Environmental Monitoring Report

Project No. 47101-004
Semi-Annual
January 2022

India: Assam Power Sector Investment Program - Tranche 3

PART A

Prepared by the Assam Power Generation Corporation Limited (APGCL) for the Asian Development Bank.

This environmental monitoring report is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

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Environmental Monitoring Report
(as of 31st December 2021)

Loan Number 4029-IND

Assam Power Sector Investment Program – Project-3

Reporting Period : from July, 2021 to December, 2021

Loan Signing Date : 30th December 2020

Prepared by the Assam Power Generation Corporation Limited (APGCL) for the Asian Development Bank

This environmental monitoring report is a document of the borrower and made publicly available in accordance with ADB's Access to Information Policy 2018 and the Safeguard Policy Statement

2009. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff.

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AEGCL	Assam Electricity Grid Corporation Limited
APDCL	Assam Power Distribution Company Limited
APGCL	Assam Power Generation Corporation Limited
CPCB	Central Pollution Control Board
CTE	Consent to Establish
CTO	Consent to Operate
DC	Double Circuit
EA	Project Executing Agency
EARF	Environmental Assessment and Review Framework
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GOI	Government of India
IEE	Initial Environment Examination
MPH	Main Power House
PAM	Project Administration Manual
PCBA	Pollution Control Board of Assam
PMU	Project Management Unit
SPS	Safeguard Policy Statement
TL	Transmission Line

Glossary of Terms

Environmental Safeguards – means the principles and requirements set forth in Chapter V, Appendix 1 and Appendix 4 (as applicable) of the SPS.

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EXECUTIVE SUMMARY

Project Name : Assam Power Sector Investment Program – Project-3	
Executing Agency	Government of Assam acting through Assam Power Generation Corporation Limited (APGCL)
Implementing Agency	Assam Power Generation Corporation Limited (APGCL)
Environment Safeguards Categorization	A
Environment Safeguards Documentation	EARF - 2013, EIA - 2018, EMP - 2018 (EIA, EMP being updated)
	EIA was also prepared and disclosed in the MoEF&CC, GOI website for the LKHEP in connection with the Environment Clearance for the project. Initially prepared in March 2017 and finally submitted to MoEF&CC in July 2019. On the basis of that Environment Clearance was accorded to the project vide letter No. J-12011/26/2012-IA-I dated 4th September, 2019. The disclosed EIA (June 2018) in the ADB's website was prepared on the base document of the EIA and EMP prepared by WAPCOS. As both the Ministry and ADB have different GENERIC STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSENT both the reports were structurally different. But the basic assessment and information provided in the EIA report were the same. Additionally as per ADB's requirement supplementary EIA were carried out in the year 2017 by ES Safeguards consultants.
Project Stage Obtained	Construction
Detailed Design Required Post-Approval	Yes. It is EPC mode of contract. Currently Package 2 (Civil and Hydromechanical) and Package 3 - Electro Mechanical are awarded. Other packages for which detail design required post approval are : Package 1 – Building and Infrastructures works Package 4 – Transmission line
Contract(s) Awarded	Yes. Package 2 (Civil and Hydromechanical) & Package 3 - Electro Mechanical awarded
Bidding Document(s) Include EMP Cleared by ADB	Yes. Bidding document of Package 2 (Civil and Hydromechanical) includes relevant sections of the EMP cleared by ADB. Package 3 Electro mechanical EMP cleared by ADB. Package 4 – Transmission line EMP cleared by ADB. Entire EMP approved by ADB was incorporated in the tender. The sections relevant to Hydro mechanical works were incorporated in the package 2 contract and sections relevant to Electro Mechanical works were incorporated in the Package 3.
Contract(s) Awarded Include EMP Cleared by ADB	Yes. Contract document of Package 2 (Civil and Hydromechanical) and Package 3 (Electro mechanical)

<table>
<tr><td></td><td>includes relevant sections of the EMP cleared by ADB. Both the contracts were awarded. In Package 3 clause no 46.4 under Section 8- Special Conditions of Contract stipulates The contractor shall comply with all applicable national, provincial and local environmental laws and regulations. The contractor shall comply with (i) the measures and requirements set forth in the Initial Environment Examination and the Environment Management Plan …… The Contractor shall allocate a budget for the compliance with these measures requirements and actions.
Package 2 EMP attached with tender in Annexure 12 and Package 3 EMP attached with Tender in Annexure 13.</td></tr>
<tr><td>National Environment, Health and Safety Clearance(s) Obtained</td><td>All clearances/permits required for the project have been obtained like Environment Clearance, Forest Clearance Stage II, Ministry of Defense, Ministry of Home Affairs, Central Electric Authority, Ministry of Tribal Affairs, etc.
Contractor have the Labour License, CTO for Batching Plant, Crusher, Clearances from PESO for establishment of Explosive Magazine, etc.
Application submitted for ground water abstraction – mentioned in Page No 27, and 61.</td></tr>
<tr><td>Contractor(s) Given Access to Site</td><td>Yes. Contractor given access on 20th November 2020 for package 2.

