>	<i>Suaeda maritima</i>	<i>Sesuvium portulacastrum, Porteresia coarctata</i>

Annex 8

Initial Information on Land
Requisition and Permanent
Acquisition proposed for
Onshore Spur Gas Pipeline

**Initial Information on Land Requisition and Permanent Acquisition
proposed for Onshore Spur Gas Pipeline**

00- 3500 mts (Dakshin Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
1	-920	1210					
2	1210	1286.6	5		645.000	613.200	503.100
3	1286.6	1306.5	6		150.000	160.000	150.000
4	1306.5	1320.1	1241		97.900	109.300	111.900
5	1320.1	1337.1	1242		131.000	136.000	119.000
6	1337.1	1354.7	1282		93.500	140.700	151.700
7	1354.7	1365.4	1280		2.400	85.700	194.000
8	1365.4	1375.3	1281		103.300	76.200	2.000
9	1365.4	1375.3	1257		54.600	0.000	0.000
10	1365.4	1375.3	1256		8.800	0.000	0.000
11	1375.3	1395.1	1258		48.200	150.700	122.200
12	1395.1	1396.2	1259		0.000	22.000	119.400
13	1396.2	1406.8	1254		166.400	82.200	5.000
14	1406.8	1462.8	1252		372.700	444.000	377.000
15	1462.8	1465.8	1251		0.000	55.600	131.500
16	1465.8	1483.5	1246		198.000	135.300	7.400
17	1483.5	1492.4	1249		0.000	70.700	189.000
18	1483.5	1492.4	1247		64.400	0.000	0.000
19	1492.4	1517.7	1248		210.970	204.750	82.300
20	1517.7	1535.36	1405		8.900	141.300	154.100
21	1517.7	1535.36	1403		0.000	0.000	15.600
22	1517.7	1535.36	1404		0.000	0.000	86.600
23	1535.36	1563.46	1406		239.800	216.600	210.400
24	1563.46	1585.16	1410		146.500	183.800	180.100
25	1585.16	1599.76	1240		106.400	115.500	84.400
26	1599.76	1627.98	1296		194.600	236.600	207.700
27	1627.98	1694.75	1218		555.200	532.300	365.500
28	1627.98	1694.75	1217		0.000	27.000	177.000
29	1694.75	1842.75	1196		1125.000	1184.000	1200.000
30	1842.75	1847.95	1200		38.900	42.300	40.000
31	1847.95	1866.9	1199		135.000	151.500	149.100
32	1866.9	1877.0	1198		130.500	183.100	61.500
33	1877.0	1908.7	1208		250.000	265.000	97.000
34	1877.0	1908.7	1207		0.000	0.000	50.000
35	1908.7	1917.2	1209		0.000	60.000	150.200
36	1917.2	1965.9	1180		418.700	405.900	182.300
37	1917.2	1965.9	1181		161.800	5.000	0.000
38	1965.9	2003.7	1179	477	45.750	285.000	413.200
39	1997	2011	1178	477	0.000	0.000	66.482
40	1992	2073	1166	901	288.421	92.093	0.629

00- 3500 mts (Dakshin Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
41	2004	2052	1167	901	277.778	377.091	297.989
42	2063	2077	1154	1686	4.287	114.714	249.270
43	2077	2094	1160	327	130.791	133.982	65.000
44	2084	2101	1159	1887	0.000	0.000	58.466
45	2094	2113	1161	1526\1887	163.069	128.117	2.627
46	2101	2120	1158	1526\1686	0.000	43.051	149.271
47	2111	2124	1162	968	91.530	16.040	0.000
48	2115	2131	1141	1	28.344	110.998	114.230
49	2128	2153	1142	2060	134.620	28.698	0.000
50	2134	2183	1144	114	256.289	387.357	397.532
51	2183	2200	1129	1526	118.897	129.261	115.439
52	2196	2231	1131	1499	210.799	31.248	0.000
53	2200	2230	1230	1472	27.432	213.189	214.503
54	2230	2239	1124	347	54.475	73.102	16.742
55	2230	2255	1125	1499	0.000	0.000	129.882
56	2221	2230	1126	319	0.000	0.000	7.799
57	2239	2252	1123	409	100.299	102.723	21.236
58	2252	2271	1121	409	142.009	138.078	0.000
59	2255	2272	1122	1526	0.000	10.370	123.377
60	2271	2288	1110	409	258.483	143.505	0.000
61	2288	2305	1109	319	0.000	129.568	260.328
62	2302	2326	1107	1499	174.555	54.597	0.000
63	2305	2320	1108	1526	0.000	75.347	110.279
64	2326	2346	1104	184	107.002	0.000	0.000
65	2320	2373	1094	1848	178.593	418.565	405.749
66	2346	2370	1095	759	49.958	0.000	0.000
67	2366	2383	1073	1500	0.000	0.000	40.466
68	2373	2380	1093	901	50.373	57.079	36.917
69	2380	2424	1092	705	330.595	349.527	84.475
70	2383	2447	1090	1500	0.000	0.000	388.103
71	2424	2446	1091	705	164.529	177.547	10.920
72	2446	2451	564	1	32.809	33.397	29.811
73	2451	2480	273	1496	208.948	231.253	223.209
74	2480	2500	275	748	117.553	161.625	29.048
75	2481	2496	274	759	0.000	0.000	95.153
76	2478	2517	270	2306	163.614	9.691	0.000
77	2507	2527	279	1599	0.000	122.166	150.541
78	2500	2507	276	759	2.697	56.427	78.337
79	2527	2535	269	759	144.680	71.749	0.000
80	2535	2549	268	181	95.685	68.339	0.000
81	2527	2548	260	767	0.000	64.196	157.190
82	2549	2560	267	1279	84.321	77.649	0.000

00- 3500 mts (Dakshin Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
83	2548	2559	261	181	0.000	10.064	81.104
84	2560	2570	266	2074	78.150	81.158	0.000
85	2559	2570	262	235	0.000	4.253	82.392
86	2570	2585	265	676	108.186	101.539	0.000
87	2570	2592	263	2306	0.000	31.077	164.958
88	2585	2596	264	1598	84.135	59.936	0.000
89	2596	2615	219	556	156.444	91.765	0.000
90	2615	2675	220	907	422.623	551.539	603.723
91	2660	2671	221	760	0.000	0.000	13.115
92	2675	2705	215	1808	221.818	238.518	51.168
93	2705	2763	214	907	433.566	316.295	0.000
94	2672	2751	213	760	0.000	129.070	541.720
95	2751	2772	201	907	0.000	39.995	157.078
96	2763	2776	200	1833	194.975	92.845	0.000
97	2789	2805	198	348	34.175	0.000	0.000
98	2776	2830	199	1	225.594	427.219	448.085
99	2830	2893	191	2103	587.529	501.103	375.329
100	2902	2909	189	1832	10.952	0.000	0.000
101	2893	2926	190	1	152.517	152.208	136.138
102	3187	3240	174	1	135.887	315.594	304.157
103	3187	3195	169	260	13.762	0.000	0.000
104	3195	3210	168	1124 \ 1647	65.339	0.000	0.000
105	3210	3237	167	260	182.305	18.742	0.000
106	3237	3252	165	1647	26.518	0.000	0.000
107	3240	3252	166	1124	89.479	88.924	0.437
108	3252	3270	136	260	146.868	141.342	61.358
109	3270	3282	135	260	103.745	99.265	75.584
110	3282	3335	134	2262	202.265	412.527	449.996
111	3302	3341	133	2262	198.080	19.319	0.000
112	3335	3358	106	1245	158.505	172.666	64.353
113	3337	3345	105	516	0.000	0.000	40.665
114	3345	3355	104	1647	0.000	0.000	21.275
115	3358	3388	109	1283	219.600	236.671	222.842
116	3399	3425	114	1290	60.038	0.000	0.000
117	3388	3421	110	1283	202.704	271.995	250.247
118	3425	3463	112	1290	274.320	61.105	0.000
119	3421	3458	111	1360	25.422	294.322	434.348
120	3463	3497	92	1360	264.756	246.939	25.712
121	3478	3495	93	1365	0.000	0.000	103.665
122	3495	3514	91	1284	0.000	0.000	53.615
123	3497	3522	48	1144	194.272	198.776	118.661
124	3527	3529	66	1144	49.752	16.331	0.000

00- 3500 mts (Dakshin Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
125	3522	3526	67	1	0.000	25.135	46.897
126	3526	3607	61	1290	164.708	631.852	643.790
127	3544	3559	63	1	29.441	0.000	0.000
128	3559	3587	62	1	268.818	5.817	0.000
129	3587	3604	55	324	83.883	0.000	0.000
130	3604	3622	57	324	75.738	0.000	0.000
131	3607	3633	58	1284	137.081	208.689	143.967
132	3611	3618	60	324	0.000	0.000	24.705
133	3633	3648	59	1199	117.639	125.093	116.916
134	3618	3665	80	1199	91.061	94.371	86.374
Total Area in Sqm=					16390.30	17467.65	16165.57
Total Area in Acre=					4.051	4.317	3.995

3500- 6500 mts (Uttar Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
1	2940	2967	15517	2608/2450	260.91	214.11	82.26
2	2923	2936	15514	1723	0.00	0.00	49.07
3	2939	2949	15507	1723	0.00	0.00	23.81
4	2967	3006	15506	1723	149.66	309.57	461.63
5	3006	3036	15505	1723	219.73	242.19	213.64
6	3035	3054	15503	1723	50.52	0.00	0.00
7	3036	3055	15504	1723	88.98	149.19	140.26
8	3055	3122	14044	1155	498.59	367.96	0.00
9	3055	3122	14048	1723	0.00	165.76	501.98
10	3122	3157	14047	1723	292.65	168.55	0.00
11	3122	3179	14043	1155	0.00	235.79	438.56
12	3677	3686	13503	461	157.49	76.23	0.00
13	3665	3677	13616	1184	0.00	86.98	145.73
14	3686	3728	13604	1182	309.82	322.12	87.46
15	3683	3724	14904	2864	0.00	13.87	231.78
16	3728	3749	13613	2351	166.76	171.79	151.56
17	3724	3732	14902	2351	0.00	0.00	10.80
18	3749	3771	13614	700	163.86	176.66	166.97
19	3771	3803	13636	697	235.07	250.06	224.52

3500- 6500 mts (Uttar Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
20	3799	3804	13637	697	0.42	0.00	0.00
21	3770	3785	13635	697	0.00	0.00	9.26
22	3803	3825	13651	619	167.10	181.90	173.96
23	3825	3843	13654	697	126.10	136.97	130.71
24	3843	3870	13670	697	201.10	218.61	208.80
25	3870	3890	13671	619	150.52	160.38	150.20
26	3890	3913	13682	2864	162.12	103.41	0.00
27	3890	3912	13683	619	0.00	77.31	166.08
28	3908	3955	13701	1182	109.06	0.00	0.00
29	3913	3931	13684	2864	93.17	146.26	137.26
30	3931	3955	13700	1182	122.52	195.65	177.64
31	3933	3956	13699	1182	0.00	0.00	12.14
32	3955	3971	13762	1544	117.62	125.85	118.27
33	3970	3985	13759	42	64.21	0.00	0.00
34	3971	3986	13753	82	46.80	119.17	112.43
35	3986	4002	13754	461	120.41	131.68	123.13
36	4002	4022	13752	1635	148.09	154.96	145.92
37	4022	4039	13750	2212	136.66	139.34	16.29
38	4023	4039	13751	2212	0.00	0.00	108.82
39	4039	4057	13748	611	103.52	0.00	0.00
40	4039	4057	13747	611	31.12	143.38	130.64
41	4057	4072	13729	2393	124.17	122.44	33.03
42	4056	4078	13745	1410	0.00	0.00	110.46
43	4072	4096	13730	1410	171.18	190.69	102.98
44	4078	4095	13742	2212	0.00	0.00	45.76
45	4097	4127	13733	461	33.81	0.00	0.00
46	4096	4132	13734	461	205.99	266.80	2.50
47	4095	4133	13739	686	0.00	16.41	282.20
48	4127	4148	13735	461	109.94	0.00	0.00
49	4132	4147	13736	461	32.52	123.70	36.52
50	4133	4146	13737	686	0.00	0.00	61.17
51	4147	4168	13509	686	167.09	169.34	29.56
52	4146	4164	13508	686	0.00	1.22	112.25
53	4170	4187	13510	2864/1216	117.09	51.36	0.00
54	4168	4176	13507	1216	0.00	56.11	105.78
55	4182	4224	13512	460	317.11	334.75	303.77
56	4224	4238	12258	1	110.92	117.72	106.56
57	4238	4257	12047	1365	185.17	171.47	140.48
58	4264	4299	12049	455	257.51	262.03	35.81
59	4257	4264	12048	2267	0.00	47.41	97.73
60	4266	4282	14813	457	0.00	8.17	109.59

3500- 6500 mts (Uttar Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
61	4282	4309	14812	457	0.00	0.00	142.60
62	4299	4330	12050	457	218.77	239.44	33.78
63	4309	4334	12057	457	0.00	8.97	174.24
64	4329	4365	12051	455	264.28	95.57	0.00
65	4342	4370	12052	457	16.52	222.81	298.15
66	4342	4430	12017	3229	416.40	477.38	432.47
67	4414	4462	12016	339/3229/3330	218.32	0.00	0.00
68	4430	4454	12072	3329	83.62	190.21	177.59
69	4454	4466	12073	3329	19.99	99.23	96.43
70	4462	4486	12074	3229	84.34	0.00	0.00
71	4466	4523	12076	3229	340.33	452.63	418.10
72	4500	4506	12077	3229	0.00	0.00	4.49
73	4523	4544	12075	339	159.98	168.91	155.99
74	4544	4574	84	467	207.31	243.14	223.99
75	4564	4588	83	467	83.78	0.00	0.00
76	4574	4645	85	1	476.07	568.51	426.27
77	4620	4622	243	2082	0.00	0.00	0.96
78	4622	4664	242	1505	0.00	0.00	147.79
79	4664	4695	241	1505	0.00	0.00	143.79
80	4639	4661	89	2976	48.64	0.00	0.00
81	4645	4670	90	468	127.22	199.85	92.49
82	4670	4686	91	2978	111.27	126.31	30.79
83	4686	4691	92	2978	62.49	43.14	1.11
84	4684	4698	93	2978	147.12	66.73	0.35
85	4700	4705	211	1447	37.48	33.90	0.00
86	4695	4718	212	3093	0.00	14.78	159.19
87	4705	4716	208	2980	89.64	65.32	0.00
88	4726	4738	209	2874	142.20	69.54	0.00
89	4716	4743	210	3093	0.00	114.90	198.42
90	4738	4748	207	2874	31.78	0.00	0.00
91	4748	4760	206	2874	96.08	4.95	0.00
92	4734	4782	215	75	94.82	351.35	322.18
93	4760	4781	205	1419	69.40	0.00	0.00
94	4781	4863	177	2677	331.67	151.50	127.46
95	4782	4837	216	75	286.97	442.32	373.75
96	4837	4845	217	3093	1.07	59.52	109.18
97	4863	4876	175	2678	85.31	68.19	29.49
98	4872	4876	171	1419	27.36	32.64	32.72
99	4876	4901	305	2677	188.20	204.31	196.25
100	4901	4908	644	1	62.81	50.21	44.39
101	4904	4922	589	1067	0.00	0.00	53.59

3500- 6500 mts (Uttar Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
102	4908	4932	588	1067	45.30	187.40	158.14
103	4911	4941	587	1067	173.91	34.07	0.00
104	4933	4936	593	2340	0.00	0.00	4.35
105	4935	4966	594	2714	88.72	243.66	254.46
106	4942	4949	584	2677	6.04	0.00	0.00
107	4949	4966	582	310	86.08	0.44	0.00
108	4967	4980	596	2805	0.00	2.29	65.65
109	4966	4997	581	2602	164.76	243.56	154.84
110	4997	5026	583	310	338.91	230.64	87.73
111	4995	5016	580	310	0.00	2.78	93.17
112	5019	5039	579	672	0.00	0.00	66.24
113	5026	5057	577	911	211.86	245.15	166.06
114	5057	5077	576	312	25.51	163.47	238.03
115	5082	5102	575	311	0.00	0.00	74.09
116	5077	5120	574	313	347.57	343.08	154.64
117	5096	5103	573	298	7.42	0.00	0.00
118	5104	5127	570	298	103.94	3.94	0.00
119	5112	5139	549	664	0.00	59.93	187.29
120	5127	5150	553	672	211.28	176.87	25.99
121	5139	5152	550	664	0.00	0.00	35.98
122	5155	5182	555	667	181.49	84.74	2.39
123	5150	5156	552	668	26.57	38.86	0.00
124	5156	5167	551	668	1.69	101.33	196.36
125	5178	5182	172	1419	38.96	43.87	47.47
126	5187	5193	537	2847	70.15	0.00	0.00
127	5182	5204	538	201	24.41	167.20	163.50
128	5193	5200	536	3239	4.60	0.00	0.00
129	5208	5220	530	1090	199.17	98.89	1.44
130	5199	5213	529	1090	0.00	34.76	104.48
131	5215	5241	523	1090	0.00	46.02	180.32
132	5226	5244	522	1090	155.49	138.07	9.23
133	5257	5273	517	2844	48.65	0.00	0.00
134	5244	5283	520	2847	142.89	313.27	389.94
135	5293	5307	881	1	0.00	0.00	38.30
136	5283	5298	518	2812	219.30	114.38	2.61
137	5298	5332	519	2492	0.00	38.10	164.87
138	5300	5356	506	2849	269.17	360.76	239.83
139	5325	5347	504	2491	153.34	34.03	0.00
140	5350	5356	502	312	44.02	32.33	0.00
141	5356	5367	501	2492	113.48	75.89	0.00
142	5352	5372	505	2492	0.00	24.62	118.01

3500- 6500 mts (Uttar Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
143	5367	5385	916	2492	78.03	135.96	96.97
144	5373	5391	499	2492	82.01	1.06	0.00
146	5396	5402	915	1911	0.89	49.41	72.68
147	5402	5410	919	3232	22.20	62.73	68.95
148	5410	5418	918	514	48.56	62.70	59.94
149	5417	5431	925	3055	0.00	15.06	103.86
150	5418	5432	926	1042	102.91	98.46	3.04
151	5431	5449	930	3076	0.00	0.00	51.80
152	5436	5447	929	1072	0.00	71.22	74.15
153	5432	5436	928	426	95.36	48.81	0.00
154	5432	5441	927	1072	9.47	0.00	0.00
155	5449	5458	933	1796	0.00	0.00	45.47
156	5448	5456	934	1042	0.00	43.30	22.74
157	5446	5454	935	826	66.00	29.83	0.00
158	5456	5469	936	1144	89.71	102.13	101.79
159	5469	5475	937	1144	53.29	50.60	40.31
160	5475	5493	1149	812	119.63	134.50	32.83
161	5475	5497	1147	1401	0.00	6.15	102.15
162	5493	5497	1148	1913	0.00	32.61	67.81
163	5486	5510	962	80	133.84	46.51	0.00
164	5503	5539	963	62	186.14	288.14	233.28
165	5528	5549	960	1955	105.56	10.24	0.00
166	5539	5549	966	2528	0.00	69.74	184.80
167	5549	5579	967	2528	212.53	241.93	193.03
168	5579	5618	970	2528	274.73	311.02	272.51
169	5583	5592	1062	2426	0.00	0.00	21.65
170	5627	5638	1041	2426	22.47	0.00	0.00
171	5618	5627	1042	2426	148.27	72.14	0.92
172	5623	5628	1043	2530	0.00	9.26	51.48
173	5627	5644	1044	2531	17.77	125.13	120.02
174	5645	5662	1045	2531	0.00	6.05	83.59
175	5644	5652	1046	2531	152.18	67.82	0.79
176	5664	5668	1047	2426	3.64	0.00	0.00
177	5652	5694	1048	2426	224.36	331.30	344.64
178	5684	5693	1032	2498	13.92	0.00	0.00
179	5694	5708	1031	1806	143.59	101.39	1.55
180	5708	5719	1030	1806	1.92	98.12	186.03
181	5706	5709	1049	2426	0.00	0.00	2.49
182	5704	5710	1026	591	9.02	0.00	0.00
183	5732	5735	1028	1804	0.00	0.00	1.01
184	5719	5746	1027	591	157.55	197.36	63.59

3500- 6500 mts (Uttar Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
185	5719	5757	1024	333	171.50	17.36	0.00
186	5746	5759	1022	331	97.69	102.05	97.71
187	5747	5755	1954	117	0.00	0.00	16.82
188	5759	5792	1978	180	140.27	263.81	332.50
189	5792	5807	1979	3104	33.93	117.76	122.51
190	5783	5797	1980	3103	74.32	4.12	0.00
191	5807	5823	1981	1504	116.51	125.29	119.80
192	5823	5836	1982	3283	97.12	109.44	70.95
193	5837	5859	1984	1914	0.00	42.07	124.80
194	5836	5845	1983	3287	116.55	70.13	0.81
195	5850	5891	2153	2539	318.45	325.65	295.94
196	5891	5920	2152	3150	211.45	232.58	219.92
197	5924	5927	2131	2539	0.00	0.00	1.64
198	5920	5931	2151	448	147.78	79.99	6.65
199	5933	5938	2150	2160	6.35	0.00	0.00
200	5930	5964	2132	1401	256.15	267.93	238.64
201	5955	5960	2134	2538	0.00	0.00	6.30
202	5964	5997	2135	2538	184.28	267.47	245.91
203	5989	6005	2137	709	65.81	0.42	0.00
204	5997	6033	2136	789	269.51	287.43	269.42
205	6033	6062	2125	424	129.64	229.13	219.85
206	6054	6074	2119	2151	0.00	33.12	128.51
207	6053	6071	2124	1329	90.71	4.59	0.00
208	6066	6081	2120	2314	132.14	116.27	14.88
209	6074	6077	2118	1329/1756	0.00	0.00	6.63
210	6066	6100	2113	2151	23.40	155.79	254.28
211	6084	6090	2121	1756	9.36	0.00	0.00
212	6100	6120	2112	243	267.31	153.14	20.99
213	6111	6135	2110	2740	0.00	12.53	120.72
214	6120	6139	2111	2740	30.09	141.19	72.30
215	6128	6129	2192	243	0.17	0.00	0.00
216	6150	6160	2106	3310/3319	0.00	0.00	31.96
217	6139	6149	2107	3249/3310	158.97	85.31	94.43
218	6149	6158	2100	3119	2.57	70.05	50.84
219	6147	6149	2212	1902	0.63	0.00	0.00
220	6158	6170	2213	3249/3321	186.23	96.45	8.92
221	6170	6194	2104	2291	169.57	187.45	184.29
222	6194	6227	2218	1093	262.18	270.19	244.34
223	6227	6239	2237	2152	2.33	93.28	163.39
224	6239	6250	2217	2152	173.67	85.32	0.54
225	6250	6274	2238	2152	94.92	191.20	258.61

3500- 6500 mts (Uttar Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
226	6274	6306	2239	1291	221.73	243.62	159.36
227	6296	6316	2240	2576	97.71	14.10	0.00
228	6306	6337	2242	2152	181.41	244.56	281.57
229	6337	6373	2256	2631	263.33	288.85	278.41
230	6373	6409	2258	2629	270.40	288.47	274.29
231	6409	6434	2259	2629	87.93	211.97	312.89
Total Area in Sq m=					22202.62	23926.74	22699.33
Total Area in Acre=					5.488	5.914	5.610

6500- 8500 mts (Char Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
1	6434	6450	153	1	118.57	122.524	115.65
2	6450	6526	56	60	713.41	610.870	430.08
3	6531	6557	87	9	261.31	212.320	140.47
4	6526	6531	88	11	6.26	36.424	34.90
5	6524	6566	89	11	33.68	73.875	128.99
6	6566	6596	90	35	225.18	238.450	223.19
7	6596	6644	91	8	361.58	383.800	358.05
8	6644	6674	92	8	225.76	241.870	227.74
9	6674	6716	93	8	308.83	331.540	304.75
10	6716	6720	94	1	33.06	31.010	33.06
11	6720	6723	95	1	24.02	26.290	25.14
12	6723	6752	110	8	218.27	231.990	210.35
13	6752	6775	112	64	166.57	181.820	180.85
14	6775	6797	113	8	164.43	175.140	163.98
15	6797	6835	114	8	288.05	307.890	289.27
16	6835	6876	115	20	309.66	329.050	307.32
17	6876	6926	117	1\25	372.35	399.050	375.87
18	6926	6974	120	25	363.25	382.780	354.46
19	6974	7035	121	25	454.74	484.810	454.30
20	7035	7038	123	1	25.09	26.822	25.19
21	7038	7216	150	65	1339.54	1428.800	1339.45
22	7216	7335	151	65	891.76	948.970	887.57
23	7335	7458	594	59	557.16	990.290	1289.92
24	7458	7582	593	59	1074.45	968.150	569.69
25	7538	7582	592	59	208.31	14.920	0.00
26	7582	7776	595	59	1441.34	1550.670	1465.19

6500- 8500 mts (Char Dhurung)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
27	7776	7901	614	71\59	956.31	1001.940	922.65
28	7901	8049	615	71	1111.11	1184.940	1111.75
29	8049	8058	616	71	68.94	73.280	66.58
30	8058	8061	623	71	19.85	20.550	20.72
31	8061	8089	624	56	207.71	223.740	211.83
32	8089	8101	625	56	93.71	100.920	95.66
33	8101	8118	626	56	122.22	131.010	123.00
34	8118	8171	629	56	89.37	0.000	0.00
35	8118	8170	630	17	303.60	418.580	247.23
36	8117	8169	631	32	0.00	0.000	139.28
37	8170	8210	635	3	298.23	318.310	296.86
38	8210	8215	637	58	33.08	40.489	44.37
39	8215	8249	650	29	270.62	99.010	0.00
40	8215	8239	649	57	9.25	193.210	268.15
41	8251	8292	661	49	313.12	328.440	301.57
42	8292	8309	763	42	120.03	129.000	121.68
43	8309	8335	663	32	198.15	209.080	192.54
44	8337	8381	675	73	244.61	1.020	0.00
45	8335	8377	676	57	79.40	334.130	194.91
46	8332	8372	677	23	0.00	0.000	110.59
47	8377	8485	716	49	500.13	858.340	941.54
48	8485	8500	717	29	310.16	129.960	0.00
49	8469	8501	718	23	97.45	0.000	0.00
50	8501	8556	732	48	238.85	0.000	0.00
51	8510	8559	733	34	153.77	151.740	0.00
52	8500	8560	734	34	29.55	329.090	481.92
53	8560	8581	749	2	146.53	165.676	160.64
Total Area in Sq m=					16202.38	17172.58	15988.90
Total Area in Acre=					4.005	4.244	3.952

11000- 14000 mts (Khuduk Khali)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
1	11030	11278	5001	1469/1	1861.79	1976.722	1842.13
2	11278	11305	5008	2	221.54	222.897	196.19
3	11305	11338	5009	2	238.02	261.728	246.90
4	11327	11344	5029	1	0.00	2.510	72.52
5	11338	11375	5026	1	182.28	294.760	311.40

11000- 14000 mts (Khuduk Khali)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
6	11375	11427	5025	1	395.68	410.300	370.54
7	11427	11452	5022	1	191.14	206.190	190.59
8	11452	11468	5021	1	114.81	126.840	124.48
9	11468	11518	5018	1	363.39	399.380	379.13
10	11518	11567	5017	1	381.81	393.920	365.01
11	11567	11609	5010	1	382.75	329.160	213.86
12	11599	11624	5015	1	0.00	9.340	121.93
13	11609	11678	5011	1	518.65	546.710	421.90
14	11678	11703	5014	1	54.00	196.710	343.05
15	11684	11690	5012	1	10.33	0.000	0.00
16	11703	11734	5013	1	356.73	247.120	68.29
17	11734	11746	5050	1479	91.15	101.730	101.70
18	11746	11759	5051	1479	97.67	101.000	89.87
19	11759	11765	5052	1481/148	23.77	47.270	64.90
20	11763	11784	5702	1	144.88	10.650	0.00
21	11765	11786	5703	1	5.53	155.140	160.31
22	11784	11800	5712	243	89.78	0.000	0.00
23	11786	11800	5711	243	20.97	112.090	100.48
24	11800	11882	5713	1366	653.21	658.520	580.20
25	11882	11920	5715	540	278.31	303.520	291.19
26	11920	11961	5716	142	308.94	322.810	231.94
27	11961	11969	5718	1151	84.76	70.120	66.77
28	11967	11986	5717	510	83.17	4.970	0.00
29	11969	11986	5723	510	31.50	135.360	189.82
30	11949	11956	5722	142	17.26	0.000	0.00
31	11986	12010	5724	510	179.49	192.340	171.53
32	12010	12025	5727	724	134.10	117.490	104.87
33	12025	12049	5729	724	147.82	187.470	130.00
34	12013	12026	5728	606	48.68	0.000	0.00
35	12049	12069	5730		111.38	160.450	154.67
36	12086	12105	5790	1483	139.40	151.420	129.75
37	12074	12100	5744	605	6.48	117.550	140.37
38	12069	12086	5743	833	0.00	21.750	156.25
39	12100	12107	5754		0.00	0.000	8.06
40	12105	12111	649	1	64.93	50.360	38.32
41	12096	12117	648	63	98.70	6.940	0.00
42	12111	12194	650	935	499.17	663.680	599.97
43	12194	12207	651	733	222.89	90.980	0.00
44	12207	12237	657	1252	229.81	246.860	231.76
45	12237	12262	658	1252	188.27	197.930	183.72
46	12262	12315	659	31	395.60	423.760	399.05
47	12315	12373	660	1258	429.11	462.240	437.37

11000- 14000 mts (Khuduk Khali)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
48	12373	12433	661	978	456.06	483.870	451.42
49	12433	12520	662	1252	649.07	690.710	646.70
50	12520	12600	663	1258	598.93	639.330	599.63
51	12600	12686	664	978	645.59	688.110	644.22
52	12686	12727	665	14	307.01	328.500	310.58
53	12727	12755	666	1299	156.59	110.450	116.70
54	12755	12769	2303	1299	150.11	227.210	207.94
55	12769	12817	1875	1165/531	299.63	329.840	313.49
56	12788	12795	1876	59	56.58	56.480	50.16
57	12817	12838	1878	1165	176.23	170.070	148.27
58	12838	12880	1880	528	319.88	333.220	303.79
59	12880	12895	1881	1163	110.89	115.850	110.65
60	12895	12926	1884	1163	131.63	249.600	231.47
61	12899	12928	1885	1163	99.70	0.000	0.00
62	12926	12956	1891		232.74	243.830	82.21
63	12923	12953	1892		0.00	1.320	144.88
64	12956	13009	1894	542	390.83	417.400	393.64
65	13009	13047	1896	542/978	286.60	305.430	284.88
66	13047	13083	1898	1258	281.02	291.390	268.31
67	13083	13095	1900	59	104.63	94.400	77.69
68	13095	13105	1875	1165/531	80.80	80.160	69.94
69	13105	13118	1903	530	98.37	107.090	88.10
70	13118	13131	1908	1299	0.20	100.400	169.37
71	13131	13211	1907	528	480.18	618.650	445.36
72	13133	13151	1909	14	0.00	2.650	97.58
73	13151	13160	1911	978	0.00	0.000	9.75
74	13213	13269	1905	1319	627.05	445.840	223.02
75	13207	13245	1906	528	0.00	34.090	203.60
76	13269	13276	2032	4	53.91	57.610	53.94
77	13276	13289	1922	1322	39.22	101.560	94.67
78	13281	13294	1923	21	56.62	0.000	0.00
79	13289	13307	1933		137.76	150.090	143.16
80	13307	13317	1944		12.49	78.690	76.33
81	13317	13325	1950	796	63.53	63.050	57.73
82	13325	13345	1951	598	147.95	163.860	155.32
83	13345	13362	1958	496	125.67	133.250	125.11
84	13362	13380	1957	496	135.15	145.100	136.45
85	13380	13398	1966	469	33.88	134.390	152.96
86	13384	13404	1965	638	113.77	26.660	0.00
87	13397	13412	1971	526	0.00	4.120	72.96
88	13400	13418	1972	1	64.11	133.260	59.90
89	13406	13422	1973	526	68.07	2.120	0.00

11000- 14000 mts (Khuduk Khali)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
90	13421	13435	1974	634	126.05	112.450	34.21
91	13414	13431	1975	1403	0.00	25.370	93.84
92	13435	13470	1983	654	259.91	278.580	264.65
93	13470	13485	1984	824	114.38	121.740	113.88
94	13485	13505	1995	326	146.26	155.520	145.34
95	13505	13522	1997	74	127.11	140.250	132.96
96	13522	13541	1998	21	143.17	147.850	137.48
97	13541	13559	2007	469	139.06	151.060	142.88
98	13559	13567	2008	632	60.12	64.430	61.50
99	13567	13576	2009	632	64.62	69.730	65.15
100	13576	13585	2017	302	65.92	68.850	61.22
101	13585	13593	2018	302	64.46	69.600	69.95
102	13593	13609	2019	650	117.15	127.490	120.86
103	13609	13616	2026	633	49.53	52.690	49.16
104	13616	13625	2027	460	67.38	71.600	66.85
105	13625	13629	2176	1158	26.96	31.580	31.30
106	13671	13716	2206	469	61.52	0.000	0.00
107	13629	13819	2207	469	701.38	1449.400	1509.16
108	13819	13847	2205	469	873.47	252.490	0.00
109	13875	13987	2202	824	320.32	60.430	0.00
110	13982	14014	2203	1	246.49	258.245	235.44
111	13847	13974	2204	469	672.03	973.740	384.91
112	13627	13692	2208	21	0.00	86.770	473.70
113	13692	13771	2209	21	0.00	0.000	294.81
114	14014	14035	2268	1	167.82	168.507	149.82
Total Area in Sq m=					22507.20	24036.71	22491.74
Total Area in Acre=					5.563	5.941	5.559

14000- 17000 mts (Shekhar khil)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
1	14035	14054	15984	1614	137.76	155.39	155.80
2	14061	14144	15824	1543	617.00	651.03	215.34
3	14060	14146	15825	396	0.00	12.47	409.62
4	14146	14147	15829	4	29.7689	30.07	23.54
5	14147	14200	15831	73	373.94	29.43	0.00
6	14150	14301	15854	598	0.00	-	281.93
7	14148	14231	15830	394\598	0.00	586.80	711.35
8	14225	14260	15832	323	321.41	280.22	0.00

14000- 17000 mts (Shekhar khil)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
9	14225	14323	15835	1543	594.79	170.30	0.00
10	14260	14301	15833	323	0.00	244.63	134.58
11	14300	14318	15834	597	0.00	55.60	129.78
12	14319	14346	15837	44	139.28	213.66	205.00
13	14346	14360	15758	96	151.84	114.14	111.02
14	14360	14376	15757	1408	124.41	124.84	117.76
15	14394	14412	15754	73	0.00	0.00	32.61
16	14376	14425	15755		359.14	392.94	342.16
17	14424	14442	15861	16	0.00	61.31	131.61
18	14426	14438	15867	666	87.28	40.55	0.00
19	14442	14456	15863	666	0.00	10.19	106.80
20	14435	14448	15866	666	89.79	75.97	0.00
21	14448	14462	15753	666\16\1529	121.03	107.04	6.03
22	14462	14501	15864	666	57.30	303.09	369.36
23	14501	14507	15865	1529	260.50	63.40	0.00
24	14508	14527	15733	1543	144.45	0.00	0.00
25	14510	14526	2473	363	12.47	139.16	138.18
26	14523	14557	2472	1543	0.00	32.84	172.55
27	14529	14546	2464	1516	152.18	123.82	8.53
28	14546	14584	2465	77	273.13	303.24	241.27
29	14584	14605	2466	73	34.26	158.94	156.00
30	14660	14674	5271	363	0.00	0.00	47.18
31	14600	14622	2467		0.00	39.00	155.75
32	14609	14647	5269	363	352.53	305.90	112.18
33	14621	14642.98	2521		0	0	47.1552
34	14647	14662	5270	425		237.64	211.42
35	14626	14676	2463	363\425\828	313.41	74.91	0.00
36	14675	14679	2649	1	31.84	36.72	36.80
37	14679	14708	2522	750	211.01	224.96	210.09
38	14708	14740	2523	170	246.10	261.44	244.60
39	14744	14760	2534	1279	0.00	51.05	117.45
40	14740	14750	5209	1279	107.20	67.06	0.00
41	14755	14770	2536	633	103.11	119.58	108.76
41	14751	14759	2537	1279	11.71	0.00	0.00
42	14770	14795	2538	1535	179.06	197.53	191.06
43	14790	14799	2539	865	18.13	0.00	0.00
44	14795	14804	2540	589	52.29	73.70	70.54
45	14806	14814	2541	375	0.00	52.65	81.94
46	14799	14809	2542	1622	0.00	30.11	75.78
47	14814	14827	2543	123	95.25	97.18	80.46
48	14827	14837	2544	1407	73.16	83.16	85.31

14000- 17000 mts (Shekhar khil)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
49	14837	14868	2545	807	239.06	250.16	235.93
50	14868	14895	2546	475	82.43	191.15	86.01
51	14862	14886	2547		111.43	6.82	0.00
52	14895	14907	5210	1279	0.00	96.24	184.61
53	14906	14910	2552	1279	0.00	0.00	5.36
54	14887	14896	2550	1279	63.90	12.35	0.00
55	14910	14918	2553	1373	0.00	0.00	35.39
56	14907	14914	2575	1	52.58	59.07	51.50
57	14901	14911	2582	622	18.18	0.00	0.00
58	14914	14939	2581	1536	229.09	193.76	25.57
59	14924	15020	2580	1552	0.00	297.62	674.07
60	14945	14970	2585	622	331.58	199.08	35.37
61	14991	15015	2588	154	182.38	174.36	41.93
62	15008	15030	2589	1536	229.09	193.76	25.57
63	15020	15031	2579	1552	0.00	0.00	25.85
64	15025	15046	2578	426	72.35	172.23	158.68
65	15030	15040	2594	1552	0.00	0.00	22.04
66	15046	15076	2595	426	222.28	243.68	234.46
67	15076	15150	2598	1129	564.44	589.79	539.89
68	15150	15176	5026	753	335.42	211.75	63.79
69	15176	15193	5027	753	131.28	136.86	119.11
70	15193	15213	5028	753	159.05	156.83	137.32
71	15213	15284	18436	599	382.64	570.75	686.71
72	15284	15291	18437	1	67.27	56.29	43.45
73	15291	15311	18438	1537	144.85	139.67	122.82
74	15311	15340	19081	294	203.16	231.07	167.05
75	15330	15347	19082	302	94.16	18.62	0.00
76	15340	15345	18443	1537	33.30	36.18	30.69
77	15345	15398	18450	1127\1128	396.11	424.47	399.10
78	15398	15421	18447	987	175.71	182.64	164.23
79	15421	15443	18454	1605	156.02	177.34	179.06
80	15443	15461	18455	1128	138.31	145.62	135.29
81	15461	15487	18468	1127	195.03	210.05	198.17
82	15487	15515	18476	1123	203.53	222.98	205.49
83	15515	15534	18480	1072	116.12	150.72	142.24
84	15528	15550	18481	1072	4.44	115.08	159.35
85	15527	15539	18463	1072	31.51	0.00	0.00
86	15539	15558	18482	1072	139.11	48.05	0.00
87	15554	15578	18487	351	187.82	192.43	177.74
88	15578	15608	19027	351	225.24	240.96	227.85
89	15608	15644	18491	584	273.45	287.84	262.89

14000- 17000 mts (Shekhar khil)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
90	15644	15664	18496	1128	149.48	158.82	150.43
91	15664	15695	18499	946\808	235.99	245.71	225.33
92	15695	15714	18504	957	128.42	156.13	150.92
93	15716	15724	18505	957	18.13	0.00	0.00
94	15714	15736	18507	1572	164.52	154.66	45.74
95	15707	15727	18508	957	109.90	17.70	0.00
96	15736	15776	18511	1212	314.98	320.06	288.81
97	15776	15873	18512	1127\1128	606.59	775.10	783.33
98	15848	15873	18515	1208	0.00	0.00	50.52
99	15873	15883	18555	1	57.53	54.30	51.18
100	15883	15915	18553	909	260.09	280.34	264.65
101	15915	15934	18559	1212	145.83	153.24	149.06
102	15934	15951	18560	715	127.96	133.05	115.84
103	15951	15971	18564	977\545	146.99	164.16	159.87
104	15971	15988	18565	1208	130.55	132.85	120.64
105	15988	16004	18567	1212	118.97	131.74	125.77
106	16004	16024	18570	957	148.74	131.74	145.41
107	16024	16030	18571	946\808	50.08	50.87	48.12
108	16030	16041	18573	431	80.10	87.06	83.01
109	16041	16076	18575	909	197.58	278.82	262.74
111	16076	16107	18580	753\331	230.23	244.87	228.59
112	16107	16128	18581	1212	154.98	174.37	157.17
113	16126	16135	19056	331	15.85	0.00	0.00
114	16128	16145	18587	731	117.41	129.25	125.57
115	16145	16166	18586	1208	157.38	169.70	162.83
116	16166	16191	18593	584	136.20	204.83	208.77
117	16184	16229	18594	645	224.75	94.35	3.15
118	16203	16304	18595		606.63	798.94	824.95
119	16304	16307	18597	4	41.04	29.17	46.66
120	16307	16346	18605	5269	262.37	313.04	332.08
121	16300	16306	18603	957\1268	0.00	0.00	12.08
122	16346	16365	18685	5269	152.15	155.40	332.08
123	16365	16377	19125	1603	86.46	93.52	88.76
124	16377	16385	18607	1	62.36	60.95	52.57
125	16385	16629	18656	1233	1259.04	1479.36	1419.94
126	16515	16572	18654	1233	222.95	196.13	194.83
127	16525	16559	18655	1233	323.38	275.87	161.30
128	16617	16636	18657	1232	0.00	5.48	87.32
129	16623	16630	4758	576	8.42	0.00	0.00
130	16629	16682	4759	1232	404.88	444.39	434.01
131	16673	16687	4760	977	0.00	0.00	48.75

14000- 17000 mts (Shekhar khil)							
Sr. No.	Chainage		Daag No.	Khatian No.	Requirement of Land in Sqm		
	From	To			Temporary Requisition in Sqm (7.5m corrd. Left side area)	Permanent Acquisition in Sqm (8.0m center corrd.)	Temporary Requisition in Sqm (7.5m corrd. Right side area)
132	16679	16703	4761	977	181.37	104.41	0.75
133	16695	16733	4762	554	200.58	280.62	280.79
134	16733	16739	4878	1	46.11	51.87	45.32
135	16739	16800	4867	1376	538.06	487.09	298.63
136	16800	16845	4866		244.50	355.96	498.88
137	16845	16913	4865	1376\1312	512.87	546.42	510.24
138	16913	16920	4863	4	54.40	57.03	54.51
139	16920	16932	4859	1601	105.60	94.84	91.04
140	16930	16942	4858	331	28.16	0.00	0.00
141	17053	17090	4811	1378	312.83	42.00	0.00
142	17049	17139	4849	1312	582.82	667.75	447.44
Total Area in Sq m=					22535.07	24053.88	22452.24
Total Area in Acre=					5.570	5.945	5.549

Land Details for CTMS

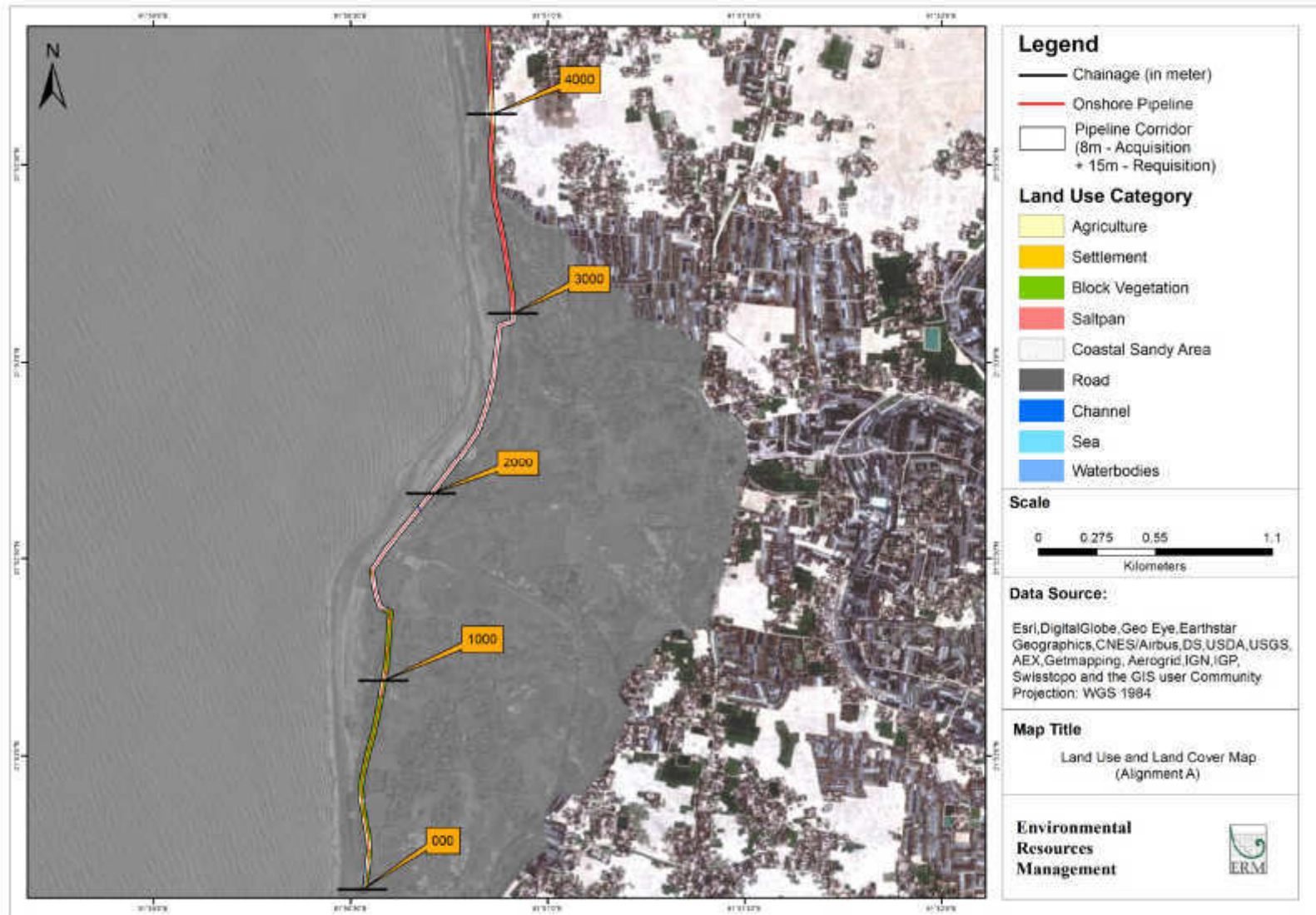
Serial No	Daag No	Khatian No	Permanent Acquisition for CTMS in Sqm
1	4785		294
2	4803		834
3	4805		461
4	4806		727
5	4807		101
6	4808		505
7	4809		565
8	4810	1378	479
9	4811	1378	270
10	4849	1312	282
11	4851	1376\1311	2808
12	4852		1063.00
13	4853	190	959.00
14	4854	182	831.00
15	4855	182	776.00
16	4857	1377	480
17	4858	331	733.00
18	4859	1601	233
19	4860	1377	43
20	4915		653.00
21	4916		1276.00
22	4937	1517	189.00
23	5211	1311	1481
Total Area in Sqm=			16043
Total Area in Acre=			3.965