<table><tr><th>Date of handover</th><th>Description of the land</th></tr><tr><td>20th Nov’20</td><td>Approx. 37 Hectare revenue land -1 handed over to Contractor.</td></tr><tr><td>20th Nov’20</td><td>Approx. 63.2 Hectare revenue land -2 handed over to Contractor.</td></tr><tr><td>2nd Jan’21</td><td>Approx. 150 Hectare revenue land handed over to Contractor.</td></tr><tr><td>11th Jun’21</td><td>477.76 Hectare, diverted forest land handed over to Contractor.</td></tr><tr><td>03rd Jul’21</td><td>45.28 Hectare, diverted reserved forest land handed over to Contractor.</td></tr><tr><td colspan="2">Total 773.24 Ha land was handed over by the end of December 2021 which is 49.03 % of the total land. All the construction activities of Package 2 and Package 3 will be concentrated within this area only. This figure of 773.24 Ha is excluding the submergence area in Dima Hasao and Karbi Anglong district in Revenue Land.</td></tr></table></td></tr>
<tr><td>Construction Progress (%)</td><td>Physical & Financial Progress : Package wise
<table><tr><th>Sl.</th><th>Package Details</th><th>Physical Progress</th><th>Financial Progress</th></tr><tr><td>1</td><td>Civil & Hydro Mechanical</td><td>23 %</td><td>10.18 %</td></tr></table></td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>2</td><td>Electro Mechanical</td><td>1 %</td><td>10 %</td></tr>
</table>
</td></tr>
<tr><td>Unanticipated Impacts including Change of Scope or Design</td><td>As per Forest Advisory Committee's (MoEF&CC) suggestion the miscellaneous area and Muck disposal site has been shifted from Forest Land to Revenue Land.
EPC contractor of Package 2 selected 4 additional dumping ground in Revenue land. For these unanticipated impacts EIA update is required (and is in progress).</td></tr>
<tr><td>Number of Site Inspections and Audits Undertaken by Environment Safeguards Staff in Reporting Period</td><td>9 nos of site inspection of all the components were carried out. Day to day monitoring on EHS were carried out by site staffs of PMC and APGCL and reported to Environment Safeguard team of PMC and APGCL.
During joint site inspections Environment Specialist of PMC and Environment Expert of APGCL participated along with Environment engineer of contractor.
Joint Site inspections were carried out on 21st July, 16th August, 9th September, 20th September, 4th October, 22nd October, 15th November, 20th December, 29th December 2021. Training were also given by Contractor to their staff on EHS. Details in Table 9.B of the Report.</td></tr>
<tr><td>Corrective Action Required</td><td>Corrective actions as per ADB Aide Memoire for the ADB Mission 13th – 17th December 2021 in Table 7A, 7B. All the corrective actions suggested by ADB were not completed and the details of the actions are mentioned in Table 7B.</td></tr>
<tr><td>Outstanding Corrective Action this Reporting Period
Non-Compliances Recorded this Reporting Period
Corrective Action Required</td><td>Environment Safeguards – Corrective Action Plan as given in the PMC MPR for December, 2021.
<table>
<tr><th>S No</th><th>Points Discussed</th><th>Completion Date</th></tr>
<tr><td>1</td><td>River crossing – will be covered following the best practices to safeguard the river ecology – agreed by contractor</td><td>Immediate</td></tr>
<tr><td>2</td><td>Night blasting – application submitted to Deputy Commissioner Dima Hasao for permission</td><td></td></tr>
<tr><td>3</td><td>Batching Plant- Sedimentation tank to be constructed. But as per CTO wastewater also to be treated before disposal complying the standards.</td><td>Sedimentation tank by 15th Jan'22.</td></tr>
<tr><td>4</td><td>Batching Plant – Labour shed and toilet to be constructed.</td><td>15th Jan'22</td></tr>
<tr><td>5</td><td>Royalty submission copies to be submitted.</td><td>30th Dec'21</td></tr>
<tr><td>6</td><td>Drinking water quality test report to be submitted</td><td>26th Dec'21</td></tr>
</table>
</td></tr>
</table>