Annex 9

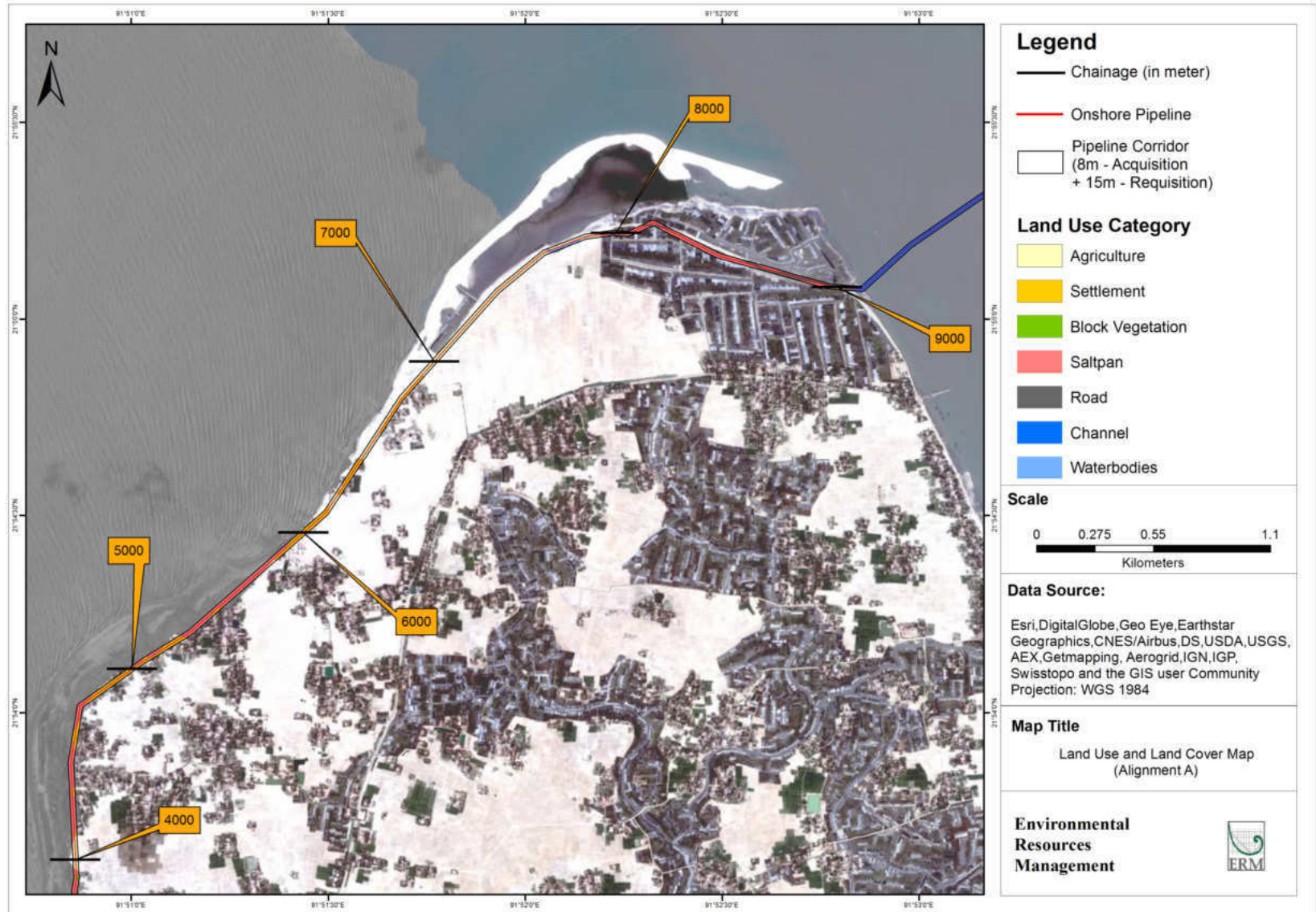
Pipeline Route Alternatives – Landuse Maps