	7	Weekly test of the drinking water to be carried out (only pH)	Will be initiated from 20th Jan'22
	8	pH of dam site and powerhouse will be carried out weekly and reported in the MER	Will be initiated from 20th Jan'22
	9	Muck management Plan will be prepared as per drawing submitted by PMC after joint survey at site.	15th Jan'22.
	10	Blasting permits to be submitted of Alberin Explotech Private Limited	30th Dec'21
	11	Ear plugs, whistles to be provided to all the tunnel workers	31st Dec'21
	12	Solid wastes management site to be developed at PR7 and explore the possibility of sending wastes to Umrangso or other site after segregation.	15th Jan'22
	13	Shade for storage of chemicals to be developed.	25th Jan22
	14	Final Layout Plan of APGCL/ PMC colony and workers to be submitted immediately.	7th Jan'22
	15	Sand quarry – It is expected that after washing the crusher dust required specific gravity will be attained. If not as a precautionary measure L&T to apply for the river sand quarry.	25th Jan'22
	16	Reflective tapes to be fixed on the unsafe roads at adit.	7th Jan'22
	17	Expansion in front of the Dam Batching plant to be stopped. Plan to be submitted (with coordinates) before execution of the works in the forest diverted land.	7th Jan'22
	18	Copy of renewal application of the labour license to be submitted for record.	31st Dec'21.
	19	Contact No and email address of all support staff responsible for implementation of EMP to be provided and updated in the MER.	31st Dec'21.
	20	Conditions of the clearances to be adhered and if followed differently justification to be given. i.e. Boundary wall of the explosive magazine.	Earthen mud bund will be prepared instead of wall.
	21	Red dust bin to be replaced by Blue and Green bins at all the kitchens.	31st Dec'21.

	22	Fires extinguishers to be placed in front of the kitchen of APGCL/ PMC campus.	31st Dec'21.
	23	Sediments to be cleared from the DT outlet side drain and Adit tunnel side drains and it is to be regularly cleared.	31st Dec'21.
	24	Safety barriers to be checked regularly.	
	25	Stack height of the 2nd compressor at Adit to be increased.	10th Jan'22.
	26	PUC of the vehicles to be renewed and the revised table of all the vehicles to be submitted in the next MER.	
	27	Safety plan and security plan to be combined and EMP provisions must be kept and submitted to APGCL for approval.	31st Dec'21.
	28	Quarry NOC for aggregates is still pending with North Cachar Hills Autonomous Council.	Pending

Number of Health and Safety Incidents

COVID 19 incidents :

Month	COVID 19 +ve	Recovered
July 2021	-	-
August 2021	1	-
September 2021	3	3 +1
October 2021	-	-
November 2021	-	-
December 2021	-	-
July – Dec Total	4	4

COVID vaccination status of the staff and workers given in page 26-35 in the Monthly Safety Report of Dec 2021.

Other incidents :

Month	Non-Work Related Incident	First Aid Cases	Near Miss Reports
July 2021	0	1	1
August 2021	1	1	0
September 2021	0	1	1
October 2021	0	2	1
November 2021	0	1	1
December 2021	0	1	0
July – Dec Total	1	7	4

GRM Functional

Yes.
Project GRM is a three-tier system approved by Government of Assam. Grievances were on land compensation issues. No grievances were on environment, Health and Safety.

	Contractors own GRM is also there to address contractor's staff and labour grievances.
Number of Unresolved Grievances from Prior Reporting Period	Nil related to environment Health and Safety.
Number of Grievances Received in Reporting Period	Nil related to environment Health and Safety.
Number of Grievances Resolved this Reporting Period	NA
Number of Grievances Still Outstanding	NA
Number of Grievances referred to Court of Law	Nil
Number of Grievances referred to the Accountability Mechanism	Nil

Note : Supplementary environmental assessment studies (CIA, WQRP, WRMP) carried out during project preparation are part of the June 2018 EIA as disclosed on the ADB website.