Pipeline Route Alternatives – Landuse Maps

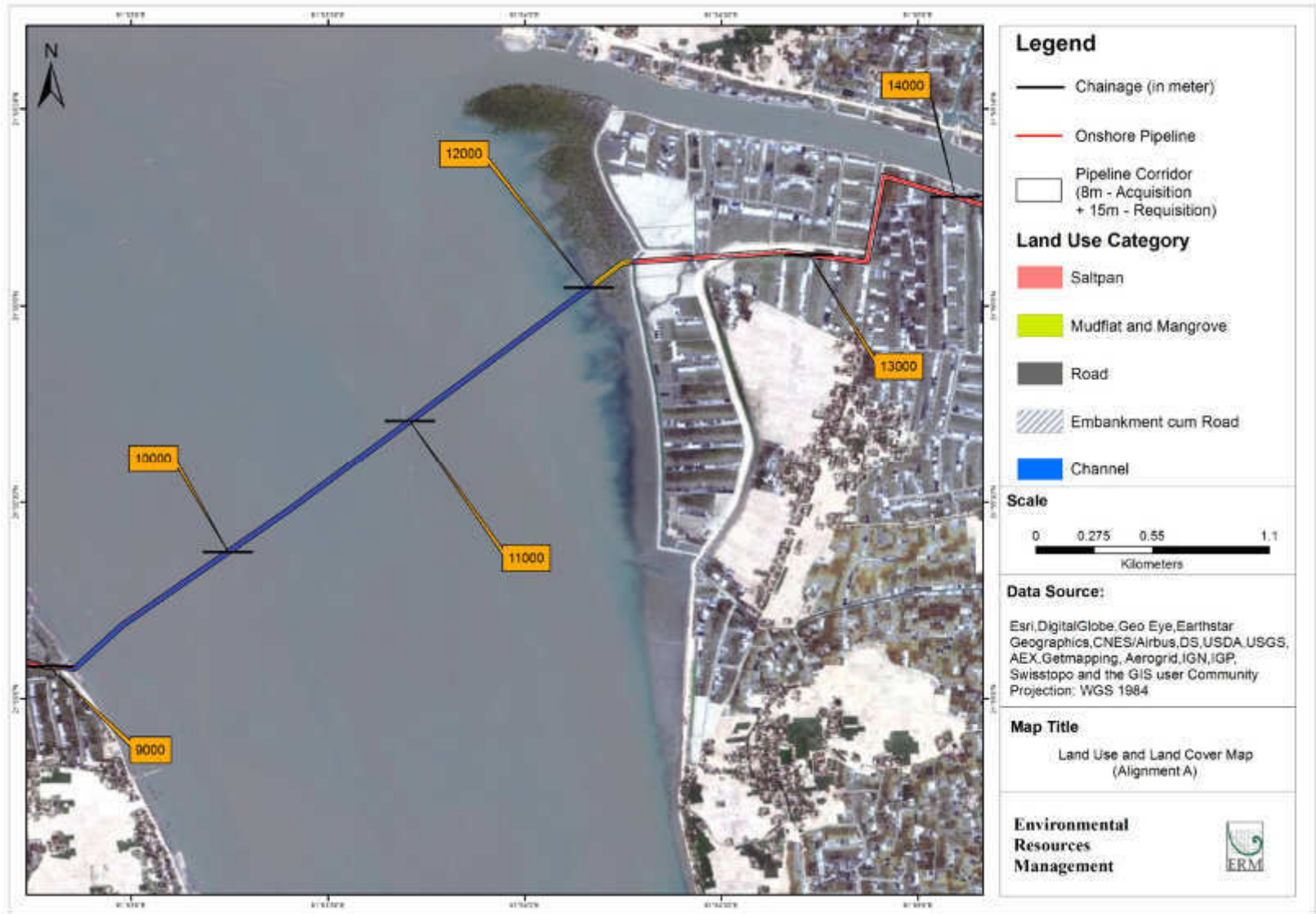
Alignment A – Sheet 1 of 4



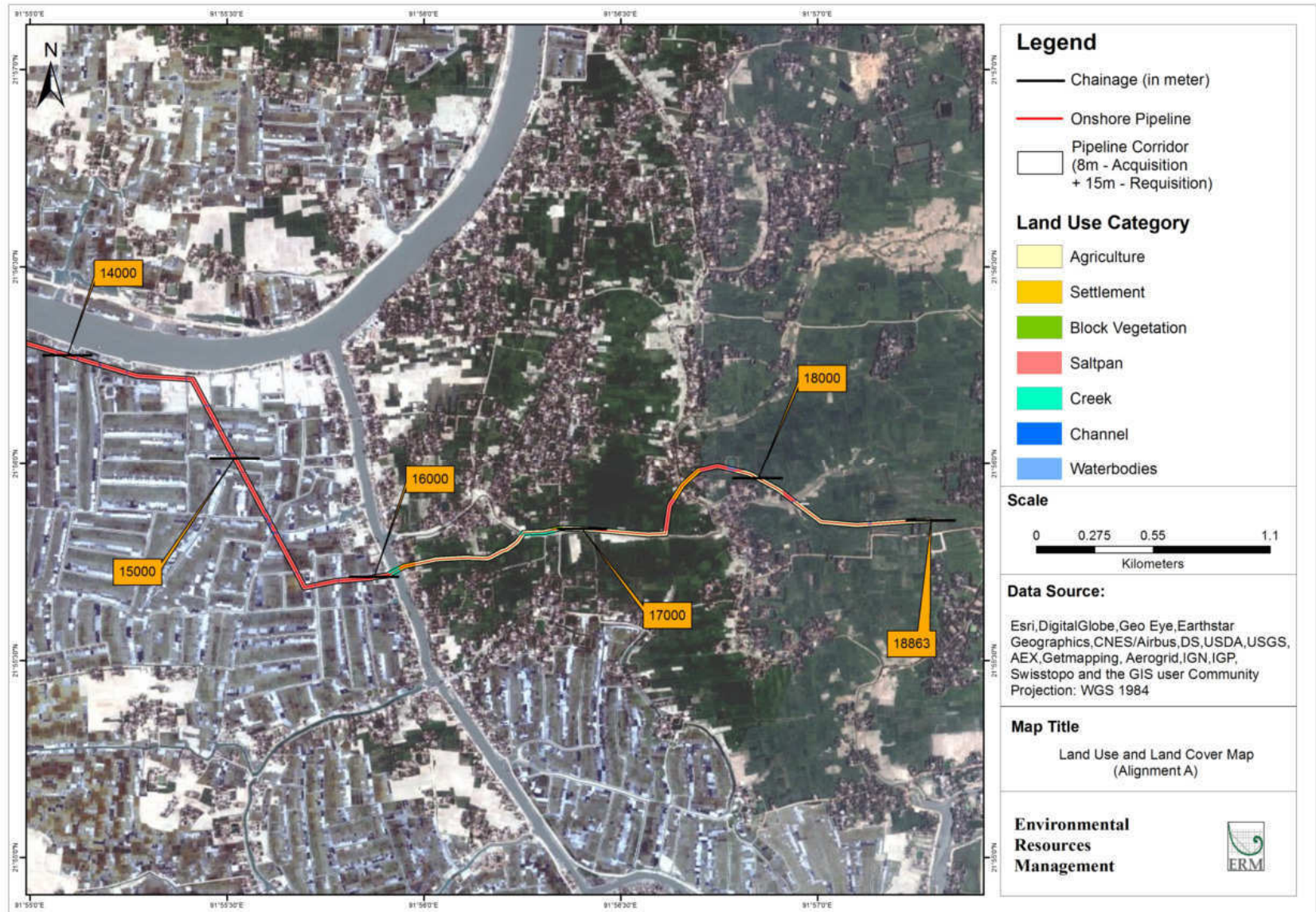
Alignment A – Sheet 2 of 4



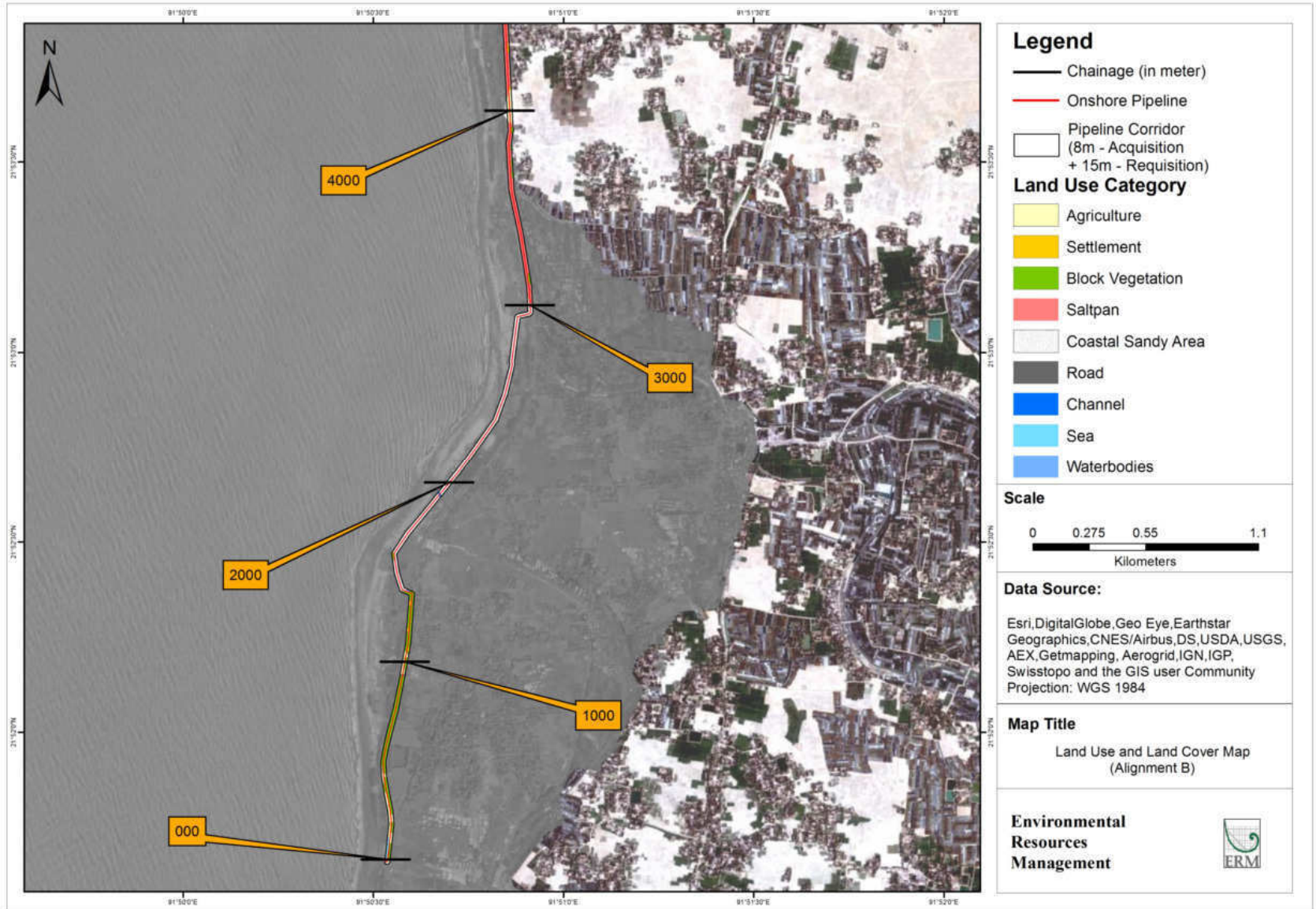
Alignment A – Sheet 3 of 4



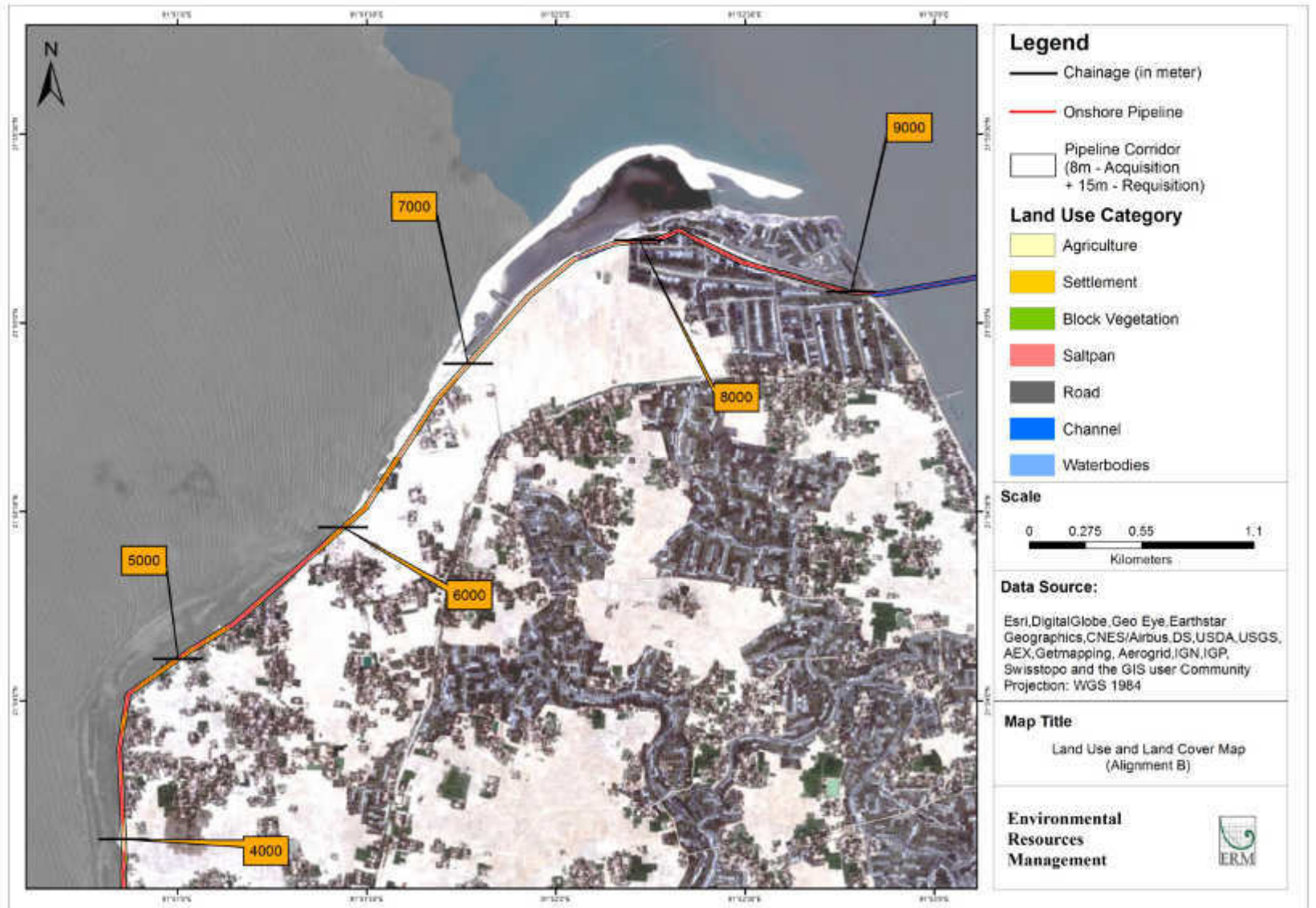
Alignment A – Sheet 4 of 4



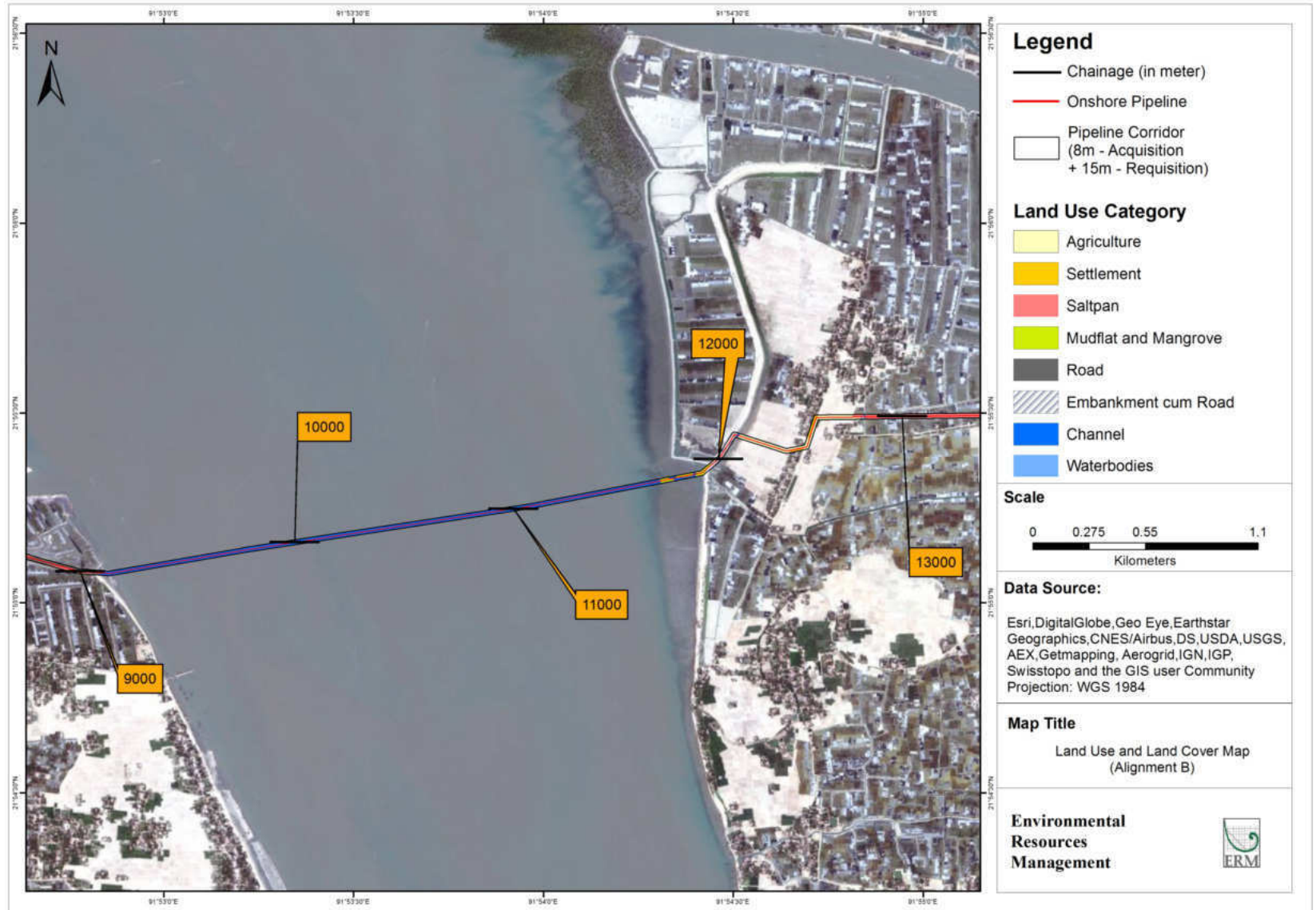
Alignment B – Sheet 1 of 4



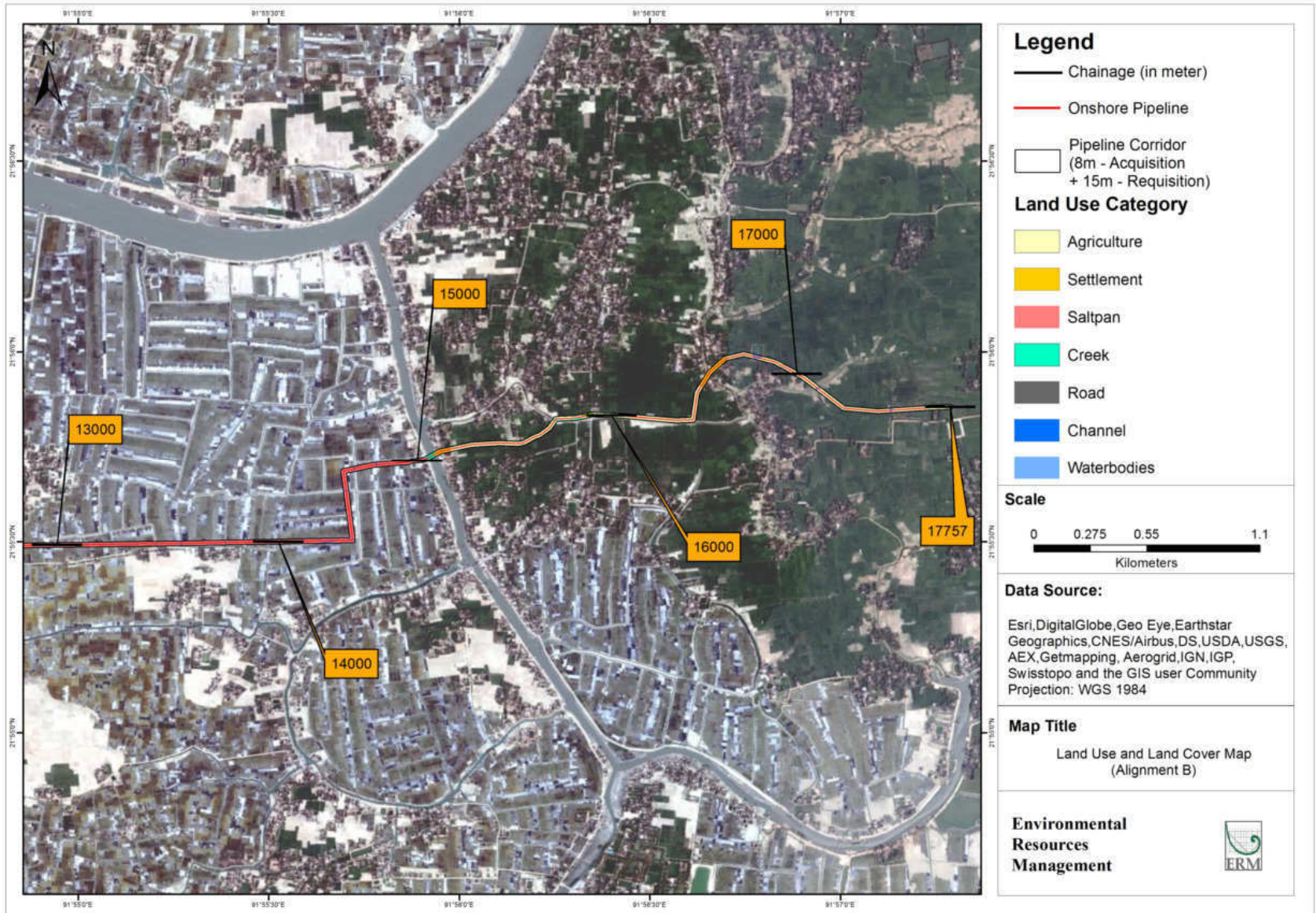
Alignment B – Sheet 2 of 4



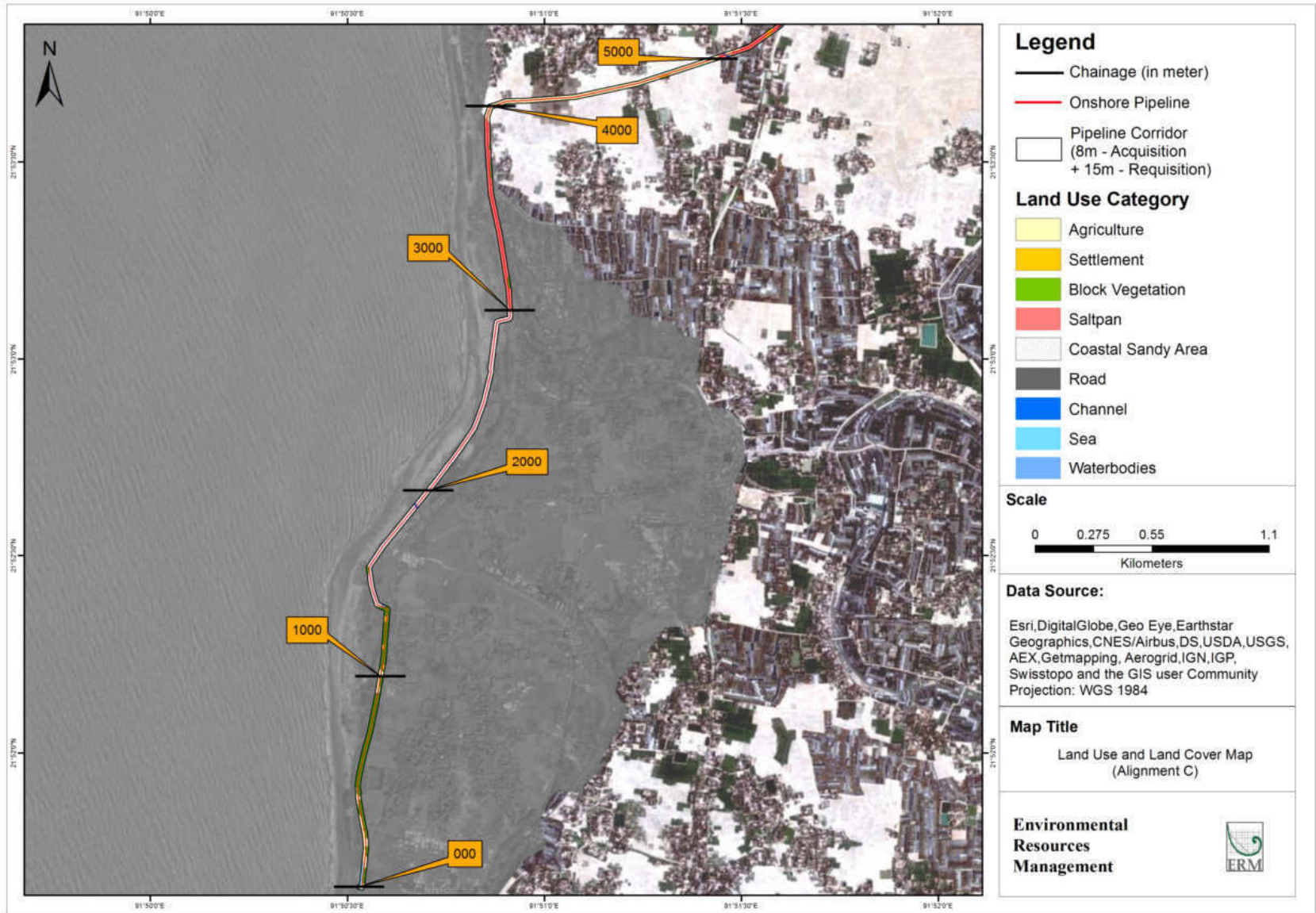
Alignment B – Sheet 3 of 4



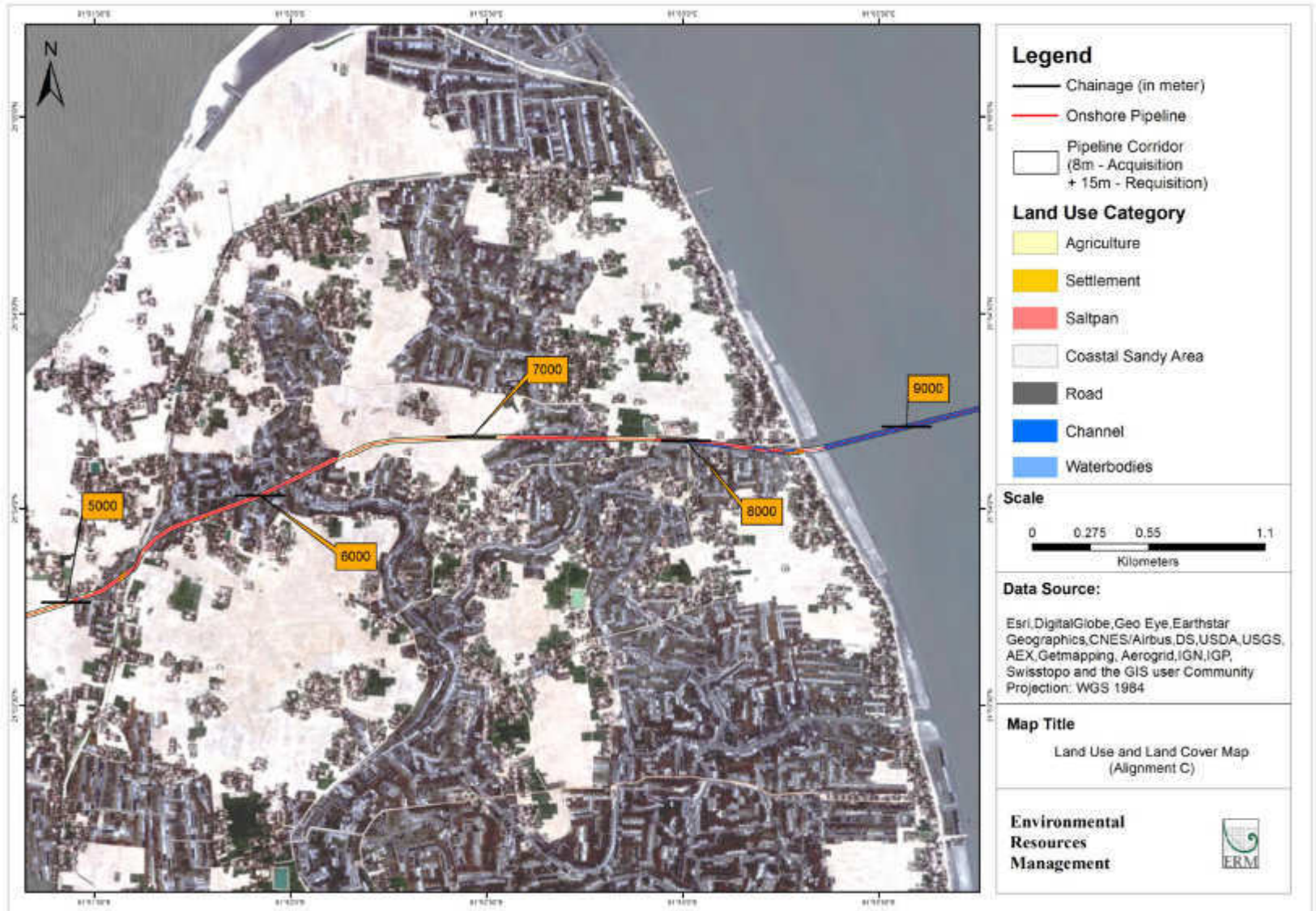
Alignment B – Sheet 4 of 4



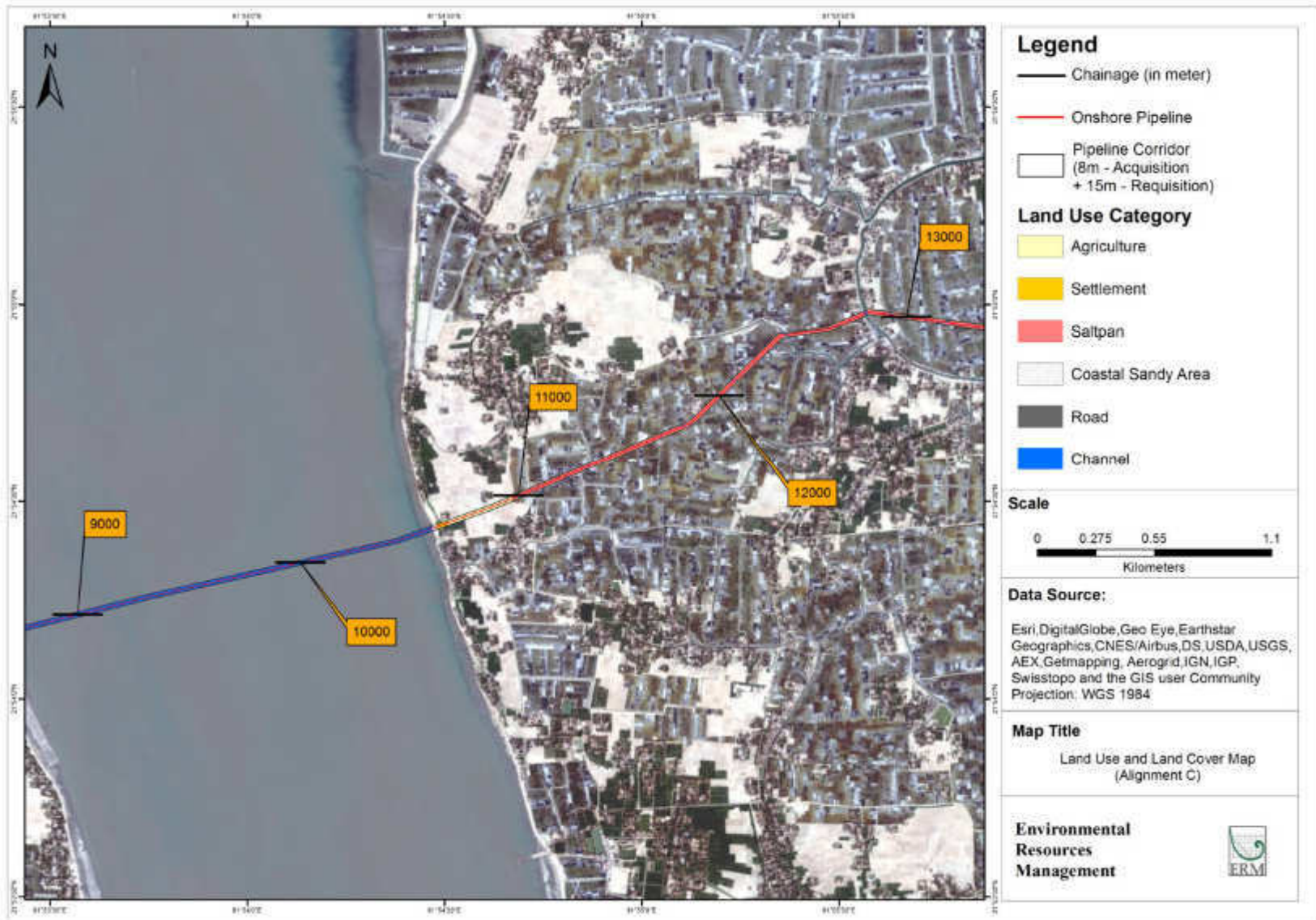
Alignment C – Sheet 1 of 4



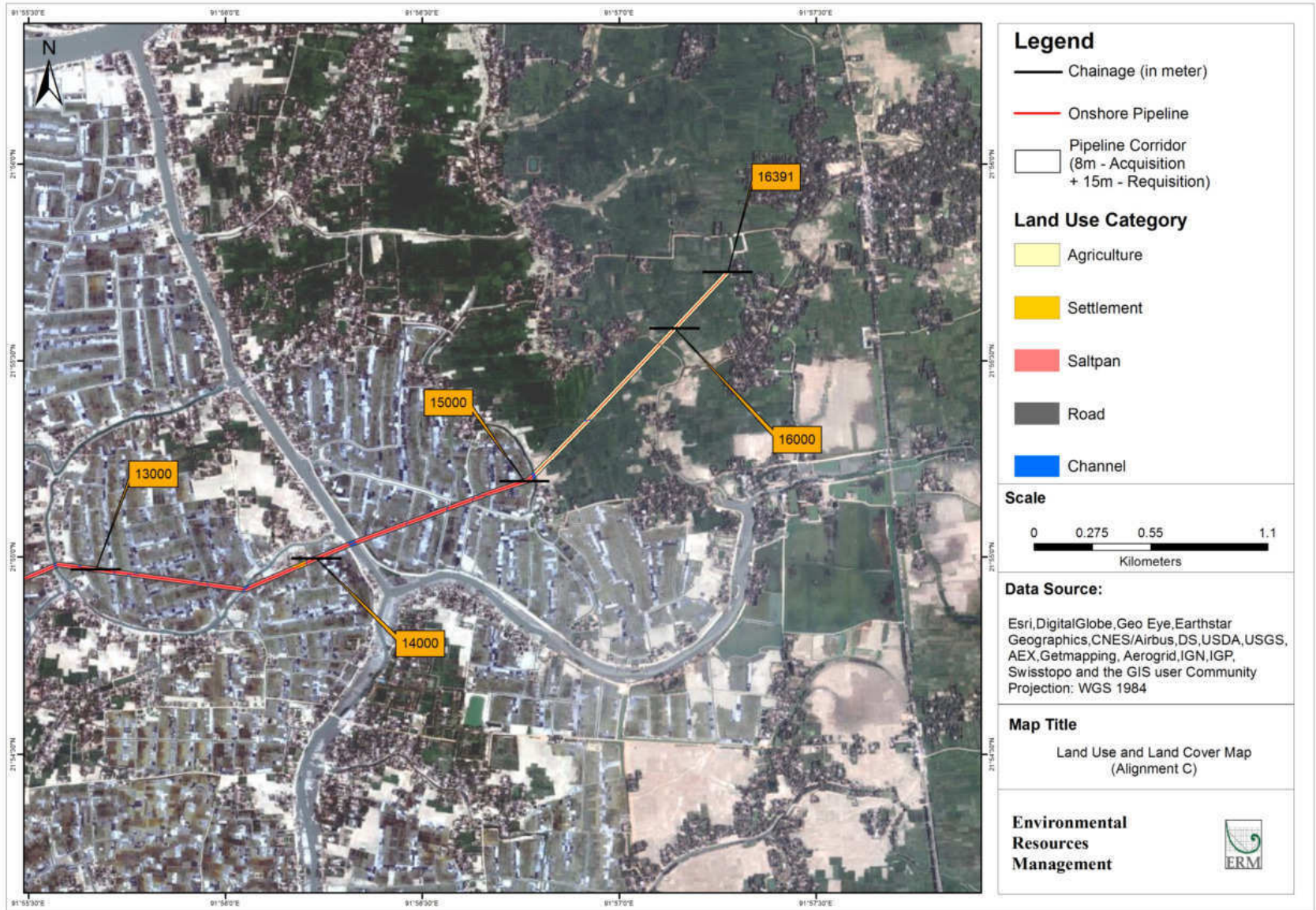
Alignment C – Sheet 2 of 4



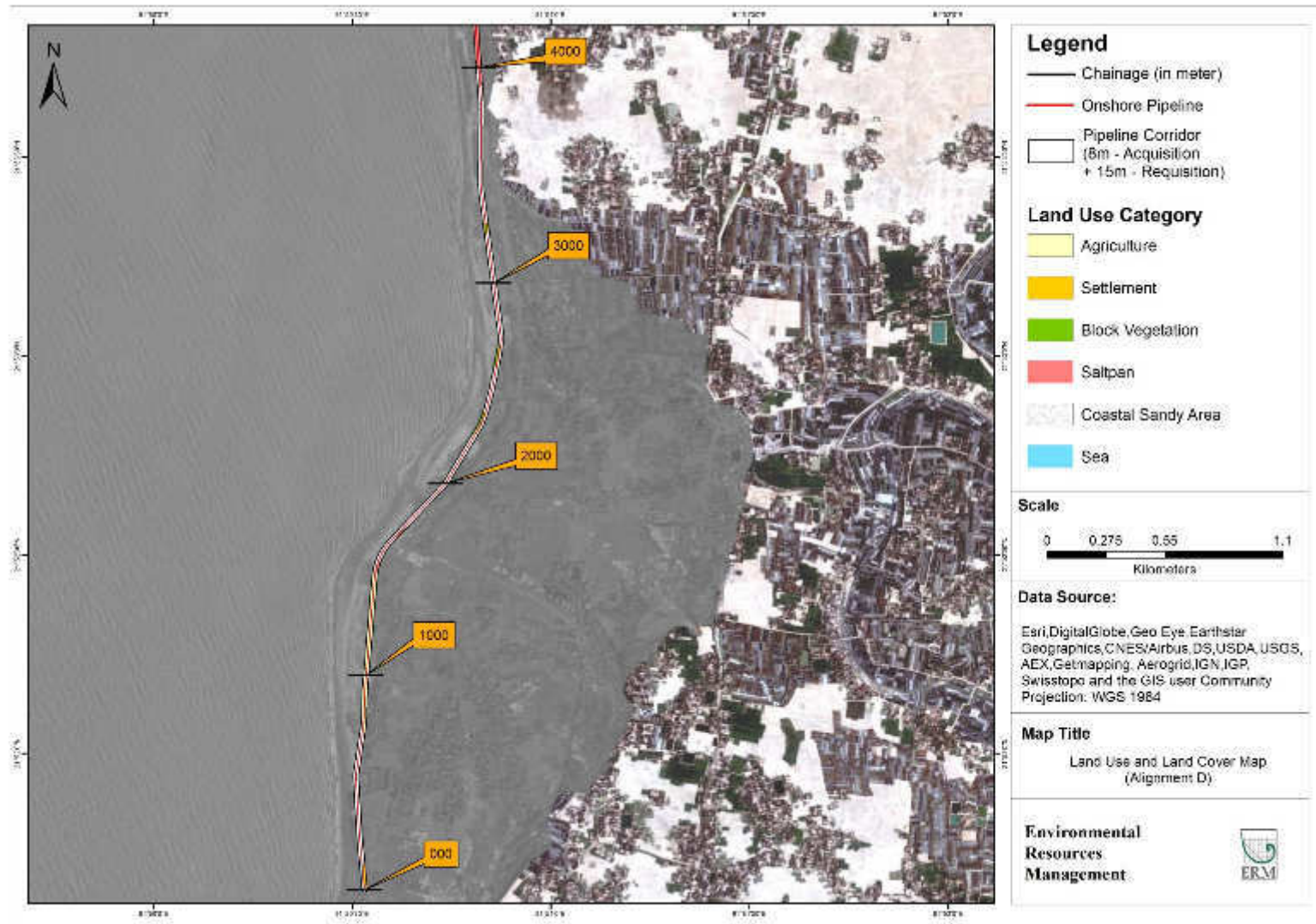
Alignment C – Sheet 3 of 4



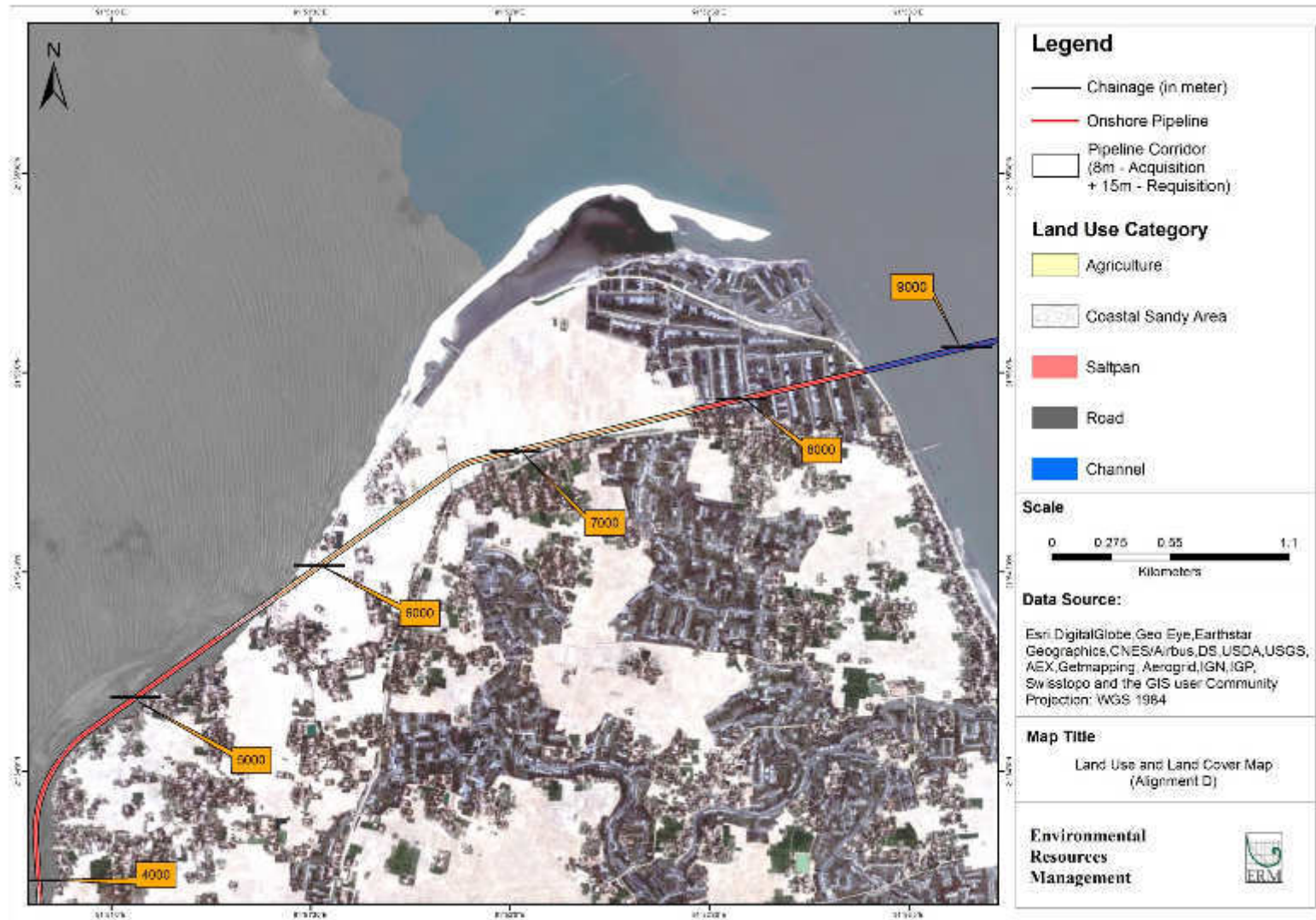
Alignment C – Sheet 4 of 4



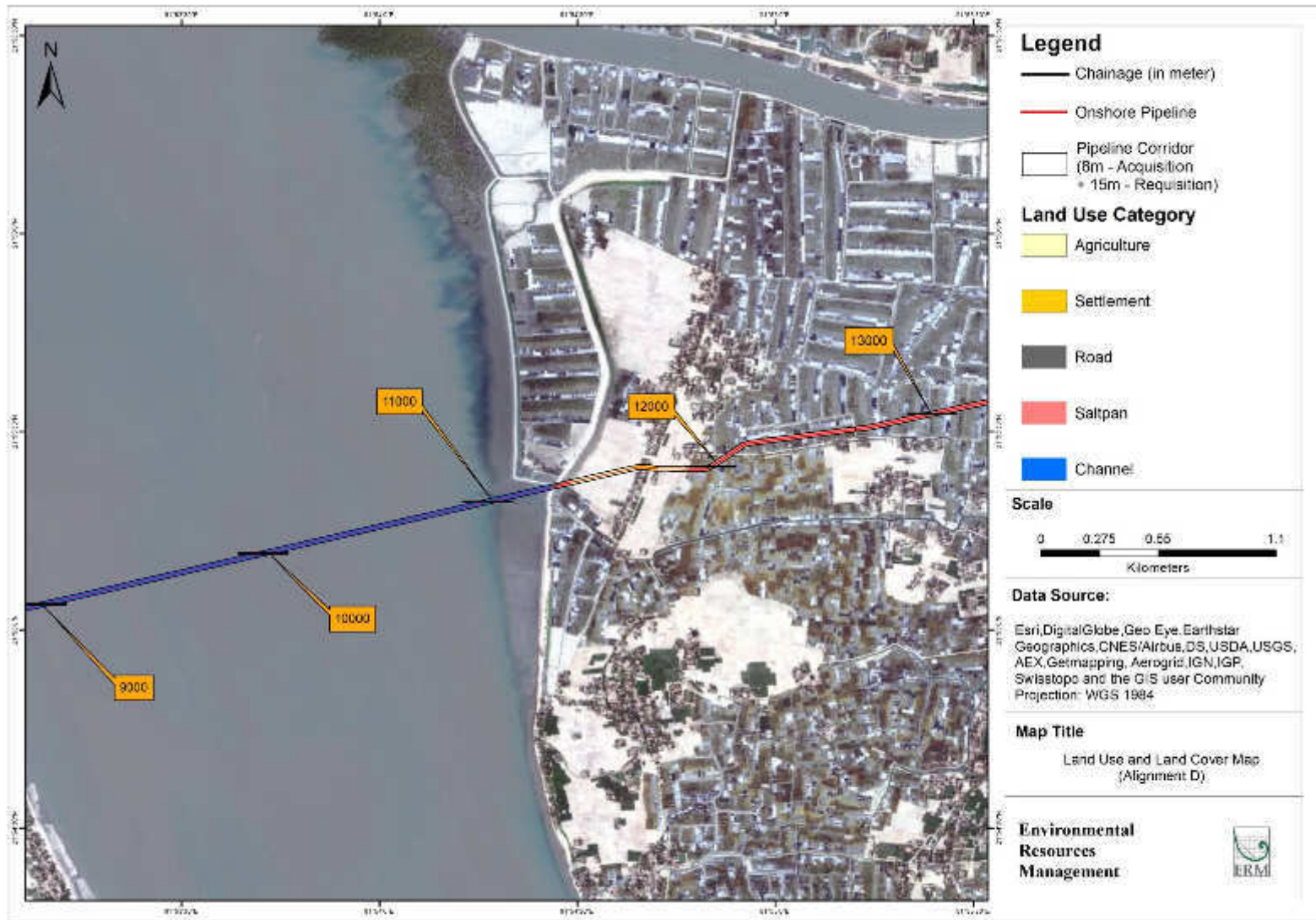
Alignment D – Sheet 1 of 4



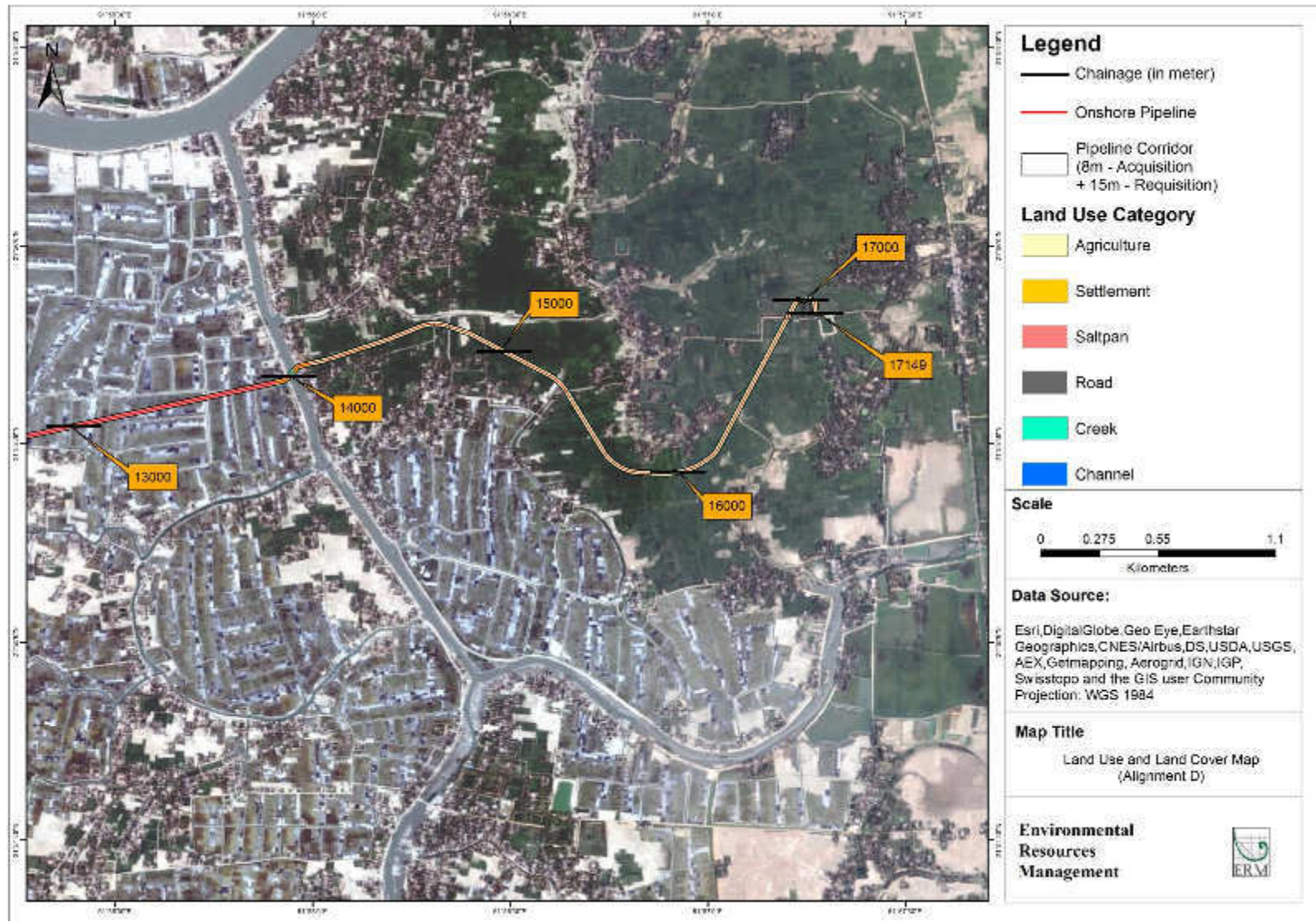
Alignment D – Sheet 2 of 4



Alignment D – Sheet 3 of 4



Alignment D – Sheet 4 of 4



Annex 10

Stakeholder Consultation - Minutes

Stakeholder Consultation-District Administration

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Dy. Commissioner (DC)	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	DC Office, District Commissionerate, Cox's Bazar	
	<i>Date</i>	23.08.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
	1.	Md. Ali Hussain	DC, Cox's Bazar
	2.	Sibbir Ahamed	Reliance Power, Bangladesh
	3.	Dhritiman Ray	ERM
	4.	Naval K Chaudhary	ERM
	5.	Soumi Ghosh	ERM
6.	Tauhidul Hasan	EQMS	
E	<i>Purpose of Consultation</i>		
	<ul style="list-style-type: none"> • Information sharing and Collection • Assessing Impact Perception • Involving in Mitigation Planning 		
F	<i>Key Points Discussed:</i>		
	<ul style="list-style-type: none"> • This meeting was held to appraise the DC of the initiation of the IEE & ESIA study for the Kutubdia LNG Project • DC Office cannot enter into any type of contract with a private agency; hence, Reliance Power has to sign a contract with the concerned ministry (MoPEMR) before any land acquisition can be initiated. The DC described how the land acquisition process is initiated : <ul style="list-style-type: none"> • Once an agreement is entered on with the Project Proponent, the Ministry can forward the proposal to DC Office for reviewing; • DC Office will then examine schedule of land (mouza/khatian/Dag No.) and establish ownership; • In case of government land the DC will ask for a settlement proposal (leasing of land); • In case of private land the DC will initiate land acquisition. • The DC stressed on the need to protect the sea and land and advised to collect information on cyclone, storm surge, high tide along with meteorological and hydrogeological information. • For GTCL (gas grid) in Moheshkhali Anwara stretch, acquisition of private land has been carried out through DC Office (for pipeline laying) • All Government land (khas) belongs to the DC. This includes canal, road, river, grazing land and reclaimed land. For all cases DC sends the proposals to the Land Department for verification. • Coastal areas planted with mangroves have been classified as protected forest. 		

Stakeholder Consultation-District Administration

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Additional Dy. Commissioner (ADC)	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	ADC Office, District Commissionerate, Cox's Bazar	
	Date	14.11.2016	
D	Attended By		
	Sr.	Name	Designation
	1.	Mr. Md. Anwarul Naser	ADC, Cox Bazar
	2.	Rahul Srivastava	ERM
	3.	Abhishek Roy Goswami	ERM
	4.	Soumi Ghosh	ERM
5.	Souvik Basu	ERM	
E	Purpose of Consultation		
	<ul style="list-style-type: none"> Information sharing and Collection Assessing Impact Perception Involving in Mitigation Planning 		
F	Key Points Discussed:		
	<p>Land Requirement for Reliance Power</p> <ul style="list-style-type: none"> Reliance Power has to select the land first and accordingly submit a formal proposal to the Land Office After getting the formal proposal from Reliance Power, the Land Office can react on the issue The land rights will first be checked If it is Khas (Govt.) Land then it will be a permanent settlement between Land Ministry, Govt. of Bangladesh and Reliance Power If the land has been eroded and at least before 30 years and no claim has been established in between, it will then considered as govt. land as per "State Acquisition and Tenancy Act 1950". Accordingly a permanent settlement between Reliance Power and Land Ministry. Govt. of Bangladesh can be effected. If it is eroded land but not before 30 years and before acquisition any claim on this land parcel appears - it will then be considered as private land and the acquisition will be initiated as per "Acquisition and Requisition of Immovable Property Ordinance, 1982". There are no legal rights of the community on any reclaimed land if the erosion has happened before 30 years and thereafter the land has been reclaimed by the community for some specific use. Sub-Registry Office of Land Office at Upazila level records the data regarding land erosion. <p>Land Price</p> <ul style="list-style-type: none"> Land Ministry, Govt. of Bangladesh will decide the rent for Khas (Govt.) land through a process of permanent settlement between Govt. of Bangladesh and Reliance Power If it involves private land acquisition, then last 12 month average land price will be considered Private land price will be arrived at by considering last 12 month's land price and multiplied by 1.5 		

Stakeholder Consultation- Fishery Department, Cox's Bazar

A	Project Title:	ESIA Study, Kutubdia LNG Project
B	Stakeholder Title:	District Fishery Department
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>		
C	Basic details:	
	Location:	District Fishery Office Cox's Bazar
	Date	23.08.2016 and 14.11.2016
D	Attended By	
	Sr.	Name
		Designation
		Meeting held on 23.08.2016
	1.	Amitosh Sen
		District Fishery Officer
	2.	Dhritiman Ray
		ERM
	3.	Soumi Ghosh
		ERM
	4.	Tauhidul Hasan
		EQMS
		Meeting held on 14.11.2016
	1.	Amitosh Sen
		District Fishery Officer
	2.	Rahul Srivastava
		ERM
	3.	Abhishek Roy Goswami
		ERM
	4.	Soumi Ghosh
		ERM
E	Purpose of Consultation	
	<ul style="list-style-type: none"> • Information Collection regarding fishing • Assessing Impact Perception • Involving in Mitigation Planning 	
F	Key Points Discussed:	
	<ul style="list-style-type: none"> • There is an ongoing program of Govt. of Bangladesh for registration of fishermen and issuing them fishermen identity cards (FID cards) • Till date 7116 fishermen have been registered in Kutubdia, out of which 2464 fishermen have been issued FIDs • FIDs are issued only to Bangladeshi citizens having National Identity Cards (NIDs) and only to adult fishermen (age > 18 years) • So actual number of fishermen are expected to be around 20% higher • Minimum 8 months of involvement in fishing in a year is required for being considered as a fisherman, • In future in absence of FIDs, coast guards may prevent from fishing in the seas • There is also an ongoing systems for registration of boats; registration of boats is by Marine Mercantile Dept. (MMD) located in Chittagong • The fees required for registration of boats is based on engine capacity of the boats • Two types of fishing is prevalent in this region – day fishing and deep sea fishing • Day fishing is with boats with engine capacity less than 30 HP • Deep sea fishing involves a trip of 7-15 days and with boats of engine capacity around 50-70 HP • The most common fish net that is used in this region is Behundi (marine setbag net) 	

Stakeholder Consultation- Bangladesh Small & Cottage Industries Corporation (BSCIC)

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project
B	<i>Stakeholder Title:</i>	Bangladesh Small & Cottage Industries Corporation (BSCIC)
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>		
C	<i>Basic details:</i>	
	<i>Location:</i>	BSCIC office Cox's Bazar (Salt Office)
	<i>Date</i>	23.08.2016
D	<i>Attended By</i>	
	<i>Sr.</i>	<i>Name</i>
	1.	Md. Shameem Alom
	2.	Ridwanu Rashid
	3.	Dhritiman Ray
	4.	Soumi Ghosh
		<i>Designation</i>
		Coordination Officer, BSCIC, Cox's Bazar
		Coordination Officer, BSCIC, Cox's Bazar
		ERM
		ERM
E	<i>Purpose of Consultation</i>	
	<ul style="list-style-type: none"> • Information Collection regarding salt Cultivation • Assessing Impact Perception • Involving in Mitigation Planning 	
F	<i>Key Points Discussed:</i>	
	<ul style="list-style-type: none"> • Frequent cyclonic storms and sea water surge into the Kutubdia Island over the years has caused infertility of the island soil - this has prompted island residents to opt for salt cultivation. This region earlier used to have mostly agricultural land. • Salt cultivation is done for almost 6 months in a year between November and May. • Salt cultivation is mainly carried out on both sides of 'Pilat Kata Khal' (inland channel) within Kutubdia Island. Water from Bay of Bengal is channelized to the Kata Khal through several sluice gates from the Kutubdia Channel. • In Kutubdia Island 7000 acres of land is under salt cultivation with around 4600 salt cultivators • The salt cultivators take land on lease / 'barga' for 6 months for salt cultivation. Salt is sold through middlemen. • There are no local markets in Kutubdia for selling salt and it proves costlier for the cultivators to take the salt and sell it in Chittagong markets. In most cases the salt cultivators take loan from the middlemen for leasing out land and hence there is an arrangement between them that the salt will be sold only to them. • Apart from salt cultivation, people on the island also earn their livelihood through fishing, paddy cultivation and working as daily labourers. • The number of salt cultivators is not same every year. If the yield is better in one year then the number of salt cultivators increases the next year, almost by 10%. • Unlike other areas such as Moheshkhali, in Kutubdia all the salt cultivators are from the island itself. 	

Stakeholder Consultation- District Forest Office

A	Project Title:	ESIA Study, Kutubdia LNG Project
B	Stakeholder Title:	District Forest Officer
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>		
C	Basic details:	
	Location:	District Forest Office
	Date	23.08.2016
D	Attended By	
	Sr.	Name
	1.	Md. Ali Kabir
	2.	G M Mohammad Kabir
	3.	Dhritiman Ray
	4.	Soumi Ghosh
	5.	Naval K Chaudhary
	6.	Tauhidul Hasan
E	Purpose of Consultation	
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding forest • Assessing Impact Perception • Involving in Mitigation Planning 	
F	Key Points Discussed:	
	<ul style="list-style-type: none"> • Kutubdia Island has coastal afforestation zones and social forestry areas. • Casuarina trees have been planted by the department as part of the Social Forestry measure on the sea facing side of the island. Community people are involved in maintenance and protection of the plants. • The coastal afforestation programmes are undertaken on Khas land (Government land) – in such cases the land is not owned by the Forest Department • Forest Department had planted casuarina trees under the coastal afforestation program in Kutubdia Island – however during the recent cyclonic event (Roanu) in May 2016, a large of these trees was uprooted. • In case of participatory community afforestation programs, the community generally looks after the plantation for a period of 10 years, after which the trees are sold through tendering. 45 % of the total sale goes to the community, 45% of the share goes to Forest Department and 10% is used for refunding of Social Forestry. • For acquiring Social Forestry land for any project, the project proponent has to take permission from District Commissioner and pay the compensation which is decided based on the age of the trees. • The Forest Department has planted mangrove species along the south eastern part of the Island especially around Boroghob Ghat. The species of mangrove planted include Keora (Sonneratia apetala) and Byne (Avicennia sp.) • The Forest Department has not carried out any wildlife survey / study in the Kutubdia Island. • The Forest Department suggested interacting with Marinelife Alliance (an NGO), who have been working on a ‘Sea Turtle Project’ along this entire coastline together with the Forest Department and the World Bank. 	

Stakeholder Consultation- Department of Environment (DOE), Cox's Bazar

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Department of Environment (DOE), Cox's Bazar	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	DOE regional office Cox's Bazar	
	<i>Date:</i>	25.08.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
	1.	Sarder Shariful Islam	Assistant Director, Department of Environment (DoE), Cox's Bazar
	2.	Naval K Chaudhary	ERM
	3.	Tauhidul Hasan	EQMS
E	<i>Purpose of Consultation</i>		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding Environmental Clearance Process • Assessing Impact Perception • Involving in Mitigation Planning 		
F	<i>Key Points Discussed:</i>		
	<ul style="list-style-type: none"> • Monitoring of the projects is being done by different offices of the DoE: <ul style="list-style-type: none"> • Green & Orange 'A' Category Projects: District Office • Orange 'B' Category Projects: Divisional Office • Red Category Projects: Head Office • Application for site clearance (IEE) needs to be submitted to District Office of DoE in three copies along with application fee as per Environmental Conservation Rules, 1997. • Processing of site clearance application in District and Divisional Offices will take minimum 2 weeks and as the project will be falling in Red Category and hence, the final clearance will be issued by the DoE Head Office only. • Due to limited infrastructure and resources, the District Office is not involved in regular environmental monitoring in the District. However, Divisional Office at Chittagong provides support as need arises. The District Office does carryout some water testing. • No secured landfill for disposal of solid and/or hazardous wastes is currently available in Cox's Bazar District. The Cox's Bazar Municipal Corporate is having a dumping ground for municipal waste; however, this is not designed scientifically. • The DoE is currently developing four landfills and treatment sites in Bangladesh, which are at (a) Gazipur; (b) Narayanganj; (c) Rangpur; and (d) Cox's Bazar. Out of these Narayanganj facility is completed and operational, whereas other three sites will be commissioned by mid-2017. • At present, Cox's Bazar district is not having any sewage treatment plant and hazardous waste disposal site. However, the Cox's Bazar Development Authority has taken into consideration the development of a sewage treatment plant, which is currently in initial planning and approval phase. • Nearest hazardous waste incineration facility is available at Chittagong Port Authority. • Cox's Bazar is not having any waste oil/ used oil and lubricant processing facility. At present, such waste oil/ lubricant is being collected by local businessmen and sold to reprocessing facilities in Chittagong region. • No coastal zone management authority exists. However, coastal area security is being looked by Coast Guards. • The proposed site is away from any ecological sensitive location; however, the project can have impact on aquatic flora and fauna due to hot/ cold water discharges. • Any destruction to mangroves to be avoided during project construction or operations. • No major development is currently planned in Kutubdia. However, Bangladesh Navy has taken site clearance for a submarine station to be located between Magnama Ghat and Ujantia in Pekua Upazila. This facility will use the Kutubdia channel as well. 		

Stakeholder Consultation-Upazila Administration

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Upazila Nirbahi Officer, Kutubdia	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	UNO Office, Kutubdia Upazila	
	<i>Date</i>	24.08.2016 and 15.11.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
	1.	Mr. Salehin Tanvir Gazi	UNO & AC (Land) In charge, Kutubdia
	2.	Mr. Md. Aktar Hossain	Chairman, Lesmikhali Union Parishad
	3.	Mr. Jalal Ahamed	Chairman, Kaiyabil Union Parishad
	4.	Mr. Saiyad Ahamed Choudhuri	Chairman, Dakshin Dhurung Union Parishad
	5.	Mr. A.S.M. Sharriar	Chairman, Uttar Dhurung Union Parishad
	6.	Shajid Mhamood	Kutubdia Upazila Land Office
	7.	Rahul Srivastava	ERM
	8.	Abhishek Roy Goswami	ERM
	9.	Soumi Ghosh	ERM
	10.	Souvik Basu	ERM
11.	Tauhidul Hasan	EQMS	
E	<i>Purpose of Consultation</i>		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding land and livelihood • Assessing Impact Perception • Involving in Mitigation Planning 		
F	<i>Key Points Discussed:</i>		
	<p>Land Requirement for Reliance Power</p> <ul style="list-style-type: none"> • A formal proposal need to be submitted by a project proponent to the land office • On the basis of a duly approved proposal, the process for land uptake will be initiated. • The land rights will be examined • In case of Khas (Govt.) Land a permanent settlement can be effected between Land Ministry, Govt. of Bangladesh and Reliance Power • In case of private land acquisition provisions of “Acquisition and Requisition of Immovable Property Ordinance, 1982” will be followed. <p>Land Price</p> <ul style="list-style-type: none"> • Land Ministry, Govt. of Bangladesh will decide the rent for Khas (Govt.) land under permanent settlement between Govt. of Bangladesh and Reliance Power • If it is Private land acquisition then last 12 month average land price will considered • Private land price will be arrived at by considering last 12 month land price multiplied by 1.5 <p>Livelihood</p> <ul style="list-style-type: none"> • Majority of the population is dependent in fishing for earning their livelihood • Fisher man are involved both in deep sea fishing and daily fishing • Other than fishing, salt production is also a major livelihood activity • Few people are also involved in agriculture and fish drying activity • Most of agricultural lands are monocroped and fully dependent on rain • Paddy is the main agricultural produce of the area. In addition vegetable sand frits like water melon are also produced from this area. 		

Stakeholder Consultation-Upazila Fishery Office

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Upazila Fishery Officer, Kutubdia	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	Upazila Fishery Office, Kutubdia Upazila	
	<i>Date</i>	24.08.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
	1.	Nasim Al Mahmood	Upazila Fisheries Officer
	2.	Md. Javed Iqbal	Marine Fishery Officer
	3.	Dhritiman Ray	ERM
	4.	Naval K Chaudhary	ERM
	5.	Soumi Ghosh	ERM
6.	Tauhidul Hasan	EQMS	
E	<i>Purpose of Consultation</i>		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding fishing activity • Assessing Impact Perception • Involving in Mitigation Planning 		
F	<i>Key Points Discussed:</i>		
	<ul style="list-style-type: none"> • Two rounds of registration of fisher men have been undertaken in Kutubdia - 5716 fishermen have been registered under Phase I while 1228 fishermen have been registered under Phase II. • Both mechanised as well as non-mechanised boats are in use in the Kutubdia Upazila. It is understood that at present approx. 150-200 boats mechanised boats (Danish boat/tempo boat and medium/large size wooden boats) are presently operating from this island; the number of non-motorised boats wooden boats in use is much higher (approx. 800 boats) • Two separate form of fishing are practiced including daily fishing (which continues for maximum of 1 to 1.5 days) and deep sea fishing (continues at a stretch for 10-12 days); Around 80% of the fisher men are involved in day fishing • Type of fishing gear commonly used include Hundara Jal, Behundi Jal • Fishermen use push net, beach side seine net, shrimp net, etc. • In Dakshin Dhurung and Kaiyarbil unions, 876 and 260 fishermen have received FIDs • Fishermen use the entire stretch of the coast for anchoring the boats, venturing in the seas and also for drying of their nets. • There is no fish landing site on the island as the fish catch is sold off in the high sea. • Commercially the fish drying activities are carried out towards the south-eastern part of the island; it is done privately and without any association with the Fisheries Department. 		

Stakeholder Consultation-Upazila Agriculture office

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Sub. Asst. Agriculture Officer, Kutubdia	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	Upazila Agriculture Office, Kutubdia Upazila	
	Date	24.08.2016	
D	Attended By		
	Sr.	Name	Designation
	1.	Md. Monir	Sub. Asst. Agriculture Officer, Kutubdia
	2.	Dhritiman Ray	ERM
	3.	Naval K Chaudhary	ERM
	4.	Soumi Ghosh	ERM
5.	Tauhidul Hasan	EQMS	
E	Purpose of Consultation		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding agriculture activity • Assessing Impact Perception • Involving in Mitigation Planning 		
F	Key Points Discussed:		
	<ul style="list-style-type: none"> • Total area of the Kutubdia Upazila is 15,102 Ha of which area under cultivation is 5465 Ha. • Some of the regions in this Upazila are tripled cropped with Rabi, Kharif I (Aaush) and Kharif II (Amon) • Single cropped area is 250 Ha, double cropped area is 1670 Ha while the triple cropped area is 2500 Ha • Farmers are being given identity cards – Krishi Upakaran Sahayata Card • At present there are 13,740 farmers who are involved in cultivation of paddy and vegetables • Farmers are classified as landless, marginalised, small, medium and big - based on the agricultural land holding size • Net cropped area in Dakshin Dhurung Union Parishad is 680 Ha while that in Kaiyabil Union Parishad is 360 Ha • Due to frequent cyclonic events and sea water surge, more and more agricultural lands are becoming infertile and getting converted for salt cultivation. 		

Stakeholder Consultation-Upazila Education office

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Asst. Upazila Education Officer, Kutubdia	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	Upazila Education Office, Kutubdia Upazila	
	<i>Date</i>	24.08.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
	1.	Omar Farukh	Asst. Upazila Education Officer, Kutubdia
	2.	Dhritiman Ray	ERM
	3.	Soumi Ghosh	ERM
E	<i>Purpose of Consultation</i>		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding Educational Status and Educational Infrastructure • Assessing Impact Perception • Involving in Mitigation Planning 		
F	<i>Key Points Discussed:</i>		
	<ul style="list-style-type: none"> • The literacy rate of Kutubdia Upazila is 71%. • The department has focused on 100% enrolment of children and has achieved enrolling almost 95% of the children into schools. • Three types of educational systems are in practice – general school, madrasa and vocational institutions • For graduate / post graduate education, students have to visit Chittagong • Details on educational Infrastructure available in Kutubdia Upazila was shared with ERM • Dropout rate among boys are more especially during winter. They get involved into fish drying activity during this period as it is an easy source of earning money. 		

Stakeholder Consultation-Upazila Health Complex

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Medical Officer, Upazila Health Complex, Kutubdia	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	Upazila Health Complex, Kutubdia Upazila	
	<i>Date</i>	24.08.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
	1.	Dr. Abdulah Hassa	Medical Officer, Upazila Health Complex, Kutubdia
	2.	Dhritiman Ray	ERM
	3.	Soumi Ghosh	ERM
E	<i>Purpose of Consultation</i>		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding morbidity status and health Infrastructure • Assessing Impact Perception • Involving in Mitigation Planning 		
F	<i>Key Points Discussed:</i>		
	<ul style="list-style-type: none"> • The Upazila Health Complex has three departments – Out Patient Department (OPD), 31 bedded indoor facility and an emergency ward. • There are 3 Medical Officers (MOs) at the Upazila Health Complex along with one Family Welfare Councillor and one UHNFO. • At Union Parishad level there are Family Welfare Centers. • It was reported by the MO that diarrhoea and respiratory tract infections are some of the common diseases among the population of the island • Usually after natural disasters people suffer from water borne diseases. • There are no ambulance service available on the island • In order to reach out to all the community people, 12 Community Clinics are held by the health department, 2 each for 6 Union Parishads. • Immunization camps are held regularly 		

Stakeholder Consultation- Bangladesh Meteorological Dept., Station Kutubdia

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Observer, Bangladesh Meteorological Dept. (BMD), Station Kutubdia	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	Observatory of BMD at Kutubdia	
	<i>Date</i>	24.08.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
	1.	Humayun Kabir	Observer, Bangladesh Meteorological Dept., Station Kutubdia
	2.	Dhritiman Ray	ERM
	3.	Naval K Chaudhary	ERM
	4.	Soumi Ghosh	ERM
5.	Tauhidul Hasan	EQMS	
E	<i>Purpose of Consultation</i>		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding Meteorological data • Assessing Impact Perception • Involving in Mitigation Planning 		
F	<i>Key Points Discussed:</i>		
	<ul style="list-style-type: none"> • Meteorological parameters such as temperature, humidity, wind speed, wind direction, barometric pressure, cloud cover and rainfall are manually recorded at this weather station at Kutubdia. • This station however does not record specific data on special weather events (such as cyclones, storm surges, tidal flows, etc.) • Recent information collected on select meteorological parameters was discussed and informed to the ERM team. 		

Stakeholder Consultation- Bangladesh Water Development Board, Kutubdia

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Elton Section Officer & Mongsa Thaymarna, Surveyor, Water Development Board, Kutubdia	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	Water Development Board Office, Kutubdia Upazila	
	Date	24.08.2016	
D	Attended By		
	Sr.	Name	Designation
	1.	Elton	Section Officer, Water Development Board, Kutubdia
	2.	Mongsa Thaymarna	Surveyor, Water Development Board, Kutubdia
	3.	Dhritiman Ray	ERM
4.	Soumi Ghosh	ERM	
E	Purpose of Consultation		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding embankment protection • Assessing Impact Perception • Involving in Mitigation Planning 		
F	Key Points Discussed:		
	<ul style="list-style-type: none"> • The Upazila, which is an island is surrounded by 40 km bund (embankment) • The height of the embankment ranges from 6.5 -7 m from the ground level. • The width at the base of the embankment ranges from 45 to 150 m at different locations whereas the width of the top of the embankment is 2.5 m. • The Water Development Board has a plan to upgrade and reconstruct some portions of the embankment that has been damaged due to Ruanu Cyclone (May 2016) 		

Stakeholder Consultation- Coastal Forest Department, Kutubdia

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Range Officer, Coastal Forest Department, Kutubdia	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	Upazila Forest Range Office, Kutubdia Upazila	
	<i>Date</i>	24.08.2016 and 16.11.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
		Meeting Held on 24.08.2016	
	1.	Asit Kumar Ray	Range Officer, Coastal Forest Department, Kutubdia
	2.	Dhritiman Ray	ERM
	3.	Naval K Chaudhary	ERM
	4.	Soumi Ghosh	ERM
	5.	Tauhidul Hasan	EQMS
		Meeting Held on 16.11.2016	
	1.	Asit Kumar Ray	Range Officer, Coastal Forest Department, Kutubdia
	2.	Abhishek Roy Goswami	ERM
	3.	Rahul Srivastava	ERM
E	<i>Purpose of Consultation</i>		
		<ul style="list-style-type: none"> • Information sharing • Information collection regarding forest and wildlife of the island • Assessing Impact Perception • Involving in Mitigation Planning 	
F	<i>Key Points Discussed:</i>		
		<ul style="list-style-type: none"> • Total protected forest area (Gazetted forest land) in Kutubdia Upazila is 867.19 acres • Dakhin Dhurung and Kaiyabil unions, where the project is located, have no protected / reserve forest lands. • However in both the unions, a total of 30 Ha. were under social forestry, of which 14 Ha. were lost during the recent Ruanu cyclone. • For acquiring any land that is either under Protected or Reserve Forest under Kutubdia Upazila, application has to be filed with the DFO (Coastal), Chittagong Division for permission. • For areas that are under social forestry, applications are to be filed with the DC who will then place it with the Forest Department for valuation of the trees that may be required to be felled for the project. Felling of such trees will necessitate approval from local level DFO, Chittagong Coastal Forest Division and at the central level from Chief Conservator of Forests, Dhaka and may require NOC from the Forest Department. • It was informed by the Range Officer that in the south western part of the island turtles comes for nesting; migratory birds also visit this portion of the island during the winter season. Crocodiles and Kamots (sharks) have also occasionally been sited on the coastal beaches of the island (especially in the northern portion of the Kutubdia Channel). 	

Stakeholder Consultation-Dakshin Dhurung Union

A	<i>Project Title:</i>	ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i>	Union Member of Dakshin Dhurung Union	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	<i>Basic details:</i>		
	<i>Location:</i>	Union Office, Dakshin Dhurung, Union	
	<i>Date</i>	16.11.2016	
D	<i>Attended By</i>		
	<i>Sr.</i>	<i>Name</i>	<i>Designation</i>
	1.	All union Member of Dakshin Dhurung Union	
	2.	Soumi Ghosh	ERM
3.	Souvik Basu	ERM	
E	<i>Purpose of Consultation</i>		
	<ul style="list-style-type: none"> • Information sharing • Information collection regarding land and livelihood • Assessing Impact Perception • Involving in Mitigation Planning 		
F	<i>Key Points Discussed:</i>		
	<ul style="list-style-type: none"> • All land along the sea shore is not owned by the Government. • Present sea shore was eroded only before 10 years • Villagers are still using this land for various purpose like vegetable cultivation, drying of fishing nets, maintenance of boats, etc. • Major livelihood activities of the union are fishing, agriculture, and salt cultivation • Health infrastructure is not so good in the union. People are sole dependent on Upazila Health Complex • Villagers are very positive about industrial development in the island as industrial development can create livelihood activity for the local people. • Only concern is industrial pollution will destroy the environment of the island • Industry should not pollute sea and channel water as most of people in the island are dependent on fishing • Electricity is not available in the union and that is one of the major problems in this union. • Salt water ingression due to broken earthen embankment is major problem. • Also expect some help from industry in supporting local infrastructure like road development, health infrastructure development, embankment protection etc. 		

Stakeholder Consultation-Fisherman Community of Dakshin Dhurung Union

A	<i>Project Title:</i> ESIA Study, Kutubdia LNG Project	
B	<i>Stakeholder Title:</i> Fisherman Community of Dakshin Dhurung Union	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>		
C	<i>Basic details:</i>	
	<i>Location:</i>	Union Office, Dakshin Dhurung, Union
	<i>Date</i>	17.11.2016
D	<i>Attended By (Attendance Sheet Attached)</i>	
	<i>Sr.</i>	<i>Name</i>
		<i>Designation</i>
	1.	Fishermen of Ali Fakir Deil Fisherman Colony
	2.	Fisherman from Dakshin Dhurung Jelepara
	3.	Madanyearpala Fisherman Community
	4.	Soumi Ghosh
	5.	Souvik Basu
E	<i>Purpose of Consultation</i>	
	<ul style="list-style-type: none"> Collection of information regarding fisherman community, fishing activity, fish catch, fishing gear, fishing boat, marketing of fish, Fish drying activity, aquaculture 	
F	<i>Key Points Discussed:</i>	
	<ul style="list-style-type: none"> Maximum fishermen (around 4000) are residing in 3 fishermen colonies within Dakshin Dhurung Union; most of them reside in the settlements at Dakshin Dhurung Jelepara, Ali Fakhir Deil, Madniyar Para (around 2200 to 2300 fisherman) Around 500 fishermen are also residing in Kaiyabil and Bindapara Majority of the fisherman in this island is residing in Boroghop Union Kutubdia fisherman federation was from under a UNDP funded program during 2003-2006 through involvement of seven NGOs. Fishing activity is continuing around the year. It is restricted only between October and November. There are three type of boats generally used for fishing activity i.e. industrial trawlers, mechanical boats and small mechanical fishing boats Industrial trawlers and small mechanical boats are used for deep sea fishing activity 20 to 35 fisher man per boat is usually engaged in deep sea fishing activity while 8 to 10 fisherman per boat is involved in day fishing. Almost 6 month a year all boat are involved in Hilsa fishing. This is the prime fish catch for all fishermen. In Kutubdia Channel near Gondapara, located north of the Kutubdia Island is located the main breeding center for hilsa fish in Bangladesh A deep sea fishing boat generally has a fish catch worth of around 4 to 6 lakh BDT in one trip while in case of a day fishing boat, the fish catch is worth around 0.5 to 1.5 Lakh BDT. One deep sea fishing trip is continued for 15 days and they move upto 300 km south west inside the sea Three category of personnel are generally involved in a fishing boat i.e. Sailors, Engine Drivers and Fishermen All of them are the contractual worker of the boat owner Annual contract value of sailor, engine driver and fisher man is in the range of 4 to 8 lakh, 1 to 1.5 lakh, 0.9 – 1.2 lakh respectively Day fishing boat sells their fish catch to the trader in Kutubdia channel near Sekhkhali and Banskhali Deep sea boat sells their fish catch in Chittagong and Cox Bazar Type of fishing nets used in this area includes Boro Behundi jal, Choto Behundi jal, Phad jal, Ilish jal, etc. The most common fish net is Behundi (marine setbag net) There are seventy fishing ground where fisherman from Kutubdia usually catch fish. These are: 	

	<ul style="list-style-type: none"> - Aat Bam - Baro Bam - Aathero Bam - Guliddar - Balaya - Purba Sonar Char - Paschim Sonar Char - Mohipur Chara - Halud Phari - Phatara - Nalya - Lamarpata - Mangala - Adha Mangala - Golpasan - Jhautala
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Photodocumentation



FGD with Fishermen Community of Dakhin Dhurung Union

ATTENDANCE SHEET
Focus Group Discussion (FGD)

Environmental and Social Impact Assessment (ESIA) Study
For

FSRU & LNG Terminal Project at Kutubdia Upazilla

Venue: D.D up office Date: 16.11.2016 Union Name: Dokkah Dhorong

Sr. No	Name	Address and Phone Number	Signature
1	Bajad Hossain	c. up. South Dokkah 01713-124463	
2	Mr. Nur Mohd. Tanqid Islam	UP Secretary 01818 525188	
3	Mrs. Jamia Akter	MUP 01825512042	
4	Mrs. Manira Begum	MUP 01825 26621	
5	Mrs. Shaktina Akter	MUP 01813 631232	
6	Mrs. Nurul Absar	MUP 01822515516	
7	Mr. Abul Hossain	MUP 01833 11223	AbulHossain
8	Mr. Mohi Uddin	MUP 01831-181948	
9	Mr. Mostafidun	MUP 01814-317922	
10	Mr. Sadek Hossain	MUP 01833 904849	
11	Mr. Hossain Kabir	MUP 01836 102372	
12	Mr. Mozammel	MUP 01821 015139	
13	Mr. Morse Alam	MUP 01814 932285	
14	Mr. Shamsul Alam	MUP 01632 195010	

Stakeholder Consultation-Fisherman Community of Boroghop Union

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Fisherman Community of Boroghop Union	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	Village Community Centre, Dakshin Amjakhali	
	Date	18.11.2016	
D	Attended By (Attendance Sheet Attached)		
	Sr.	Name	Designation
	1.	Fishermen Community of Boro Kaibartapara	
	2.	Fisherman community of Dakhsin Amjakhali	
	3.	Fisherman community of Uttar Amjakhali	
	4.	Fisherman Community of Nayajelepara	
	5.	Fisherman Community of Ajamcolony	
	6.	Fisherman Community of Uttar Boroghop	
	7.	Sabbir Ahamed	Reliance Bangladesh
	8.	Soumi Ghosh	ERM
9.	Souvik Basu	ERM	
E	Purpose of Consultation		
	<ul style="list-style-type: none"> Collection of information regarding fisherman community, fishing activity, fish catch, fishing gear, fishing boat, marketing of fish, Fish drying activity, aquaculture 		
F	Key Points Discussed:		
	<ul style="list-style-type: none"> Majority of the fishermen are residing in Boroghop Union. 70% to 80% population is dependent on fishing There are 6 fishermen colonies in Boroghop Union. These include - Uttar Amjakhali, Dakshin Amjakhali, Boeo Kaibortopara, Naya Jelepara, Ajamcolony, Uttar Boroghop Number of Fishermen in these colonies: Uttar Amajakhli-150 to 200 Fishermen Dakshin Amajakhli: 800-1000 Fishermen Boro Kaibartapara: 400-500 Fishermen Naya Jelepara: 40-50 Fishermen Ajam Colony: 300-350 Fishermen Uttar Boroghop: 400-500 Fishermen Fishing activity is continuing around the year. It is restricted only between October and November. There are four types of fishing activity - Daily fishing, Ice Fishing, Deep Sea Fishing and Foot fishing Daily Fishing: one day fishing activity. Starts early morning and continues upto next day early morning. 7 to 8 person are involved in this type of fishing in one boat. Fishing is usually done 25-50 km from the west coastline. Daily Fishing with ice: The fishing boats fish for 4-5 days in the sea with 8-12 fishermen onboard. Fishing is usually done 50-75 km from the west coastline. Deep Sea Fishing: From the onset of monsoon till spring (July/ August to March/ April), for a period of 9-10 months – fishermen go for deep-sea fishing. Trawlers are used for deep-sea fishing and they usually go upto the Indian boarder in the west and southwest for fishing (ranging from 70 to 300 km). The fishermen fish for 12 to 15 days in each trip; in a month's time they can complete about two trips The deep-sea fishing is based on the lunar calendar and the cycle revolves round the new moon cycle and full moon cycle. Fish catch is usually more during the full moon ('Purnima') and new moon ('Amavashya'). In each fishing trawler about 25 – 35 fishermen goes for fishing in the deep sea. Foot Fishing: Use of any type of motorized and non-motorized boat is not required for this type of fishing. Foot fishing can be done standing on the coast line or at the bank of a water body or at less depth water near the coast line. Fishermen of Kutubdia use 		

push nets and shrimp nets to catch shrimps and shrimp fry during their lean fishing periods.

- Type of fishing net used in this area include Boro Behundi jal, Choto Behundi jal, Phad jal and Ilish jal
- The most common fish net is Behundi (marine setbag net)
- Fish drying unit are locally called as Sutkimahal. These units are mainly located western side of the embankment.
- Fish drying process start in October and November and ends at March and April
- Aquaculture practices are mainly concentrated in Uttar Dhurung Union

Other information regarding general fishing practices and on fisher men communities are similar to what has been mentioned in the minutes for the Stakeholder consultation conducted with the fishermen community in Dakshin Dhurung Union and hence has not been repeated.

Photodocumentation



FGD with Fishermen Community of Boroghop Union

ATTENDANCE SHEET
Focus Group Discussion (FGD)

Environmental and Social Impact Assessment (ESIA) Study
For

FSRU & LNG Terminal Project at Kutubdia Upazilla

Venue: Uttara Amzakhali Village Resource Center Date: 17/11/2016 Union Name: Board Gab Union

Sr. No	Name	Address and Phone Number	Signature
০১	রাজ প্রসাদ দাস	পূর্ব (কিবত) পাড়া	
০২	শেখ দাশ	"	
০৩	মোজাফ উদ্দিন	উত্তর আমজাখালী	
০৪	আব্দুল আমান উল্লাহ	"	
০৫	আবদুল জব্বার	দক্ষিণ আমজাখালী	
০৬	বদর আমান	"	
০৭	মোহাম্মদ রশিদ	"	
০৮	মন্ডোষ দাস	কৈবর্ত পাড়া	
০৯	আলী আকবর	দক্ষিণ আমজাখালী	
১০	জহির উদ্দিন	"	
১১	মোহাম্মদ লেমান	উত্তর আমজাখালী	
১২	মোহাম্মদ নুরুল আমান	দক্ষিণ আমজাখালী	
১৩	আজিজুল হক	উত্তর আমজাখালী	
১৪	মোজাফ উদ্দিন হক	"	
১৫	আবদুল রশ্বাক	দক্ষিণ আমজাখালী	
১৬	মহি রস	কৈবর্ত পাড়া	

১০	বিজয় দাস	স্বর্গ কৈবর্ত পাড়া	বিজয় দাস
১১	তপন কান্তি দাস	৫	তপন কান্তি দাস
১২	অনিন দাস	৫	অনিন দাস
১৩	সিধু দাস	১১	সিধু দাস
১৪	সুধাঙ্কু দাস	১১	সুধাঙ্কু দাস
১৫	রমজান আনী	উত্তর আমজাখানী	রমজান আনী
১৬	নিজার দাস	কৈবর্ত পাড়া	নিজার দাস
১৭	স্রতি দাস	কৈবর্ত পাড়া	স্রতি দাস
১৮	জামীম উদ্দিন	মধ্যম আমজাখানী	জামীম উদ্দিন
১৯	আব্দুল হেলাল	১১	আব্দুল হেলাল
২০	জামীম উদ্দিন	৫	জামীম উদ্দিন
২১	আব্দুল খালেক	দক্ষিণ আমজাখানী	আব্দুল খালেক
২২	রশিদ আহমদ	উত্তর বজ্রগোপ	রশিদ আহমদ
২৩	ভাল্লভু আহমেদ	উত্তর বজ্রগোপ	ভাল্লভু আহমেদ
২৪	নুরুল ইসলাম	উত্তর আমজাখানী	নুরুল ইসলাম
২৫	কামাল হোসেন	৫	কামাল হোসেন
২৬	আহম্মদ মামুন	৫	আহম্মদ মামুন
২৭	সহু দাস কাহু দাস	কৈবর্ত পাড়া	সহু দাস
২৮	আহম্মদ মাহাজান	উত্তর আমজাখানী	আহম্মদ মাহাজান

Uttar Amzakhali
Village Resource Center

17/11/2016

Baxorgop Union

৩৬	নাছির উদ্দিন সংগতি	উত্তর আমজাখালী	
৩৭	আব্দুল কানাম আজাদ সংগতি	দক্ষিণ আমজাখালী	 ১৭/১১/১৬
৩৮	মোহাম্মদ কিব্রি়র আহমেদ	বিদ্যাসুন্দর সাতপাড়া	 ১৭/১১/১৬
৩৯	সুলতানা খোন্দকার	ইতমতুল্লাহ	

Stakeholder Consultation-Fisherman Community of Ali Akbar Deil Union

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Fisherman Community of Ali Akabar Deil Union	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	Union Office, Ali Akbar Deli Union	
	Date	18.11.2016	
D	Attended By(Attendance Sheet Attached)		
	Sr.	Name	Designation
	1.	Fishermen Community of Waider Baperpara	
	2.	Fisherman community of Ali Akdar Deil Jele Para	
	3.	Sabbir Ahamed	Reliance Bangladesh
	4.	Soumi Ghosh	ERM
E	Purpose of Consultation		
	<ul style="list-style-type: none"> • Collection of information regarding fisherman community, fishing activity, fish catch, fishing gear, fishing boat, marketing of fish, Fish drying activity, aquaculture 		
F	Key Points Discussed:		
	<ul style="list-style-type: none"> • Fishing is main livelihood activity of the minority community mainly Hindus • The Muslim population has started adopting fishing as a means of livelihood only recently in the last 15-20 years • Ali Akabar Deil Jele Para is mainly a Hindu fishermen colony • All the fisherman of this union are concentrated in Ali Akbar Deil Jelepara and Waider Baper para • Fishing activity is continuing around the year. It is restricted only between October and November. • Aquaculture is not practices in Ali Akbar Deil. It's practice is mainly concentrated in Uttar Dhurung Union • Major problem of the fisherman in this union is boat anchoring during cyclone. Fishermen anchor their boat inside the Kutubdia Channel during cyclones. Travel cost increases because of this. They need a safe anchor point in their Union. <p><i>Other information regarding general fishing practices and on fisher men communities are similar to what has been mentioned in the minutes for the Stakeholder consultation conducted with the fishermen community in Dakshin Dhurung Union and hence has not been repeated.</i></p>		

Photodocumentation



FGD with Fishermen Community of Ali Akabar Deil Union

ATTENDANCE SHEET
Focus Group Discussion (FGD)

Environmental and Social Impact Assessment (ESIA) Study
For
FSRU & LNG Terminal Project at Kutubdia Upazilla

Venue Ali Akbar Doh Union office Date 17/11/2016 Union Name Ali Akbar Doh

Sr. No	Name	Address and Phone Number	Signature
০১	কুমিল্লা কাম্বালা দাস	সং. সা. টেকনাং উপজেলা আবু-নূর (৩)	
	আবু-নূর (৩)	৫৪৩	
	আবু-নূর (৩) সী	৫৪৩	
	শ্রী রতন গিমা	↓ ০১৪৫৫৬৭৪৩৩৩-	শ্রী রতন গিমা
	আব্দুল রহিম	৫	আব্দুল রহিম
	মিনুল কাম্বালা	৬	মিনুল কাম্বালা
	(মোহাম্মদ হুসেইন)		(মোহাম্মদ হুসেইন)
	তপন কাশিম		তপন কাশিম
	বাকি কোমার		বাকি কোমার
	দিবু দাস		দিবু দাস
	রুজন দাস		রুজন দাস
	সুনীল দাস		সুনীল দাস
	সোনা রায় দাস (মুদ্রা)	০১৪১৬২৭২৪৪৫ (৬)	সোনা রায় দাস (মুদ্রা)
	সাজিদ দাস	০১৪৬৪৫১০৪২২	সাজিদ দাস
	আজি হুসেইন	০২৫২৬৭৪৭১৩৪	আজি হুসেইন

১	আবু আব্দুল	ডি ওএ	আবু আব্দুল
২	সুখি সোফিয়ার	এস	
৬	নূরুল ইসলাম	আ. মোস্তফা ওএ	
৪	সামসুল হক	ওএ	
৫	আবু মোস্তফা	ওএ	
৬	আবুল কালাম	ওএ	
৭	আবুল কালাম	ওএ	
৮	আবুল কালাম	ওএ	
৯	আবুল কালাম	ওএ	
১০	আবুল কালাম	ওএ	
১১	আবুল কালাম	ওএ	
১২	আবুল কালাম	ওএ	
১৩	আবুল কালাম	ওএ	
১৪	আবুল কালাম	ওএ	
১৫	আবুল কালাম	ওএ	
১৬	আবুল কালাম	ওএ	
১৭	আবুল কালাম	ওএ	
১৮	আবুল কালাম	ওএ	
১৯	আবুল কালাম	ওএ	
২০	আবুল কালাম	ওএ	
২১	আবুল কালাম	ওএ	
২২	আবুল কালাম	ওএ	
২৩	আবুল কালাম	ওএ	
২৪	আবুল কালাম	ওএ	
২৫	আবুল কালাম	ওএ	
২৬	আবুল কালাম	ওএ	
২৭	আবুল কালাম	ওএ	
২৮	আবুল কালাম	ওএ	
২৯	আবুল কালাম	ওএ	
৩০	আবুল কালাম	ওএ	

০১৪৩৭১৬৫
৫৭

Stakeholder Consultation-Fisherman Community of Uttar Dhurung Union

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Fisherman Community of Uttar Dhurung Union	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	Union Office, Uttar Dhurung Union	
	Date	19.11.2016	
D	Attended By (Attendance Sheet Attached)		
	Sr.	Name	Designation
	1.	Fishermen Community of Akbar Bolipara	
	2.	Fisherman community of Char Dhurung Jelepara	
	3.	Fisherman Community of Chullarpara	
	4.	Soumi Ghosh	ERM
5.	Souvik Basu	ERM	
E	Purpose of Consultation		
	<ul style="list-style-type: none"> • Collection of information regarding fisherman community, fishing activity, fish catch, fishing gear, fishing boat, marketing of fish, Fish drying activity, aquaculture 		
F	Key Points Discussed:		
	<ul style="list-style-type: none"> • Fishing and salt cultivation are two major livelihood activities of this union • Most of agricultural land have converted to salt pans due to inundation with saline waters • Salt water ingress ion is the main problem of this union due to the broken earthen embankment • Fish drying units are locally called as Sutkimahal. These units are mainly located western side of the embankment. • Fish drying process start in October and November and ends at March and April • There are two type of fish drying process -Horizontal Drying and Vertical Drying • The processors having their own drying houses (Sutki Mahal) and earn 100,000 Tk to 200,000 Tk per season while the laborers involved earn around 3000 Tk. per month • About, 5-6 laborers work in each Sutki Mahal. • Local processors sell their dried fish to mobile assembler, who is known as Mahajan. • There are some aquaculture farms present in this union. • The farms mainly cultivate shrimps • Consultation revealed that 7 to 8 families usually form a group and take on lease around 20 to 22 gonda of low lying land near the extended sea shore for Tk 10,000 per season for 7 to 8 months and fill that land with saline water channelized from sea. • They also invest 20,000 to 25,000 Tk for purchasing 80,000-100,000 shrimplets (seeds), among which 20,000 to 25,000 shrimplets die. • Remaining seeds grow to the size of 100-120 gram in 3 to 4 month time. <p><i>Other information regarding general fishing practices and on fisher men communities are similar to what has been mentioned in the minutes for the Stakeholder consultation conducted with the fishermen community in Dakshin Dhurung Union and hence has not been repeated.</i></p>		

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FGD with Fishermen Community in Uttar Dhurung Union

ATTENDANCE SHEET
Focus Group Discussion (FGD)

Environmental and Social Impact Assessment (ESIA) Study
For
FSRU & LNG Terminal Project at Kutubdia Upazilla

Venue: Uttara Duesing Union Parishad Office Date: 18/10/2016 Union Name: Uttara Duesing

Sr. No	Name	Address and Phone Number	Signature
১	আবু হোসেন	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
২	শ্রীমতী মনজুর আনাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
৩	আবু হোসেন	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
৪	মনজুর আনাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
৫	নূর আনাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
৬	মিরাজুল ইসলাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
৭	আবুল কালাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
৮	মাহামুদুল করিম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
৯	আবুল কালাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
১০	আবুল কালাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
১১	মাহামুদুল করিম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
১২	মনজুর আনাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
১৩	আবুল কালাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
১৪	মনজুর আনাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
১৫	আবুল কালাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	
১৬	মনজুর আনাম	হাট, উত্তরা, লক্ষ্মীপুর জেলা ফোন: ০১৬৭৩৩৫৩০০	

Utter Duesing

১৭	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
১৮	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
১৯	কুমিল্লা জেলা	১	কুমিল্লা জেলা
২০	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
২১	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
২২	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
২৩	কুমিল্লা জেলা	১	কুমিল্লা জেলা
২৪	কুমিল্লা জেলা	১	কুমিল্লা জেলা
২৫	কুমিল্লা জেলা	১	কুমিল্লা জেলা
২৬	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
২৭	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
২৮	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
২৯	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
৩০	কুমিল্লা জেলা	১	কুমিল্লা জেলা
৩১	কুমিল্লা জেলা	১	কুমিল্লা জেলা
৩২	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
৩৩	কুমিল্লা জেলা	১	কুমিল্লা জেলা
৩৪	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
৩৫	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
৩৬	কুমিল্লা জেলা	১	কুমিল্লা জেলা
৩৭	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
৩৮	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
৩৯	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা
৪০	কুমিল্লা জেলা	কুমিল্লা জেলা	কুমিল্লা

Uttar Durrani

৬৭ মোঃ সওদাগর ইমাম	আফসার বসিতি লাহা	কাজুত ইসলাম
৬৮ মোহাম্মদ উল্লাহ	আজিম উদ্দিন মিকদারাম	আবান উল্লাহ
৬৯ মোঃ হাবিব	ম	মুহিবুল্লাহ
৭০ মুর আমদ	আফিফ হাবিব	মুহিবুল্লাহ
৭১ মোঃ আজম	মনজুর আলী হকীম লাহা	মঃ আমদ
৭২ মোঃ হুব আমদ	আফিফ হাবিব	আফিক হক
৭৩ আবদুল করিম	লাহা কাটা	আবু করিম
৭৪ আবুল হারাম	মনজুর আলী হকীম লাহা	আবুল আমদ
৭৫ জুবায়ের	↓	জুবায়ের
৭৬ মোঃ হাবিব ০১৮২২৬৫৪০৫	৩নং ডাক (মঃ, ২৩, মি)	হাবিব
৭৭ মোঃ লিখা উল্লাহ ০১৮২৭০১৫০৪৪	২নং ডাক (মঃ, ২৩, মি)	লিখা
৭৮ মোঃ হুমায়ুন ০১৮৫২১৫০২৩	উল্লাহ আমদ ০১৮৫২১৫০২৩	হুমায়ুন

Stakeholder Consultation-Key Informant Interview of Fisherman Community

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Key Informant Interview of fisherman community	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	Union Office, Uttar Dhurung Union	
	Date	19.11.2016	
D	Attended By		
	Sr.	Name	Designation
	1.	Nasima Akhtar	Secretary, Kutubdia Fisherman Federation
	2.	Soumi Ghosh	ERM
	3.	Souvik Basu	ERM
E	Purpose of Consultation		
	<ul style="list-style-type: none"> • Collection of information regarding fisherman community, fishing activity, fish catch, fishing gear, fishing boat, marketing of fish, Fish drying activity, aquaculture 		
F	Key Points Discussed:		
	<ul style="list-style-type: none"> ▪ Kutubdia Fisherman Federation was started in the year 2003 ▪ It was a UNDP Funded Project ▪ Seven NGOs were involved in this Project. They formed a consortium. ▪ 32 Society was formed under this federation. Total around 6000 fisher men were involved with these 32 societies ▪ Main agenda of this federation is improvement of Socio Economic condition of fishermen ▪ All societies had their own Bank account ▪ Fishermen deposited money in these accounts for future use ▪ They could also take money on credit for their own purposes ▪ This federation also trained the family member of the fisherman family on various other livelihood opportunities ▪ This activities of the federation continued till 2006 but thereafter it was discontinued 		

Stakeholder Consultation-Local Community

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Local community of Dakshin Dhurung	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	Ali Fakir Deil, Dakshin Dhurung Union	
	Date	19.11.2016	
D	Attended By		
	Sr.	Name	Designation
	1.	Local Community of Ali Fakir Deil Village	
	2.	Soumi Ghosh	ERM
	3.	Souvik Basu	ERM
E	Purpose of Consultation		
	<ul style="list-style-type: none"> • Information Collection • Assessing Impact Perception • Involving in Mitigation Planning 		
F	Key Points Discussed:		
	<ul style="list-style-type: none"> ▪ The study area comprises primarily of single cropped agricultural land as irrigation facility is not available. ▪ Only individual level pond irrigation is present for a few land parcels ▪ As per local community, original embankment was about 100-200 m towards west of the present bund. The land which holds the present embankment was under cultivation and also under private ownership. This land parcel was eroded nearly 10 year back. Location of the present bund was used as an airstrip during the British period. ▪ Presently villagers use the reclaimed lands (existing beach portions) for various purposes like boat maintenance, drying of fishing nets, repairing of fishing nets, cultivation of water melon and vegetable etc. ▪ There is an anchorage point about 100 m north of the existing lighthouse. This point is in use by the fishermen of the village. About 100-150 boats are anchored here. ▪ Most of the boats are motorized and go out for fishing for 3-4 days at a stretch in sea. ▪ There is a ship navigation channel upto the Chittagong port which is about 6-7 km from the shore. ▪ During low tide the fishing boats goes west of the navigation channel and during high tide it goes east of the navigation channel. ▪ During cyclonic weather the fishermen keep their boats in the Kutubdia Channel. ▪ The original embankment was about 100-200 m towards west of the present bund. The present embankment area was under cultivation and under private ownership ▪ There are around 8-10 huts just along the bund towards the southern side of the potential site. They are part of the Kaiyarbil Union. ▪ Cultural sites: <ul style="list-style-type: none"> - There was a mazhar that has been washed off. - On the beach side just north of the present lighthouse there was a graveyard which has been washed off and is presently demarcated by four wooden posts. It is not in use. - Cultural Heritage properties within Island include (i) Ek Hatia Fakir Mosque, established in 1904, (ii) Tomb of Kutub Aulia (iii), Kalarma Mosque - The Ek Hatia Fakir Mosque is located close to the Project site ▪ Consultations revealed that only a few households were engaged in agricultural activities and majority are engaged in fishing activity ▪ Lands are mostly used for growing crops for self-consumption. ▪ Due to frequent cyclonic events and sea water surge, more and more agricultural lands are becoming infertile and getting converted for salt cultivation. ▪ People are very positive about the industrial development as it will create some 		

	<p>livelihood opportunity for local people however they also very apprehensive about the pollution which might result from the industrial activity.</p> <ul style="list-style-type: none"> ▪ Water supply is not present in the village. Villagers totally are dependent on tube well for their requirements for drinking and other household activity. ▪ Electricity is not present in the Dakhin Dhurung and Kaiyabil union. People expect some help for the project proponent on this aspect. ▪ Union level health facility is present in Dakhin Dhurung and Kaiyabil union but it is not enough to cater to the health related need of the local people. People are totally dependent on Upazila Health Complex for their health issues. ▪ In Kutubdia Upazila, salt harvesting is one of the primary livelihood options of the island population. ▪ Salt cultivation is done for almost 6 months in a year between November and May. ▪ It is mainly done at the central part of the island on both sides of the Filate Kata Khal. ▪ There are 4600 salt cultivators in the whole Upazila ▪ There are no local markets in Kutubdia for selling salt and it proves costlier for the cultivators to take the salt and sell it in Chittagong markets. In most cases the salt cultivators take loan from the middlemen for leasing out land and hence there is an arrangement between them that the salt will be sold only to them. ▪ Most of agricultural land is mono cropped or bicropped. ▪ Paddy is the main agricultural produce of the area. In addition vegetables are also grown ▪ Community are not interested in agriculture due to less profit. So that most of agricultural land is converted in to salt pan for earning more profit.
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Stakeholder Consultation-NGOs

A	Project Title:	ESIA Study, Kutubdia LNG Project	
B	Stakeholder Title:	Marinelife Alliance – an NGO	
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>			
C	Basic details:		
	Location:	Cox's Bazar	
	Date	23.08.2016	
D	Attended By		
	Sr.	Name	Designation
	1.	M Zahirul Islam	Principal Investigator, Marinelife Alliance
	2.	Dhritiman Ray	ERM
	3.	Naval K Chaudhary	ERM
	4.	Soumi Ghosh	ERM
5.	Tauhidul Hasan	EQMS	
E	Purpose of Consultation		
<ul style="list-style-type: none"> • Information Collection • Assessing Impact Perception • Involving in Mitigation Planning 			
F	Key Points Discussed:		
<ul style="list-style-type: none"> ▪ Marinelife Alliance (an NGO), is working on a project on 'Conservation of Sea Turtle in Bangladesh Coastal and Marine Territory' together with the Forest Department and the World Bank. ▪ They have been working on this project for the last 6 years on the Bangladesh coastline between St. Martin to Kuakatta. ▪ Turtles have been found to visits various sandy beaches along this coastline for nesting and foraging. The species that have been recorded from this region include Olive Ridley Turtle, Green Turtle and Hawksbill Turtle. ▪ Marinelife Alliance has set up sea turtle conservation stations in different islands to protect the turtle eggs from poaching and stray animals and help with the hatching process. ▪ The Sonadia Island is the most sensitive location and more than 50% of the total turtles that visit this region are found nesting in Sonadia. ▪ In Kutubdia, the turtle sites are located along the sandy beaches on the extreme south tip of the island in Ali Akbar Deil Union. The turtles have not been found to visit the northern beaches or other parts of the island, where human interference is more. ▪ Over the years the number of turtles visiting Kutubdia for nesting has gradually reduced. ▪ Marinelife Alliance has set up Turtle Conservation Center in Syed Para, Madher Para within the Kutubdia Island. ▪ The nesting season is usually between October and March with hatching usually occurring during May. ▪ In addition to turtles winter birds are also found to visit the southern tip of the Kutubdia Island. 			

Stakeholder Consultation- Security Personnel, Valve Station 2, Napura

A	Project Title:	ESIA Study, Kutubdia LNG Project
B	Stakeholder Title:	A Security personnel at Napura Valve Station 2
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>		
C	Basic details:	
	Location:	Napura, Chittagong District
	Date	25.05.2017
D	Attended By	
	Sr.	Name
	1.	Md. Assfuddin, Security Personnel at Valve Station 2
	2.	Bijan Mishra, Reliance Power
	3.	Rituparn Singh, Reliance Power
	4.	R. Vishwanathan, ADB
	5.	Dhritiman Ray, ERM
6.	Soumi Ghosh, ERM	
E	Purpose of Consultation	
	<ul style="list-style-type: none"> • Information Collection • Assessing Impact Perception • Involving in Mitigation Planning 	
F	Key Points Discussed:	
	<ul style="list-style-type: none"> ▪ Two security personnel work in two shifts of twelve hours at the existing valve station at Napura. ▪ The functioning of the valve station in the area has not caused any kind of disturbance or difficulty among the community people and they do not have any complaints regarding it. 4-5 families reside just adjacent to the campus of existing Valve station and it has not impacted them in any way. Even they have a livestock shed along the fence of the valve station – there had been no reports regarding any impacts on the livestock. ▪ The area is primarily under cultivation. ▪ According to the security personnel the existing valve station has not caused any kind of impact both environmentally or socially on the community people residing just adjacent to the site. 	

Stakeholder Consultation- Farmer (community member)

A	Project Title:	ESIA Study, Kutubdia LNG Project
B	Stakeholder Title:	A Farmer
<p><i>Note: This document provides a working summary of the main facts captured during the consultation/ key informant interview held and should not be treated as formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to record significant information/ feedback and not intended for official review or approval.</i></p>		
C	Basic details:	
	Location:	Napura
	Date	25.05.2017
D	Attended By	
	Sr.	Name
	1.	Gafur Mia, Farmer (community member)
	2.	Bijan Mishra, Reliance Power
	3.	Rituparn Singh, Reliance Power
	4.	R. Vishwanathan, ADB
	5.	Dhritiman Ray, ERM
6.	Soumi Ghosh, ERM	
E	Purpose of Consultation	

	<ul style="list-style-type: none"> • Information Collection • Assessing Impact Perception • Involving in Mitigation Planning
F	<p><i>Key Points Discussed:</i></p> <ul style="list-style-type: none"> ▪ The person has his own land and he cultivates, especially paddy. ▪ The region is double cropped area and primarily people grow paddy for both the seasons. ▪ The produce (paddy) is primarily for self-consumption and the surplus is sold off. The soil is very fertile and good crops are grown. ▪ The person has witnessed construction of the existing gas pipeline by GTCL. The land owners could not cultivate for two seasons during the construction of the pipeline. Later, the land was restored and returned to the land owner by the company and they are currently cultivating on the parcel of land. ▪ If any such project is further implemented in the area there will be no issues, if their concerns and impacts related to income are mitigated.

Photodocumentation



Consultation with Security Personnel at Valve Station 2, Napura



Consultation with farmer, Napura



Residences adjacent to existing Valve Station 2



Chainage showing proposed pipeline route



Kutubdia LNG Project, Cox's Bazar District, Bangladesh

Meeting Minutes of Public Consultation

Held on 30 August 2017

Venue: Elham Community Centre, College Road, Kutubdia

**Proponent Proponent: Reliance Bangladesh LNG
Terminal Limited**

ESIA Consultant: ERM India Private Limited

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List of Attachments

1. Attendance Record
2. Executive Summary of the ESIA Report on Kutubdia LNG Project in Bangla
3. Executive Summary of the ESIA Report on Kutubdia LNG Project in English
4. Sample Feedback Questionnaire in Bangla
5. Sample Feedback Questionnaire in English
6. Coverage of the Public Consultation Meeting in Local Media

1. Public Notice

An advertisement was published on 23rd August, 2017 in **Danik Cox's Bazar**, a local newspaper of Cox's Bazar, requesting the dwellers of Kutubdia and other regions of Cox's Bazar for their participation in the Public Consultation proposed on 30th August 2017 to discuss environmental and social findings related to LNG terminal Project proposed to be located offshore Kutubdua Island with ~16 km onshore pipeline from Kutubdia Island up to Napura.

২ বুধবার ২৩ আগস্ট ২০১৭, ০৯ ভদ্র ১৪২৪

আলোচনা সভার আমন্ত্রণ

রিলায়েন্স বাংলাদেশ এলএনজি টার্মিনাল লিমিটেড কুতুবদিয়া দ্বীপ
কক্সবাজার, বাংলাদেশ।

সকল অংশীদারগণ, অগ্রহী প্রভাবিত ব্যক্তিবর্গ এবং সাধারণ জনগণের
অবগতির জন্য জানানো যাচ্ছে যে, "মেসার্স রিলায়েন্স বাংলাদেশ
এলএনজি টার্মিনাল লিমিটেড" একটি ৫০০ এমএমএসসিএফডি
ক্ষমতা সম্পন্ন এফএসআরইউ ভিত্তিক এলএনজি টার্মিনাল প্রকল্প
কুতুবদিয়া দ্বীপে (কক্সবাজার, বাংলাদেশ) প্রতিষ্ঠার পরিকল্পনা
করেছে। উক্ত প্রকল্পটি বাস্তবায়নের নিমিত্ত প্রয়োজনীয় সকল চুক্তি
সমূহ পেট্রোবাঙ্গলার এর সহিত সম্পাদিত হবে।

অতএব, প্রকল্প প্রস্তাবক ("রিলায়েন্স বাংলাদেশ এলএনজি টার্মিনাল
লিমিটেড"), আগামী ৩০ শে আগস্ট ২০১৭ ইং স্থানীয় সময় সকাল
১১:০০ ঘটিকা থেকে দুপুর ২:০০ ঘটিকার মধ্যে ইলহাম কমিউনিটি
সেন্টারে (কলেজ রোড), বড়ঘোশ, কুতুবদিয়া দ্বীপ, সর্বসাধারণের
জন্য পরিবেশ ও সামাজিক সচেতনতা বিষয়ক আলোচনা সভার
আয়োজন করেছে।

ইনভায়রনমেন্টাল এন্ড সোশ্যাল ইমপ্যাক্ট অ্যাসেসমেন্ট (ইআইএ)
রিপোর্ট যার মধ্যে বিস্তারিত সংশ্লিষ্ট নথি সমূহ বিদ্যমান, তাহা
জনসাধারণের দেখার জন্য নিম্নলিখিত অবস্থানে পাওয়া যাবে।

- ১। জেলা পরিষদ অফিস
- ২। উপজেলা অফিস
- ৩। আঞ্চলিক অফিস, পরিবেশ বিভাগ (কক্সবাজার)

উক্ত সভায় সকল অংশীদারগণ, অগ্রহী প্রভাবিত ব্যক্তিবর্গ এবং
সাধারণ জনগণকে জ্ঞানির নিমিত্ত উপস্থিত হওয়ার জন্য আমন্ত্রণ
জানানো হল।

বিস্তারিত তথ্যের জন্য, যোগাযোগ করতে পারেন

জনাব রঞ্জন লোহার
প্রকল্প পরিচালক

ফোন নং: +৮৮০-২-৫৫১৩৮৫৯১ ; মোবাইল নং: +৮৮০১৯০২৫১০০৬৫
ইমেইল: ranjan.lohar@relianceada.com

১১ আগস্ট গ্রেনেড হামলায় নিহতদের স্মরণে



কক্সবাজারে
মহেশখা
সংস্কার

প্রেস বিজ্ঞপ্তি
মহেশখালী-কক্স
সংস্কারের দাবী
করেছে জাতীয়
(জাসদ)। উ
বক্তারা বলেন
কক্সবাজারে
অত্যন্ত বৃষ্টি
প্রতিনিয়ত
মানুষের
যাতায়াত।
পারাপারে ম
শেষ নেই।

2. Invitation to Honorable Guests

Invitation letters were sent to honorable guests requesting them to be present in the Public Consultation meeting. Among the guests present for the meeting were District and Upazila Level Govt. Officials, UNO of Kutubdia Upazilla, Chairman and Vice Chairman of Kutubdia Upazila, Elected Representatives (Chairmen of Union Parishads and Members), Representatives from Political Parties, Representatives of Local NGOs, Members of the Kutubdia Fisheries Federation, Local Media, etc.

The list of the invitees is given below.

1. Md. Ali Hossain, Dy. Commissioner, Cox's Bazar District
2. Md. Anwarul Naser, ADC – General, Cox's Bazar District
3. Kazi Md. Abdur Rahman, ADC – Revenue, Cox's Bazar District
4. Sujan Choudhury, Upazila Nirbahi Officer (UNO), Kutubdia Upazila
5. Dr. Abdul Alim, District Fisheries Officer, Cox's Bazar
6. Sariful Islam, Asst. Director, Dept. of Environment (DOE), Cox's Bazar
7. Md. Sabibur Rahman, Executive Engineer, BWDB, Cox's Bazar
8. Md. Rakibul Hasan, Sub Divisional Engineer, BWDB, Cox's Bazar
9. Shah Alam, Asst. Director – Land and Revenue, BWDB, Cox's Bazar
10. K M Julfikar Tariq, Executive Engineer, BWDB, Chittagong
11. Md. Humayun Kabir, Divisional Forest Officer, Coastal Forest Division, Chittagong
12. Ashit Kumar Roy, Forest Ranger, Kutubdia Upazila
13. Md. Mohsin, Sub-Divisional Engineer LGED, Kutubdia
14. Nasim Al Mehmood, Upazila Fisheries Officer, Kutubdia
15. Nurul Basher Choudhury, Upazila Chairman, Kutubdia
16. Sayeda Mehurunnissa, Upazila Women Vice Chair Person, Kutubdia
17. Humayun Kabir Haider, Upazila Vice Chairman, Kutubdia
18. M. Didarul Firdaus, Officer in Charge (OC) - Police, Kutubdia Upazila
19. Md. Gayasuddin, Tehsildar – Land Office. Kutubdia
20. Md. Sayid, Kanungo – Land Office, Kutubdia
21. Akhtar Husain, Sub-Inspector, Kutubdia Thana
22. Shimrul Sharma, Election Officer, Kutubdia
23. ASM Shaharyar Choudhury, Union Parishad Chairman, Uttar Dhurung
24. Md. Hussain, Panel Chairman, Uttar Dhurung Union Parishad
25. Kohinoor Aktar, Member, Uttar Dhurung Union Parishad
26. Salimullah, Member, Uttar Dhurung, Union Parishad
27. Saiyed Ahmed, Union Parishad Chairman, Dakshin Dhurung
28. Md. Tariq, Secretary, Dakshin Dhurung Union Parishad
29. Jalal Ahmed, Union Parishad Chairman, Kaiyabil
30. Shamsurul Alam, Member – Kaiyabil Union Parishad
31. Akhtar Hussain, Union Parishad Chairman, Lemshikhali
32. Adv. Faridul Islam Choudhury, Union Parishad Chairman, Boroghop
33. Kamal Pasha, Thana Co-operative Officer, Kutubdia
34. Aurangjeb Matar, President – Awami League, Kutubdia
35. Abul Kalam Azad, Chairman Upazila Fisheries Federation, Kutubdia
36. Suklal Das, Secretary, Upazila Fisheries Federation, Kutubdia

37. Nurul Amin, Asst. Sec, Upazila Fisheries Federation, Kutubdia
38. Bhajahari Das, President, Upazila Fisheries Federation, Kutubdia
39. Bhagirath Das, Secretary, Village Development Committee, Jelepara
40. Sirajul Islam, Secretary, Village Development Committee, North Amjadkhali
41. Mohiuddin Kutubi, Secretary, Village Development Committee, South Amjadkhali
42. Md. Fazlul Haque, Project Coordinator, COAST (NGO), Kutubdia
43. Abdul Morshed Chowdhury, Chairman – PHALS (NGO), Cox's Bazar
44. Bimal Chandara Sarkar , Chief Executive – MUKTI (NGO), Cox's Bazar
45. Didarul Alam Rashed, Executive Director – NONGOR (NGO), Cox's Bazar
46. Md. Abdul Kaiyum, Coordinator – NACOM (NGO)
47. Zahirul Islam, Executive Director, MARINE LIFE ALLIANCE (NGO), Cox's Bazar
48. Dr. Md. Atiqulla Sayeed, FRIENDSHIP (NGO)
49. Anjuman Apa Deasy, FRIENDSHIP (NGO)
50. Shariful Islam, Officer – Youth Development, Kutubdia
51. Md. Hassan Kutubi, Reporter, Daily Janakatha Kutubdia
52. S. K. Liton, President, Upazila Press Club, Kutubdia
53. Mannan, Journalist
54. Monir, Journalist

Invitation issued to Guests for the Public Consultation

PUBLIC CONSULTATION INVITATION



PUBLIC CONSULTATION INVITATION

23rd August 2017

Dear Sir,

We take this opportunity to notify that M/s. Reliance Bangladesh LNG Terminal Limited shall be setting up a 500 mmscf FSRU based LNG Receiving Terminal at Kutubdia Island, Cox's Bazar, Bangladesh under the agreements to be signed with PetroBangla.

The project proponent is organizing a public consultation process for environmental & social concerns on **30th August, 2017 between 11:00 AM to 2:00 PM local time** at Elham Community Center (College Road), Boroghop, Kutubdia Island, Cox's Bazar, Bangladesh.

The Environmental and Social Impact Assessment (EIA) report, containing the detailed concerned documents is available at following locations:

- A. In the Office of Zilla Parishad Office,
- B. In the Office of Upazilla Parishad Office,
- C. In the Regional Office, DoE at Cox's Bazar

We take this opportunity to invite you and the esteemed officials from your organization to attend the proceedings.

For further information, please contact:

Mr. Ranjan Lohar, Project Director

Phone: +880-2-55138591

Cell: +880-1902510065

e-mail: ranjan.lohar@relianceada.com

3. Summary of the Participation at the Public Consultation

People from all walks of life were present at the public consultation meeting. They listened to what the proponents had to say about the project. They also gave their valuable opinions

and stated their concerns. A brief summary of the people present at the public consultation meeting is given below:

Total Participants= 123	Male = 98	Female=25
Govt. Officials = 13	Fishermen = 12	Journalists = 04
Elected Representatives =21	Cultivators = 03	NGOs = 14
Politicians = 02	Businessman = 02	Project / ESIA Team = 7
Teachers = 03	Service = 01	ADB Representative=01
College Students = 25	General Community = 15	

The attendance record of the participants is provided in **Attachment 1**.

4. Documents Used for Disclosure

An Executive Summary of the ESIA Study for the Kutubdia LNG Project in the local language (Bangla) was distributed to all participants in course of the meeting. A copy of this

document used for disclosure to communities is presented under **Attachment 2**. The English Version of the Executive Summary is placed under **Attachment 3**. In addition to the Executive Summary, a Feedback Questionnaire was also circulated amongst the participants to solicit their views on key aspect of the Project. The Bangla version of the Questionnaire is presented under **Attachment 4** while the English version is included under **Attachment 5**.

5. Future Engagement with Stakeholders

In appreciation of the fact, that the consultations with the affected communities and stakeholders have to be an ongoing process, a Stakeholder Engagement Plan has been developed as part of the ESIA. In line with it, Reliance Power Limited through their subsidiary Reliance Bangladesh LNG Terminal Limited (RBLTL), will pursue a vigorous community outreach strategy throughout the project life cycle to buildup trust and facilitating open information exchange among stakeholders.

Accordingly, the contact information of company representatives were displayed at various locations of the Elham Community Hall during the Public Consultation Meeting and also announced in course of the meeting. For any future queries related to the Kutubdia LNG Project, the stakeholders were advised to get in touch with the concerned company representatives.



Contact Information of RBLTL Representatives – Displayed at the Venue

6. Summary of the Q&A Session during the Public Consultation

Questions raised by the Audience Members

SL No.	Name of the Questioner	Occupation	Query / Remarks	Key Words of Issues Raised
1.	Saiyed Ahmed	UP Chairman, Dakshin Dhurung	<ul style="list-style-type: none"> For laying of the 16 km onshore gas pipeline 50 acres land will be required, then why only 30 acres will be acquired and rest 20 acres will be returned to the land owners? He added that land owners should be compensated for the rest 20 acres also. 	Land Requirement; Compensation to Land Owners.
2.	Sujon Choudhury	Upazila Nirbahi Officer (UNO), Kutubdia Upazila	<ul style="list-style-type: none"> Welcomed the Project and said that the people of the island will benefit from it as there has been no industrial setup in the island earlier. He explained the difference between land acquisition and requisition of land for laying of gas pipeline For laying of gas pipeline survey cannot be done one year before. It should be done just before construction work so that people are properly compensated. Existing employment opportunities in Kutubdia are limited to agriculture and salt production. As there is no power supply, there are no industries on the Island. Population density of Kutubdia Upazila is much higher than that of national population density. There is no alternate livelihood option in this island. Upazila Office has taken up a 20 point agenda for Tourism development in the island. Requested if Reliance can support some of the action items as part of their CSR Initiatives to boost tourism on the Island. 	Land Requirement; Compensation to Land Owners; Engagement Opportunities; CSR Plan.

SL No.	Name of the Questioner	Occupation	Query / Remarks	Key Words of Issues Raised
			<ul style="list-style-type: none"> Requested Reliance for proper CSR Plan. Considering the high climate vulnerability of Kutubdia, inclusion of cyclone preparedness measures (such as Cyclone Shelters, etc.) under CSR program should be considered. 	
3.	Faridul Islam Choudhury	UP Chairman, Boroghop	<ul style="list-style-type: none"> It is first development initiative for the island Upazila, it will open doors for the Kutubdia. Appreciated the fact that land owners will be compensated for the requisite land during and disruption period for laying gas pipeline and the same will be returned to the land owners for reuse. Wanted to know how will the Project benefit the Kutubdia Island? Inquired whether the gas pipeline land is being given to the company on lease? Also inquired about the impact of hot/cold water discharges in the sea? Welcomed Reliance to Kutubdia for execution of the Project. 	Project Benefits; Land Requirement; Compensation to Land Owners; Thermal Pollution.
4.	Jalal Ahmed	UP Chairman, Kaiyabil	<ul style="list-style-type: none"> How much land will be taken for the Terminal? How will the people residing within the area as well as trees and crops be compensated? Why is requirement for land on the seashore for the Land Based Terminal not mentioned? 	Compensation to Land Owners; Compensation for Assets; Revised Design of the Facility.

SL No.	Name of the Questioner	Occupation	Query / Remarks	Key Words of Issues Raised
5.	Nurul Basher Choudhury	Chairman, Kutubdia Upazila	<ul style="list-style-type: none"> • Welcomed the Project, but wanted to know what will be the benefits for Kutubdia? • Land compensation rate should be same as mainland. • Will Kutubdia get power? 	Project Benefits; Compensation to Land Owners; Power Generation.
6.	M. Didarul Firdaus	Officer in Charge (OC) - Police, Kutubdia Upazila	<ul style="list-style-type: none"> • Cited the example of an earlier gas pipeline laying in Moheshkhali. No disclosure seminar/ meeting were conducted. People were not provided with a scope to share their suggestions. Thanked Reliance for organizing such a meeting where people can voice their concerns. • Mentioned that Reliance is doing a development work and thanked them for selecting Kutubdia for this project. • At Moheshkhali land had been returned to the land owners after laying of pipeline and they are using the land currently. • This Project is a good initiative for the country and it is being implemented in accordance to law. • Use of gas is to be decided by government and the people of Kutubdia should have any apprehensions regarding this. • Thanked Reliance Power whole heartedly for the initiative. 	Project Benefits; Use of Natural Gas; Compensation to Land Owners.
7.	Humayan Kabir Haider	Vice Chairman, Kutubdia Upazila	<ul style="list-style-type: none"> • Mentioned that Reliance should ensure that unskilled workers from the island Upazila gets work during construction period • Sought support for the development of Kutubdia through the company's CSR program 	Engagement Opportunities; CSR Program.
8.	Md. Abdul Kaiyum	Coordinator – NACOM (NGO)	<ul style="list-style-type: none"> • Kutubdia, Moheshkhali region has diverse natural resources • Thanked Reliance for conducting a 	CSR Program (Bio-diversity Conservation);

SL No.	Name of the Questioner	Occupation	Query / Remarks	Key Words of Issues Raised
			<p>detailed study related to environment</p> <ul style="list-style-type: none"> • Initiatives on biodiversity conservation should be adopted under CSR program • Alternate livelihood option for people of Kutubdia should be considered 	Engagement Opportunities.
9.	Md. Fazlul Haque	Project Coordinator, COAST – Action Aid (NGO)	<ul style="list-style-type: none"> • Initiative on alternate livelihood • Improvement of embankment and plantation along embankment to prevent the Island from natural hazards • Proper compensation for losses • Efforts to be made to avoid impacting residential structures along the pipeline route. • Thanked Reliance for organizing this consultation – it’s very helpful and informative to all College Students who are attending the event. 	Engagement Opportunities; CSR Program (Improvement of Embankment); Compensation to Land Owners.
10.	Hassan Kutubi	Journalist and Secretary Kutubdia Press Club	<ul style="list-style-type: none"> • Adequate compensation for losses • Employment opportunities for the people of Kutubdia • Welcomed more such companies to Kutubdia 	Compensation to Land Owners; Engagement Opportunities.
11.	Shariful Islam	Asst. Director, Dept. of Environment (DOE)	<ul style="list-style-type: none"> • Initial project plans and application from the Company to DOE reviewed and issued Terms of Reference (TOR) for the ESIA • Details on mitigation / management plans will be reviewed during the next stage of appraisal • Project should be implemented following all applicable legal norms and requirements. 	Legal Compliance.
12.	Abul Kalam Azad	Chairman Upazila Fisheries Federation (UFF),	<ul style="list-style-type: none"> • The fishermen will be impacted during the construction period (especially fishermen from Uttar Kaiyabil, Madnayarpara); so they should be considered for 	Fishing Activities; Engagement Opportunities; CSR Program

SL No.	Name of the Questioner	Occupation	Query / Remarks	Key Words of Issues Raised
		Kutubdia	<p>employment opportunities from the Project.</p> <ul style="list-style-type: none"> Improvement of embankment should be undertaken for improving the condition in Kutubdia 	(Improvement of Embankment).
13.	Nurul Amin, Asst.	Fisherman and Secretary of UFF	<ul style="list-style-type: none"> Project will impact fishing routes and setting up small setback nets for shoreline fishing. Fishermen should be given priority while considering employment opportunities from the Project Inquired on impact on the shelter belts due to the project as they are an important protection measure against cyclones. Cyclone preparedness measures should be considered. 	Fishing Activities; Tree Felling; Engagement Opportunities; CSR Program (Improving Cyclone Preparedness).
14.	S. K. Liton,	President, Upazila Press Club, Kutubdia	<ul style="list-style-type: none"> Alternate livelihood options for the fishermen in general Compensation for land to be given on priority basis Protection of trees planted by forest department to save the embankment Whether power will be generated on the Island? 	Engagement Opportunities; Compensation to Land Owners; Tree Felling; Power Generation.
15.	Md. Zahirul Islam	Executive Director, Marinelife Alliance (NGO)	<ul style="list-style-type: none"> The Project should adopt mangrove plantation programs around the Island – this will serve as a conservation activity and would prevent erosion as well. Company can consider it as a CSR initiative. 	CSR Program (Mangrove Plantation).

Note: UP= Union Parishad; NGO = Non-Governmental Organization

As Answered by RBLTL and ESIA Team

Use of Natural Gas:

Reliance Bangladesh LNG Terminal Limited (RPLTL) is aware of the recent scarcity of natural gas in Bangladesh due to its diversified use in industrial and electric power sector – resulting in fast depletion of existing reserves. Keeping this in mind RBLTL has planned to establish this LNG terminal off Kutubdia Island for supply of regasified liquid natural gas (RLNG). The RLNG will be transported through the national grid to Meghnaghat, where Reliance is setting up a 750 MW Power Plant for providing electricity to the people of Bangladesh. The surplus RLNG, after supplying to the Meghnaghat Power Plant, will be utilized as per Govt. of Bangladesh requirements.

Land Requirement:

Total land requirement for the construction of the spur gas pipeline from Kutubdia Island to Custody Transfer and Metering Station (CTMS) at Napura and land for CTMS in Napura will be ~ 50 acres. Petrobangla, Government of Bangladesh, will undertake land acquisition. (~30 acres of land will be acquired – ~26 acres for pipeline and ~4.0 acres for CTMS). Rest ~20 acres land will be returned back to the land owners after restoration following the construction of pipelines.

Revised Design of the Facility:

The ESIA Study reflected that the agricultural land within the island Upazila, Kutubdia is fast diminishing due to erosion and cyclonic surge that renders the soil infertile due to salt water. Agriculture is a primary occupation for most of the people (after fishing and salt cultivation) and they mostly cultivate for self-consumption and the surplus is sold off.

The earlier design required approximately 44 acres of land for the Land fall Point (Onshore Regasification Facility) – that would take up a major portion of the agricultural field in Kaiyarbil Union along with few residential land areas; this would have largely impacted land loss, and loss of trees and structures. Hence, it was considered that the impact on land and physical displacement may be reduced. This was one of the primary reasons that induced a design change to an offshore facility (FSRU) that has no requirement for setting up a land based facility. It only requires land for erection of gas pipeline.

Power Generation

The power requirement during the construction phase for laying of pipeline will be sourced through diesel generators.

For onshore operations, 500 kWh-of power will be generated using natural gas at the CTMS at Napura. For marine operations, power will be generated on board the FSRU. No power generation facility will be established on the Island.

Compensation to Land Owners:

The requisition and acquisition of land for the onshore gas pipeline and CTMS will be executed and owned by Petrobangla. The land will be given to RBLTL on lease for 15 years for erection of pipeline and subsequent operations. The rates to be ascertained for compensation for land will be as per the Law of the Country and ADB SPS, 2009 for the 30 acres that will go for permanent acquisition. For the rest 20 acres, that will be required during erection of pipelines, the land owners/users will receive compensation for the loss incurred, for the period of construction. The land will be returned after construction to the respective owners after restoration and they can continue with the activities as earlier.

Compensation for Assets:

The Project will try and route the onshore pipeline in a manner not to impact any assets (such as structures, trees, etc.). However in case of any unavoidable impact, due compensation will be paid for impact on the asset in accordance with the requirements of GoB. The Project will also pay compensation for any temporary crop damage that occurs during the Construction Period.

Fishing Activities:

There is no land based facility under the present project design. A sub-sea pipeline, of about 2 km, will be laid to fetch regasified LNG from FSRU to onshore at Kutubdia Island. The fishing routes, as mapped by the fishermen themselves, during the ESIA consultation phase, shows that the south-west route taken by the fishermen is south of the onshore pipeline alignment; the other two north-west fishing routes initiating from the west coast of the island is north of the pipeline alignment. Moreover this is a sub-sea pipeline and will remain buried under the sea bed. Hence, no impacts are envisaged on fishing routes emerging from the west coast near the Project location.

Similarly, for shoreline fishing, it was observed during the ESIA Study that, the fishermen do not have any fixed fishing ground to setup the small setback nets. They keep changing the locations depending on the fish availability. Also there will be no land based facility planned at Kutubdia Island, hence there will no obstruction to shoreline fishing. The onshore gas pipeline be buried underneath the surface and will not impact shoreline fishing and the fishermen can continue the shoreline fishing. There Project will not have any impact on the fishing activities under taken by the fishermen, especially on the west coast of Kutubdia Island.

Tree Felling:

The project will avoid felling of big and mature trees as much as possible during the erection of pipelines. It will not cause any impact to the shelter belt trees. The Project will undertake tree plantation at identified areas along the inland pipeline route and at CTMS.

Thermal Pollution:

The FSRU will involve use of sea water for vaporisation in the re-gasification process and for engine cooling. There will be cold water discharge at 7°C less than sea water ambient temperature and machine cooling water discharge at 4°C more than sea water ambient temperature. Both cold water and machine cooling water will be discharged offshore to allow maximum mixing of the thermal plume as per norms. The modeling results (using CORMIX) showed that the temperature change in both cases is less than 1°C within 100 m of mixing zone from discharge location and will remain well within the permissible standard (International Finance Corporation, the World Bank Group Standard) of change of 3°C within 100 m of mixing zone from discharge location.

Legal Compliance:

The Project will fulfill all legal compliances relating to environmental and social requirements and will be implemented strictly in accordance with the Law of the Land. Reliance will remain committed to the environment protection through all stages of the Project lifecycle.

Project Benefits:

This is the first project of this kind in Kutubdia and it's expected that this Project will act as a precursor to future development of Kutubdia. It has the potential to make Kutubdia more visible in the investment scenario in this region (which till now has all been focused around Moheshkhali). Moreover, the Project will play an important role by supplying gas within the region/country. An expanded gas supply will result in reliable source of power and support future economic development of dependent sectors.

During the construction period, the Project will provide for temporary employment opportunities for the unskilled labourers and business opportunities for the local people. The Project will also develop and implement CSR initiatives keeping in mind the requirements for the Island.

Engagement Opportunities:

RBLTL authority has noted the concerns regarding the employment problem of the local people of Kutubdia and will provide preference to the local people to the extent possible, while considering engagement of unskilled personnel for the Project.

CSR Program:

Reliance will develop a CSR program considering the views and opinion of different stakeholders present in the meeting. Main issues to be evaluated and considered are – alternate livelihood, biodiversity conservation and monitoring, skill training, mangrove plantation, embankment protection, improving cyclone preparedness, supporting tourism initiatives, etc.

7. Outcome of the Process

In summary, there was no major concern that arouse during the public consultation. The cooperation from the participants was worthy of praise and the entire meeting can be considered as worthwhile. The stakeholders whole heartedly welcomed the Project and requested Reliance to help, to the extent possible, in alleviating the socio-economic condition of the People of the Island, who are otherwise struggling with limited economic opportunities (through traditional means) available on the Island and the adverse climatic conditions that they frequently encounter.

6. Photographs from the Public Consultation

ATTACHMENTS

Attachment 1: Attendance Record

Reliance Bangladesh LNG Project
Participant List for Public Consultation

Reliance Bangladesh LNG Project

Public Consultation Meeting

A meeting was held at Iham Community Center, Kutubdia on 30th August 2017 in Kutubdia Island regarding consultation of Environmental and Social Impact Assessment of the proposed Kutubdia LNG Project in Cox's Bazar District of Bangladesh. The following signatories were present in the meeting.

Sl No	Name	Designation / Village Name	Mobile No	Signature / Thumb Impression
01	Fazal Uddin	Chairman Barishope U.P.	01732-7169 11	
02	M. Didarul FERDOUS	Officer in charge	01713-377 668	
03	Sujan Choudhury	UNO	018999418	
04	Sarder Sharifet Islam	Ad DoE Coxbazar	01556340776	
05	MD. AKHTAR HANIF	SI	01711-0553 77	
06	M. Kamal Faha	UCO, Kutubdia	01816439679	
07	Shimul Sharma	Upazila Election Officer	01818769208	
08	Syed Haseeb Ahmed	Sample Clerk DOE, Cox's Bazar	01911-4689 20	
09	Ashutosh Kumar Das	Forest Ranger Kutubdia	01731635440	
10	Arifur Rahman Deast	Friendship Kutubdia	01824741050	
11	DR. MDHANIF ATINULLAH SAYEED	FRIENDSHIP	01819360261	
12	U.L. A.O. 333874		01811987997	

Reliance Gas Processing Project

Public Consultation Meeting

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Sl No	Name	Designation / Village Name	Mobile No	Signature / Thumb Impression
13	Md. Abdul Kiyum	Upstila Coordinator NACOM	01818908199	
14	Md Gachur uddin	Program officer NACOM	01720851098	
15	Abul Hasnat	Community Health Care provider South Dhurung	01610802531	
16	M.M. Hasan Kutubi	Reporter Daly Janakantha	01815646821 0718-572565	
17	আব্দুল হক	পারিভ্রমণ বোর্ড, কুমিল্লা	01812777770	
18	শ্রী: ম. জুবায়ের	প্রকল্প সমন্বয়কারী সংশ্লিষ্ট কমিটি	01713-367444	
19	Jalal Ahmed	Chairman. Kuyes bill	0174077676	
20	ব্রজেননাথ চৌধুরী	সহকারী প্রোগ্রাম অফিসার	01815612094	
21	আব্দুল হক	ইউ পি এম অ.ন.উ.স.স. (ক.কি.)	01814701288	
22	নওব্বান হুসেন	সি.সি. সি.সি.	01826070153	
23	শ্রী: মো. হুসেন	সি.সি. অফিসার সংশ্লিষ্ট কমিটি	01718278273	
24	শ্রী: মো. হুসেন	সংশ্লিষ্ট কমিটি সংশ্লিষ্ট কমিটি সংশ্লিষ্ট কমিটি	01813210808	

Reliance Bangladesh LNG Project

Public Consultation Meeting

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SI No	Name	Designation / Village Name	Mobile No	Signature / Thumb Impression
25	মহিউদ্দিন কুতুবদিয়া	কুতুবদিয়া	01922510426	মহিউদ্দিন
26	ইলম সালমা	কুতুবদিয়া	01829811736	ইলম
27	সাবিত্রী সোমনা	কুতুবদিয়া	0187677800	সাবিত্রী
28	সাবিত্রী সোমনা	কুতুবদিয়া	01851689727	সাবিত্রী
29	জুনায়েদ বিবি	কুতুবদিয়া	01814871503	জুনায়েদ
30	দিল্লী খান	কুতুবদিয়া	0186288888	দিল্লী খান
31	জোবায়েরা সোমনা	কুতুবদিয়া	01828486028	জোবায়েরা
32	সাবিত্রী সোমনা	কুতুবদিয়া	01820278122	সাবিত্রী
33	সাবিত্রী সোমনা	কুতুবদিয়া	01825674824	সাবিত্রী
34	সাবিত্রী সোমনা	কুতুবদিয়া	01866130921	সাবিত্রী
35	জোবায়েরা সোমনা	কুতুবদিয়া	01819595137	জোবায়েরা
36	জায়েদুল নাসিম	কুতুবদিয়া	01816134279	জায়েদুল

Reliance Gas Pipelines (LNG) Project

Public Consultation Meeting

A meeting was held at Ilham Community Center, Kutubdia on 30th August 2017 in Kutubdia Island regarding consultation of Environmental and Social Impact Assessment of the proposed Kutubdia LNG Project in Cox's Bazar District of Bangladesh. The following signatories were present in the meeting:

Sl No	Name	Designation / Village Name	Mobile No	Signature / Thumb Impression
37	মোঃ মিজানুল ইসলাম	স্বাস্থ্যকর্মী উত্তর কামালপুর	01731173353	মোঃ মিজানুল ইসলাম
38	মোঃ আমজাদ আলম	MUP, কামালপুর কামালপুর	01718134595	আমজাদ আলম
39	তাহমিনা রক	মহিলা কল্যাণ	01820012408	তাহমিনা রক
40	আব্দুল হক রহমান	ছাত্র কামালপুর	018223380040	আব্দুল হক
41	মোঃ মোস্তাফিজ আলম	21	01879044406	মোঃ মোস্তাফিজ আলম
42	আব্দুল হক রহমান	11	01828556529	আব্দুল হক
43	মোঃ আব্দুল হক রহমান	11	01825428627	আব্দুল হক
44	মোঃ আব্দুল হক রহমান	11	01869363558	আব্দুল হক
45	আব্দুল হক রহমান	11	01868247014	আব্দুল হক
46	আব্দুল হক রহমান	11	01877547286	আব্দুল হক
47	Bijan Mishra	Sr. VP. Env. Reliance Power	+91 9311073222	Bijan Mishra
48	মোঃ আব্দুল হক রহমান	ছাত্র	01615956858	মোঃ আব্দুল হক রহমান

Reliance Gas Pipeline Project

Public Consultation Meeting

A meeting was held at Itham Community Center, Kutubdia on 30th August 2017 in Kutubdia Island regarding consultation of Environmental and Social Impact Assessment of the proposed Kutubdia LNG Project in Cox's Bazar District of Bangladesh. The following signatories were present in the meeting.