1.0 Introduction

1.1 Brief Project Description

Government of Assam is the Executing Agency for the Assam Power Sector Investment Program – Project-3 and acting through Assam Power Generation Corporation Limited (APGCL). The Assam Power Generation Corporation Limited and its Project Management Unit are wholly responsible for the implementation of ADB-financed projects, as agreed jointly between the borrower and ADB, and in accordance with the policies and procedures of the government and ADB. ADB staff is responsible for supporting implementation including compliance by Assam Power Generation Corporation Limited and its Project Management Unit of their obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

The objective of the project is to increase generation from clean energy sources in the State of Assam. The project shall comprise of the following :

Output 1 : Lower Kopili hydropower generation capacity expanded through the construction and commissioning of the 120 megawatt (MW) Lower Kopili Hydroelectric Project and its connection to the transmission grid. This comprises 2 units of 55 MW main powerhouse, 2 units of 2.5 MW and 1 unit of 5 MW auxiliary powerhouse.

Output 2 : Institutional capacity of APGCL strengthened. Through capacity building on construction, operations and maintenance and safeguards for 30 staff (including 6 women).

Output 3 : Resource Management and community resilience initiatives implemented. Through (i) installation of sensors and monitoring equipment. (ii) development of dashboards for state and local government agencies for resource management and (iii) development of plans and training for at least 500 people (including 40% women) along the Kopili River basin for increased capacity for managing disaster.

The Project's impact will be aligned with increased availability of electricity in Assam. The outcome of the project will be increased capacity of energy generation in Assam, where electricity generation will be increased by 469 gigawatt-hour/year (GWh/year). Greenhouse gas generation from electricity generation will decrease by 360,000 tCO2/year from 2024 onwards.

The dam proposed to be built at Longku (Figure-1) will be a concrete gravity dam, of height 65 m and top longitudinal cross section 335 m. The crest of the dam will be 229 m above mean sea level (MSL). The dam will create a reservoir at Longku with a spread of 620 hectares (ha), with live storage of 77 million cubic meter. A tunnel will be excavated to deliver the water from the reservoir to the main power plant. Water from the intake to the main power plant enters the tunnel of diameter 7.0 meter on the right bank of the Kopili river. This tunnel will be 3.641 kilometer (km) long. At the end of this low-pressure tunnel, water will enter the pressure shaft. The pressure shaft will be circular of 6.1 m diameter (UG section, 462m); Surface backfill 6.1m diameter (159m); Inclined surface 5.2 m diameter (89m), steel lined. The pressure shaft will deliver water to two steel penstocks each of length of about 60 m, which in turn would convey water to the turbines. Water to the auxiliary power plant will be taken directly along a steel-lined circular pressure shaft of diameter 2.7 m and of length 70 m, and delivered to the turbine through three steel penstocks, each

about 30 m long. The designed discharge capacity is 112.7 cubic meter per second (m/s), at a flow velocity of 3.13 m/s.

The power evacuation system, an essential component of LKHEP, will be used to evacuate power it generates into the National / local grid. The power evacuation system will include the construction of a 220 kV Double Circuit (DC) transmission line (TL) from the Main Power House (MPH) site of LKHEP to an existing 132/33 kV Substation (S/S) at Sankardev Nagar (Lanka) and the construction of a 33 kV Single Circuit (SC) TL from the Auxiliary Power House (APH) site of LKHEP to an existing 132/33 kV S/S at Umrangsu. The length of TL between the MPH to Sankardev Nagar is 50 km, and between the APH to Umrangsu is 20 km. The TL corridors are envisaged to by-pass some villages / settlements and avoid forests (Figure 4).

The power evacuation system will also involve upgrading of an existing 132/33 kV S/S at Sankardev Nagar with the existing 2 power transformers of capacity 2x25 MVA to 220kV with 2 inter-connected transformers (ICT) of capacity 2 x 160 MVA. The relevant switchgear proposed type is a Gas Insulated Substation (GIS). There is no land acquisition associated with the transmission system activity, and no potential impacts on biodiversity are anticipated.

The Lower Kopili HEP (subproject) is classified as Environment Category A, Involuntary Resettlement (IR) Category A, and Indigenous Peoples (IP) Category A ("triple A") in accordance with ADB's Safeguard Policy Statement (SPS 2009). Additionally, based on the results of the climate change risk assessment, the subproject is High Risk for Multi-Hazard Index and Climate. To fulfill national regulatory requirements and ADB's SPS 2009, APGCL prepared an Environmental Impact Assessment (EIA) with environmental no-objection obtained from the Ministry of Environment, Forest and Climate Change of Government of India.