Sl No.	Name	Designation / Village Name	Mobile No	Signature / Thumb Impression
49	Anik Ajmece	ADB	09178882572	
50	Ashrafal Kayes	Madangan	01815172007	
51	REAZUL KABIR	NONGOR	01816-243272	
52	মুহাম্মদ মফিজ	কসব্দা	01836634333	
53	ডা. নওশাদ হোসেন	সাইয়াক	01032951810	
54	মুহাম্মদ মফিজ	মুহাম্মদ	018228416545	
55	লতা হোসেন	কসব্দা	01819726720	
56	Ashrafal Alam	Brayhop	01826344055	
57	Imhinnak	M.U.P.P.V.	01815367777	
58	মুহাম্মদ হোসেন	কসব্দা	01814831772	
59	মুহাম্মদ হোসেন	কসব্দা	01791509205	
60	মুহাম্মদ হোসেন	কসব্দা	01822225555	

Reliance Bangladesh LNG Project

Public Consultation Meeting

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Sl No	Name	Designation / Village Name	Mobile No	Signature / Thumb Impression
61	কুমারী রতন	কুমারী রতন (মহিলা)	01884029949	কুমারী
62	মি বি মতিয়ার	৭	01812515428	
63	খান মুনীর হোসেন	মহিলা	—	
64	ডা. মোস্তাফিজুর রহমান	ডা. মোস্তাফিজুর রহমান	01711078890	
65	মুহাম্মদ হোসেন	মুহাম্মদ হোসেন	01231635440	
66	Dudul Boran	USEO এস.এম.	01817726513	
67	SALIMULLA	MUP স.এম.	01832015077	
68	আব্দুল হান্নান	ডা. এ. এ. এ.	01812980477	
69	খান মুনীর হোসেন	ডা. মোস্তাফিজুর রহমান	01814679779	
70	ডা. মোস্তাফিজুর রহমান	MUP ডা. মোস্তাফিজুর রহমান	01815336877	
71	ডা. মোস্তাফিজুর রহমান	MUP ডা. মোস্তাফিজুর রহমান	01819308888	
72	ডা. মোস্তাফিজুর রহমান	ডা. মোস্তাফিজুর রহমান	01823925784	

Reliance Bangladesh LNG Project

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73	সুফিয়ারাছাদ	ইস্টার্ন গ্রীট	01790998398	
74	আব্দুল হামিদ	মসজিদ গ্রীট	01746972958	
75	আব্দুল হামিদ	৷		আব্দুল হামিদ
76	আব্দুল হামিদ	৷	02728002680	আব্দুল হামিদ
77	আব্দুল হামিদ	৷	02668980222	আব্দুল হামিদ
78	আঃ আব্বাস আলী	৷	01214940234	
79	আব্দুল হামিদ			
80	আব্দুল হামিদ		01820025588	
81	আব্দুল হামিদ	ইস্টার্ন গ্রীট	01890055005	
82	আব্দুল হামিদ	ইস্টার্ন গ্রীট	018533414	
83	আব্দুল হামিদ	MVP ৷	02628009529	
84	আব্দুল হামিদ	M.O.P	01713651753	

Reliance Gas Processing Project

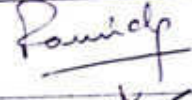

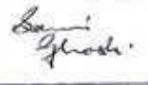
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Sl No	Name	Designation / Village Name	Mobile No	Signature / Thumb Impression
85	কামরুল হান্নান	শিক্ষক	0181535448	
86	জিন্নাত আমিন	MUP	01875517047	
87	সবিতা বেগম	MUP	018252662	
88	Kafil Uddin	Teacher	01819-882006	
89	SAIFUL	st	01863114062	
90	Mujahid	st	0128425831	
91	Mr. Nurjahan	শিক্ষক	01821804450	
92	জামায়া আফ্রিন	ছাত্রী	01883890855	
93	সন্নিয়া সান্নিমা	ছাত্রী	01869510575	
94	সুকুমার গণ্ডি	ছাত্র	01779393637	
95	DHRITIMAN RAY	Principal Consultant ERM	9830478704	
96	RITUPARN SINGH	ANP-Reliance	7498460981	

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Sl.No	Name	Designation / Village Name	Mobile No.	Signature / Thumb Impression
97	RAVINDRA GUPTA	Sr. Manager Reliance	8817016245	
98	RAHOL SAHA	Manager Reliance	+91 7187228286	
99	SOUMI GHOSH	Senior Consultant	9830260743	

Reliance Bangladesh LNG Project

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Sl No	Name	Designation / Village Name	Mobile No	Signature / Thumb Impression
101	Mobarak Hosen	Research RA Assistant	01681838550	
102	Md Riad	Research RA Assistant	011666-473653	
103	M. ZAHIRUL ISLAM	Executive ED Director	01716624310	
104	SAYED AHMED	CHAIRMAN SOUTH DHOAKA	0172-124464	
105	সফিকুল ইসলাম	সিনিয়র এডিটর	01834432180	
106	ফরিদুল আমিন	সিনিয়র এডিটর	01834951064	
107	মুহাম্মদ হোসেন	সিনিয়র এডিটর	01820020449	
108	ফরিদুল আমিন	সিনিয়র এডিটর	0181605535	
109	শাহান মুহাম্মদ	সিনিয়র এডিটর	01813993106	
110	Didarul Alam Pintal	E.D. 'WONGOR'	01818-067706	
111	Abulhasan Arad	UFF	01719558002	
112	ফরিদুল আমিন	UFF	01771-53808	

Reliance Energy Services Limited

Public Consultation Meeting

A meeting was held at Ilham Community Center, Kutubdia on 30th August 2017 in Kutubdia Island regarding consultation of Environmental and Social Impact Assessment of the proposed Kutubdia LNG Project in Cox's Bazar District of Bangladesh. The following signatories were present in the meeting:

Sl No	Name	Designation / Village Name	Mobile No.	Signature / Thumb Impression
		বঙ্গ (বঙ্গ)	01817408996	
	মোঃ নাজিম হোসেন	বঙ্গ (বঙ্গ) আবদুল	01814782810	
	আব্দুল	আব্দুল	01712-5593 21410	
	আব্দুল	আব্দুল	0182710 000	
	আব্দুল	আব্দুল	01771484 852	
	আব্দুল	আব্দুল	01857640 651	
	আব্দুল		018251528	
	আব্দুল	আব্দুল	২	
	আব্দুল	আব্দুল	—	
	আব্দুল	আব্দুল	01720829876	
	আব্দুল	আব্দুল	—	
	আব্দুল	আব্দুল	01818-81810	

**Attachment 2: Summary of the ESIA Report on
Kutubdia LNG Project in Bangla**

(Distributed to all Attendees during the Public Consultation)

কুতুবদিয়া এল.এন.জি. প্রকল্প - কক্সবাজার এলাকা, বাংলাদেশ

নির্বাহী সারসংক্ষেপ

বাংলাদেশে, শিল্প ও বিদ্যুৎ খাতে প্রাকৃতিক গ্যাসের চাহিদা দ্রুত বেড়ে যাওয়ায়, প্রাকৃতিক গ্যাসের সক্ষিত ভাণ্ডারে দ্রুত হ্রাস ঘটছে। এটিকে বিবেচনায় রেখে রিলায়েন্স পাওয়ার ও তার বাংলাদেশ সহায়ক সংস্থা, রিলায়েন্স বাংলাদেশ এল.এন.জি. টার্মিনাল লিমিটেড (RBLTL) এর মাধ্যমে বাংলাদেশের কক্সবাজার অঞ্চলের কুতুবদিয়া স্থানে 3.5 - 5 MMTPA এর একটি এল.এন.জি. (LNG) স্টোরেজ এবং পুনরায় গ্যাসীকরণ প্রকল্প (FSRU) নির্মাণের পরিকল্পনা করেছে।

প্রকল্প পটভূমি :-

প্রস্তাবিত ভাসমান এল.এন.জি. স্টোরেজ ও গ্যাসায়ন প্রকল্পটি (FSRU) কুতুবদিয়ায় সমুদ্রের মধ্যে স্থাপনের পরিকল্পনা করা হয়েছে। এল.এন.জি. স্টোরেজের ক্ষমতা হবে ১৩৭,০০০ থেকে ২১৬,০০০ ঘনমিটার এবং এর বাৎসরিক ক্ষমতা ৩.৫-৫.০ MMTPA।

এই প্রকল্পের দুটি অংশ।

- সামুদ্রিক উপাদান।
- উপকূলবর্তী উপাদান।

সামুদ্রিক উপাদান :-

- ১। দুদিকে নোঙর ব্যবস্থামূলক সামুদ্রিক জেটি।
- ২। ১,৩৭,০০০ - ২,১৬,০০০ ঘন মিটার ক্ষমতা সম্পন্ন FSRU।
- ৩। ৭৫০ MMSCFD ক্ষমতাসম্পন্ন FSRU।
- ৪। ২ কিমি দীর্ঘ সমুদ্রমধ্যস্থ, ৩০ ইঞ্চি ব্যাস, উচ্চ চাপ ক্ষমতা সম্পন্ন পাইপলাইন।

উপকূলবর্তী উপাদান :-

একটি ১৬ কিমি দীর্ঘ ৩০ ইঞ্চি ব্যাসের পাইপলাইন জুর্গর্ভস্থ পাইপলাইনের সঙ্গে নাপুরাতে অবস্থিত ডালব স্টেশনের সঙ্গে যুক্ত করা হবে। নাপুরায় একটি মিটারিং স্টেশন (CTMS) হবে। বাঁশখালির গ্যাস স্টেশনটি জাতীয় গ্যাস গ্রিডের সঙ্গে যুক্ত থাকবে। এই ১৬ কি.মি পাইপলাইনের মধ্যে ২ কি.মি. কুতুবদিয়া চ্যানেল দিয়ে যাবে এবং বাকী অংশটি জমির ভেতর দিয়ে যাবে। নাপুরাতে একটি ৫০০ Kwh গ্যাস ভিত্তিক বিদ্যুৎ কেন্দ্র স্থাপন করা হবে।

সম্পদ অবশ্যিকতা :-

ভূমি :- ১৬ কিমি দীর্ঘ পাইপলাইন পাতার জন্য আনুমানিক ৫০ একর জমি লাগবে। এই আনুমানিক ৫০ একর জমির মধ্যে ৩০ একর জমি পাইপলাইনের রক্ষণাবেক্ষন ও মেরামতির জন্য লাগবে। বাকি ২০ একর জমি পাইপলাইন পাতার পর জমির মালিককে ফেরত দিয়ে দেওয়া হবে। এই ৩০ একর জমি পেট্রোবাংলা অধিগ্রহণ করবে। জমি অধিগ্রহণের পরে এই জমি RBLTL কে ১৫ বছরের জন্য হস্তান্তর করা হবে।

লোকবল :-

প্রকল্পটি নির্মাণকালের জন্য সর্বাধিক ৫০০ জন কর্মচারীর প্রয়োজন হবে। এর মধ্যে ৬০ শতাংশ অদক্ষ কর্মচারী। নির্মাণকালে যে কর্মী নিয়োগ করা হবে তা সাময়িক কালের জন্য এবং স্থানীয় অঞ্চল থেকে বেশীরভাগ লোক নিয়োগ করা হবে। প্রকল্পটির কার্যকরী পর্বে মোট ৬৫ জন লোকের প্রয়োজন হবে। তার মধ্যে এল.এন.জি. টার্মিনালের জন্য ৩৫ জন লোক এবং CTMS-এর জন্য ৩০ জন লোক লাগবে।

পানি :-

প্রকল্পটি নির্মাণ কালে সাধারণত দৈনিক ২০ কিলোলিটার পানি লাগবে এবং সর্বাধিক ৪০ কিলোলিটার পানি লাগতে পারে। এই পানির একটি অংশ পরিশুভ করে কাজে নিযুক্ত লোকদের খাওয়ার পানি হিসাবে জোগান দেওয়া হবে। নির্মাণকালের জন্য প্রয়োজনীয় পানি চিটাগঞ্জ পোর্ট থেকে সরবরাহ করা হবে। প্রকল্পটির কার্যকরী পর্বে ২০ কিলোলিটার

পানি লাগবে এবং তা বার্জের মাধ্যমে চিটাগঞ্জ পোর্ট থেকে থেকে সরবরাহ করা হবে। তালত স্টেশনে (CTMS) দৈনিক ২ কিলো লিটার পানি লাগবে এবং তা বাজার থেকে কেনা হবে।

বিদ্যুৎ :-

প্রকল্পের নির্মাণকালে সর্বাধিক ১ মেগাওয়াট বিদ্যুৎ লাগবে। এবং তা ডি.জি. স্টেট থেকে সরবরাহ করা হবে। প্রকল্পটির পরিচালনা পূর্বে CTMS-এর কার্য চালানোর জন্য ৫০০ Kwh বিদ্যুৎ লাগবে এবং তা ক্যাপটিভ বিদ্যুৎ কেন্দ্র থেকে সরবরাহ করা হবে। সামুদ্রিক অঞ্চলের কার্যের জন্য ১০ মেগাওয়াট বিদ্যুৎ লাগবে এবং তা ওখানেই FSRU-তে উৎপন্ন করা হবে।

পরিবেশগত সামাজিক প্রভাব মূল্যায়ন সমীক্ষা :-

প্রস্তাবিত প্রকল্পটি রোড ক্যাটাগরি হিসাবে নথীভুক্ত এবং এরজন্য বাংলাদেশ সরকারের থেকে পরিবেশগত ছাড়পত্র নিতে হবে। প্রকল্পটি নির্মাণের জন্য RBLTL আন্তর্জাতিক ঋণদাতার কাছ থেকে আর্থিক সাহায্যের জন্য পরিকল্পনা করেছে। এবং এর জন্য এশিয়ান ডেভেলপমেন্ট ব্যাঙ্কের (ADB) নির্দেশিকা এবং প্রয়োজনীয়তা সামঞ্জস্য রেখে অধ্যয়ন করা হয়েছে। প্রস্তাবিত প্রকল্পটি ADB-SPS, ২০০৯ অনুযায়ী ক্যাটাগরি 'এ' (A) হিসাবে শ্রেণীভুক্ত করা হয়েছে। পরিবেশগত ছাড়পত্রের জন্য এবং আন্তর্জাতিক আর্থিক সহায়তা লাভের জন্য RBLTL পরিবেশ ও আর্থসামাজিক প্রভাব মূল্যায়ন সমীক্ষা করা হয়েছে।

পরিবেশ ও আর্থসামাজিক মূল্যায়ন এবং অধ্যয়নের জন্য FSRU-এর চারদিকে ১০ কিমি জায়গা এবং প্রস্তাবিত পাইপলাইনের দুধারে ৫০০ মিটার এলাকার পর্যালোচনা করা হয়েছে। এই পর্যালোচনার জন্য ভৌতপরিবেশ, জৈব পরিবেশ, আর্থসামাজিক পরিবেশ সম্পর্কিত বিভিন্ন প্রাথমিক ও সেকেন্ডারী তথ্য সংগ্রহ করা হয়।

সম্ভাব্য প্রভাব এবং প্রশমন ব্যবস্থা :-

সম্ভাব্য পরিবেশগত প্রভাব

- * নির্মাণকার্যের জন্য ধুলিকণা ও শব্দ নির্গমন।
- * প্রকল্প পরিচালনা পূর্বে বিদ্যুৎ উৎপাদনের জন্য NOx ও CO নির্গমন।
- * পাইপলাইন পাতার জন্য স্থানীয় পানি নিকাশীর উপর প্রভাব।
- * মাটি ও ভূগর্ভস্থ পানি দূষিত হতে পারে। যদি তেল মাটিতে পড়ে।
- * তরল বর্জ্য ও অন্যান্য দূষিত পানি।

প্রস্তাবিত প্রকল্প থেকে বায়ুর উপর কি প্রভাব পড়তে পারে তা পর্যালোচনা করে দেখা গেছে যে, প্রকল্পের জন্য সংযোজিত বায়ুদূষণ ও শব্দদূষণ মাত্রা প্রযোজ্য মানের মধ্যেই থাকবে।

FSRU-তে পুনরায় গ্যাসীকরণ প্রক্রিয়া ও ইঞ্জিন ঠান্ডা করার জন্য সমুদ্রের পানি ব্যবহার করা হবে। পুনরায় গ্যাসীকরণ প্রক্রিয়া থেকে ঘন্টায় ১৫,০০০ ঘন মিটার পানি যা সমুদ্রের পানির তুলনায় ৭°C কম হবে এবং ইঞ্জিন ঠান্ডার থেকে ঘন্টায় সর্বাধিক ৩০০০ ঘন মিটার পানি যা সমুদ্রের পানির তুলনায় ৪°C বেশি তাপমাত্রার পানি সমুদ্রে ছাড়া হবে। নিয়ম অনুযায়ী হিমায়িত পানি ও ইঞ্জিন ঠান্ডা করার পানি তাড়াতাড়ি সমুদ্রের পানির সঙ্গে মিশে যাবে, সেইভাবে ছাড়া হবে। ঠান্ডা পানি ছাড়ার জন্য কি ধরনের প্রভাব পড়তে পারে তা CORMIX মডেল ব্যবহার করে পর্যালোচনা করা হয়েছে। মডেলিং-এর ফলাফলে দেখা গেছে যে হিমায়িত পানি ছাড়ার ১০০ মিটারের মধ্যে তাপমাত্রার পরিবর্তন সর্বাধিক ০.২৫°C থেকে ০.৮৬°C হবে। একইভাবে মেশিন ঠান্ডা করার পানি নিক্ষেপ করার স্থান থেকে ১০০ মিটারের মধ্যে ০.১০°C থেকে ০.২০°C তাপমাত্রায় পরিবর্তন হবে। FSRU থেকে নিকাশিত হিমায়িত পানি এবং ইঞ্জিন ঠান্ডা করার পানির তাপমাত্রা প্রযোজ্য মানের মধ্যে থাকবে।

মূল্য ও জলজ বাত্তুতন্ত্রের প্রভাব :-

পাইপলাইন বরাবর ও CTMS সাইটে যদি কোন গাছপালা থাকলে তা কাটা হতে পারে। তাতে স্থলজ উদ্ভিদের ওপর প্রভাব পড়তে পারে। উপকূলবর্তী পাইপলাইনের পাশে ও CTMS-এর চারদিকে পুনরায় গাছ লাগানো হবে। পাইপলাইন নির্মাণ কার্যের সময় চেষ্টা করা হবে যাতে বড় গাছ কাটা না হয়।

নির্মাণ কার্যে ব্যবহৃত নৌকা ও জাহাজ সমুদ্রে ও কুতুবদিয়া চ্যানেলে চলাফেরার সময়ে সামুদ্রিক কচ্ছপের আঘাত বা মৃত্যু হতে পারে। সামুদ্রিক কচ্ছপের বাসা বাধার জায়গার সমীক্ষা করা হবে। নির্মাণ কর্মীর দ্বারা কচ্ছপের ডিমের কোন ক্ষতি বা জলজ পরিবেশের যাতে কোনো ক্ষতিকারক প্রভাব না পড়ে তার উপযুক্ত ব্যবস্থা নেওয়া হবে।

নির্মাণ পর্যায়ে সমুদ্র ও চ্যানেলের মধ্য দিয়ে পাইপলাইন পাতায় সময় ও জেট নির্মাণের জন্য পানির মধ্যে যে শব্দ নির্গমন হবে তাতে সামুদ্রিক প্রাণীর ওপর বিরূপ প্রভাব পড়তে পারে। এই শব্দের জন্য অগভীর পানির ভিতরে (১৫ মিটার) কি প্রভাব পড়তে পারে তা মডেলিং (Intermediate Noise Propagation Model) করে নির্ধারণ করা হয়েছে। মডেল ফলাফল দেখায় যে সামুদ্রিক প্রাণীর আঘাত করতে পারে এমন শব্দ উৎস স্থল থেকে ৫০ মিটার এর মধ্যে থাকবে। ডলফিন জাতীয় প্রাণী সাধারণত ৫০ মিটার ও বেশী গভীর পানিতে থাকে অর্থাৎ প্রভাব এলাকার মধ্যে এই ধরনের প্রাণীর বাসস্থান নেই এবং এই প্রভাব গুরুত্বপূর্ণ হবে না।

প্রজেক্টটি কার্যকরী পর্বে LNG বাহিত জাহাজ চলাচলের জন্য পানির মধ্যে যে শব্দ উৎপন্ন হবে তাতে সামুদ্রিক প্রাণীর উপর প্রভাব পড়তে পারে। মডেল ফলাফল দেখায় যে, আঘাত করতে পারে এমন শব্দের মাত্রা উৎস স্থল থেকে ১০০ মিটার পর্যন্ত। এই এলাকায় সংবেদনশীল কোন প্রাণীর আবাসস্থল নেই। অর্থাৎ ডলফিন জাতীয় প্রাণীর উপর কোন প্রভাব পড়ার সম্ভাবনা নেই।

কার্যকরী পর্বে LNG বাহিত জাহাজ ও FSRU থেকে তেল টুয়ে সমুদ্রের পানিতে মিশতে পারে। এতে জলজ প্রাণীর উপরে প্রভাব পড়তে পারে। এছাড়াও FSRU-র আলোর তীব্রতা সামুদ্রিক প্রাণীদের উপর প্রভাব ফেলতে পারে। FSRU এবং LNG বাহিত জাহাজ থেকে তেল নির্গমন রোধ ব্যবস্থা ও আলোর তীব্রতা কমানোর ব্যবস্থা রাখা হবে।

পরিষ্কৃত প্রকল্পটি বিভিন্ন সংরক্ষণ বিষয়ে কাজ করবে।

আর্থসামাজিক ব্যবস্থার উপর প্রভাব

ইহা অনুমান করা হচ্ছে যে, প্রকল্পটি স্থাপনার কারণে আর্থ সামাজিক পরিবেশের উপর ইতিবাচক এবং বিরূপ দুইধরনের প্রভাবই পরিলক্ষিত হতে পারে। ইতিবাচক প্রভাবগুলি হলো - অদক্ষ শ্রমিকদের অস্থায়ী কর্মসংস্থানের সুযোগ সৃষ্টি এবং স্থানীয় মানুষের ব্যবসা বানিজ্যের সুযোগ বৃদ্ধি। এটাও অনুমান করা যায় যে আর্থসামাজিক ব্যবস্থার উপর কিছু বিরূপ প্রভাবও পরিলক্ষিত হবে। সেগুলি হলো জমি অধিগ্রহণের কারণে উদ্ধৃত ক্ষতি (CTMS এবং ভূগর্ভস্থ পাইপলাইন এর জন্য প্রয়োজনীয় জমির পরিমাণ যথাক্রমে আনুমানিক ৪ একর এবং ২৬ একর) এবং আয়ের উৎসের ক্ষতি। তটবর্তী অঞ্চলে টানা জাল ও ছোট বেঙ্গলী জাল ব্যবহার করে যে মৎসজীবেরা মাছ ধরে তাদের উপর সংশ্লিষ্ট প্রভাব পড়বে। প্রকল্প নির্মাণ কালে (১২ মাস আনুমানিক) এই সংশ্লিষ্ট প্রভাবটি আলী ফকির ডেইল ও কিন্দীপাড়ার মৎসজীবীদের ক্ষেত্রে প্রযোজ্য। যেহেতু কুতুবদিয়ার সমুদ্র তীরবর্তী অঞ্চলে এবং কুতুবদিয়া চ্যানেলের তটবর্তী অঞ্চলে কোনোরকম অবকাঠামো নির্মাণের পরিকল্পনা নেই তাই প্রকল্পের কার্যকরী পর্বে কোনোরকম প্রভাব অনুমান করা যাচ্ছে না। নিরাপত্তা জনিত কারণে FSRU এবং জেট পার্শ্ববর্তী ৫০০ মিটার অঞ্চলে সর্বসাধারণের প্রবেশ রোধিত এলাকা থাকবে কিন্তু তা কোনো ভাবেই মাছ ধরার এবং যাতায়াতের অসুবিধা সৃষ্টি করবে না। এটা থেকে দেখা যাচ্ছে যে প্রকল্পটির প্রভাবগুলি মূলত স্থানীয় ও অস্থায়ী / স্থায়ী বা উপযুক্ত ব্যবস্থাপনার মাধ্যমে নিরূপন করা সম্ভব।

জনসাধারণের স্বাস্থ্য ও নিরাপত্তার উপর প্রভাব

নির্মাণ কার্যের সময় নির্মাণ সামগ্রী এবং ভারী যন্ত্রপাতি জলপথে নির্মাণ স্থলে আনা হবে। সুতরাং সড়ক পথে মাশপহ আনয়নের কারণে ফোনোমর্ফ বায়ুজট এবং জনসাধারণের ব্যবহারের উপর কোনো বিরূপ প্রতিক্রিয়া সৃষ্টির সম্ভাবনা নেই। তবে অনুমান করা যায় যে, পাইপলাইন নির্মাণের সময় বায়ু এবং শব্দ দূষণের কারণে স্থানীয় জনগণের কিছু সাময়িক অসুবিধা সৃষ্টি হতে পারে।

ইতিবাচক প্রভাব

আশা করা যায় যে, প্রকল্পের নির্মাণপর্বে এবং কার্যকরী পর্বে আর্থসামাজিক উন্নয়নের সম্ভাবনা আছে এই অঞ্চলে।

তথ্য প্রকাশ, পরামর্শ এবং অংশগ্রহণ

উক্ত প্রকল্পের পরিবেশ এবং সামাজিক প্রভাব অধ্যয়ন করার সময় পরিপার্শ্বিক পরিবেশগত অবস্থা এবং আইনগত ও প্রশাসনিক ব্যবস্থা অনুধাবন করার জন্য বিভিন্ন স্টেকহোল্ডারদের সাথে বিভিন্ন সময় পরামর্শ করা হয়েছে। এই পক্রিয়া প্রকল্পের সম্বন্ধে স্টেকহোল্ডারদের উপলব্ধি সম্বন্ধে ধারণা তৈরী করতে এবং প্রতিক্রিয়া নথিভুক্ত করতে সহায়তা করেছে, যা প্রকল্পের পরিকল্পনার সময় বিচার্য ও সহায়ক হয়েছে।

অভিযোগ নিবারণ ব্যবস্থা

প্রকল্পের কারণে উদ্ভূত ঝড় এবং অভিযোগ সমাধানের জন্য অভিযোগ নিবারণ ব্যবস্থার স্থাপন করা হবে এবং ইহার লক্ষ্য হলো এই প্রকল্পের সাথে সম্পর্কিত সামাজিক ও পরিবেশগত অভিযোগ ও উত্তেজনা নিদিষ্ট সময়সীমার মধ্যে এবং স্বচ্ছভাবে সমাধান করা।

পরিবেশ ও সামাজিক ব্যবস্থাপনার পরিকল্পনা

পরিবেশ ও সামাজিক ব্যবস্থাপনার পরিকল্পনার লক্ষ্য হলো পরিবেশগত এবং সামাজিক প্রভাব এড়ানো / কমানো এবং তার নিরূপণ করা। এই পরিকল্পনার অন্তর্গত হলো -

- * সম্ভাব্য ক্ষতিকারক প্রভাব প্রশমন
- * প্রকল্প নির্মাণ ও কার্যকরী পর্বে উদ্ভূত প্রভাব এবং তার প্রশমন ব্যবস্থার পর্যবেক্ষণ করা
- * প্রতিষ্ঠানিক দক্ষতা তৈরী ও প্রশিক্ষণ
- * প্রয়োজনীয় বিধিবিধি আৱশ্যিক শর্ত পরিপূর্ণ করা
- * প্রকল্প পরিকল্পনা, নকশা, নির্মাণ এবং পরিচালন পর্বের সাথে এই ব্যবস্থার সম্পর্ক স্থাপন

পুনর্বাসন অবকাঠামো

গ্যাস পাইপলাইন এবং CTMS এর জন্য প্রয়োজনীয় জমি পেট্রোবাংলা অধিগ্রহণ করবে এবং সেই জমি পেট্রোবাংলা মালিকানাধীন থাকবে এবং RBLTL কে পাইপলাইন নির্মাণ এবং পরবর্তী পরিচালনার জন্য ১৫ বছরের জন্য এই জমি ইজারা দেবে। এই পুনর্বাসন অবকাঠামো জাতীয় আইন এবং ২০০৯ ADB সুরক্ষা নীতির সঙ্গে সঙ্গতি রেখে তৈরী করা হয়েছে যা ভবিষ্যতে পেট্রোবাংলা অনুসরণ করবে।

ভূমি অধিগ্রহণ, অনাকাঙ্ক্ষিত পুনর্বাসন এবং সকল ক্ষতিগ্রস্তলোকের জীবিকা পুনরুদ্ধারের জন্য ক্ষতিপূরণ ব্যবস্থা এই অবকাঠামোর মধ্যে অন্তর্ভুক্ত করা হয়েছে।

বাস্তবায়ন ব্যবস্থা

প্রশমন পরিকল্পনা (ESMP), ঠিকাদার সংস্থার চুক্তির অন্তর্ভুক্ত করা হবে। নকশা এবং নির্মাণ কার্যের সঙ্গে যুক্ত প্রশমন ব্যবস্থা বাস্তবায়নের দায়িত্ব ঠিকাদার সংস্থার উপর ন্যস্ত হবে। প্রকল্পের সাথে সরাসরি ভাবে যুক্ত কর্মীরা বিশেষতঃ EHS অফিসার এবং সাইট ইঞ্জিনিয়ারদের দায়িত্ব হলো ঠিকাদার সংস্থার দ্বারা প্রশমন ব্যবস্থার বাস্তবায়ন পর্যবেক্ষণ করা। পরিবেশ এবং সামাজিক ব্যবস্থাপনার পরিকল্পনা বাস্তবায়নের কার্যকারিতা নিরীক্ষণের জন্য একটি সুপরিষ্কৃত নিরীক্ষণ ব্যবস্থা গড়ে তোলা হয়েছে। এছাড়া প্রকল্প এলাকা থেকে প্রকল্পের জন্য নিয়োজিত সদর দপ্তর এবং প্রয়োজন অনুযায়ী নিয়ন্ত্রক কর্তৃপক্ষ এবং আর্থিক সহায়তাকরী সংস্থালিতে নিয়মিত তথ্য সরবরাহের লক্ষ্যে একটি সুপরিষ্কৃত প্রতিবেদন ব্যবস্থা স্থাপন করা হবে।

**Attachment 3: Summary of the ESIA Report
on Kutubdia LNG Project in English**

Executive Summary - Kutubdia LNG Project in Cox's Bazar Region in Bangladesh

In Bangladesh, the demand for natural gas is rapidly rising due to its diversified use in industrial and electric power sector – resulting in fast depletion of existing reserves. Government of Bangladesh (GoB) has thus adopted a strategy for the development of the power sector which envisages private participation for power generation and gas supply. Keeping this in view, Reliance Power through its subsidiary in Bangladesh, Reliance Bangladesh LNG Terminal Limited (RBLTL) plans to establish a LNG terminal for supply of regasified liquid natural gas (RLNG) off *Kutubdia* Island in Cox's Bazar Region of Bangladesh.

Project Background

The LNG terminal is proposed with a Floating Storage and Regasification unit (FSRU) in the range of 3.5 – 5.0 MMTPA located offshore of the *Kutubdia* Island. Overall the Project will consist of:

Marine component off *Kutubdia* Island covering

- vi) Twin (double berth) jetty with topside;
- vii) FSRU of storage capacity of 137,000 m³ to 216,000 m³;
- viii) Regasification onboard FSRU of 750 MMSCFD peak capacity;
- ix) High pressure 30 inches (30") subsea re-gasified LNG (RLNG) pipeline of ~2.0 km;

Onshore component covering

- x) Subsurface /subsea spur gas pipeline of ~16 km length (30 inches diameter) connecting *Kutubdia* Island to custody transfer metering station (CTMS) through Valve Station no. 2 located at *Napura, Banskhali* from where the gas pipeline will be connected into the GTCL's national gas grid pipeline of *Moheshkhalli – Anwara* Section. The pipeline length of ~16 km also includes 2.7 km of subsea pipeline length passing through *Kutubdia* Channel. The CTMS at *Napura* will also have 500 kwh of gas based power generation facility.

Resource Requirements

Land: The land required for construction (i.e. laying) of ~16 km long high pressure spur gas pipeline (from *Kutubdia* Island to CTMS at *Napura*) and the CTMS will be ~50 acres. No land based facility is proposed on *Kutubdia* Island and no land will be required for the same. For operation and maintenance purposes out of ~50 acres, Petrobangla, Government of Bangladesh will acquire ~30 acres of land on permanent basis both for pipeline (~26 acres) and CTMS (~4.0 acres). The ownership of all the land required and acquired will lie with Petrobangla. Once land is acquired, it will be handed over to RBLTL on lease for 15 years for pipeline erection and subsequent operations and maintenance for supply of RLNG into the national gas grid.

Manpower: During peak construction phase, the Project would deploy ~500 persons, mostly unskilled workers (~60%). Construction of Project is expected to be completed in ~12 months (working three shifts a day). Construction manpower will be temporarily employed from within the local regions to the extent possible. The operation of the LNG terminal post-construction will require up to 35 full time employees onboard the FSRU for round the clock operations and 30 full time employees working in three shifts daily at the CTMS.

Water: During construction phase, the Project would require domestic water of ~20 m³/day for normal construction activities including water for drinking use after desired treatment for the labour to be engaged onsite (to be sourced through barges from the *Chittagong* Port). No ground water will be extracted for the Project related construction purposes. During operation phase, the Project would require ~20 m³/day of fresh water (to be sourced through barges from the *Chittagong* Port) to meet water requirement for personnel working on-board the FSRU. Approximately 2.0 m³/day of fresh water will be procured from local market to meet the water requirement of personnel working at the CTMS.

Power: Maximum 1 MW power would be sourced for laying of pipeline through diesel generators. For onshore operations, 500 kWh-of power will be generated using RLNG at the CTMS. For marine operations, ~10 MW of power will be generated using RLNG on board FSRU.

ESIA Study

RBLTL has initiated an environmental and social impact assessment (ESIA) study to comply with the requirements of environmental impact assessment (“EIA”) guidelines of the GoB. The present LNG Project has been classified as Category Red and thus requires an EIA to be conducted for obtaining to obtain necessary Environmental Clearance Certificate for the Project. RBLTL is also seeking finance from international lenders for setting up of the Project and hence the ESIA conforms to the guidelines and requirements of the Asian Development Bank (ADB). This Project has been classified as category A as per the ADB SPS, 2009 and thus requiring an ESIA.

A 10 km radial zone around the FSRU site has been considered as study area for the ESIA. Additionally, an area of 500 metres on both sides of the pipeline route and CTMS at *Napura* has been included within the study area. The existing baseline conditions within the study area, including the physical environment, the ecological environment and the socio-economic environment, was studied through various primary studies, secondary information collection and collation and stakeholder consultations; this helped in assessing the impacts due to the LNG Project.

Potential Impacts and Mitigation Measures

Environmental Impacts

The potential environmental impacts envisaged are:

- Noise and dust generation due to construction activities.
- Gaseous emissions particularly NO_x and CO during operation phase (power generation facility on board FSRU and at the CTMS).
- Disturbance to micro-drainage of the area due to pipeline laying
- Possibility of soil and groundwater contamination due to accidental spillage
- Generation of waste during construction
- Generation of sewage and other liquid waste

The impacts are mostly localised in nature that can be mitigated with good engineering practices and appropriate mitigation measures recommended. In addition, impacts have been assessed due to air and noise emissions from the Project. The incremental and resultant concentrations of the air pollutants as well as the predicted noise levels at the onshore receptors considered for the study was found to remain within the prescribed standards. The FSRU option would involve use of sea water for vaporisation in the re-gasification process and for engine cooling. There will be cold water discharge (maximum of 15,000 m³/hour) at 7 °C less than ambient temperature and machine cooling water (maximum 3000 m³/hour) at 4 °C more than ambient will be discharged from engine room. Both cold water and machine cooling water will be discharged offshore to allow maximum mixing of the thermal plume as per norms. Separate simulations to consider worst case scenarios for cold water and machine cooling water discharge were carried out using Steady State three dimensional CORMIX model. The results showed there will be temperature change 0.25 °C to 0.86 °C within 100 m from maximum discharge of cold water. Similarly, the machine cooling water discharge will result in change in 0.10 °C to 0.20 °C within 100 m from maximum discharge of machine cooling water. Both discharge of cold water and machine cooling water will be well within the permissible standard (World Bank Standard) of change of 3°C within 100 m of mixing zone from discharge location.

Impacts on Terrestrial and Aquatic Ecology

Vegetation removal along the pipeline route and CTMS site will cause loss of vegetation cover. The impacts will be mitigated by plantation of saplings at the identified areas along the inland pipeline route and at CTMS. Felling of mature trees will mostly be avoided through appropriate routing of the pipeline alignment.

There is likelihood of impact on turtles during the construction period due to boat and vessel movement in sea and channel area. A survey of turtle nesting habitats near along pipeline route near *Kutubdia* Island and *Kutubdia* Channel will be conducted. Adequate safeguard will be built in the contract of the Contractor to prevent any poaching of turtle eggs by the construction workforce as well as to prevent any disturbance to aquatic habitats from construction activities.

During construction phase, there will be potential impact on marine fauna due to underwater noise generation mainly during pile driving activities for jetty construction at ~1.5 km from the shore. The intermediate noise propagation model has been considered to assess impact of underwater noise at shallow water depth (~15m). The model results showed that the criterion threshold for injury will remain within 50 m from source of pile driving activities. With very short activities of pile driving (a few days) and no sensitive habitats prevailing within the impact zone, and cetaceans generally prevailing in 50 m and above water depth, the impacts is assessed as insignificant. Similarly, during operation phase, the impact due to underwater noise generation mainly from LNG cargo movement is assessed as in significant.

During the operation phase, impacts may arise from spillage and leakage of fuel and lubricant, mortality caused due to movement of ships and vessels and from illumination in the offshore region of jetty and FSRU. The Project will have in place specific procedures and necessary preparedness to contain any accidental spill at source and also prevent their spread in the surrounding environment. The Project will also plan vessel movement and design the site illumination in a manner to limit impacts on aquatic habitats. The Project shall take initiative on various conservation activities on the island.

Impacts on Social Environment

The Project will have both positive and adverse impacts on social environment. The positive impacts will include temporary employment opportunity for the unskilled labourers during the construction period and business opportunities for the local people. Based on the present level of information available from the Project Developer it is anticipated that the Project is likely to have adverse social impacts pertaining to permanent land loss (of ~4 acres for CTMS and ~26 acres for subsurface pipeline) and likely loss of income from the land to be acquired for pipeline and CTMS.

As no onshore structure at *Kutubdia* Island or close to *Kutubdia* Channel are proposed, hence no potential impact on shoreline fishing activities during operation phase of LNG terminal are anticipated. The FSRU will have an exclusion zone of 500 m surrounding the FSRU/jetty for security and safety reasons. This may not directly impact fishing activities or their access routes.

The impacts are mostly localised and some permanent in nature that can be mitigated with appropriate measures.

Impact on Community Health & Safety

Construction materials and heavy equipment used during the construction phase will be brought into the pipeline route and CTMS site through barges using the water ways and is not expected to cause any traffic congestions on roads and possible disruption to the community usage of roads. However, some inconvenience to community is anticipated during pipeline erection in construction phase terms of air and noise pollution.

An exclusion zone of 500 m will be maintained surrounding FSRU/jetty, which will further eliminate potential safety risk to fishing boats. Potential societal risks will get attenuated due to the proposal of subsea and subsurface (2 m below ground level) gas pipeline for its entire route. Adequate mitigation measures are outlined in the ESMP to prevent and minimise impacts on community health and safety.

Beneficial Impacts

The construction phase of the Project (of ~12 months from the date of obtaining of all approvals) will have an important role in the socio-economic development of the area within the island, whereas the operation phase of the Project will play an important role by supplying gas in the region. A reliable and expanded gas supply will support future economic development of dependent sectors like industry and manufacturing enabling them to operate and compete

Overall the ESIA study of the Project ascertains that:

- The Project will result in moderate positive socio-economic benefits and the potential negative environmental and social impacts that have been identified as mostly short-term and localised in nature, and can be minimized adequately through good design, appropriate application of mitigation measures and regular supervision of implementation;
- By implementing the recommended mitigation measures the Project will minimize the identified risks whereas on-going consultation and engagement will support the maintenance of a harmonious relation with the local community;
- Community health and safety related impacts will be managed at source to reduce the footprint.

Information Disclosure, Consultation and Participation

Series of consultations were held during the ESIA process with several stakeholders to have an insight of the baseline situation of the site and regulatory and administrative setups in the *Kutubdia* LNG Terminal site. This in turn helped in developing an understanding of the perceptions of stakeholders with regards to the Project and also allowed for a means of recording their feedback. The stakeholder views expressed were incorporated in the ESIA and the planning and development of the Project.

Grievance Redressal Mechanism

A Grievance Redressal Mechanism (GRM) will be in place to handle and resolve the conflicts and aggrieved situations. This Project specific GRM will aim to provide a time bound and transparent mechanism for expressing and resolving social and environmental concerns linked to this Project.

Environment and Social Management Plan

Project specific Environment and Social Management Plans (ESMP) have been developed with an aim to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts/risks and to propose enhancement measures. The plan covers

- mitigation of potentially adverse impacts;
- monitoring of impacts and mitigation measures during Project implementation and operation;
- institutional capacity building and training;
- compliance to statutory requirements; and
- integration of the ESMP with Project planning, design, construction and operation.

Resettlement Framework

A Resettlement Framework has been prepared. The requisition and acquisition of land for the onshore spur gas pipeline and CTMS will be executed and owned by Petrobangla. RBLTL will be given the land on lease for 15 years for erection of pipeline and subsequent operations. The Resettlement Framework covers requirements to be followed by Petrobangla on compliance with national laws and ADB's Safeguard Policy Statement of 2009. Compensation arrangements for land acquisition, involuntary resettlement and livelihood restoration of all affected persons (APs) - are included in the Resettlement Framework.

Implementation Arrangements

The ESMP (mitigation plan) will be included in the construction contract and the contractor will be responsible for implementation of the measures associated with design and construction. The Project Developer's staff, specifically the EHS Officer and Site Engineer, will monitor the implementation of these mitigation measures by the contractors at the site. A monitoring programme has been devised to periodically evaluate the effectiveness of the ESMP implementation and a robust reporting system will be put in place to ensure regular flows of information from the Project site to the Project headquarters and, as necessary, to regulatory authorities and funding agencies.

Attachment 4: Sample Feedback Questionnaire in Bangla

(Distributed to all Attendees during the Public
Consultation)

কুতুবদিয়া এল এন জি প্রকল্প

পরিবেশগত ও আর্থ-সামাজিক প্রভাব নিরূপনের উপর আয়োজিত মতামত বিনিময় সভা

স্থান : কুতুবদিয়া, তারিখ - ৩০/০৮/২০১৭

১। আপনারা এই প্রকল্পটি সম্বন্ধে আগে শুনেছেন? শুনলে কোথা থেকে শুনেছেন - খবরের কাগজে / মাইক দ্বারা প্রচার / নিজেদের মধ্যে আলোচনার মাধ্যমে / লোকমুখে / ইত্যাদি -

২। আজকের এই সভা থেকে প্রকল্পটি সম্বন্ধে কী কী জানলেন ?

৩। এই প্রকল্পটি সম্বন্ধে আপনি কি মত পোষণ করেন ?

৪। এই প্রকল্প প্রস্তুতকারী সংস্থার কাছ থেকে স্থানীয় মানুষ হিসাবে আপনার কি কি প্রত্যাশা ?

৫। এছাড়া আপনার আর কোনো মতামত আছে? যদি থাকে, সংক্ষেপে জানান।

নাম :-

ঠিকানা :-

ফোন :-

**Attachment 5: Sample Feedback
Questionnaire in English**

Name:

Address:

Contact Number:

**Attachment 6: Coverage of the Public
Consultation Meeting in Local Media**

ইয়াবাসহ যুবলীগ টকনাফে

১৯ টেকনাফে
নীলায় অল্প
দকাকৃত ইয়াবা
৭ নোভা বেলালসহ
৮০০০ পুশি।
১০০০ গুলীর রাতে
১০ নং প্রয়াগ
এসআই আবুল
ই আলমগীরের
মডেল থানা
অভিযান চালিয়ে
উকিন, তাঁর ভাই
সহ সজাপতি
তাদের বোন
মকে অস্ত্র
করেছে।
এলাকার মুক্ত
মেয়ের জন্ম।
মুন কবির জয়
হরে। একদিন
উঠে আসেন।
মাই প্রতিমকে
ছেলের সাথে
গুডায় তাদের
নুবলীগ নোভা
মকে ৫ হাজার
দৈনিক খেঁচী
তাজা কার্টুজ
ও অস্ত্র আইসে
মাজতে প্রেরণ
নার অভিযান
উকিন খান
সহ করে
উই হেলাল
পাতক আসামি

পলাতক তিনে শেলি ালে

১৯
১৯
১৯

কুতুবদিয়ায় এলএনজি টার্মিনাল স্থাপন বিষয়ক মতবিনিময় সভা

নিজস্ব সংবাদপত্রঃ কুতুবদিয়া

কক্সবাজারের দ্বীপ-কুতুবদিয়ায় দৈনিক প্রায় ১ লাখ ৩৭ হাজার থেকে ২ লাখ ১৬ হাজার সন্নিহিত কমাডা সম্পদ (বাৎসরিক ৩.৫-৬ এমএমটিপিএ) একটি আনন্দময় এল এনজি. স্টোরেজ ও গ্যাসায়ন প্রকল্পের কাজ শুরু হচ্ছে আগামী নভেম্বর মাসে। প্রায় ৬ থেকে ৭ হাজার কোটি টাকা ব্যয়ে আগামী এক বছরের মধ্যে এ প্রকল্পকাজ সম্পন্ন করবে আর্থজাতিক কোম্পানি রিলায়েন্স লিমিটেড। প্রকল্পটি বাস্তবায়নে পরিবেশ ও সামাজিক সচেতনতা বিষয়ক এক মতবিনিময় সভা গতকাল বুধবার উপজেলায় উপস্থান কমিউনিটি সেন্টারে অনুষ্ঠিত হয়। এতে উপস্থিত ছিলেন উপজেলা নির্বাহী কর্মকর্তা মুজিব হোসেন, জেলা পরিবেশ অধিদপ্তরের সহকারী পরিচালক সর্গার শরিফুল ইসলাম, উপজেলা আইস চেয়ারম্যান জামান কবির হায়দার, থানা অফিসার ইনচার্জ (ওসি) দিলাকর ফেরদৌস, উপজেলা আ.লীগ সভাপতি আওরফুল মাহবুব, ইউপি চেয়ারম্যান এড. ফরিদুল ইসলাম হোসেন, জালাল আতম, জেদুল আতম হোসেন, কোম্পানির অফিসি ডিরেক্টর রজন পোহার, সিনিয়র আইস প্রেসিডেন্ট ড. বিজন মিত্র, এজিএনএল আইস প্রেসিডেন্ট খাতু পার্বী সিং, এশিয়ান ডেভেলপমেন্ট ব্যাঙ্ক (এডিবি) প্রতিনিধি মি. অফিক আলমেরা, প্রকল্প ম্যানেজার মিত্রাভল সাহা, পরিবেশ বিশেষজ্ঞ সুমি ধোম, দিল্লী রায়সহ উপজেলার বিভিন্ন স্তরের গণ্যমান্য ব্যক্তিবর্গ। সরকারের সাথে করা চুক্তিতে রিলায়েন্স কর্তৃপক্ষ এ প্রকল্পকাজ বাস্তবায়নে সর্বাঙ্গীণ সহযোগিতা প্রদান করে এবং প্রকল্পের প্রকল্প ম্যানেজারের প্রতিশ্রুতি ব্যক্ত করেন জামান কবির হায়দার, থানা অফিসার ইনচার্জ ও সর্গারের থানা ম্যানেজার।

এ টার্মিনাল স্থাপনের জন্য ৬৩ একর জায়গা নির্ধারণ করা হয়েছে উপজেলার প্রায় ৩৩০ (বাইস) এলাকা সীমান্ত বুক-৩ ও কেয়ারবিলা (কিন্দাপাতা-আলী মন্দির ডেইল) সীমান্ত পর্যন্ত। সরকারি বিধিমাতে ৩০ একর জায়গা অধিগ্রহণ করবে পেট্রোলিয়াম। বাকী ৩৩ একর জায়গা পাইপলাইন পাতানোর পর প্রাপ্তি ফাউন্ডেশন ফেরত দেবে সংশ্লিষ্ট জমি মালিকের কাছে। সাইটের দু'দিকে মোড়ত ব্যান্ডামূলক সেক্স দু'কি.মি. লম্বা একটি সামুদ্রিক জেটিসহ আনন্দময় এল এন জি. স্টোরেজ ও গ্যাসায়ন কেন্দ্রের সাথে ৩৩ ইঞ্চি ব্যাসের উচ্চ চাপ কমাডাসম্পন্ন পাইপ লাইন সমুদ্র থেকে ৩ চর বুক-৩ তয়ে ৩ কি.মি. কুতুবদিয়া চ্যানেলের অধঃদেশ দিয়ে দীর্ঘ ১৬ কি.মি. অবধি বর্ধমানীয় নাপুরাতে অবস্থিত ডাঙর স্টেশনের সঙ্গে যুক্ত হবে। যখনই সর্গার পরিবেশ-প্রতিবেশের সাথে ভারসাম্য রক্ষা করেছে এ প্রকল্প বাস্তবায়িত হবে বলে অভিমান্ত ব্যক্ত করেন কোম্পানির কর্মকর্তা ও বিশেষজ্ঞগণ।



কুতুবদিয়ায় এলএনজি টার্মিনাল স্থাপন বিষয়ক মতবিনিময় সভায় বক্তব্য রাখছেন উপজেলা নির্বাহী কর্মকর্তা মুজিব হোসেন

ফটিকছড়ির বাগান বাজারে কিশোরের মৃত্যু বিদ্যুৎস্পৃষ্টে

নিজস্ব সংবাদপত্রঃ ফটিকছড়া

ফটিকছড়ি উপজেলার দুর্গপুর গ্রামাঞ্চল বাগান বাজার ইউনিয়নের বিদ্যুতের তারে জড়িয়ে মুগ্ধন রাসেল উকিন (১৪) শামের এক মূল ছাটের মর্মান্তিক মৃত্যু হয়েছে। বুধবার সকাল ১৩টার দিকে ঘটনাটি ঘটে। নিহত রাসেল ওই ইউনিয়নের মুগ্ধন পুর গ্রামের জমিদার আবু তাহেরের পুত্র এবং দুর্গপুর উচ্চ বিদ্যালয়ের নবম শ্রেণীর ছাত্র। তার মৃত্যুতে এলাকায় শোকের ছায়া নেমে এসেছে। জামা যায়, কিশোর রাসেল মরার পাশে গাছে ডাল কঠোরে দিয়ে আত্মহত্যার পরে বৈদ্যুতিক তারে জড়িয়ে বিদ্যুতায়িত হয়ে পড়ে। একপর্যায়ে সে গাছ থেকে নিচে পড়ে ঘটনাস্থলে প্রাণ হারায়। উক্ত বিদ্যালয়ের প্রধান শিক্ষক আবদুল মালেক বিষয়টি নিশ্চিত করে বলেন, অত্যন্ত মর্মান্তিকভাবে ঘটনাটি ঘটল। রাসেল আমার স্কুলের নবম শ্রেণীর ছাত্র ছিল। গত মঙ্গলবার সে নবম শ্রেণীর রেজিস্ট্রেশন করে। তার রোল নাম্বার ছিল ৯।

বোয়ালখালীতে বজ্রপাতে ১ জন নিহত

নিজস্ব সংবাদপত্রঃ বোয়ালখালী

বোয়ালখালীতে বজ্রপাতে কক্সবাজার জেলার পেকুয়ার বারপাকিয়া বুধ মন্দির ফোনা গ্রামের মো. আলী (৪৫) নিহত হয়েছেন। তিনি মৃত শহর আলীর ছেলে। গতকাল (বুধবার) দুপুরে উপজেলার বরপাশায়ে আকস্মিক বজ্রপাতে নিহত হন তিনি। বরপাশায়ে এলাকার আবদুল ছোব্বান মোকিদার বাড়ি এলাকার শুষ্ক বিলে আমনের চারা রোপণের সময় এ ঘটনা ঘটে বলে জানিয়েছেন শ্রীপুর-বরপাশায়ে ইউনিয়ন পরিষদের চেয়ারম্যান মোহাম্মদ মোকারম।

Annex 11

Corporate Social Responsibility (CSR) Plan

Corporate Social Responsibility

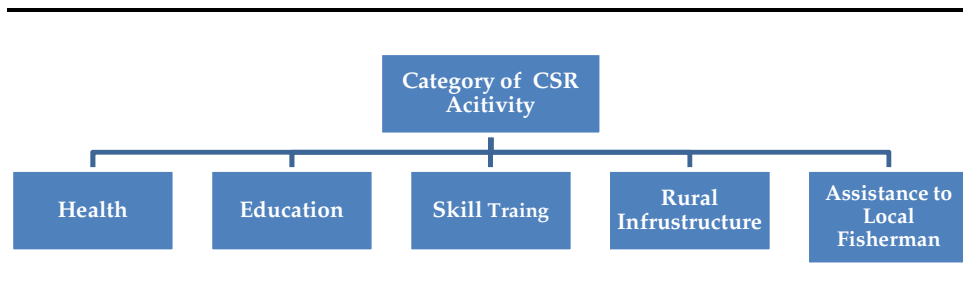
Corporate Social Responsibility (CSR) is important for maximising the project benefits for its key stakeholders and local community. This contributes to establish good relationship with them, obtain and maintain social license to operate.

In this regard, the subsequent sections discuss the community need based CSR plan on the outcomes of the community consultation and the socio-economic overview of the region.

Potential Areas of CSR Intervention

The activities that have been proposed on the basis of professional judgement and feedback received during community consultations are categorized into four major categories:

Figure Categories of Community Need



Health

The healthcare facilities in the vicinity include 1 primary health centres in the Ali Fakir Deil and availability of one doctor but not on regular basis and there is no in house treatment facility available in this health centre. This primarily caters to the preliminary treatment, immunisation program, mother and child care and family planning issues. Community consultations indicated that the villagers visited Upazila Health Complex at Boroghob which is about 6 kilometres from the place.

To improve the health care facilities the following activities can be undertaken:

1. **Conducting periodic health clinics:** RBLTL can provide doctor's facilitation service to the community people by conducting bi-monthly health clinics in the two villages-Ali Fakir deil and Bindapara with the help of their in house Medical Officer;
2. **Providing ambulance service:** RBLTL can aid access to quick medical care by improving the provision of ambulance to the local villages. The RBLTL unit can make available the telephone numbers of the

ambulance service available with the Plant to the community to reduce their communication problems;

3. **Health Care through convergence:** RBLTL in collaboration with the local health care facility centres, especially at the Upazila level, can come up with provisions by adding beds for the patients in the rural hospital. These beds can be kept reserved for the villagers of Ali Fakir Deil and Bindapara. BSL can also conduct eye camps, immunisation camps (e.g. Hepatitis B, C and other communicable diseases) and blood donation camps. ;
4. **Undertaking health awareness camps:** RBLTL can undertake health awareness camps specifically with a focus on improving the maternal and child health, family planning with the general community and on health and hygiene, hand washing with school children.
5. **Conducting school health check-up and eye check-up camps:** RBLTL also can conduct school health check-up and eye check-up camps for the students of primary schools and secondary school located within the vicinity, twice in a year

Education

The literacy profile of the study areas indicate that - average literacy rate of Dakshin Dhurung and Kaiyabil union observed as 30.4% and 21.6% which is lower than the district literacy rate. Community consultations indicated that literacy level among the older generations are comparatively low than the younger generations.

The study area possesses necessary educational infrastructure to cater to the educational needs of the rural population. All study area villages reported to have at least a primary school within their boundaries, and a secondary and senior secondary school is located in union level and Upazila level. Focus Group Discussions (FGDs) with the community members indicated that although sufficient educational infrastructure is available in the region there are many incidents of school dropouts especially at upper-primary level and at the secondary level due to various reasons; one of the main reason being that the students and their families are not able to bear the cost of the education related to purchasing of text books and other study materials. Other reason is involvement of child labour in fishing activity.

Community consultation reveals that following activities related to education can be helpful for the community:

1. **Improving infrastructure facilities at the government schools:** RBLTL can work towards improving the educational infrastructure as well as civic infrastructure in the local government higher secondary school and primary schools in consultation with the school authority (based on RBLTL's preference). This may include improving the sports facilities, classrooms, establishment of computer labs/science labs etc.

2. **Providing financial assistance to the children of low-income and vulnerable families:** The low-income families in the area are those families that fall below the national poverty line that may impact their ability to pay for their child's education. The vulnerable families (women headed families, families with differentially able person) may also be subjected to similar situations related to child's education. To promote literacy among the low-income groups and children belonging to vulnerable families, RBLTL can implement a scholarship programme that provides assistance in payment of school fees and provides books/stationary to these children (it is recommended that such a monetary aid be paid in kind or through direct transfers);
3. **Library facility within the community:** RBLTL can consider for providing resources for setting up a library in the one of the two villages under area of influence if the community provides a suitable place. Specific course-related resources for the students can be provided in the library ranging from school level to graduation level, such as copies of textbooks and article readings held on 'reserve' (meaning that they are loaned out only on a short-term basis, usually a matter of hours).

Skill Training

Employment profile of the study area indicates that most of the community people are engaged in both fishing or allied activities.

Consultations also indicated that the community members (specifically youth) are interested in obtaining paid employment in the proposed project. In this context following activity can be undertaken:

1. **Identification of skill gaps and need assessment:** RBLTL can undertake a skill gap and need assessment study in the project vicinity to identify the key skills that are available within the community and those that are useful to the company's operations. In case of gaps, and need of special trainings as expressed by the youths, RBLTL can initiate focused skill based trainings for the interested community youths selected in consultation with the concerned union and provide them with the opportunity of working for the company;
2. **Manpower planning:** RBLTL to start manpower planning and assess the availability of skilled local youth in the area of influence who can either be directly recruited or be trained for future requirement during the operations phase. RBLTL can consider providing skill training to Graduate and Post Graduate youths as future manpower during the operational phase.
3. **Providing skill based trainings as the support services:** RBLTL can also undertake skill based trainings for enhancing skills of the interested community members (specifically youth) that are required in maintaining ancillary services. This may include vehicle maintenance/ repair work etc. RBLTL can collaborate with Bangladesh

Industrial and Technical Assistance Center (BITAC) located at Chittagong in this regard.

Rural Community Infrastructure

Stakeholder consultation with the community people and Union representatives revealed that brick soling road from Ali Fakir Deil light house to Dakshin Dhurung Union office is a major problem in the area of influence and mitigation of this problem needs priority. Community consultation reveals that, metal road with some solar power street light are two infrastructural needs of the local people.

RBLTL can take the initiative together with Dakshin Dhurung union in solving this problem.

Assistance to Local Fisher Man

Ali Fakir Deil has traditional fishing communities whereas some of fishermen are also lived in Bindapara village. Fishing is the key income generating activity of these villages.

Community consultation reveals that fishing activity required high investment both in terms of boat and fishing net. Investment on fishing nets itself ranges from 8000 to 25000 BDT. Those who use motor boats need more quantities of net which is a huge burden on the fishermen. In this context RBLTL can help to fisherman by providing fishing net to the poor fisherman in Ali Fakir Deil and Binda Para.

Schedule for Implementation of CSR Activities

The aforementioned activities can be undertaken on both long term and short term basis. An indicative timeline for the activities is suggested in **Table 1**. The key considerations for preparation of the schedule were:

- Immediate need for the activities;
- Nature of benefits of the activities; and
- Cost implications

It must be noted that certain activities will be an ongoing affair as they will have significant community benefits and relatively limited cost implications. These activities include provision of educational material support for students to help them continue their studies, conducting periodic health clinics, provision of ambulance facilities, undertaking periodic health camps, and undertaking health awareness camps.

Activities that bear higher cost implications, specifically infrastructure related activities, will need to be carried out in a phased manner. **Table 1** provides an indicative period when these can be undertaken (however it must be noted that not all the activities need to be undertaken in the same period).

Table 4.1 *Indicative Schedule for Implementation of CSR Activities*

Sl. No.	Community Investment/CSR Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
1	Health															
1.1	Conducting health clinics in project area at regular intervals															
1.2	Providing ambulance service															
1.3	Health Care through convergence															
1.4	Undertaking health awareness camps															
1.5	Conducting school health check-up and eye check-up camps for the students															
2	Education															
2.1	Improving infrastructure facilities at the government schools															
2.2	Providing financial assistance to the children of low-income and vulnerable families															
2.3	Library facility within the community															
3	Skill Training															
3.1	Identification of skill gaps and need assessment															
3.2	Manpower planning															
3.3	Providing skill based trainings as the support services															
4	Rural Community Infrastructure															
5.	Assistance to Local Fisher Man															

Yearly Budgetary Allocation of CSR activities

RBLTL can spend 2% of the net profits of the company made during the immediately preceding financial years on its CSR activities. CSR Budget shall be allocated for each financial year with the approval of the Board of Director. Every endeavour should be made to spend the entire annual CSR budget in that year itself. However, the unspent CSR amount, if any, would be carry forward to the next year. Details of CSR activity Budget presented in Table 4.2

Table 4.2 *CSR Activity Budget*

Sl.no	Unit	Target	Amount in Lacs BDT
1.	Health		
1.1	Conducting health clinics in project area at regular intervals	24 Health Camp	24.00
1.2	Providing ambulance service		1.00
1.3	Health Care through convergence	10 Beds	10.00
1.4	Undertaking health awareness camps	10 Awareness Camp	5.00
1.5	Conducting school health check-up and eye check-up camps for the students	4 Health Camp at Two School	2.00
2	Education		
2.1	Improving infrastructure facilities at the government schools	2 School/Year	2.00
2.2	Providing financial assistance to the children of low-income and vulnerable families	10 Student/Year	5.00
2.3	Library facility within the community	2	2.00
3	Skill Training		
3.1	Identification of skill gaps and need assessment		5.00
3.2	Manpower planning	-	-
3.3	Providing skill based trainings as the support services		5.00
4	Rural Community Infrastructure		
4.1	Road Development from Light house to Dakshin Dhurung Union		30.00
4.2	Street lighting		10.00
5.	Assistance to Local Fisher Man	10 Nets/ Year	2.00

Annex 12

Standard Operating Procedures (SOPs)

1 STANDARD OPERATING PROCEDURE FOR OCCUPATIONAL HEALTH & SAFETY

1.1 PURPOSE

Occupational health and safety (OSH) issues are an important part of quality management, risk management. At present there are no laws governing the occupational health and safety practices in industry in Bangladesh but as a good practice the Environmental, Health and Safety guidelines for Liquefied Natural Gas (LNG) facility provided by the IFC have been considered for developing the Standard Operating Practices (SOP). However The Factories Act, 1965 and the Factories Rules 1979 would also apply as per requirement. The Standard Operational Practice would help in integrating occupational Health and Safety element in all managerial development processes, i.e. corporate strategy, human resources and organisational development and also help to develop better, healthier and more competitive workplaces within the LNG facility.

1.2 SCOPE

The Standard Operating Practice is a guide to prevention of occupational risk and integrates good practice for workers working in FSRU and LNG facility, focusing on the most significant risks in this sector. The SOP targets to ensure that the international best practices in the Occupational Health Safety (OHS) are integrated into the RBLTL Operations.

IFC EHS guideline for LNG facility had indicated that the five primary causes of the injury among worker working in FSRU and LNG facility include: Fire and explosion, Roll-over, Contact with cold surfaces, Chemical hazards, and Confined spaces. Other than that there are six common cause of injury among the worker working in any industrial facility include: Slips trips and falls, work place stress, work place violence, handling of hazards chemical, electrical shocks and bad ergonomics practices.

1.3 PROCEDURE

The procedures below define the standard procedures which should be followed to prevent the common causes of injury to the healthcare givers.

1.3.1 Procedure for Preventing Fire and Explosions

Fire and explosion hazards at LNG facilities may result from the presence of combustible gases and liquids, oxygen, and ignition sources during loading and unloading activities, and / or leaks and spills of flammable products. Possible ignition sources include sparks associated with the buildup of static electricity, lightning, and open flames. The accidental release of LNG may generate the formation of an evaporating liquid pool, potentially resulting in a

pool fire and / or the dispersion of a cloud of natural gas from pool evaporation.

The procedures detail out the precautions which needs to be followed by the facility and it's all employees across different departments of the LNG facility during any fire or Explosion event. The safeguards to the followed include:

- LNG facilities should be designed, constructed, and operated according to international standards¹ for the prevention and control of fire and explosion hazards, including provisions for safe distances between tanks in the facility and between the facility and adjacent buildings²;
- Implementing safety procedures for loading and unloading of product to transport systems (e.g. rail and tanker trucks, and vessels³), including use of failsafe control valves and emergency shutdown and detection equipment (ESD/D);
- Preparation of a formal fire response plan supported by the necessary resources and training, including training in the use fire suppression equipment and evacuation. Procedures may include coordination activities with local authorities or neighbouring facilities.⁴
- Prevention of potential ignition sources such as:
 - Proper grounding to avoid static electricity build up and lightning hazards (including formal procedures for the use and maintenance of grounding connections);⁵
 - Use of intrinsically safe electrical installations and non-sparking tools;⁶
 - Implementation of permit systems and formal procedures for conducting any hot work during maintenance activities,⁷ including proper tank cleaning and venting,
 - Application of hazardous area zoning for electrical equipment in design;
- Facilities should be properly equipped with fire detection and suppression equipment that meets internationally recognized technical specifications for the type and amount of flammable and combustible

¹ An example of good practice includes the US National Fire Protection Association (NFPA) Code 59A: Standard for the Production, Storage, and handling of Liquefied Natural Gas (LNG) (2006) and EN 1473. Further guidance to minimize exposure to static electricity and lightening is available in API Recommended Practice: Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents (2003)

² 1 If adequate spacing between the areas cannot be ensured, blast walls should be considered to separate process areas from other areas of the facility and/or strengthening of buildings should be considered

³ See Liquefied Gas Handling Principles on Ships and in Terminals - 3rd edition (2000), Society of International Gas Tanker and Terminal Operators Ltd (SIGGTO) and US EPA Code of Federal Regulations (CFR) 33 CFR Part 127:

⁴ Emergency preparedness and response are addressed in the General EHS Guidelines of IFC

⁵ For example, see Chapter 20, ISGOTT (1995)

⁶ For example, see Chapter 20, ISGOTT (1995)

⁷ Control of ignition sources is especially relevant in areas of potential flammable vapor-air mixtures such as within vapor space of tanks, within vapor space of rail / truck tankers during loading / unloading, near vapor disposal / recovery systems, near discharge vents of atmospheric tanks, in proximity to a leak or spill.

materials stored at the facility. Examples of fire suppression equipment may include mobile / portable equipment such as fire extinguishers, and specialized vehicles. Fixed fire suppression may include the use of foam towers and large flow pumps. The installation of halon-based fire systems is not considered good industry practice and should be avoided. Fixed systems may also include foam extinguishers attached to tanks, and automatic or manually operated fire protection systems at loading / unloading areas. Water is not suitable for fighting LNG fires as it increases the vaporization rate of LNG.¹

- All fire systems should be located in a safe area of the facility, protected from the fire by distance or by fire walls;
- Explosive atmospheres in confined spaces should be avoided by making spaces inert;
- Protection of accommodation areas by distance or by fire walls. The ventilation air intakes should prevent smoke from entering accommodation areas;
- Implementation of safety procedures for loading and unloading of product to transport systems (e.g. ship tankers, rail and tanker trucks, and vessels), including use of failsafe control valves and emergency shutdown equipment/structures;
- Preparation of a fire response plan supported by the necessary resources to implement the plan;
- Provision of fire safety training and response as part of workforce health and safety induction / training, including training in the use fire suppression equipment and evacuation, with advanced fire safety training provided to a designated firefighting team;

1.3.2 *Procedure for Preventing Roll-Over*

Storage of large quantities of LNG in tanks may lead to a phenomenon known as “roll-over”. Roll-over may occur if LNG stratifies into layers of different densities within the storage tank, resulting in pressures that, in the absence of properly operating safety-vent valves, could cause structural damage.

Recommended measures to prevent roll over include the following:

- Monitor LNG storage tanks for pressure, density, and temperature all along the liquid column;
- Consider installation of a system to recirculate the LNG in within the tank;
- Install pressure safety valves for tanks designed to accommodate roll over conditions;
- Install multiple loading points at different tank levels to allow for the distribution of LNG with different densities within the tank to prevent stratification.

¹ Good practice examples include the US National Fire Protection Association (NFPA) Standard 59A or other equivalent standards.

1.3.3 *Procedure for Preventing Contact with Cold Surface*

Storage and handling of LNG may expose personnel to contact with very low temperature product. Plant equipment that can pose an occupational risk due low temperatures should be adequately identified and protected to reduce accidental contact with personnel. Training should be provided to educate workers regarding the hazards of contact with cold surfaces (e.g. cold burns), and personal protective equipment (PPE) should be provided as necessary. The recommended Personal Protective Equipment (PPE) for handling cryogenics includes a full-face shield over safety glasses, loose-fitting thermal insulated or leather gloves, long sleeved shirts and trousers without cuffs. Gloves should be loose fitting to allow quick removal if liquid should be spilled inside. Gloves are not made to permit the hands to be immersed in a cryogenic liquid. They will only provide short-term protection from accidental contact with the liquid. No metal jewellery rings watches etc. should be worn on hands or wrist while transferring cryogenic liquids.

1.3.4 *Procedure for Prevention of Chemical Hazards*

The design of the onshore facilities should reduce exposure of personnel to chemical substances, fuels, and products containing hazardous substances. Use of substances and products classified as very toxic, carcinogenic, allergenic, mutagenic, teratogenic, or strongly corrosive should be identified and substituted by less hazardous alternatives, wherever possible. For each chemical used, a Material Safety Data Sheet (MSDS) should be available and readily accessible on the facility.

Facilities should be equipped with a reliable system for gas detection that allows the source of release to be isolated and the inventory of gas that can be released to be reduced. Blowdown of pressure equipment should be initiated to reduce system pressure and consequently reduce the release flow rate. Gas detection devices should also be used to authorize entry and operations into enclosed spaces. Liquefaction facilities with gas treatment operations may have the potential for releases of hydrogen sulphide (H₂S). Wherever H₂S gas may accumulate, the following measures should be considered:

- Development of a contingency plan for H₂S release events, including all necessary aspects from evacuation to resumption of normal operations;
- Installation of monitors set to activate warning signals whenever detected concentrations of H₂S exceed 7 milligrams per cubic meter (mg/m³). The number and location of monitors should be determined based on an assessment of plant locations prone to H₂S emissions and occupational exposure;
- Provision of personal H₂S detectors to workers in locations of high risk of exposure along with self-contained breathing apparatus and emergency oxygen supplies that is conveniently located to enable

personnel to safely interrupt tasks and reach a temporary refuge or safe haven;

- Provision of adequate ventilation of occupied buildings and of adequate safety systems (e.g. airlocks, ventilation shut down by gas detection) to avoid accumulation of hydrogen sulfide gas;
- Workforce training in safety equipment use and response in the event of a leak.

1.3.5 *Procedure for Working in Confined Spaces*

Confined space hazards, as in any other industry sector, are potentially fatal to workers. Confined space entry by workers and the potential for accidents may vary among LNG terminal facilities depending on design, on-site equipment, and infrastructure. Confined spaces may include storage tanks, secondary containment areas, and storm water / wastewater management infrastructure. Confined spaces can occur in enclosed or open structures or locations. Serious injury or fatality can result from inadequate preparation to enter a confined space or in attempting a rescue from a confined space. Recommended management approaches include:

- Engineering measures should be implemented to eliminate, to the degree feasible, the existence and adverse character of confined spaces.
- Permit-required confined spaces should be provided with permanent safety measures for venting, monitoring, and rescue operations, to the extent possible. The area adjoining an access to a confined space should provide ample room for emergency and rescue operations.
- Access hatches should accommodate 90% of the worker population with adjustments for tools and protective clothing. The most current ISO and EN standards should be consulted for design specifications;
- Prior to entry into a permit-required confined space:
 - Process or feed lines into the space should be disconnected or drained, and blanked and locked-out.
 - Mechanical equipment in the space should be disconnected, de-energized, locked-out, and braced, as appropriate.
 - The atmosphere within the confined space should be tested to assure the oxygen content is between 19.5 percent and 23 percent, and that the presence of any flammable gas or vapor does not exceed 25 percent of its respective Lower Explosive Limit (LEL).
 - If the atmospheric conditions are not met, the confined space should be ventilated until the target safe atmosphere is achieved, or entry is only to be undertaken with appropriate and additional PPE.
- Safety precautions should include Self Contained Breathing Apparatus (SCBA), life lines, and safety watch workers stationed outside the confined space, with rescue and first aid equipment readily available.
- Before workers are required to enter a permit-required confined space, adequate and appropriate training in confined space hazard control,

atmospheric testing, use of the necessary PPE, as well as the serviceability and integrity of the PPE should be verified. Further, adequate and appropriate rescue and / or recovery plans and equipment should be in place before the worker enters the confined space.

1.3.6 Procedure for preventing Slips Trips and fall

Slips/trips/falls is very common scenario in any industrial facility due to water is spilled on the floor and road accidentally, electrical cords run across pathways, and/or if any equipment block passageways. To prevent such situations the following precautions can be undertaken:

- Provide safe clean-up of spills, and keep walkways free of obstruction.
- Keep floors clean and dry. In case water / liquid has been spilled, the area should be cordoned off by using "Caution Wet Floor" sign till the area is cleaned.
- Keep access to exits clear and unobstructed at all times (Exit Routes, to be marked as per the Fire Safety Plan),
- Provide ceiling or floor outlets for equipment to ensure that power cords do not run across pathways,
- Mark mobile equipment (e.g., stools) with a bright color, or a taped "X", making them more visible and distinguishable from the floor. Tape used for marking should be washable and durable,
- Keep aisles and passageways sufficiently wide for easy movement at all times. Temporary electrical cords that cross aisles should be taped or anchored to the floor,
- Eliminate cluttered or obstructed work areas either by reorganising equipment or by allocating more space ,
- Use prudent housekeeping procedures such as cleaning only one side of a passageway at a time, and provide good lighting for stairwells, to help reduce accidents,
- Provide adequate lighting especially during night hours.
- Instruct workers to use the handrail on stairs, to avoid undue speed. When employees carry heavy load they/supervisor should instruct them, to maintain an unobstructed view of the stairs ahead of them. In case the load is bulky the employee should request the supervisor for help to manage the bulky load,
- Eliminate uneven floor surfaces. In case of unevenness of floor the same should be clearly marked on the floor using reflective tapes, and
- Promote safe work in cramped working spaces. Avoid awkward positions, and use equipment that makes lifts less awkward.

1.3.7 Procedure to prevent against Work Place Stress

All hospital employees by analysis the Injury Log, are exposed to work place stress and burnout, due to factors such as shift work, long hours, fatigue, and intense emotional situations. These situations may also increase a person's risk for cardiovascular disease, psychological disorders, workplace injury, and other health problems. Even though early warning signs e.g., headaches, sleep

disturbances, difficulty concentrating, job dissatisfaction, and low morale are visible and need to be identified by the Heads of the Department and HR Department, efforts should be made to educate employees and management about job stress.

The hospital should undertake programs to address workplace stress, to:

- Carry out stress management programmes every year or more often, as warranted, to improve the ability of workers to cope with difficult work situations. It should teach workers about the nature and sources of stress, the effects of stress on health, and personal skills to reduce stress (e.g., time management or relaxation exercises).
- Arrange for counselling of employees on an annual basis, for work and personal problems and or stress as they would affect the work performance.

In addition to the personal level stress management RBLTL shall also adapt its policies and procedures to ensure that employees can manage stress. This would include Organizational Change Programs to make necessary change in the company policies and procedures to reduce organizational sources of stress. It involves identifying aspects of work which have excessive workload, conflicting expectations. The policies and procedures of the organisation thus need to be redesigned to reduce or eliminate the identified stress factors.

Possible solutions include:

- Redesigning the workload in line with workers' capabilities and resources.
- Giving workers opportunities to participate in decision making and actions affecting their jobs.

1.3.8 Procedure for Protection against Work Place Violence

The work place related violence would be primarily handled by Security Staff and the procedures covered in the SOP on Security. However, employees are at times faced with violent situations especially with respect to the families of patients. Though the Security staff would be called in to handle the situation the following measures need to be undertaken so that the staffs are not harmed even if the mob turns violent.

- The staff should be provided the necessary training to recognize and diffuse violent situations and patients and:
 - Be alert for potential violence and suspicious behaviour and report it the Security and ask for support.
 - Be trained to identify the warning signs of increasing anger/violence e.g., pacing and/or restlessness, clenched fist, increasingly loud speech, excessive insistence, threats, cursing etc. They should escalate the incident to the security staff when required.
- Appropriate engineering controls should also be used to provide security such as:

- Installing concealed panic buttons in areas of the staff locations or near the door where it can be easily be reached by the staff. These buttons could notify hospital security of an impending violent or unpleasant situation and they can take necessary actions, adequate lighting and video surveillance, and
- Limit access to certain areas by implementing a waiting room area with controlled access. The access of the public to these areas can only be through the waiting room.
- Use of metal detectors on any person entering the hospital. This acts as a deterrent.
- Attach furniture and equipment to the floor especially in areas of the hospital which are identified as high risk zones, so that they cannot be used as weapons.

1.3.9 Procedure for Safe Handling of Hazardous Chemicals

The exposure to hazardous chemical which is use in the facility can cause several risk example burns, irritation etc. to prevent such accidents happening the following measures should be undertaken:

- The employees who are handling hazardous chemicals should be communicated in writing regarding the hazards related to handling of the chemicals. This hazard communication should ensure that the employees are made aware of the hazardous chemicals they are exposed to in the workplace. They should not only be provide with Material Safety Data Sheet of all the chemicals but also the hazards explained to them.
- The workers should be provided training on warning labels, and access to Material Safety Data Sheets (MSDSs). They should also be trained in potential chemical hazards and controls (engineering controls, work practices, Personal Protective Equipment) necessary to prevent hazards from the chemical in the work area.
- Supervisors should ensure that the employee follow all MSDS instructions regarding safe handling, storage, and disposal of hazardous chemicals.

1.3.10 Procedure to Prevent Electrical Shocks

Faulty electrical equipment/machinery or wiring, damaged receptacles and connectors, unsafe work practices (such as trailing an electrical extension cord across the workspace, not using proper insulation and sockets, no notice etc.) can lead to electrical hazards including electric shock, electrocutions fires, and explosions. To prevent such incidents the following precaution should be maintained:

- Ensure, through regular maintenance by trained personnel that electrical equipment are free from recognized hazards (insulation integrity, Interrupting rating, circuit impedance and other characteristics, deteriorating agents),
- Ensure that only certified equipment are used or installed,

- Sufficient access and working space shall be provided and maintained around all electric equipment to permit ready and safe operation and maintenance of such equipment. Ensure that all electrical services are properly grounded,
- Tag out and remove from service all damaged receptacles and portable electrical equipment,
- Repair all damaged receptacles and portable electrical equipment before placing them back into service ,
- Ensure that employees are trained not to plug or unplug energized equipment when their hands are wet and to the extent possible to do so with the power switched off
- Employees associated with the use and maintenance of the equipment should wear personnel protection and electrical protective equipment,
- Ensure the use of ground-fault circuit interrupters (GFCI's) on all 15- and 20-ampere receptacles.
- All temporary electrical connection shall be done by trained and authorised electricians and the persons so deployed shall necessarily have the electrical license from the concerned Government authority.
- A safe lockout and tagging procedure shall be established prior to work on or near electrical equipment or lines, mechanical, pressure systems, and lines or equipment containing dangerous or hazardous material.
- A safe lockout and tagging procedures is an operating procedures by which a person, acting individually or as a member of a maintenance crew, may have a machine or part of a machine or equipment removed from and hold out of service until released by that person. A tag indicating “Danger! Do not Operates” or the equivalent shall be placed at the power source of the equipment being serviced and wherever feasible such equipment shall be disconnected from the power source.
- Power shall be turned off, tagged, and locked in the open position at the master switch or at the main breaker.

1.3.11 Procedure for Good Ergonomic Practices in Administrative Departments

Employees in administrative roles especially working at administrative office would be using a computer intensively for long hours, can develop musculoskeletal disorders (MSD) of the hand/arm, shoulder, neck, and back. Good ergonomic practice which need to be adopted include ergonomically designed workstation layout which would allow to:

- Employees should have adequate space to arrange materials and supplies in front of the body so they can be easily reached with the elbows in close to the torso.
- Employees should be provided with adjustable, supportive padded chairs, that support the forearms, legs, and low back. Arm rests should allow the elbows to hang normally at the side of the body.
- Employees should be provided space so that the monitor can be arranged in such a way that it can be viewed slightly below, (about 20

degrees), horizontal eye level and can be seen without looking up, or leaning forward.

- Employees should be provided with engineering controls to limit awkward positions, (e.g., provide headsets for employees to use when answering phones).
- RBLTL should ensure that the employees are able to use a keyboard, which includes an adjustable mouse support that can be easily reached from a keying position. Employees should be able to keep wrists straight while typing and use wrist pads to rest on when not typing.

1.4 RESPONSIBILITIES

While it is the responsibility of RBLTL to provide a safe and comfortable working environmental to all the staff by developing engineering controls, provide PPE's, carry out training and raising awareness of the staff to ensure that they follow the precaution and reduce workplace or occupational injuries, it is equally important that the employees also follow the instruction provided in each of the procedures.

1.5 MONITORING FRAMEWORK

To review the implementation of the Occupational health and Safety SOP the following monitoring indicators can be initially considered and presented in *Table 1.1*. However these may be reviewed and changed as per the requirement in due course as mentioned in the Environment Health & Safety Management System.

Table 1.1 Monitoring Indicator for Occupation Health and Safety

Sl. No.	Monitoring Indicator	Monitoring Mechanism
1.	Use of personnel protective equipment (gloves, gowns, face masks)	Interview of the personnel, Visual observation
2.	Injury log book	Analysis of the Injury Log
3.	Availability of hand washing facility	Interview, Visual observation
4.	Obstruction free walk way and exit route	Visual observation
5.	Use of signage e.g., "Caution Wet Floor " while cleaning floor	Interview, Visual observation
6.	Marking of mobile equipment for more visible and distinguishable from the floor	Visual observation
7.	Adequate lighting arrangement	Visual observation
8.	Training of staff to control and defuse violent situations	Interview, Document Review
9.	Engineering controls to defuse violent situations e.g., panic buttons, metal detectors, limiting access to certain areas	Interview, Visual observation
10.	Stress management programmes	Interview with employees, Document Review
11.	Counselling of employees	Interview with employees, Document Review

Sl. No.	Monitoring Indicator	Monitoring Mechanism
12.	Facilities e.g., differential height stools, footrest bar, height-adjustable work tables, anti-fatigue mats etc. near surgical area.	Interview, Visual observation
13.	Regular maintaining of electrical equipment by trained personnel	Interview, Document Review

1.6

REFERENCES

The Occupational Health and Safety procedures would be governed by the following:

- Environmental Health and Safety Guidelines for Liquefied Natural Gas (LNG) Facilities- International Finance Corporation (IFC)
- The Factories Act, 1965 and the Factories Rules 1979

1.7

RECORD

RBLTL should maintain record of all injury or illness in the injury log. The Occupational Health Safety Committee's review of the Injury Log would also be maintained as minutes of meeting.

1.8

REVIEW & UPDATE

This Standard shall be reviewed annually after the annual audit and relevance with regard to implications for the RBLTL, such as:

- New or changing global commitments;
- Evolving regulatory requirements; and
- Changes to international standards and guidelines.

If such changes are identified, a brief Addendum to the Standard shall be prepared outlining the change and its key requirements.

Form I: Template of Injury Log

Identification of person				Injury Case			Classify the Case				No. of days the injured or ill worker was		Check the "Injury" column or choose one type of illness:					
Case No	Employee Name	Department	Job title	Date of Injury /Illness	Location of Injury / Illness	Describe injury or illness, parts of body affected, and object / substance that directly injured or made person ill	Death	Days Away from Work	Job transfer of Restriction	Other Recordable Cases	Away from Work	On job transfer or restriction	Injury	Illness	Musco-skeletal disorder	Communicable Disease	Hearing loss	All other illnesses

STANDARD OPERATING PROCEDURE FOR FIRE PROTECTION AND MANAGEMENT

2.1 PURPOSE

This section outlines the procedure for the management of fire emergencies and evacuation plans during the operations phase. The main objective of the Emergency Response Plan (ERP) is to ensure that activities are carried out to the following priorities:

- Safeguard lives;
- Safeguard existing activities at Kutubdia Island;
- Provide response to emergency situations using an effective communication network and organized procedures;
- Protect the company or Third Party assets
- Maintain the company image/reputation
- Resume normal activities

Personnel involved in dealing with fire emergency situations shall follow these priorities while making decisions and developing strategies.

2.2 SCOPE

The ERP covers the emergency response that needs to be applied to both onshore and offshore elements of the project, excluding the FSRU. Emergency response at the FSRU shall be managed through a separate document therefore only the framework is covered in this section. For the FSRU, a HSSE bridging document shall be developed to be used in conjunction with this document, as well as the Emergency Response Plan of the FSRU.

2.3 EMERGENCY RESPONSE TEAM COMPOSITION

The emergency response onsite will be mediated by RBLTL through two dedicated team's viz. the First Intervention Team (FIT) and Emergency Response Team (ERT). The roles and responsibilities of key team members have been outlined below.

Incident Controller

The shift operation supervisor is the incident controller and will be leading the response team until the emergency is totally brought under control. The incident controller takes control of an incident and manages directly or appoints personnel to positions. He assumes control of the organization and maintains command with site personnel.

- Assess the situation;
- Appoint, brief and task personnel;
- Establish Incident control point (ICP);
- Initiate Incident action plan (IAP);
- Manage emergency operations at the incident site;

- Plan, execute, review and re-assess fire-fighting operations continuously;
- Maintain safe environment; and
- Record actions taken during course of incident control

Field Operators

Shift Field Operators are part of the First Intervention team (FIT) and will act in emergency response operations as per instructions of the incident controller. They will act in ensuring

- Timely alert;
- Isolation of release;
- Evacuation of personnel;
- Rescue and relief work; and
- Fire-fighting operations, where instructed

Panel Operator

The Panel Operator also has a role on the FIT with the responsibility to maintain:

- Prompt isolation of effected area of plant;
- Maintaining internal communication with emergency site, Duty Manager, port control room etc.; and
- Acting on incident controller's instructions

In case of an emergency, the Shift Security supervisor will report to the Shift Operation supervisor immediately together with the Shift Security guards, as an Auxiliary Support Team.

Emergency Response Team

In case of prolonged or serious emergencies, RBLTL shall have a strong back up team. The ERT will be assisting the FIT in the following areas:

- Handle communication both Internal/External;
- Devise strategies to control the emergency situation - plan, organize, implement via incident controller and evaluate the results;
- Read drawings, issue guidelines to incident controller;
- Arrange logistics; identify potential needs, suppliers of service, material. Secure agreements, resource hiring etc.;
- Food, transport, replacement of site personnel, alternate duty roster in case of prolonged emergencies;
- Handling of journalists, media, public (in line with protocol with the RBLTL);
- Implement the plan jointly as supporting team, external aid arrangements;
- Maintain a log of events and recording the sequence of actions taken; and
- Inform and Coordinate with Country Crisis Management Team (CCMT)

The minimum composition of the ERT is at least one manager, one discipline engineer (duty engineer), one technician from all disciplines and one administration co-coordinator. The following functions are the responsibility of the ERT:

- *Planning/Intelligence*: Gathers all information regarding the incident, any impact on other parts of the process and possible evolution
- *Incident Operation*: Manages the practical aspects of incident control, implements the action plan, provides a practical input to it, establishes a structure of actors, identifies additional practical resources, relays current information regarding the incident back to the Incident Manager
- *Safety Advice*: Evaluates the adequacy of response to incident, advises the Incident Controller about response strategy and tactics.
- *Logistics support*: Provides and maintains personnel, materials, facilities and services as and when requested by Incident Controller.

Responsibilities of FSRU crew

The shift pilots, teams at FSRU, Kutubdia landfall point with the support of district administration and human resources from onshore will be responsible for executing emergency plan in the event of emergency situation.

Public Relations and Emergency Coordination with Local Government

RBLTL shall have designated and trained site personnel who will interact with press, public, govt. and media briefing during any emergency. No employee or contractor would interact directly with above agencies without permission of Emergency Response Controller (ERC).

Country Crisis Management Team (CCMT)

Country crisis management team of RBLTL will also provide support to ERT at site.

Mutual Aid / External Help Arrangements

As part of mutual aid scheme, RBLTL hopes to enter in agreements with Govt. machinery like nearest fire station in Chakaria, police station and neighboring industries at Kutubdia to share emergency resources and equipment in case of serious crisis. However, the decision of seeking external assistance will be taken by duty manager on advice of ERT and CCMT.

Fire Department

The Incident controller should make contact with the senior fire officer upon his arrival. The senior fire officer commands the fire-fighting and rescue operation. A representative should remain with the senior fire officer to provide guidance and advice about the LNG station.

2.4 PROCEDURE

2.4.1 Procedure for LNG Fire and Gas Cloud

It is the responsibility of the emergency site commander to take situational decision. LNG spill is most credible when LNG is being transferred from LNGC to FSRU by Ship to Ship Transfer using hoses or in case of a collision

between LNG Carrier and FSRU storage tanks. The following actions will be adopted in case of LNG Fire.

- Spot and immediately isolate the leak/spill i.e. source of Hydrocarbon;
- Evacuate the area and rescue people, if any;
- Use water spray on vapour cloud to ensure effective dispersion of vapour cloud;
- Cool the surroundings by water screens. Only water-cooling of surroundings to be maintained to stop secondary fires and structures overheating as in the case of FSRU. The FSRU will have fire water facilities designed as per classification society requirements;
- Standby vessel with firefighting capability can be used for providing cooling water requirements

In order to regulate/control fires, fire alarms will be adopted in on basis of locations with potential fire scenarios. Gas alarms shall be installed across all the locations with a potential to have a gas leak. The installation of automatic shutdown upon detection by these alarms will be considered, depending upon the reliability of the gas detector and the scenario. An all-clear siren shall be installed for use to indicate all clear after an emergency. Other alarm systems would include the following:

- Shipboard emergency alarms;
- Adverse weather / rough sea condition warnings;
- Emergency shut-down ESD alarms

2.5 *FIRE EXTINGUISHER*

When a cryogenic liquid such as LNG is suddenly heated by contacting a warm liquid such as water, violent boiling of the LNG can occur, resulting in localized overpressure releases. For this reason, most of the water base agents are not only ineffective, but their application on an LNG spill can worsen the fire. The only known agents that have demonstrated the ability to completely extinguish LNG fires are the dry chemicals.

- **Sodium Bicarbonate Base:** This agent, which is the dry chemical first developed, has been largely replaced by the more effective potassium bicarbonate base material in the oil and gas industry.
- **Mono ammonium Phosphate Base:** This agent is approximately as effective as the sodium bicarbonate base material on flammable liquids and vapors. It has the added advantage of being an effective extinguishing agent in Class A (ordinary combustibles) fires.
- **Potassium Bicarbonate Base (Purple-K):** This agent has been shown to be more effective than the sodium bicarbonate base material and has become the standard dry chemical in high intensity fire applications.

STANDERD OPERATING PROCEDURE FOR HANDLING STORAGE, TRANSPORTATION AND MANAGEMENT OF HAZARADUS AND E-WASTE

3.1 PURPOSE

The Hazardous Waste Handling & Management Policy of RBLTL coordinates all facets of hazardous waste management in accordance with Environmental Health and safety Guideline for Waste Management of IFC.

The purpose of this procedure is to take measures to manage hazardous waste in environmentally sound manner and to work in conjunction with Environment Policy for proper collection, transport, treatment, storage and disposal of hazardous and E-waste.

3.2 DEFINITION

Hazardous Waste: Hazardous waste means any waste which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances.

E-Waste: E-waste comprises of wastes generated from used electronic devices and house hold appliances which are not fit for their original intended use and are destined for recovery, recycling or disposal.

3.3 SCOPE

Scope of this document has been defined to consider hazardous waste (e.g., waste oil, sludge ,oil filter, oil soaked cotton, rags etc.); e-waste (e.g., electronic appliances such as mobile phones, computers, printing machine, electronic medical equipment etc.); In case of any change or modification in the operation of RBLTL, waste inventory and this SOP shall be updated.

3.4 PROCEDURE

3.4.1 Procedure for Management of Hazardous Waste

- RBLTL shall identify and shall keep inventory of different type of hazardous waste (refer *Table 3.1*) generated from its operation;

Table 3.1 Type of Hazardous Waste

Sl. No.	Hazardous Waste
1	Used oil and waste oil
2	Empty barrels/containers contaminated with hazardous chemicals /wastes Contaminated cotton rags or other cleaning materials
3	Mercury-switches
4	Activated glass cullets from cathode-ray tubes and other activated glass and PCB-capacitors

- For storing of hazardous waste, RBLTL shall follow following process:
 - The storage area should be provided with concrete floor;
 - The storage area floor should be provided with secondary containment;
 - Proper slopes as well as collection pit to be provided in the storage area to collect wash water and the leakages/spills etc.;
 - In case of leakage/spills, following procedure should be followed:
 - At the foremost, to try and eliminate the source of the spill by adopting any of the following measures e.g. i) up-righting drums or other containers, ii) closing valves, or other similar actions;
 - Prevent the oil from spreading or entering drains by absorbing flowing oil or diking the area with sand bags, jute/cotton mats, or berms;
 - Spread absorbent material e.g., sawdust over the surface of the spill from the perimeter of the spill to its center; and
 - Contaminated absorbents containing diesel fuel etc. shall be stored in drums and disposed off as hazardous waste.
 - Storage area should be provided with the flameproof electrical fittings;
 - Automatic smoke, heat detection system should be provided in the sheds;
 - Adequate firefighting systems (ABC type fire extinguisher) should be provided for the storage area; and
 - The Storage area shall be designed in such a way that the floor level is at least 150 mm above the maximum flood level.
- RBLTL shall make an agreement with scientific hazardous waste treatment storage and disposal facility and handover hazardous waste to that facility on regular basis.
- RBLTL shall provide the transporter of the hazardous waste with the relevant information e.g., nature of the wastes and measures to be taken in case of an emergency and shall label the hazardous and other wastes containers.
- RBLTL shall maintain a register to record all accident /incident during handling hazardous waste.
- All the workers involved in handling hazardous waste should be equipped with personnel protective equipment (gloves and boots).

3.4.2 Procedure for Management of E-waste

- RBLTL shall identify and shall keep inventory of different type of electronic waste generated from its operation;
- For storing of e-waste, RBLTL shall follow following process:
 - E-waste should be stored in an area that is weatherproof and restricted for unauthorised person;
 - E-waste should be stored away from any storm water drains.
 - Sorting areas shall be regularly cleaned and at the end of the day the facility must be swept;
 - Make sure e-wastes are collected regularly or taken to a recycler on time;
 - Different e-waste items shall be stored separately in different container/designated storage area and there should be no mixing of different kinds of e-waste;
 - All the container/ designated storage area shall be clearly labelled;
- RBLTL shall channelize e-waste through collection centre or dealer of authorised producer or through designated take back service provider of the producer ⁽¹⁾ to authorised dismantler or recycler;
- RBLTL shall ensure that end-of-life ⁽²⁾ electrical and electronic equipment are not mixed with e-waste containing radioactive material;

3.5 RESPONSIBILITIES REGARDING HAZARDOUS WASTE HANDLING STORAGE AND TRANSPORTATION

Sl. No.	Process	Responsibility	Deviational Response
1	Waste oil and sludge should be collected to be pumped into drums, labelled and stored in its designated place	Operation / Maintenance Engineer	Respective Department
2	Oil soaked cottons generated during maintenance of equipment should be collected and stored at designated place.	Operation / Maintenance Engineer	Maintenance to ensure proper collection
3	Maintain Inventory of hazardous waste generated and stored at identified place.	Stores in charge / Head Environment	NIL
4	Agency approved by MPPCB/CPCB to purchase and reprocess the HW. All the containers shall be leak proof. License validity to be checked	Stores in charge / Head Environment	Leaking drums or tankers should not be permitted for waste oil transportation.
5	At the security gate, check if the tanker is having the following: a) Driver has valid heavy	Security Guard	If any one of the requirements is not met, the tanker should be

(1) Agency authorised by the producer of the electronic item who take back the 'end-of-life' (the time when the product is intended to be discarded by the user) electronic item.

(2) 'end-of-life' of the product means the time when the product is intended to be discarded by the user

Sl. No.	Process	Responsibility	Deviational Response
	vehicle license and is trained to transport hazardous cargo. b) Vehicle has a valid Exhaust Emission Check sticker. c) Vehicle has valid fitness certificate.		sent back by the security guard after information to Head-Environment/Stores in charge.
6	Taking empty weight of tanker	Stores in charge	NIL
7	Pre load checks: a) Ignition of the vehicle should be off and batteries are disconnected/isolated b) Portable fire extinguishers DCP/Foam type should be kept nearby c) Dip is taken to ascertain that the container/barrel is empty.	Operation Engineer/HW Storage yard In-charge	NIL
8	The barrel should be marked "Waste Oil". Then load the barrels on the vehicle and tighten properly to avoid any turbulence and formation of vapours.	Stores in charge/HW Storage yard In-charge	NIL
9	Issue of non-returnable gate pass	Station Director / Stores in charge	NA
10	Security checks at the gate for valid gate pass for materials going out.	Security guard	Inform Stores in charge if any deviation is noticed

3.6 RESPONSIBILITIES REGARDING HAZARDOUS WASTE HANDLING STORAGE AND TRANSPORTATION

Sl. No.	Process	Responsibility
1	Collection, Storage & transfer of E-Waste at designated places	IT/Admin/User Department Representative
2	Disposal of e-waste through authorized recycler	PCB IT / Admin /MM User Department Representative
3	Overall Supervision & verification of e-Waste Management	EHS/IT/Admin/MM/User Department Head

3.7 MONITORING FRAMEWORK

- Inventory of e-waste and hazardous waste

3.8 REFERENCES

- Environmental Health and Safety Guideline for Waste Management of the World Bank Group

3.9 REVIEW & UPDATE

This Standard shall be reviewed annually to determine its accuracy and relevance with regard to implications for the RBLTL, such as:

- New or changing global commitments;
- Evolving regulatory requirements; and
- Changes to international standards and guidelines.

If such changes are identified, a brief Addendum to the Standard shall be prepared outlining the change and its key requirements. The Management Procedure shall be revised in accordance to the procedures laid down in the ESHS MS Manual.

**FORMAT FOR MAINTAINING RECORDS OF HAZARDOUS
AND E- WASTES**

Date	Type of waste with category	Total quantity (Metric Tonnes)	Method of Storage	Method of Disposal

Date.....

**Signature
Designation**

**FORMAT FOR REPORTING ACCIDENT RELATED TO HAZARDOUS
WASTE AND E-WASTE**

1. The date and time of the :
accident
2. Sequence of events leading to :
accident
3. Details of hazardous and other :
wastes involved in accident
4. The date for assessing the :
effects of the accident on
health or the environment
5. The emergency measures :
taken
6. The steps taken to alleviate the :
effects of accidents
7. The steps take to prevent the :
recurrence of such an accident

Date:
Place:

Signature:
Designation:

Annex 12.A Critical Habitat Criteria (IFC PS6 Guidance Note 2012)

Criteria	Tier 1	Tier 2
Criterion 1: Critically Endangered (CR) / Endangered (EN) species:	<p>a) Habitat required to sustain \geq 10 % of the global population of a CR or EN species /sub /species and where there known regular occurrences of the species and where habitat could be considered a discrete management unit for the species.</p> <p>b) Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.</p>	<p>c) Habitat that supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally- important concentrations of Red-listed EN species where that habitat could be considered as a discrete management unit for the species/subspecies.</p> <p>d) Habitat of significant importance to CR/EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species.</p> <p>e) As appropriate, habitat containing nationally/regionally important concentrations of an EN, CR or equivalent national/regional listing.</p>
Criterion 2: Habitat of significant importance to endemic and/or restricted-range species;	<p>a) Habitat known to sustain \geq 95 % of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species.</p>	<p>b) Habitat known to sustain \geq 1 % but < 95 % of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.</p>
Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species;	<p>a) Habitat known to sustain, on a cyclical or otherwise regular basis, 95 % of the global population of a migratory or congregatory species at any point of the species lifecycle where that habitat could be considered a discrete management unit for that species.</p>	<p>(b) Habitat known to sustain, on a cyclical or otherwise regular basis, \geq 1 % but < 95 % of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.</p> <p>(c) For birds, habitat that meets BirdLife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or for Identifying Wetlands of International Importance.</p> <p>(d) For species with large but clumped distributions, a provisional threshold is set at \geq 5 % of the global population for both terrestrial and marine species.</p> <p>(e) Source sites that contribute \geq 1 % of the global population of recruits.</p>

Annex 12.B Candidate Critical Habitat Species (Criteria 1-3) and Assessment

Scientific Name	Common Name	IUCN Listing	Criterion 1	Criterion 2	Criterion 3	Species Information	CH Rationale
<i>Anoxypristis cuspidata</i>	Knifetooth Sawfish-Korat Machh	EN	X			<p>The species occupies a large range. The species is native to Australia; Bangladesh; India; Indonesia; Iran, Islamic Republic of; Malaysia; Myanmar; Papua New Guinea; Sri Lanka</p> <p>Citation: http://dx.doi.org/10.2305/IUCN.UK.2013-1.RLTS.T39389A18620409.en</p>	<p>The species has a wide distribution and the area near the Kutubdia Island does not hold regionally or nationally important populations of the species and thereby does not trigger Criteria 1 Tier 2 c or e. .</p>
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle	VU		X		<p>The Olive Ridley sea turtle has a circumtropical distribution, with nesting occurring throughout tropical waters and migratory circuits in Atlantic Ocean, Indian Ocean and Pacific Ocean. Nesting occurs in nearly 60 countries worldwide. The present annual nesting female sub populations globally are estimated to be 0.84-0.85 millions approximately.</p> <p>Citation: http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T11534A3292503.en</p>	<p>Sporadic nesting of Olive Ridley Turtle reported from the Kutubdia island. As per discussion with the locals approximately 2000 individuals come for sporadic nesting along the Kutubdia coast from Boroghop at south to Uttar Dhurung at North. The approximate number of turtles visiting the Kutubdia Island is less than 1% of the global population for the species and therefore Criteria 3 is not triggered.</p>
<i>Threskiornis melanocephalus</i> , <i>Chroicocephalus brunnicephalus</i> , <i>Sterna</i>	Black-headed Ibis, Brown headed Gull, Black-naped	VU/NT/ LC		X	-		<p>The study area/Kutubdia Island is not likely to hold between 1 and</p>

Scientific Name	Common Name	IUCN Listing	Criterion 1	Criterion 2	Criterion 3	Species Information	CH Rationale
<i>sumatrana</i> , <i>Larus</i> <i>ichthyaetus</i> , <i>Larus</i> <i>brunnicephalus</i> , <i>Charadrius</i> <i>mongolus</i> , <i>Charadrius</i> <i>leschenaulti</i> , <i>Charadrius</i> <i>alexandrinus</i> , <i>Pluvialis fulva</i> , <i>Calidris</i> <i>temminckii</i> , <i>Calidris alba</i> , <i>Arenaria</i> <i>interpres</i> , <i>Actitis</i> <i>hypoleucos</i> , <i>Tringa glareola</i> , <i>Numenius</i> <i>phaeopus</i> , <i>Numenius</i> <i>arquata</i> , <i>Gallinago</i> <i>stenura</i> , <i>Todiramplus</i> <i>chloris</i> , <i>Tadorna</i> <i>ferruginea</i> , <i>Pandion</i> <i>haliaetus</i> , <i>Calidris minuta</i> , <i>Xenus cinereus</i> , <i>Motacilla alba</i> , <i>Charadrius</i> <i>mongolus</i>	Tern, Great Black-headed Gull, Brown-headed Gull, Little Sand Plover, Greater Sand Plover, Kentish Plover, Pacific Golden Plover, Timminck's Stint, Sanderlin, Ruddy Turnstone, Common Sandpiper, Wood Sandpiper, Whimbrel, Eurasian Curlew, Pin-tailed Snipe, Collared Kingfisher, Ruddy Shelduck, Osprey, Little Stint, Terek Sandpiper, White Wagtail, Lesser Sand Plover						95% of the global populations of any of these 25 migratory avian species and therefore does not trigger Criteria 3 Tier 2b
<i>Sousa chinensis</i> , <i>Tursiops</i> <i>aduncus</i> , <i>Orcaella</i> <i>brevirostris</i> , <i>Neophocaena</i> <i>phocaenoides</i>	Indo-pacific Humpback Dolphin, Indo-Pacific Bottlenose Dolphin, Irrawaddy Dolphin, Indo-Pacific Finless Porpoise	VU/ LC/DD			X -		The study area/Kutubdia Island is not likely to hold between 1 and 95% of the global populations of any of these Dolphin species and therefore does not trigger Criteria 3 Tier 2b

Annex 13

Risk Assessment and
Emergency Response &
Disaster Management Plan

Risk Assessment (RA) and Emergency Response & Disaster Management Plan (ERDMP)

Document Stage: Final

August, 2017

Bangladesh: Liquefied Natural Gas (LNG) Terminal Project, Offshore Kutubdia Island

1 INTRODUCTION

1.1 BACKGROUND

Reliance Power Limited through their subsidiary in Bangladesh, Reliance Bangladesh LNG Terminal Limited (RBLTL) plans to establish a LNG storage and re-gasification facility of up to 5.0 million tonnes per annum (MMTPA) capacity with peak load of 750 million standard cubic feet per day (MMSCFD). There will be LNG storage of 137,000 m³ to 216,000 m³ in Floating Storage and Regasification Unit (FSRU) located offshore *Kutubdia* Island connecting metering station at *Kutubdia* Island in Cox's Bazar region of Bangladesh.

Presently, an environmental and social impact assessment (ESIA) study has been commissioned to comply with the requirements of environmental impact assessment ("EIA") guidelines of the Government of Bangladesh ("GoB") and lenders requirement as per ADB's Safeguard Policy Statement (SPS), 2009. As part of ESIA study, this report covers Risk Assessment study of the proposed LNG Project. The report covers salient features of the Project, objectives and methodology of the risk assessment study. This report includes identification of major hazards, hazard screening and ranking, frequency and consequence assessment for major hazards. The hazards have been quantitatively evaluated through a criteria base risk evaluation matrix. Risk mitigation measures to reduce significant risks to acceptable levels have also been recommended as a part of the risk assessment study.

1.2 BRIEF DESCRIPTION OF THE LNG PROJECT

Reliance Power Limited (RPL) intends to develop LNG storage and re-gasification facility (LNG terminal) of about 3.5 to 5.0 MMTPA. The LNG terminal will include the following components:

Marine facilities off Kutubdia Island covering:

- i) Twin (double berth) jetty with topside;
- ii) Floating Storage and Regasification (FSRU) with storage capacity of 137,000 m³ to 180,000 m³;
- iii) Regasification onboard FSRU for send out of RLNG with 750 MMSCFD as peak capacity;
- iv) High pressure 30 inches (30") subsea re-gasified LNG (RLNG) pipeline of ~2.0 km;

Onshore facilities covering:

- v) Subsurface/subsea gas spur pipeline of ~16 km length (30 inches diameter) connecting *Kutubdia* Island to custody transfer metering station (CTMS) through Valve Station no. 2 to be located at *Napura, Banskhali* from where the gas pipeline will be connected into the GTCL's national gas grid pipeline of

Moheshkhalli – Anwara Section. The pipeline length of ~16 km also includes 2.7 km of subsea pipeline length passing through *Kutubdia Channel*. The CTMS at *Napura* will also have a small 500 kwh of gas based power generating unit and pipeline pigging facility.

The proposed LNG Project involves the following key operations/activities:

LNG Offloading: LNG will be brought by LNG carriers (LNGC) of sizes ranging from 125,000 m³ to 263,000 m³ capacity (the maximum being equivalent to Q-Flex LNG Carrier). LNG will be offloaded from the LNG Carrier via twin jetty (with topside facility) to the FSRU. The LNG offloading will be performed through Marine Loading Arms (MLAs) on both the LNG Carrier and FSRU sides of the jetty. The offloaded LNG will flow through 4 nos. (3 working + 1 standby) of MLAs (each of 16" diameter and of arm length of ~12 m) on the FSRU side of the jetty to the FSRU Storage Tanks with attached couplings. At an offloading rate of ~10,000m³/hour, LNG cargo will be transferred within 24 hours. Considering 5.0 MMTPA, there will be annual requirement of ~51 to 77 LNG cargos with representative offloading of ~24 hours per day at roughly 5 days per cycle.

LNG Storage: FSRU serves as LNG receiving, storage and regasification facility. The cryogenic LNG will be stored in membrane/moss type cargo storage tanks on-board the FSRU with total storage capacity varying from 137,000 m³ to 216,000 m³. Each storage tank will be equipped with block valves on the filling lines which will allow isolating the tank in case of emergency. Moreover, in case of failure of the tank pressure control system, each tank is protected against overpressure by independent safety valves discharging directly to the atmosphere via a dedicated vent mast.

Tanks will be equipped with spray pumps. Each pump discharge will be equipped with a control valve which enables to control the pump electrical current. Moreover, a return line to tank with an additional control valve will be provided in order to control the spray nozzles inlet pressure. The LNG storage within FSRU will be maintained at the 0.09 bar g. The LNG offloading will be done at the pump inlet pressure of 4.5 bar g connecting MLAs of LNGC with MLAs of FSRU at the jetty. Displaced vapour is balanced from the FSRU back to the LNG Carrier.

LNG Regasification on-board FSRU: LNG (transferred from LNGC to FSRU and stored on-board FSRU) will be re-gasified through Shell and Tube vaporisers (STVs). The peak 750 MMSCFD gas send-out capacity targeted in this Project would be met by re-gasification skids with N+1 philosophy. As per the current information, FSRU will have vaporizer system with direct sea-water heater (open loop system) wherein LNG at ~ -155°C passing through shell – tube type exchanger will be heated by sea water (at 20°C to 30°C offshore *Kutubdia Island*) flowing through the shell side in an open loop (discharged to sea and not recycled back) configuration.

Gas Send-Out and Metering: The RLNG (natural gas) from the FSRU will be transported through a high average pressure (~80 bar g) RLNG subsea pipeline of diameter ~30" of ~2.0 km length from FSRU to shore line of *Kutubdia* Island followed by subsurface/subsea spur pipeline of ~16 km up to Custody Transfer Metering system (CTMS) at *Napura* valve station from where it will be further connected through a section of ~50 m 30" high pressure (HP of 77 bar g) with emergency shut down (ESD) valves connected either side before connecting into the proposed national gas grid of GTCL (*Moheshkhali - Anwara* section) at *Banskhali*. The salient features of the proposed FSRU is provided in **Table 3.1**

Table 1.1 *Salient Features of the FSRU*

Parameter	Specification Required
LNG Storage Capacity	137,000 m ³ to 216,000 m ³
Regas Technology	Open loop
Spare Philosophy	Operating + Standby for all critical equipment
Flaring	Zero Flaring under Normal Conditions
Staff / Crew	Operation Phase ~ 35 persons on board FSRU

Source: Reliance Power

Main information about the onshore pipeline is presented in the **Table 1.2**.

Table 1.2 *Salient Features of the Pipeline from FSRU to CTMS*

Parameter	Specification Required
Length	~18 km (2 km subsea from FSRU to <i>Kutubdia</i> shore +16 km onshore subsurface/subsea)
Diameter	30"
Operating Pressure	80 bar (g)
Operating Temperature	5-15 °C

The chainage wise route map of spur pipeline is shown in **Figure 1.1**.

Figure 1.1 *Google Earth Image of the LNG Terminal & Related Spur Pipeline Route*



Source: Reliance Power

1.3 OBJECTIVE OF THE RISK ASSESSMENT

The Risk Assessment (RA) aims to provide a systematic analysis of the major risks that may arise as a result of the operation of the proposed LNG storage and regasification facility (FSRU facility) located in Bay of Bengal ~1.5 km to the west off *Kutubdia* Island in *Cox's Bazar* District of Bangladesh. The RA process outlines rational evaluations of the identified risks based on their significance and provides the outline for appropriate preventive and risk mitigation measures. The output from the risk assessment will contribute towards strengthening of the Emergency Response Disaster Management Plan (ERDMP) in order to prevent damage to personnel, infrastructure and receptors in the immediate vicinity of the plant. Additionally, the results of the risk assessment can also provide valuable inputs for keeping risk at As Low as Reasonably Practicable (ALARP) and arriving at decisions for mitigation of high risk events.

The overall objective of this risk assessment with respect to the proposed LNG Project involves identification and evaluation of major risks, prioritizing risks identified based on their hazard consequences and using the outcome to guide development of ERDMP. Hence in order to ensure effective management of any emergency situations that may arise during the operation of the floating LNG storage unit (FSRU); transport of RLNG via offshore HP gas subsea pipeline of ~2 km followed by onshore/subsea pipeline of ~16 km up to the Valve Station at *Napura*, the following specific objectives need to be achieved.

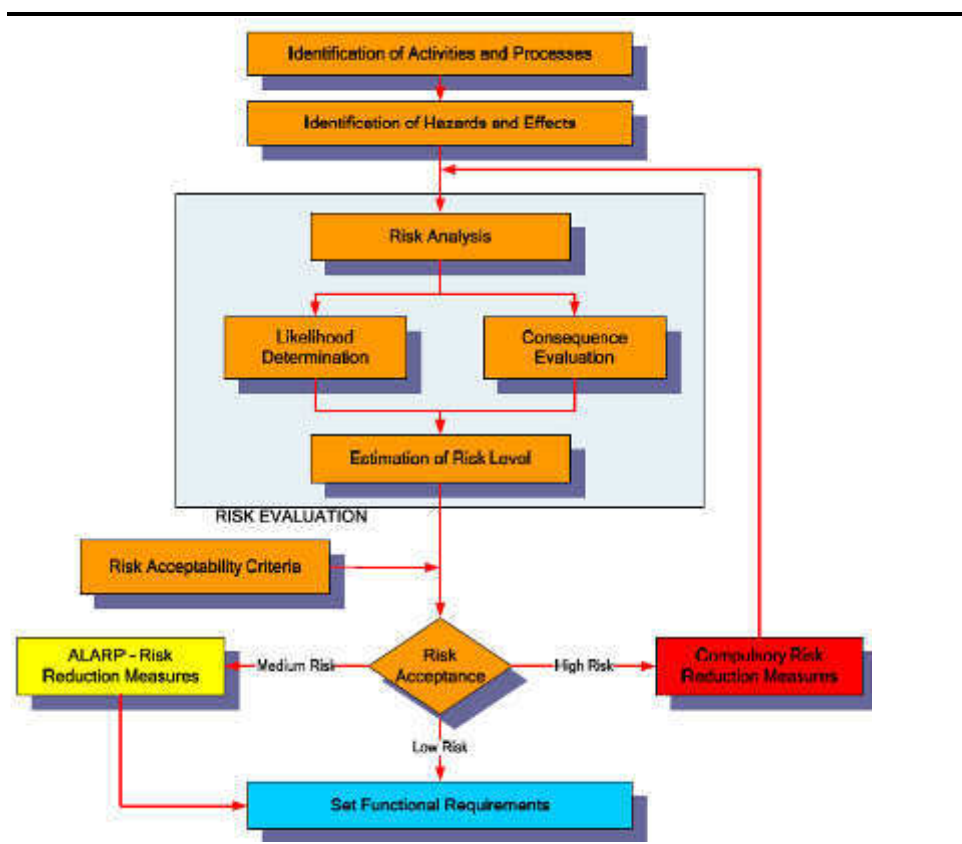
- Identify potential risk scenarios that may arise due to unloading of LNG from carrier to the FSRU, transportation of natural gas through pipeline and storage of LNG in FSRU;
- Review existing information and historical databases to arrive at possible likelihood of such risk scenarios;
- Predict the consequences of such potential risk scenarios and if consequences are observed to be high, establish the same through application of quantitative simulations; and
- Recommend feasible preventive and risk mitigation measures as well as provide inputs for developing ERDMP.

1.4 RISK ASSESSMENT METHODOLOGY

The risk assessment process is primarily based on likelihood of occurrence of the risks identified and their possible hazard consequences particularly being evaluated through hypothetical accident scenarios. With respect to the proposed Project, major risks viz. leaks and rupture of storage tanks and pipeline have been assessed and evaluated through a risk matrix generated to combine the risk severity and likelihood factor. Risk associated with the proposed Project have been determined semi-quantitatively as the product of likelihood (probability) and severity (consequence) factors by using order of magnitude data [*risk ranking = severity (consequence) factor x likelihood (probability factor)*]. Significance of Project related risks was then established through their classification as high, medium, low, very low depending upon risk ranking.

The risk matrix is widely accepted as standardized method of risk assessment and is preferred over purely quantitative methods, given that its inherent limitations to define a risk event is certain. Application of this tool has resulted in the prioritization of the potential risks associated with the proposed Project thus providing the basis for drawing up risk mitigation measures and leading to formulation of plans for risk and emergency management. The overall approach is summarized below in Figure 1.2.

Figure 1.2 Risk Assessment Methodology



1.5 REPORT LAYOUT

The layout of the remaining report comprises of the following sections:

- Section 2 describes Hazards Identification
- Section 3: Frequency Analysis
- Section 4: Consequence Analysis of credible accident scenarios
- Section 5: Risk Summation
- Section 6: Conclusion and recommendations

Hazard identification for the purposes of risk assessment involves the qualitative review of the Project design and operations including relevant information provided by Reliance Power (for RBLTL). Available literature related to LNG terminal and pipeline risk assessment worldwide, terminal design, pipeline route and configuration, work procedures were reviewed in light of the proposed Project activities. Information (including historical data) related to possible hazards associated with LNG storage in FSRU, offshore HP gas pipeline operations including pipeline transportation of re-gasified natural gas were also sourced from veritable secondary sources of the upstream oil and gas industry viz. OSHA, UNEP, API, OGP, EGIG etc.

Based on the result of this exercise, potential hazards that may arise due to proposed Project were identified and a qualitative understanding of their probability and significance were obtained. It is to be noted here that many of these potential hazards could be triggered by natural events like earthquakes, floods and such factors have been considered in arriving at probable frequency of occurrence of such hazards.

Taking into account the applicability of different risk aspects the following hazards have been identified with respect to the proposed Project which has been dealt in detail in the subsequent sections.

- Accidental release of LNG resulting from the FSRU moving outside the operational reach of the unloading arms or the failure of a cargo transfer hose during the transfer process;
- Accidental release of re-gasified natural gas from offshore HP gas pipeline supplying onshore pumping units leading to pool fire, jet fire or vapour cloud explosion ;
- Accidental release of LNG from storage tanks at FSRU leading to pool fire, jet fire and/or flash fire;
- Release of natural gas from pipeline supplying up to the valve station leading to the jet fire or vapour cloud explosion (VCE).
- Spillage of fuel oil during bunkering of FSRU; and
- Spillage of fuel oil due to FSRU fuel tank integrity failure or external damage.

2.1 HAZARDS FROM LNG

LNG is an extremely cold, non-toxic, non-corrosive and flammable substance. If LNG is accidentally released from a temperature-controlled container, it is likely to contact warm surfaces and air that transfer heat into the liquid. The heat input begins to vaporise some of the liquid, returning the liquid to the gaseous phase. The relative proportions of liquid and gaseous phases immediately following a release depend on the release conditions. The liquid phase will form an LNG pool on the ground which will begin to “boil”, due to

heat input from the surrounding environment. Immediately following vaporisation, the gas is colder and heavier than the surrounding air and forms a vapour cloud. As the gas disperses, it mixes with the surrounding air and warms up. The vapour cloud will only ignite if it encounters an ignition source while concentrated within its flammability range.

Downstream of the vaporisers the natural gas will be in the gas phase. A release from piping and equipment will result in a gaseous phase release directly.

The hazards effects of LNG in the event of an accidental release from tanks, piping or equipment, including the characteristics of the possible hazardous effects have been described below.

2.1.1 Cryogenic Burns

LNG can cause frosting if it comes in contact with skin of personnel handling it. LNG vapours upon LNG evaporation being cold; it may cause frosting of lungs, though chemically it does not react with lungs. The process equipment and pipeline are well designed and thermally insulated with mitigations in place to prevent any leakage.

2.1.2 Toxicity & Asphyxiation

No occupational exposure limit is prescribed for methane.

It is an asphyxiate gas which displaces oxygen when there is a high concentration of methane in air. High concentration of methane in air normally occurs very close to the leakage source. Risk of asphyxiation increases as methane is an odourless gas. Recommended concentration is 19.5% of oxygen (v/v) in air.

2.1.3 Fire Hazards

LNG vaporises quickly as it absorbs heat from the surroundings. Methane vapours are flammable between concentration of lower flammability limit of 5% (v/v) and higher flammability limit of 15% (v/v). LNG at its boiling point of -162°C is denser than air (at ambient temperature of 25°C) while it becomes lighter as it mixes with air.

Jet Fire

Jet fires result from ignited releases of pressurized flammable gas or superheated/pressurized liquid through a hole from a pipeline or storage tank. The momentum of the release carries the material forward in a long plume entraining air to give a flammable mixture. Jet fires only occur where the LNG is being handled under pressure or when handled in gas phase as

unobstructed release. Jet fire is destructive to anything which falls within its ambit and causes convective heating which spreads around the jet.

Flash Fire

Following an LNG release, a large proportion of the liquid will evaporate immediately to form a cloud of methane, initially located around the release point. If this cloud is not ignited immediately, it will move with the wind and be diluted as a result of air entrainment. Similarly, a gas release may not be ignited immediately and will disperse in the air.

The dispersing vapour cloud may subsequently come in contact with an ignition source and burn rapidly with a sudden flash. If the source of material which created the cloud is still present, then the fire will flash back to the source giving a pool fire or, if under pressure, a jet fire. Direct contact with the burning vapours may cause fatalities but the short duration of the flash fire means that thermal radiation effects are not significant outside the cloud and thus no fatalities are expected outside of the flash fire envelope.

Vapour Cloud Explosion

A flash fire is the most likely outcome upon ignition of a dispersing vapour cloud from an LNG release. If ignited in open areas (i.e. unconfined conditions), pure methane is not known to generate damaging overpressures (explosion). However, if the gas is ignited in areas where there is significant degree of confinement and congestion an explosion may result.

Pool Fire

A pool fire occurs when a flammable liquid is released from a pipeline or storage tank onto the ground and ignited. A pool formed from the release of liquid LNG will initially spread due to the gravitational and surface tension forces acting on it. As the pool spreads, it will absorb heat from its surroundings causing evaporation from the pool surface. Ignition of this vapor leads to a pool fire.

Fireball

Immediate ignition of releases caused by a rupture in a gas piping may give rise to a fireball upon ignition. Fireballs have very high thermal radiation, similar to jet fires although the duration of the event is short.

To summarize, a liquid phase release may result in a flash fire, vapour cloud explosion, pool fire or jet fire. A gas phase release can result in a flash fire, fireball or jet fire.

2.2 RELEASE SOURCES INFORMATION

Based on the currently available Project information, the major release sources considered are as defined in *Table 2.1*.

Table 2.1 Release Sources Considered

Code	Release Source	Phase	Release Nature	Nos.	Length, m	Pipe Dia, mm	Pressure, bar g	Temp. °C	Density, kg/m ³	Inventory, kg
01-L	LNG Piping from LNGC Tank to HP Pump	Liquid	Pipeline	1	60	500	0.09	-161.5	465	5,480.3
02-L	LNG Unloading Arms	Liquid	Unloading Arms	4	12	400	4.50	-161.5	465	701.5
03-L	LNG transfer HP pump discharge to vapouriser at FSRU	Liquid	Pipeline	1	10	400	99.00	-155.0	454	570.7
04-G	BOG Suction to Compressor	Gas	Pipeline	1	2	400	0.09	-140	427	107.4
05-G	BOG Discharge from Compressor to Recondenser	Gas	Pipeline	1	5	400	6.50	25	5.2	3.2
06-G	NG high pressure offloading from FSRU – Jetty into spur pipeline up to metering station	Gas	Buried Pipeline	1	~18,000 (2,000+ 16,000)	750	80 Normal (Max 95)	5.0	72.3	575172.3
07-G	NG high pressure pipeline from metering station into GTCL pipeline (section within isolatable ESD valves)	Gas	Pipeline	1	~50	750	77	12.5 Average (Range 10- 15)	65.8	1163.25
08-G	Vent connected to emergency relief valve	Gas	Stack	1	20 (height)	100	77	12.5	65.8	1163.25

Source: Information developed based on discussions with Reliance Power

2.3 RISK SCENARIOS

The risk scenarios that have been considered for failure consequence modelling are given in *Table 2.2*. The failure frequencies related to release and ignition are discussed in *Section 3*.

Table 2.2 Release Scenarios Considered for the

Code	Release Source	Release Scenario
01-L	LNG Piping from LNGC Tank to HP Pump [1 no. x 60 m x 500 mm (20")]	<ul style="list-style-type: none"> ▪ 25 mm, ▪ 50 mm ▪ 100 mm
02-L	LNG Unloading Arms [4 nos. x 12 m x 400 mm (16")]	<ul style="list-style-type: none"> ▪ 25 mm, ▪ 50 mm, ▪ 100 mm ▪ Full Bore Rupture (400 mm)
03-L	LNG transfer through HP pump discharge to vapouriser at FSRU [1 no. x 10 m x 400 mm]	<ul style="list-style-type: none"> ▪ 25 mm, ▪ 50 mm, ▪ 100 mm
04-G	BOG Suction to Compressor at FSRU [1 no. x 2 m x 400 mm]	<ul style="list-style-type: none"> ▪ 25 mm, ▪ 50 mm, ▪ 100 mm
05-G	BOG Discharge from Compressor to Re-condenser [1 no. x 5 m x 400 mm]	<ul style="list-style-type: none"> ▪ 25 mm, ▪ 50 mm, ▪ 100 mm
06-G	NG high pressure offloading from FSRU – Jetty into spur pipeline up to CTMS: (buried pipeline) [1 no. x 18,000 m x 750 mm (30")]	<ul style="list-style-type: none"> ▪ 50 mm ▪ 100 mm
07-G	NG high pressure pipeline from metering station into GTCL pipeline (section within isolatable ESD valves) [1 no. x 50 m x 750 mm (30")]	<ul style="list-style-type: none"> ▪ 50 mm, ▪ 100 mm.

Note: All process pipelines have also been considered for full bore rupture scenario

The frequency analysis of the hazards identified with respect to the proposed Project was undertaken to estimate the likelihood of their occurrences during the Project life cycle. Hazard frequencies in relation to the proposed Project were estimated based on the analysis of historical accident frequency data and professional judgment. Based on the range of probabilities arrived at for different potential hazards that may be encountered from process related pipeline and high pressure buried pipeline failures, the following frequency categories and criteria have been defined (refer to Table 3.1).

Table 3.1 *Frequency Categories and Criteria*

Likelihood Ranking	Criteria Ranking (cases/year)	Frequency Class
5	Likely to occur often in the life of the project, with a probability greater than 10^{-1}	Frequent
4	Will occur several times in the life of project, with a probability of occurrence less than 10^{-1} , but greater than 10^{-2}	Probable
3	Likely to occur sometime in the life of a project, with a probability of occurrence less than 10^{-2} , but greater than 10^{-3}	Occasional/Rare
2	Unlikely but possible to occur in the life of a project, with a probability of occurrence less than 10^{-3} , but greater than 10^{-6}	Remote
1	So unlikely it can be assumed that occurrence may not be experienced, with a probability of occurrence less than 10^{-6}	Improbable

Source: Guidelines for Developing Quantitative Safety Risk Criteria – Centre for Chemical Process & Safety

The basis for the release event (failure) frequencies worked out is as per the reported historical data as described in *Table 3.2*.

Table 3.2 *Failure Rate Frequencies for the Identified Release Scenarios*

S N	Equipment	Release Scenario	Release Phase	Release Frequency	Unit	Reference
1	Marine loading arms	Leak	Liquid/Gas	4.05E-03	y-1	COVO study
		Full bore rupture	Liquid/Gas	4.05E-05	y-1	
2	Pipe size 600 mm to 750mm	<= 25mm hole	Liquid/Gas	1.00E-07	m ⁻¹ y ⁻¹	Hawksley
		50 mm & 100mm	Liquid/Gas	7.00E-08	m ⁻¹ y ⁻¹	
		Full bore rupture	Liquid/Gas	3.00E-08	m ⁻¹ y ⁻¹	
3	Pipe size 150 mm to 500mm	<= 25mm	Liquid/Gas	3.00E-07	m ⁻¹ y ⁻¹	
		50 mm & 100mm	Liquid/Gas	1.00E-07	m ⁻¹ y ⁻¹	
		Full bore rupture	Liquid/Gas	5.00E-08	m ⁻¹ y ⁻¹	
4	High pressure gas buried pipeline	Leaks	Natural gas	5.1E-05	km ⁻¹ y ⁻¹	
		Full bore rupture	Natural gas	2.0E-05		
5	High pressure gas pipeline	Leaks	Natural gas	4.14E-04	km ⁻¹ y ⁻¹	EGIG Report
		Full bore rupture	Natural gas	6.2E-05	km ⁻¹ y ⁻¹	

3.1.1 Pipeline Failure – Ignition Probability

In the period 1970-2010, only 4.4% of the gas releases recorded as incidents in the EGIG database ignited. Ignition depends on the existence of random ignition sources. The EGIG database gives the opportunity to evaluate the link between ignition and leak size. The ignition probability of pipeline failure (rupture and leaks) with respect to the proposed Project is derived based on the following equations as provided in the IIGEM/TD/2 standard

$$\left. \begin{aligned} P_{\text{ign}} &= 0.0555 + 0.0137pd^2; \text{ for } 0 \leq pd^2 \leq 57 \\ P_{\text{ign}} &= 0.81; \text{ for } pd^2 > 57 \end{aligned} \right\} \text{ (For pipeline ruptures)}$$

$$\left. \begin{aligned} P_{\text{ign}} &= 0.0555 + 0.0137(0.5pd^2); \text{ for } 0 \leq 0.5pd^2 \leq 57 \\ P_{\text{ign}} &= 0.81; \text{ for } 0.5pd^2 > 57 \end{aligned} \right\} \text{ (For pipeline leaks)}$$

Where:

- P_{ign}** = Probability of ignition
- p** = Pipeline operating pressure (bar)
- d** = Pipeline diameter (m)

Based upon the above equations, the ignition probabilities calculated for the Project scenarios are described in *Table 3.3*.

Table 3.3 Ignition Probabilities for the Considered Release Scenarios

Code	Scenario	Phase	Release Nature	Pipe Dia, (d) m	Pressure, (p) bar g	pd ²	0.5pd ²	Ignition Probability for pipeline Rupture	Ignition Probability for pipeline Leak
01L	LNG Piping from LNGC Tank to HP Pump	Liquid	Pipeline	0.5	0.09	0.022	0.011	0.055	0.055
02L	LNG Unloading Arms	Liquid	Unloading Arms	0.4	4.50	0.72	0.36	0.065	0.060
03 L	LNG transfer through HP pump discharge to vapouriser at FSRU	Liquid	Pipeline	0.4	99.00	15.84	7.92	0.27	0.16
04G	BOG Suction to Compressor	Gas	Pipeline	0.4	0.09	0.014	0.007	0.055	0.055
05G	BOG Discharge from Compressor to Recondenser	Gas	Pipeline	0.4	6.50	1.04	0.52	0.07	0.06
06G	NG high pressure offloading from FSRU – Jetty into spur pipeline up to metering station	Gas	Pipeline	0.750	80	45.00	22.50	0.67	0.36
07	NG high pressure pipeline from metering station into GTCL pipeline (section within isolatable ESD valves)	Gas	Pipeline	0.75	77	43.3	21.65	0.65	0.35

Based on the generic frequencies and ignition probabilities as described out above in *Tables 3.2 & 3.3*, the Project specific failure frequencies resulting in probable fire incidences are given in *Table 3.4*.

Table 3.4 Project Specific Failure & Fire Frequencies

Code	Scenario	Phase	Release Nature	Leak Scenario.	Release Frequency (as per Table 3.2)	Unit	Project specific Release Frequencies	Ignition Probabilities	Project specific Fire Frequencies
01-L	LNG Piping from LNGC Tank to HP Pump	Liquid	Pipeline	25 mm	3.00E-07	m ⁻¹ y ⁻¹	1.80E-05	0.055	9.90E-07
				50mm	1.00E-07		6.00E-06	0.055	3.30E-07
				100mm	1.00E-07		6.00E-06	0.055	3.30E-07
02-L	LNG Unloading Arms	Liquid	Unloading Arms	25 mm	4.05E-03	y ⁻¹	4.05E-03	0.06	2.43E-04
				50mm	4.05E-03		4.05E-03	0.06	2.43E-04
				100mm	4.05E-03		4.05E-03	0.06	2.43E-04
				FBR	4.05E-05		4.05E-05	0.065	2.63E-06
03-L	LNG transfer through HP pump discharge to vapouriser at FSRU	Liquid	Pipeline	25 mm	3.00E-07	m ⁻¹ y ⁻¹	3.00E-06	0.016	4.80E-08
				50mm	1.00E-07		1.00E-06	0.016	1.60E-08
				100mm	1.00E-07		1.00E-06	0.016	1.60E-08
04-G	BOG Suction to Compressor	Gas	Pipeline	25 mm	3.00E-07	m ⁻¹ y ⁻¹	6.00E-07	0.055	3.30E-08
				50mm	1.00E-07		2.00E-07	0.055	1.10E-08
				100mm	1.00E-07		2.00E-07	0.055	1.10E-08
05-G	BOG Discharge from Compressor to Recondenser	Gas	Pipeline	25 mm	3.00E-07	m ⁻¹ y ⁻¹	1.50E-06	0.06	9.00E-08
				50mm	1.00E-07		5.00E-07	0.06	3.00E-08
				100mm	1.00E-07		5.00E-07	0.06	3.00E-08
06-G	NG high pressure offloading from FSRU – Jetty into spur pipeline up to metering station	Gas	Buried Pipeline (subsea/sub-surface)	50mm & 100 mm	5.1E-05	km ⁻¹ y ⁻¹	9.18E-04	0.36	3.3E-04
				FBR	2.01E-05		3.6E-04	0.67	2.4E-04
07-G	NG high pressure pipeline from metering station into GTCL pipeline (section within isolatable ESD valves)	Gas	Pipeline	150 mm	4.14E-04	km ⁻¹ y ⁻¹	2.07E-05	0.35	7.25E-06
				100mm	4.14E-04		2.07E-05	0.35	7.25E-06
				FBR	6.20E-05		3.10E-06	0.65	2.02E-06

4.1 CONSEQUENCE MODELLING

Consequence modelling of the identified scenarios has been carried out using DNV's Phast 6.7 Model. The possible events as a result of the identified scenarios for LNG and RLNG releases will have hazard effects as described in following sections.

4.1.1 Jet Fire

Hazard extents due to jet fire for the identified scenarios are described in **Table 4.1**.

Table 4.1 Jet Fire Radiation Hazard Extent

Code	Release Source	Phase	Leak Size	Hazard Extent, m					
				Weather Conditions					
				F, 2m/s			D, 5 m/s		
				Radiation Level, kw/m ²					
				4.0	12.5	37.5	4.0	12.5	37.5
01-L	LNG Piping from LNGC Tank to HP Pump	Liquid	25 mm	36	29	NR	33	26	22
			50 mm	60	49	39	56	45	38
			100 mm	94	77	62	91	73	61
02-L	LNG Unloading Arms	Liquid	25 mm	70	57	48	62	48	40
			50 mm	129	105	88	115	90	74
			100 mm	238	192	161	212	165	135
			FBR 400mm	552	440	366	505	391	320
03-L	LNG transfer HP pump discharge to vapouriser at FSRU	Liquid	25 mm	114	94	81	102	80	67
			50 mm	212	173	149	190	149	124
			100 mm	393	319	273	353	276	229
04-G	BOG Suction to Compressor	Gas	50 mm	8	NR	NR	NR	NR	NR
			100 mm	17	13	NR	18	15	NR
05-G	BOG Discharge from Compressor to Re-condenser	Gas	25 mm	12	8	NR	12	NR	NR
			50 mm	26	20	NR	26	21	NR
			100 mm	52	40	31	53	42	33
06-G	NG high pressure offloading from FSRU – Jetty into spur pipeline up to metering station (buried pipeline)	Gas	50 mm	91	69	53	90	72	59
			100 mm	172	125	94	170	129	101
07-G	NG high pressure pipeline from metering station into GTCL pipeline (section within isolatable ESD valves)	Gas	50 mm	88	66	50	89	69	54
			100 mm	166	121	92	164	125	98

NR = Not reached

4.1.2 Flash Fire

Flash fire occurs for a short duration when a cloud of flammable gas is present in air within upper and lower flammability limits and gets ignition source. Flash fire occurs without causing significant overpressure. The observed

concentrations of UFL and LFL for the Project scenarios are described in *Table 4.2*.

Table 4.2 *Flash Fire Low Flammability Level Hazard Extent*

Code	Release Source	Phase	Leak Size	Hazard Extent, m			
				Weather Conditions			
				F, 2m/s		D, 5 m/s	
				Flash Fire Effects			
				UFL	LFL	UFL	LFL
01-L	LNG Piping from LNGC Tank to HP Pump	Liquid	25 mm	19	53	6	21
			50 mm	31	141	21	55
			100 mm	39	167	40	99
02-L	LNG Unloading Arms	Liquid	25 mm	23	115	15	65
			50 mm	67	137	51	133
			100 mm	100	151	110	177
			FBR 400mm	163	600	184	403
03-L	LNG transfer HP pump discharge to vapouriser at FSRU	Liquid	25 mm	23	103	21	98
			50 mm	52	192	49	212
			100 mm	118	250	118	282
04-G	BOG Suction to Compressor	Gas	50 mm	2	6	2	5
			100 mm	4	12	4	10
05-G	BOG Discharge from Compressor to Re-condenser	Gas	25 mm	2	6	1	6
			50 mm	3	12	3	10
			100 mm	6	25	6	21
06-G	NG high pressure offloading from FSRU – Jetty into spur pipeline up to metering station (buried pipeline)	Gas	50 mm	32	101	22	147
			100 mm	59	187	43	278
07-G	NG high pressure pipeline from metering station into GTCL pipeline (section within isolatable ESD valves)	Gas	50 mm	11	46	10	40
			100 mm	57	168	42	268
08-G	Vent attached to pressure relief valve	Gas	100 mm (dia of 20 m stack)	21	21	19	21

Note: UFL & LFL are Upper and Lower Flammability Limits of 165,000 ppm and 44,000 ppm respectively of methane within which flash fire occurs

4.1.3 Vapour Cloud Explosion

Vapour cloud explosion for LNG is not a likely scenario as it is stored at low pressure in sub cooled conditions. For the natural gas, VCE scenario considered and hazard effects are described in *Table 4.3*.

Table 4.3 *Vapour Cloud Explosion Hazard Extent*

Code	Release Source	Phase	Leak Size	Hazard Extent, m			
				Weather Conditions			
				F, 2m/s		D, 5 m/s	
				Overpressure Effects Late Ignition			
				0.2068 bar	0.1379 bar	0.2068 bar	0.1379 bar
07-G	NG high pressure pipeline from metering station into GTCL pipeline (section within isolatable ESD valves)	Gas	50 mm	127	132	115	119
			100 mm	71	92	71	92
			150 mm	71	92	71	92

Note: UFL & LFL are Upper and Lower Flammability Limits of 165,000 ppm and 44,000 ppm respectively of methane within which flash fire occurs

4.1.4 Pool Fire Hazard Extent

Pool fire hazard takes place during accidental release of LNG when it comes in contact with the surrounding and absorbs heat from the edges of the spilled LNG pool on the deck or sea surface to change part of it into vapour phase. The vapour phase upon finding an ignition source burns the pool causing pool fire. Pool fire hazard effect has been considered for transfer of LNG from LNGC to FSRU at low pressure and in sub-cooled conditions. It has been observed that pool fire hazard has not been observed for small, medium or large releases. However, the pool fire hazard has been observed for the full bore rupture of LNG unloading arms for transfer to LNG from LNGC to FSRU. The observed results are shown in *Table 4.4*.

Table 4.4 Pool Fire Hazard Extent

Code	Release Source	Phase	Leak Size	Hazard Extent, m					
				Weather Conditions					
				F, 2m/s			D, 5 m/s		
				Radiation Level, kw/m ²					
			4.0	12.5	37.5	4.0	12.5	37.5	
02-L	LNG Unloading Arms	Liquid	FBR 400mm	164	109	64	172	122	76

4.2 OBSERVED HAZARDS EXTENT & RISK MITIGATIONS

4.2.1 Marine Operations

On review of the activities related to the proposed LNG terminal, the main activity noted is transfer of LNG from LNG carrier to FSRU through marine loading arms. The leak and ignition frequency for small (25 mm), medium (50 mm) or large (100 mm) leaks from unloading arms is 2.43E-04 per year which is relatively high in comparison to full bore rupture frequency of 2.63E-06 for unloading arms (refer to *Table 3.4*). It is also important to note that offloading of LNG will flow through marine loading arms with attached couplings. In case of any leak or full bore rupture, safety systems of decoupling of loading arms and actuation of emergency shut down valve coupled which together with adequate supervision during unloading operations there will be release of maximum quantity would be for ~30 seconds. Thus it is expected that most credible leak scenario for the unloading arms will be 100 mm spill from marine loading arms.

The hazard effect extent has been worked as part of the consequence modelling (*Tables 4.4, 4.5 & 4.7*) for jet fire, flash fire and pool fire. The maximum distance for jet fire hazard has been worked out as 238 m from source for 4 kw/m² of radiation level under F-2 m/sec weather condition, while maximum distance for the lower flammability level (LFL) has been worked out as 177 m from source under D 5 m/sec weather condition. Thus considering, the above outcome a safe exclusion zone of 250 m should be maintained for the Project related offshore operations.

To further mitigate any non-Project related marine traffic moving into area of FSRU/jetty, RBLTL will ensure adequate supervision through support /chase boats to keep such traffic away.

4.2.2 Onshore Operations

The onshore Project component include

- a) Subsea and subsurface spur pipeline of ~18 km length (including ~2 km from FSRU to shore of *Kutubdia* Island);
- b) Above ground section of ~40 m at CTMS connecting into GTCL pipeline; and
- c) Vent through pressure relief valve for any emergency pressure built-up.

The leak and ignition frequency for the spur pipeline has been estimated as $3.3E-04$ per year while the frequency of $2.02E-06$ per year has been estimated for the section between CTMS and GTCL.

The hazard effect extent has been worked as part of the consequence modelling (*Tables 4.4, 4.5 & 4.7*) for jet fire and flash fire. The maximum distance for jet fire hazard for credible 100 mm leak from buried pipeline has been worked out as 172 m from source for 4 kw/m^2 of radiation level under F-2 m/sec weather condition, while maximum distance for the same scenario for the lower flammability level (LFL) has been worked out as 177 m from source under D 5 m/sec weather condition.

The hazard effect extent for the credible leak of 100 mm for CTMS pipeline section of 40 m length above ground pipeline section has been worked out as 166 m from source for 4 kw/m^2 of radiation level under F-2 m/sec weather condition, while maximum distance for the same scenario for the lower flammability level (LFL) has been worked out as 268 m from source under D 5 m/sec weather condition. The maximum hazard for VCE scenario for CTMS pipeline leak scenarios has been worked out as 132 m under F 2 m/sec condition for pressure of 0.1379 bar g (2 psig). Thus considering, the above discussion 250 m should be maintained for the Project related offshore operations.

The chances of leakage from the buried pipeline are remote however, during the situation of earthquake of higher intensity there may be a leakage from the pipeline may happen. To minimize risk to the stakeholders along the pipeline, RBLTL will ensure that adequate safety provisions are inbuilt in the pipeline laying design and emergency response plan will be adhered to for any evacuation of stakeholders along the pipeline during emergency situation.

The distance for lower flammability level extent for vent from CTMS during emergency situation has been worked out as 21 m from source.

To mitigate risk of the above worked out hazard extents to the external stakeholders from CTMS, RBLTL will ensure that CTMS will be provided with adequately designed fence wall of at least 3 m high.

4.3

RISK EVALUATION

In parallel with the frequency analysis, hazard prediction / consequence analysis exercises were undertaken to assess the likely impact due to Project related risks on onsite personnel, infrastructure and environment. Overall, the consequence analysis takes into account the following aspects:

- a) Nature of impact on environment and community;
- b) Occupational health and safety;
- c) Asset and property damage;
- d) Corporate image; and
- e) Timeline for restoration of property damage.

The following criteria for consequence rankings (Refer) have been drawn up in context of the possible consequences of the risk events that may occur during the proposed Project operations:

Table 4.5 *Severity Categories & Criteria*

Consequence	Ranking	Criteria Definition
Catastrophic	5	<ul style="list-style-type: none"> ▪ Leads to irreversible damage to marine and coastal ecological habitat. ▪ Permanent loss of economic livelihood ▪ Multiple fatalities/permanent total disability to more than 50 persons. ▪ International media coverage ▪ Loss of corporate image and reputation
Major	4	<ul style="list-style-type: none"> ▪ Temporary loss of economic livelihood ▪ Restoration of wildlife and ecological habitat within 5-10 years. ▪ Single fatality/permanent total disability to one or more persons ▪ National stakeholder concern and media coverage.
Moderate	3	<ul style="list-style-type: none"> ▪ Restoration of wildlife and ecological habitat within 2-5 years ▪ Short term hospitalization & rehabilitation leading to recovery ▪ State wide media coverage
Minor	2	<ul style="list-style-type: none"> ▪ Restoration of wildlife and ecological habitat 1-2 years. ▪ Medical treatment injuries ▪ Local stakeholder concern and public attention
Insignificant	1	<ul style="list-style-type: none"> ▪ Restoration of wildlife and ecological habitat in less than 1 year. ▪ First Aid treatment

- No media coverage

Based on ranking of likelihood and frequencies, each identified hazard has been evaluated based on the likelihood of occurrence and the magnitude of consequences. The significance of the risk is expressed as the product of likelihood and the consequence of the risk event, expressed as follows:

$$\text{Significance} = \text{Likelihood} \times \text{Consequence}$$

The below illustrates all possible product results for the five likelihood and consequence categories while the assigns risk significance criteria in three regions that identify the limit of risk acceptability. Depending on the position of the intersection of a column with a row in the risk matrix, hazard prone activities have been classified as low, medium and high thereby qualifying for a set of risk reduction / mitigation strategies.

Table 4.6 Risk Matrix

			Likelihood →				
			Frequent	Probable	Unlikely	Remote	Improbable
			5	4	3	2	1
Consequence ↑	Catastrophic	5	25	20	15	10	5
	Major	4	20	16	12	8	4
	Moderate	3	15	12	9	6	3
	Minor	2	10	8	6	4	2
	Insignificant	1	5	4	3	2	1

Table 4.7 Risk Evaluation Criteria & Action Requirements

S.N.	Risk Significance	Criteria Definition & Action Requirements
1	High (16 - 25)	“Risk requires attention” – Project HSE Management need to ensure that necessary mitigation are adopted to ensure that possible risk remains within acceptable limits
2	Medium (10 – 15)	“Risk is tolerable” – Project HSE Management needs to adopt necessary measures to prevent any change/modification of existing risk controls and ensure implementation of all practicable controls.
3	Low (5 – 9)	“Risk is acceptable” – Project related risks are managed by well-established controls and routine processes/procedures. Implementation of additional controls can be considered.
4	Very Low (1 – 4)	“Risk is acceptable” – All risks are managed by well-established controls and routine processes/procedures. Additional risk controls need not to be considered

4.3.1 *Risk Ranking – LNG Piping*

Likelihood ranking	1	Consequence ranking	3 (moderate)
Risk Ranking & Significance = 3 i.e. "Low" i.e. Risk is Acceptable and are managed by well-established controls and routine processes			

4.3.2 *Risk Ranking – Unloading Arm Rupture (Worst Case Scenario)*

Likelihood ranking	2	Consequence ranking	2
Risk Ranking & Significance = 4 i.e. "Low" i.e. All risks are managed by well-established controls and routine processes/procedures			

4.3.3 *Risk Ranking – High Pressure Gas Pipeline Rupture (Worst Case Scenario)*

Likelihood ranking	3	Consequence ranking	5
Risk Ranking & Significance = 15 i.e. "Medium" i.e. Risk is Tolerable and can be managed through adoption of necessary controls.			

4.4 **CONCLUSION**

The risk assessed has been done based on conceptual information available from prefeasibility report of the Project. However, the Project is yet to finalize detailed engineering aspects of the Project components. It is recommended that the risk related outcome has to be worked out based on the finalized design parameters together HAZOP workshops by the Engineering Procurement Construction (EPC) Vendor. An early emergency response plan has been included in *Section 5*.

A document on EHS norms to be followed for the Project construction has been included in Annex 14 of this document. The EPC vendor will prepare systems for compliance of risk mitigations as well for implementation of action plans for Environmental, Social and Health Management. EPC vendor will also ensure Emergency Response Plan will be in place before start of construction activities for the Project.

5.1 PURPOSE

This section outlines the procedure for the management of emergencies and evacuation plans during the operations phase. The main objective of the Emergency Response Plan (ERP) is to ensure that activities are carried out to the following priorities:

- Safeguard lives;
- Protect the environment;
- Provide response to emergency situations using an effective communication network and organized procedures;
- Protect the company or Third Party assets
- Maintain the company image/reputation
- Resume normal activities

Personnel involved in dealing with emergency situations shall follow these priorities while making decisions and developing strategies.

5.2 NATURAL HAZARDS

Natural hazards which may impair the safety of the Project include the following:

- Severe weather conditions; and
- Earthquake or ground movement;

Extreme weather conditions are primarily lightening, cyclones and high winds and heavy rains. Cyclones and high winds may damage the FSRU and land based structures. Potential hazards to workers is anticipated from direct impact of the structure i.e. falling equipment and any subsequent hydrocarbon releases viz. LNG caused by equipment and pipeline damage. The *Kutubdia Upazila* of Cox's Bazar District where the proposed Project is located, is one of the most vulnerable and risk prone Upazila's to disaster and climate change.

5.2.1 Cyclones

Cyclone and tidal surge are the most common hazard of the *Upazila*. In the last decade 29 April 1991, 2 May 1994, 16 May 1997 and 20 May 1998, and 2001, 15 May, 2004, 14 May, 2007 cyclone hit in the *Upazila*. Most of cyclones were speeded at least 160 km/hour and the areas had been over flooded with tidal surge. Almost all 5 unions affected by the cyclone and highest water inundation were up to 20 feet high in the *Upazila*; sometimes the water logging lasted for 72 hours maximum in low lying areas. The cyclonic history and hazard outcome of the *Upazila* is presented in *Table 5.1*.

Table 5.1 Kutubdia Upazila – Cyclonic History

Sl. No	Year	Hazard Outcome	Sectoral Losses
1	2009	341 people died and 17500 houses damaged. Huge damage occurred to the resources of the Upazila. Hundreds acres of shrimp and salt cultivations were damaged.	Infrastructure, household, forest, fishery culture, betel leaf and betel nut cultivation, salt cultivation, educational institution etc.
2	2007	20,000 families and 10,000 houses damaged. At least 3000 inhabitants of the Upazila were wounded; 7 km roads, 24 educational institutions and 560 acres of cropland were fully damaged.	Infrastructure, household, forest, fishery culture, betel leaf and betel nut cultivation, salt cultivation, educational institution etc.
3	1991	21,603 families and 49,000 houses were completely damaged. A total of 10,028 casualty occurred and at least 23048 wounded inhabitants were recorded from the Upazila. At least 31,000 livestock died, while 192 km long road, 49 educational institutions and nearly 560 acres of cropland were fully damaged.	Infrastructure, household, forest, fishery culture, betel leaf and betel nut cultivation, salt cultivation, educational institution etc.
4	1980	600 acres of crops damaged and 20 people had died.	Infrastructure, household, forest, fishery culture, betel leaf and betel nut cultivation, salt cultivation, educational institution etc.
5	1978	100 acres of cropland and agricultural production affected, 27 educational institutions fully damaged, 700 acres of land damaged and 890 families affected.	Infrastructure, household, forest, fishery culture, betel leaf and betel

Source: Development of Upazila Disaster Management Plan Upazila: Kutubdia, August 2014

5.2.2 Scope

The ERP covers the emergency response that needs to be applied to both offshore (including FSRU) and onshore elements of the Project. Emergency response at the FSRU shall be managed through a separate document therefore only the framework is covered in this section. For the FSRU, a HSSE bridging document shall be developed to be used in conjunction with this document, as well as the Emergency Response Plan of the FSRU.

5.2.3 Emergency Response Team Composition

The emergency response onsite will be mediated by Reliance through two dedicated team’s viz. the First Intervention Team (FIT) and Emergency Response Team (ERT). The roles and responsibilities of key team members have been outlined below.

Incident Controller

The shift operation supervisor is the incident controller and will be leading the response team until the emergency is totally brought under control. The incident controller takes control of an incident and manages directly or appoints personnel to positions. He assumes control of the organization and maintains command with site personnel.

- Assess the situation;
- Appoint, brief and task personnel;
- Establish Incident control point (ICP);
- Initiate Incident action plan (IAP);
- Manage emergency operations at the incident site;
- Plan, execute, review and re-assess fire-fighting operations continuously;
- Maintain safe environment; and
- Record actions taken during course of incident control

Field Operators

Shift Field Operators are part of the First Intervention Team (FIT) and will act in emergency response operations as per instructions of the incident controller. They will act in ensuring

- Timely alert;
- Isolation of release;
- Evacuation of personnel;
- Rescue and relief work; and
- Fire-fighting operations, where instructed

Panel Operator

The Panel Operator also has a role on the FIT with the responsibility to maintain:

- Prompt isolation of effected area of the operations on-board FSRU and CTMS;
- Maintaining internal communication with emergency site, Duty Manager, port control room etc.; and
- Acting on incident controller's instructions

In case of an emergency, the Shift Security supervisor will report to the Shift Operation supervisor immediately together with the Shift Security guards, as an Auxiliary Support Team.

Emergency Response Team

In case of prolonged or serious emergencies, Reliance shall have a strong back up team. The ERT will be assisting the FIT in the following areas:

- Handle communication both Internal/External;
- Devise strategies to control the emergency situation - plan, organise, implement via incident controller and evaluate the results;
- Read drawings, issue guidelines to incident controller;

- Arrange logistics; identify potential needs, suppliers of service, material. Secure agreements, resource hiring etc.;
- Food, transport, replacement of site personnel, alternate duty roster in case of prolonged emergencies;
- Handling of journalists, media, public (in line with protocol with the Reliance);
- Implement the plan jointly as supporting team, external aid arrangements;
- Maintain a log of events and recording the sequence of actions taken; and
- Inform and Coordinate with Country Crisis Management Team (CCMT)

The minimum composition of the ERT is at least one manager, one discipline engineer (duty engineer), one technician from all disciplines and one administration co-coordinator. The following functions are the responsibility of the ERT:

- *Planning/Intelligence*: Gathers all information regarding the incident, any impact on other parts of the process and possible evolution;
- *Incident Operation*: Manages the practical aspects of incident control, implements the action plan, provides a practical input to it, establishes a structure of actors, identifies additional practical resources, relays current information regarding the incident back to the Incident Manager;
- *Safety Advice*: Evaluates the adequacy of response to incident, advises the Incident Controller about response strategy and tactics; and
- *Logistics support*: Provides and maintains personnel, materials, facilities and services as and when requested by Incident Controller.

Responsibilities of FSRU crew

The shift pilots, teams at FSRU, CTMS facility with the support of district administration and human resources from onshore will be responsible for executing emergency plan in the event of emergency situation.

Public Relations and Emergency Coordination with Local Government

Reliance shall have designated and trained site personnel who will interact with press, public, govt. and media briefing during any emergency. No employee or contractor would interact directly with above agencies without permission of Emergency Response Controller (ERC).

Country Crisis Management Team (CCMT)

Country crisis management team of Reliance will also provide support to ERT at site.

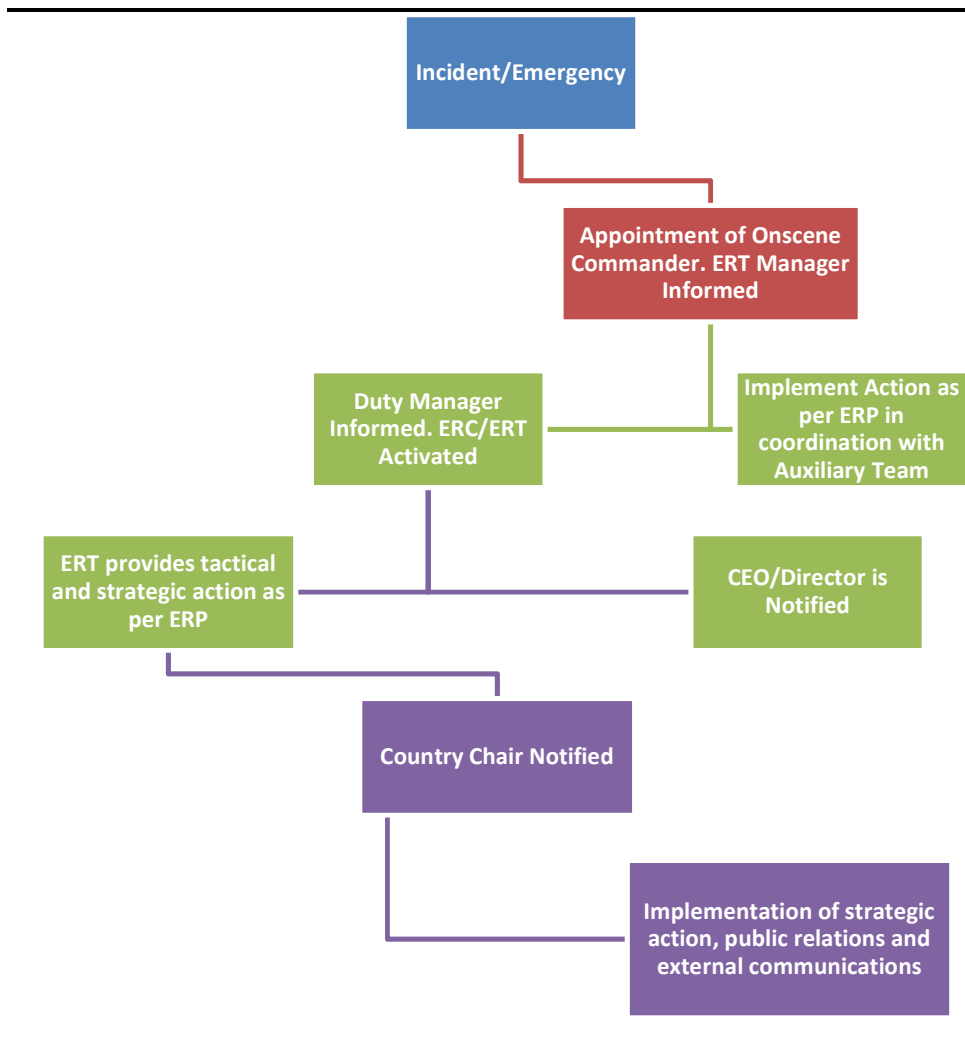
Mutual Aid / External Help Arrangements

As part of mutual aid scheme, Reliance will explore possibility of sharing of information and resources with GTCL in case of serious crisis. However, the decision of seeking external assistance will be taken by duty manager on advice of ERT.

5.2.4 Emergency Alert Process

For an alert or emergency, the list of all authorities/ parties and resources to be immediately informed (including the Control Room at the Company) will be listed. If an alert is initiated by a third party, control room of the Company to be informed and actions coordinated with those serving as experts. The emergency notification and response process has been presented in Figure 5.1.

Figure 5.1 Emergency Notification & Response Process



Source: Reliance

5.2.5 Emergency Response Actions

LNG Fires & Gas Clouds

It is the responsibility of the emergency site commander to take situational decision. LNG spill is most credible when LNG is being transferred from LNGC to FSRU using marine loading arms or in case of a collision between

LNG Carrier and FSRU storage tanks. The following actions will be adopted in case of LNG Fire.

- Spot and immediately isolate the leak/spill i.e. source of Hydrocarbon;
- Evacuate the area and rescue people, if any;
- Use water spray on vapour cloud to ensure effective dispersion of vapour cloud;
- Cool the surroundings by water screens. Only water-cooling of surroundings to be maintained to stop secondary fires and structures overheating as in the case of FSRU. The FSRU will have fire water facilities designed as per classification society requirements;
- Standby vessel with firefighting capability can be used for providing cooling water requirements

In order to regulate/control fires, fire alarms will be adopted in on basis of locations with potential fire scenarios. Gas alarms shall be installed across all the locations with a potential to have a gas leak. The installation of automatic shutdown upon detection by these alarms will be considered, depending upon the reliability of the gas detector and the scenario. An all-clear siren shall be installed for use to indicate all clear after an emergency. Other alarm systems would include the following:

- Shipboard emergency alarms;
- Adverse weather / rough sea condition warnings;
- Emergency shut-down ESD alarms

Cyclonic/Thunderstorms Hazards

For cyclonic events, the response actions will be adopted by Reliance in coordination with the *Kutubdia* Emergency Operations Centre (EOC). The centre makes an effective coordination along with response to the disaster. The centre is open for 24 hours and it assesses analysis, observe and provide and preserve information. The centre is normally stationed at PIO office of the *Upazila* and consists of a control room and communication cell. The contact details of the *Kutubdia* EOC are presented in Table 5.2 below.

Table 5.2 *Kutubdia Emergency Operations Centre (EOC) Details*

Sl. No	Name	Designation	Mobile Number
1	Mr. Md. Mominur Rashid	TNO. Kutubdia	01712510061
2	Mr. Subrata Das	PIO, Kutubdia	0342356042,
3	Mr. Golam Rashid Bachu	Upazila Team Leader	01714374455
4	Mr. Abdur Rauf	NGO Member	01733 262995
5	Mr. Md. Azamgir	Chairman, Koiyarbil Union Parishad	01714 374722
6	Mr. Alauddin Al-Azad	Chairman, Dakhin Dhurung Union Parishad	01713 627670
7	Mr. Nur Md. Tarikul Islam	Secretary, Lamshikhali Union Parishad.	01818575188

Source: Development of Upazila Disaster Management Plan Upazila: Kutubdia, August 2014

The actions to be performed include but not limited to the following activities:

- On receipt of cyclonic/thunderstorm warning, Reliance ERT will take the initiative to evacuate the FSRU and land based facility workers and personnel with assistance from *Kutubdia* EOC and *Upazila* volunteers;
- For evacuation of workers from FSRU, marine vessels to be kept at standby with contacts details of vessel owners made available with ERT;
- The workers and personnel to be guided to respective cyclonic shelter as directed by the *Upazila* volunteers;
- Ensure provision of food, drinking water, torches, communication facilities (satellite phones) and emergency supplies at the shelter; and
- Obtain continuous update on the status of the cyclones/thunderstorms.

In order to ensure effective emergency response during such event, efforts will be made by Reliance to improve preparedness of the ERT to deal with such event through participating on demo session on alert warning/early signal, removal, rescue and operation of relief works. The session will emphasise particularly towards guiding the workers and personnel to safety of the shelters with periodic mock drills undertaken by Reliance to this effect.

Medical Emergency onshore (Terminal area)

Any medical emergency at the onshore terminal will be managed in accordance with the Medical Emergency Response Plan.

Bomb scare / Terrorist Attack

Any security related incident shall be managed in accordance with the Security Manual. For the FSRU, the Ship Security Plan shall be complied with. During a security incident on the FSRU, all personnel shall report to the FSRU, and act in accordance with the instructions of the FSRU Captain. In case of onshore attack, a security plan shall be developed, and all personnel shall act in accordance with the instructions of the Land based facilities manager.

Annex 14

Framework for
Environmental, Health, Safety and
Social Management System

1 FRAMEWORK FOR DEVELOPING ENVIRONMENT, HEALTH, SAFETY & SOCIAL MANAGEMENT SYSTEMS (EHSSMS)

1.1 CONTRACTUAL AGREEMENT AND OBLIGATION

Reliance Bangladesh LNG Terminal Limited (RBLTL) and Reliance Bangladesh LNG and Power Limited (RBPL) (hereinafter also referred to as the owner companies) are being funded by Asian Development Bank for the project development to establish a 750 MW GCPP and 4MTPA LNG Terminal, thus subscribes to the Asian Development Bank's Safeguard Policy Statement, 2009 as guideline for developing, adopting the practices pertaining to Environment, Health, Safety and Social during execution of the project work to comply with the requirements. Hence, the contractors are required to follow the same as per following guideline based on which Contractors are obliged to submit their Environmental & Social Management Plan / System (ESMP / ESMS) before 30 days of starting their respective works.

1.2 THE GUIDING PRINCIPLES

Guiding principle for development of (EHSSMS) systems documents by respective Project contractors will adhere to the Asian Development Bank's Safeguard Policy Statement, 2009 and ESIA-ESMP documents prepared complying with the ADB and IFC EHS guidelines.

1.2.1 The Owner's Responsibility

Reliance Bangladesh LNG Terminal and Power Limited shall, through itself or external monitoring agency will review and approve the EHSSMS as submitted by the contractor, in concurrence with ADB. The review frequency:

- a. Within a week from the date of receiving of the environmental, health, safety and social management action plan EHSSMAP
- b. Review of EHSSMAP of each contractor on each quarter for its adequacy
- c. Review of compliance of the requirements included in EHSSMAP on monthly basis.

1.2.2 The Contractor's Responsibility

The contractor shall be responsible for

- a. Devising EHSSMAP and construction safety manual
- b. Putting an environmental, health, safety and social (EHS&S) Organization in place
- c. Implementing the EHS&S requirements as defined in the ESIA documents of both LNG terminal and power plant as applicable

- d. Extend cooperation to the Project owner in all inspections / audits.

1.2.3 *The Contractor's Obligation*

All the Contractors associated with supply, logistics and construction works are obliged to submit their EHSSMAP before 30 days of starting their respective works. The document will cover the following:

1. Introduction to the organization with contact details of the head of the organization at site and corporate.
2. The organization structure at site including EHS&S Team and their contact details (due care should be taken to make the Head at site as person responsible for execution and adherence to EHS&S implementation.)
3. Policies
 - a. EHS
 - b. Social
 - c. Equal Opportunity Employment
 - d. Human Rights
 - e. Human Resources
 - f. Redressal of Sexual Harassment in Work Place
 - g. Child Labour
 - h. E-Waste / Hazardous Waste / Battery Management
4. Codes / Practices / Guidelines followed to develop the manual for practice (LNG / Power)
5. Working Philosophy
6. Identification of Hazards (HAZID is carried out by PMC and Contractors both) / Environmental Impact (Part of ESIA study-by owner) / Social Impact taking clues from ESIA and practices at other sites (Part of ESIA study-by owner)
7. Standard Operating Procedures to mitigate and minimize the EHS&S Impact in the vicinity
 - a. OHS Manual
 - b. Environmental Manual
 - c. Social Engagement Plan
8. Training needs and schedule
9. Health care facility at site
10. Emergency Response Plan with Emergency Organization and Contacts
11. Documents Control procedure (DCI is prepared by each Contractor duly approved by Project Owner or through its PMC)
12. Emergency Response and Disaster Management Plan coordinated with the National Disaster Management Plan.

The contractor is to follow the framework for developing EHSSMAP by considering the outcome of the ESIA of the project and regulatory requirements pertaining to EHS and Social issues of their respective works. Following are the abstract guidelines for developing the EHSSMAP document.

1.3.1 Environment

The owner company expects all contractors to implement conditions of the permits/licenses required regulatory agencies including Department of Environment, Bangladesh. To carry out the activities at site various contractors have to implement specific requirements as mentioned in their contract order. In order to respectfully complete the job the Contractors are abide with the conditions of the consent as laid down by the statutory bodies and Lenders' requirements.

1. All the contractors as their contractual obligation shall nominate / designate a qualified person to be the Environment & Safety Officer / Engineer along with adequate number of Stewards / Chemists / Social Officer / Support Staff to coordinate between the concerned contractual worker and Owner Group responsible officer to implement the required EHS&S norms and guidelines for their respective contractual work.
2. The contractor shall ensure the deployment of adequate numbers of EHS&S representative as defined in to organization chart of their manual and approved by owner company in their working sites, failing which the work shall may be suspended by Project Owner till satisfactory arrangements are made by the contractors.
3. The Contractor shall install all equipment complying with local regulatory requirements for air and noise emissions and wastewater discharges. All basic amenities and drinking water required at the site will be provided by the Contractors.
4. The Contractor shall be responsible to provide water tankers / water spray system at their respective work places at their own cost to minimize / eliminate fugitive dust which may be arising out of the construction activities.
5. The Contractor shall restrict the disposal of the construction material (fresh/waste) in its isolated work place only, which can be taken out by the contractor once their job is completed to the designated place / authorized vendor for scarp (if, any available at Bangladesh) at main land. In case of non-compliance, the same shall be got done at the risk & cost of the contractor.
6. The Contractor shall be liable for maintenance of his construction machineries at site in such a manner that it does not pollute air, water, soil and noise of the area.

7. The Contractors shall ensure that their workforce do not involve in any cutting of trees in the nearby area, defacing and tampering any installation.

1.3.2 Hazardous Material / Waste Management

1. Storage and handling of any hazardous material such as petrol/diesel/ lube oil/ grease etc. shall be handled on a PCC (impervious) platform duly covered at top and adequate drain to recover and collect any spilled material. This is to comply with the HWM rules and acts of the host country. The replaced /waste oil & grease from automobiles, machineries and diesel generator sets are required to be collected in a container and disposed to the authorized vendors. The copies of manifest system (chalaans) of such disposal are required to be submitted to project owner on demand.
2. In no case the effluent will be allowed to be discharged to nearby fields/drains.
3. The Contractor's workforce will not litter the nearby agricultural fields by any means.
4. The Contractor will provide an effective garbage management system.
5. In case of labour settlement is required to be established, then that should follow SPS / IFC Guideline. The labour establishment shall practice and adhere to the ADB's SPS / IFC Guideline to avoid and minimize the municipal waste management, water supply and treatment of effluent, fuel supply, hygiene, avoidance and reduced impact practices on local population – it's cultural & aesthetical aspects, religious ethics & sentiments, Political & Social aspects, and dependency on local natural resources (like Fuel wood, Fuel Oil, Potable water etc.) of the local villagers / population. A separate labour establishment SOP shall be provide by the contractors before site mobilization and to be approved by project owner in concurrence of ADB; and
6. After completion of the work the Contractor will clear the construction site after depositing back the waste material in to the waste bins at the designated places on every day basis. The non-metallic waste is to be disposed of at the frequency arranged with authorities in main land.

1.3.3 Health

1. The Contractor shall be responsible for constructing his labour establishment as per the approved drawings and practices conforming to the local labour laws.
2. The Contractor shall be responsible for providing the labour establishments constructed in the allocated area in a manner such that it shall accommodate people to live in hygienic condition.
3. Providing safe drinking water and chlorine tablets to the workers are required to be adhered to strictly.

4. The Contractor to provide emergency / common medical facilities to its workforce, and 24 hours first aid facilities.
5. The Contractors are required to provide and maintain first aid box, Trauma Blanket and Eye wash facility at their respective working site / office as well as at the labour establishments.
6. The Contractor will provide the working site(s) and labour establishment with proper sanitation facilities like toilets/ bathrooms / drinking water and crèche etc.
7. Contractor shall make arrangements for ambulance services and for the treatment of industrial injuries. Names of those shall be providing these services shall be furnished to Project Owner prior to start of construction, and their telephone numbers shall be prominently displayed in Contractor's field office / labour establishments.

1.3.4 Social

1. The contractor shall give priority in maximizing the deployment of local population (both men and women) for its work based on the requirement and meeting minimum criteria of the work. However, a short on job training for skill development can also be envisaged to engage the local population during construction activity. All such records shall be furnished to project owner on monthly basis.
2. The contractor shall make provision to address the grievances for its employees where as the grievances of workers / community shall to be resolved under the banner of Grievances Redressal Cell of Project Owner.

General

1. The contractor shall be liable for obtaining the required permissions and clearances from appropriate government regulatory authorities for extraction / transportation of building construction materials.
2. The contractor shall issue I-cards to all of his employees and workers and shall also ensure that those are displayed as their persons during working at the site. All work men are required to be verified by local police so that their origin can be traced back in case of need.
3. The contractor shall not engage any child labour (less than 18 years) in any of the construction sites.
4. The contractors' labors must not resort to drinking and indulgence with local people.
5. The contractor will notify the owner if any precious/ semi precious materials or any object of heritage importance is found during the course of excavation without tampering the same.

1.3.5 Safety

1. Before commencing of contract work, all the workers/supervisors and employees of all contractors are required to go for Safety awareness programme to be organized by the EHS Personnel of the Contractor

and will be witnessed by EHS Personnel of the project owner. Every day there will be a Tool Box Talk in the site by the contractor. All workers and supervisors of the contractors are required to attend the same. Attendance shall be marked for all these activities and failure to attend these programmes shall attract the attention of Project Owner to report such an activity to the Head of Site and Head Office leading to stop their payment.

2. All new inductees of the contractor are also required to follow the stipulations mentioned in Sr. No.1
3. The contractor's Safety personnel in consultation with project owner shall deliver the following responsibilities;
 - a. The scheduling of man power arrival at site to start the job required to be furnished with project owner.
 - b. The safety supervisor shall find, procure and maintain inventory of a minimum quantity of various safety gears / PPE requirement and fire extinguishers required for the allotted job and submit regular monthly report to project owner.
 - c. The contractor shall be allowed to start their work at site only after proper verification of adequacy of safety gears/PPE and fire fighting equipment required for the specific job at site by the Safety personnel of project owner. The list of some standard safety gears and PPE are as follows:
 - i. Safety Shoes – With Steel toes (CE approved / IS)
 - ii. Dust Mask: DGMS or equivalent regulators approved
 - iii. Vapour Mask (EN 149 / IS 9473 - CE approved) – As per the requirement
 - iv. Ear Muffs: Ability to reduce sound level till 24dB.
 - v. Ear plugs: Ability to reduce sound level till 29dB.
 - vi. Full Body Harness: IS 3521
 - vii. Safety Helmets: IS 2925
 - viii. Welding shield / Apron
 - ix. Goggles
 - x. Hand Gloves
 - xi. Safety Nets
 - xii. Breathing Apparatus
 - xiii. Diving Apparatus
 - xiv. Fluorescent vest

All the above PPE should meet either host country quality standard & requirement or international standards are to be used.

- d. The inventory list of the available safety gears and its place is required to be furnished on monthly basis to the project owner.
- e. In case of any lapse of the adherence to practice of the safety to same project owner shall have right to stop their work at site.
- f. The contractor's EHS officer shall execute / practice the muck drill as per Emergency preparedness / response plan to the site

specific job allocation and the same shall be submitted to Project Owner.

- g. In case of any eventuality the contractor's safety officer shall inform the site engineer and EHS In-charge of Project Owner as a matter of first information.
- h. The event is required to be recorded in the accident reporting format.
- i. Such reporting shall be investigated jointly with Project Owner authorized personnel/committee. The inability to adhere to any safety requirement shall be recommended to the authority for appropriate action and cancellation of work.
- j. Various offense in violation of safety requirement are categorized below with penal clauses and fine.

Sr. No.	Type of Offense	Category	Penal Clause	Remarks
1	Not Wearing Helmets/Safety shoes/ Welding goggles / Shield / Apron / Safety Goggles / Hand Gloves	A	<u>First Offence</u> - Warning Note <u>Second Offence</u> - Warning Note and a Fine of BD TK.500/- <u>Third Offence</u> - Warning Note and a fine of BD TK 1000/- <u>Fourth Offence</u> - Note of recommendation of the concerned workmen / supervisors for termination of his job.	<u>Authority to execute:</u> Recommendation of Safety In Charge and the concerned site engineer of Project Owner. <u>Approving authority:</u> Construction Manager
2	A. Full body Harness/ Safety Belts / Any Other life saving safety gear B. Electrical Gloves / Electrical Safety Shoes	B	<u>First Offence</u> - Warning Note & Fine of BD TK 1000/- <u>Second Offence</u> - Warning Note for dismissal and a Fine of BD TK 2000/- <u>Third Offence</u> - Action for the concerned workman/ supervisor for termination of his job and a fine of BD TK 3000/- <u>First Offence</u> - Warning Note & Fine of BD TK.500/- <u>Second Offence</u> - Warning Note for dismissal and a Fine of BD TK 1000/- <u>Third Offence</u> - Warning Note for dismissal and a fine of BD TK.2000/- <u>Fourth Offence</u> - Action for the concerned workman/ supervisor for termination of his job and a fine of BD TK.3000/-.	<u>Authority to execute:</u> Recommendation of Safety In Charge and the concerned site engineer of Project Owner. <u>Approving authority:</u> Construction Manager

Sr. No.	Type of Offense	Category	Penal Clause	Remarks
3	Non Use of Safety Net / Unsafe working which may tend to fatal events	C	<u>First Offence</u> - Warning Note & Fine of BD TK.3000/- <u>Second Offence</u> - Action for the concerned workmen/ supervisors for termination of his job and fine of BD TK.5000/-.	<u>Authority to execute:</u> Recommendation of Safety In Charge and the concerned site engineer of Project Owner. <u>Approving authority:</u> Construction Manager

Safety during Welding, Cutting and Stone Breaking

Those engaged in welding and cutting works shall be provided with protective face and eye shields, and gloves, etc.

The Contractors / vendors engaged for the construction / erection / commissioning purpose are permitted to use Industrial LPG cylinders for cutting purpose.

Safety during Painting / Pipe Coating Works

In no case the contractor shall not employ workers below the age of 18 years and in particular no women should be deployed in to the work of painting or products containing lead in any form. Wherever there is painting work the following precautions should be taken.

1. No paint containing lead product in powder form except in the form of paste or readymade paint to be used.
2. Suitable face masks shall be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped'
3. Overalls shall be supplied by the Contractor to workmen and adequate facilities shall be provided to enable the working painters to wash during and on cessation of work.

Use of Hoisting Equipment

1. Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards or conditions:
 - a. These shall be of good mechanical construction, sound materials and adequate strength and free from patent defect and shall be kept in good condition and in good working order.

- b. Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.
- c. Every crane driver or hoisting appliance operator shall be properly qualified and adequately experienced. No inexperienced person should be in charge of any hoisting machine including any scaffolding winch or giving signals to the operator.
- d. In case of hoisting machine and of chain ring hook, shackle swivel and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load and the conditions under which it is applicable. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.
- e. In case of departmental machine, the safe working load shall be notified by the Construction Manager / his authorized representative. As regards Contractors machines, the Contractor shall notify the safe working load of the machine to the Construction Manager, where ever he brings any machinery to site of work and get it verified by the Safety I/C concerned.
- f. The tools, tackles, lifting and hoist to be used by the contractors are required to be tested for its suitability and certified by a third party competent safety personnel as per factories Acts / Rules etc.. All such copies are required to be submitted to Construction Manager of Project Owner for further verification and record.

Safety during Electrical Works

- 1. The electrical safety is the most vulnerable because of its typicality, required to be attended with specific safety gears like; safety shoes with out steel toes tested for 11/33 kv, Hand gloves tested for 11/33kv (IS 4770).
- 2. If any equipment, machinery or materials to be used or supplied or methods or processes to be practiced or employed in the performance of this Contract is/are covered by a patent under which Contractor is not licensed. Contractor shall before supplying or using the equipment, machinery, materials, methods or process as the case may be, obtain such license (s) and pay such royalty (ies) and license fee (s) as may be necessary in connection with the performance of this Contract. In the event that the Contractor fails to pay such royalty or obtain such license, the Contractor will defend at his own expense any suit for infringement of patent which is brought against the Contractor

or the Owner as a result of the failure, and shall pay any damages and costs awarded in such suit and will keep Owner indemnified from and against all other consequences thereof.

3. A PTW (including confined space, isolation) system should be in place for working in any live installation and other places as applicable. Such records are required to be maintained and produced as and when required by the project owner.

Safety during Working at Heights

1. Provide adequate area lighting at appropriate height.
2. The ladders / monkey ladders are to be as per IS: 3696(Part 2) or equivalent Bangladesh Standard for a safe working.
3. Safe means of access shall be provided to all working platforms and other working place. Every ladder shall be securely fixed. No portable single ladder shall be over 30 feet in length while the width between the side rails in rung ladder shall in no case be less than 11feet 5 inches for ladder up to and including 10feet in length for longer ladders this width would be increased at least ¼" for each additional foot of length. Un-inform step spacing shall not exceed 12". Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the site of work shall be so stacked or placed as to cause danger or inconvenience to any person or public. The Contractor shall also provide all necessary fencing and lights to protect the workers and staff from accidents, and shall be bound to bear the expenses of defense of every suit, action or other proceedings, as law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay damages and costs which may be awarded in any such suit or action or proceedings to any such person, or which may with the consent of the Contractor be paid to compromise any claim by any such person.
4. The contractors those who will be working at height shall have to arrange for Fall Arrestor (CE Approved) and fix it at definite height in consultation with Safety personnel of Project Owner.
5. The contractor at his own cost shall be responsible for putting safety protection barriers, warning signals and posting the safety flag man at desired locations.
6. Contractor shall erect and maintain barricades required in connection with his operation to guard or protect:-
 - (i) Excavation
 - (ii) Hoisting areas
 - (iii) Areas adjudged hazardous by Contractor's or Project Owner's Safety I/c, including storage of hazardous material
 - (iv) Project Owner's existing property liable to damage by contractor's operations, in the opinion of Construction Manager / Site Engineer / Safety In Charge.

(v) Material Unloading spots.

7. Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 3'. This will also be marked with "Danger" sign boards.
8. Contractor's employees and those of its sub-contractors shall become acquainted with barricading practice and shall respect the provisions thereof to ensure safe work practices.
9. Barricades and hazardous areas adjacent to but not located in normal routes of travel shall be marked by red flasher lanterns at nights.

Safety during working with Scaffolding

1. Suitable scaffolding shall be provided for all works that cannot safely be done from the ground or from solid construction except such short period work as can be done safely from ladders. When a ladder is used, an extra person shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and handholds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1 in 4 (1horizontal 4 vertical).
2. Scaffolding or staging more than 12 numbers above the ground or floor, swing or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise rewarded at least 3' high above the floor or platform of scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
3. Working platform, gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform or the gangway or the stairway is more than 12', above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened.
4. Prior to start of work the contractors shall submit method statements for approval of PMC/Safety personnel. Contractor to commence works only after receipt of approved method statements.
5. The contractor shall provide camera to its EHS personnel, so that any unsafe acts are captured in photos and analyzed on review.

Safety during Excavation & Trenching

1. All trenches 4feet or more in depth, shall at all times be supplied with at least one ladder for each 10 feet length or fraction thereof.
2. Vertical cutting of soil shall be avoided, instead slopes, as approved by PMC shall be done.

3. Ladder shall be extended from bottom of the trench to at least 3'3" above the surface of the ground. The site of the trenches which is 5' or more in depth shall be stepped back to give suitable slope, or securely held by timber bracing, so as to avoid the danger of sides to collapse. The excavated material shall not be placed within 5' of the edge of the trench or half of trench depth whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting to be done.
4. Cross-over bridges/planks should be provided for movement of personnel. Under no circumstances jumping across the trenches should be permitted.

Safety and Information Signs

1. The Contractor shall provide a full set of safety and information signs at temporary facilities which will have:
 - Identify escape routes from buildings
 - Give directions to different camp facilities
 - Identify buildings
 - Give hazard, fire, prohibitive and advisory warnings
 - Identify Company offices
 - Identify Contractors offices
 - Identifies the camp, the Company, the Contractor and other agreed parties, from the roadside
 - Identifies emergency response assembly areas, emergency and medical instructions and contacts.
 - All information and warning signs shall be in English, local languages.
 - Emergency Contact No.'s, Fire, Security, Medical
 - Ambulance Points & Emergency vehicle rendezvous points
 - Public address system usage

Communications

- The Contractor shall provide all temporary communication services and facilities to its Project working site
- Mobile, intrinsically safe radios, antenna mast and all supporting software and hardware
- Mobile telephone system including any local transmitter/receiver antenna

Lifting and Transportation in Marine Work

- 1) Company anticipates that the majority of Contractor project materials will be delivered by sea freight to Chittagong Port; delivery from Chittagong Port to the WORK Site will be by sea transport. Contractor

shall be required to make a RORO jetty close to the Site to offload the consignments and bring those at site.

- 2) Contractor will note that there will not be a marine jetty available at the WORK Site for the receipt of materials delivered by sea freight.
- 3) The contractor will deploy adequate number of barges/pontoons with adequate capacity for safe working of personnel and movement of T&Ps.
- 4) Major equipment and prefabricated items greater than 40 tonnes in weight or out of gauge size (4m x 4m cross section) will require detailed lifting and/or transport studies to be carried out by Contractor; Company will review these studies.
- 5) Civil and other works will be carried out or utilities diverted by Contractor, if required, to facilitate its transportation requirements.
- 6) Transport route survey should be conducted by the Contractor before bid submission to determine maximum allowable weight and size.
- 7) Contractor will develop lifting strategies and plans to maximize schedule opportunities without compromising the project HSE and quality requirements; these strategies and plans will be submitted to Company for review.
- 8) All heavy lift cranes will only be used in configurations recommended by the crane manufacturers. All crane capacities are to be within the published equipment chart capacities for the crane in the configuration being used for the lift and in compliance to applicable codes and industry practices.
- 9) Full certification for all cranes, rigging tackle, etc will be required for inspection prior to use at the WORK Site.
- 10) Rigging studies will be carried out for all key items of equipment and be subject to approval by experienced and qualified lifting engineers.

Insulation of Equipment and Piping

- Company preference for the manufacture of bulk insulation material is that it be carried out off-site and that Contractor maximises the insulation and pre-dressing of equipment and piping off-site such that in-situ insulation is minimised.
- This Plan will reduce the full extent of scaffold requirement, Subcontractor interface, reduce safety risk and maintain a high level of quality control.

- Any pre-dressed pipe-work will have to be lifted using lifting frames designed for such usage; Company will review the design of all such lifting frames.
- Contractor cold pre-insulation fabrication shop will be air-conditioned to ensure polyurethane foam spraying quality.
- Contractor should display adequate numbers of safety posters and banners in the work site.

1.3.6 *Safety During Demolition of Construction Arrangements*

1. Before any demolition work is commenced and also during the process of the work all roads and open area adjacent to the work site shall either be closed or suitably protected with proper warning signs.
2. No electric cable or apparatus which is liable to be a source of danger over a cable or as apparatus used by the operator shall remain electrically charged in such areas.
3. All practical steps shall be taken to prevent danger to persons employed, from risk of fire or explosion or flooding. No floor or other part of the building shall be so overloaded with debris or material as to render it unsafe.
4. When the work is done near any place where there is a risk of drowning, all necessary safety equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work. One person must be kept to keep watch on safety of personnel working.

General

1. All vehicles plying for construction purpose will observe restricted speed of 15kms/h.
2. Wearing of the safety helmets shall follow the color coding as per the table in Sr.No.16.
3. Contractor shall adhere to safe construction practice and guard against hazardous and unsafe working conditions and shall comply with Owner's safety rules set forth herein and as brought out from time to time.
4. To ensure effective enforcement of the rules and regulation relating to safety arrangements made by the Contractor shall be open to inspection by the Construction Manager / his representative at any working hours.
5. The works throughout including any temporary works shall be carried on in such a manner as not to interfere in any way whatsoever with the traffic on any roads or footpaths, at the site or in the vicinity there to or any existing works whether the property of project owner or of a third party.

6. In addition to the above, the Contractor shall abide by the HSE codes/ provision as per Factories / Environmental Protection Acts / Rules/ Regulations/ Stipulations/ Guidelines / Notifications of Bangladesh / State and Safe working code framed from time to time.
7. The Contractor shall also arrange to obtain valid gate passes for his men and equipment from the concerned authorities of Project Proponent.
8. No man/material/equipment not covered by valid passes shall be permitted within the Project area and no material/equipment shall be permitted to be taken out of the Project area, unless authorized by the concerned authorities of the Project.
9. The Contractor shall be held fully responsible for any or all delays/losses/damages that may result consequent on any lapses that may occur on the part of his-sub-contractors/employees in this regard.
10. A weekly EHS coordination meeting will be conducted at site by Safety Personnel of Owner group with different contractors along with concerned HODs as per schedule to be circulated by EHS Personnel of Owner.
11. There will be a EHS coordination meeting at site every fortnight of each month constituting all the contractors in charges, their authorized representatives, representatives of Project Owner, which will be chaired by the Construction Manager.
12. The entire MOM in this regard shall be issued to the contractors for execution after approving the same from Construction Manager.
13. Any problem related to the implementation of EHS norms can be discussed with Project Owner site management responsible for EHS activity at given point of time.
14. The Contractor shall submit a monthly compliance report of the above mentioned clauses to Project authority, failing which Contractor will be responsible for the disciplinary action to be initiated against him.
15. Notwithstanding the above Clauses, there is nothing in these to exempt the Contractor from the operations of any other Act or rules in force in the Republic of Bangladesh towards satisfactory implementation of EHS norms.

Color coding for wearing the safety helmets at Site

SN	Colour of Helmets	Who will wear	Remark
1.	YELLOW	Labourers / Workers	Logo / Name of the Company / Contractor at the back side of the Helmet
2.	RED	Security / Contractors / Employees Of Contractor	Logo / Name of the Company / Contractor at the back side of the Helmet
3.	GREEN	EHS In Charge / Safety In Charge & Safety Staff/	Logo of Reliance Owner Company at the back side of the Helmet
4.	SKY BLUE	All Executives / Supervisors of REL	Logo of Reliance Owner Company at the back side of the Helmet
5.	WHITE	VISITORS	Logo of Reliance Owner Company at the front side of the visitors Helmet

1.4 LIST OF APPLICABLE ACTS, RULES & REGULATIONS AND GUIDELINES FOR THE PROJECT

1.4.1 Acts, Rules and Regulations

1. Bangladesh Building Construction Act, 1952
2. Bangladesh Dangerous Cargoes Act, 1953 (Act No. V of 1953)
3. Bangladesh Dangerous Cargoes Act, 1953
4. Bangladesh Environment Court Act, 2010
5. Bangladesh Environmental Conservation Act, 1995
6. Bangladesh Environmental Conservation Rules, 1997
7. Bangladesh Explosive Substances Act, 1908
8. Bangladesh Explosives Act, 1884
9. Bangladesh Fatal Accidents Act 1855
10. Bangladesh Fire Prevention and Protection Act, 2003
11. Bangladesh Forests Act, 1927
12. Bangladesh Labour Act, 2006
13. Bangladesh Mining Settlements Act, 1912
14. Bangladesh Smoke Nuisances Act, 1905
15. Bangladesh Standards

Guidelines

16. Notes on Compensation for Workplace deaths and injuries for Bangladesh
17. Asian Development Bank's Safeguard Statement Policy, 2009
18. Environmental & Social Impact Assessment for LNG Terminal at Kutubdia Island, September 2009, Bangladesh
19. Where in the contractor can access all the documents from Sr. 1 till Sr. No. 17 through internet, the document in Serial No. 18 will be available for reference in Project Owner's Office at construction site (Kutabdia / Narayanganj) or in its Head office at Dhaka.