There is a change in layout since the EIA during the Forest Clearance process as per Forest Advisory Committee (FAC), MoEF&CC. The Figure 2 has been prepared as per FAC requirements and Figure 3 is the updated layout map as on 31.12.2021. So Figures 2 & 3 are updated layouts. As transmission line in on the Revenue Land, hence the figure 4 is not changed.

Figure 1: Project Location Map





Figure 2 :Project Layout Map

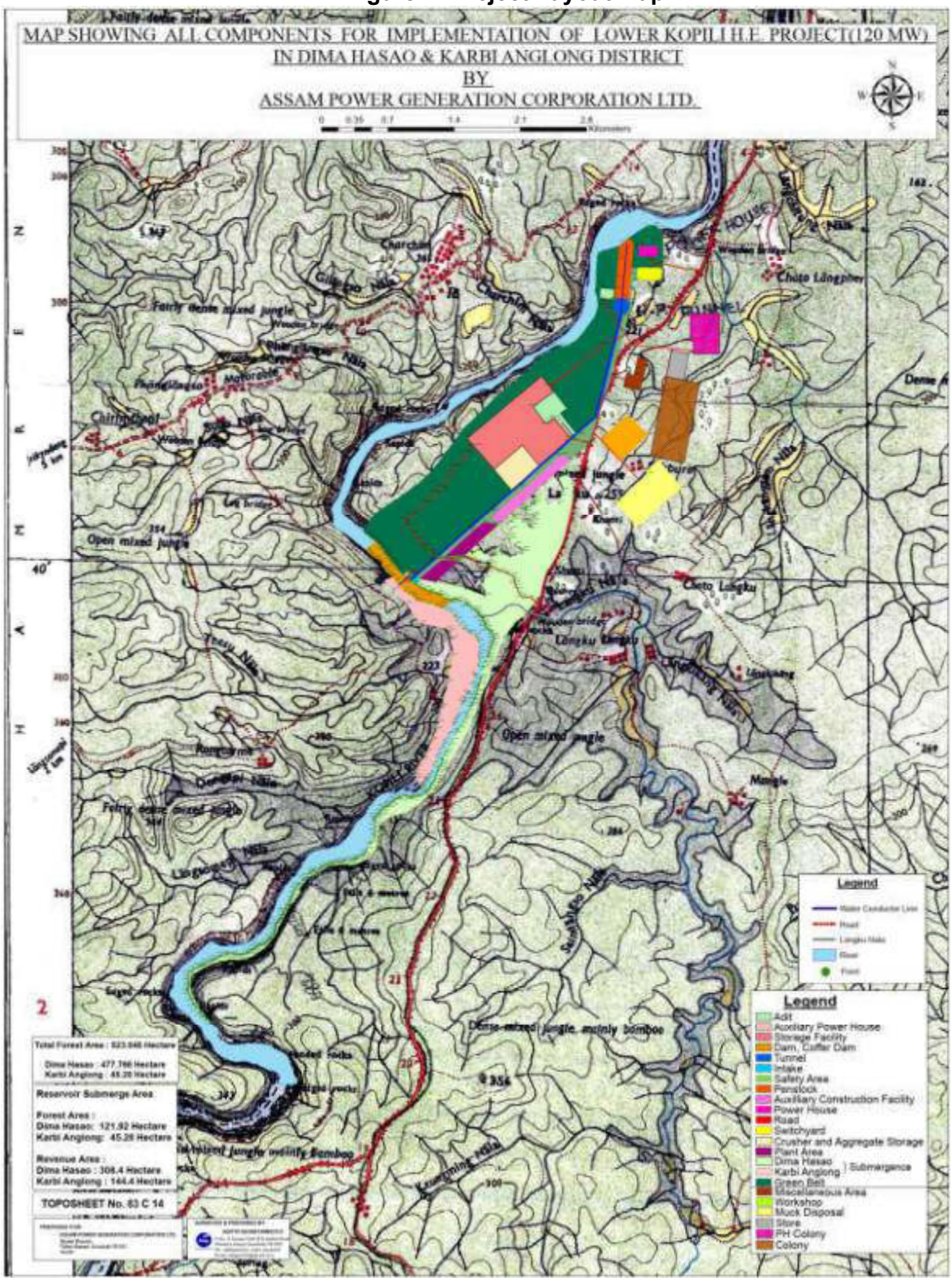


Figure -3 : Detail Layout Plan (as on 31.12.2021)

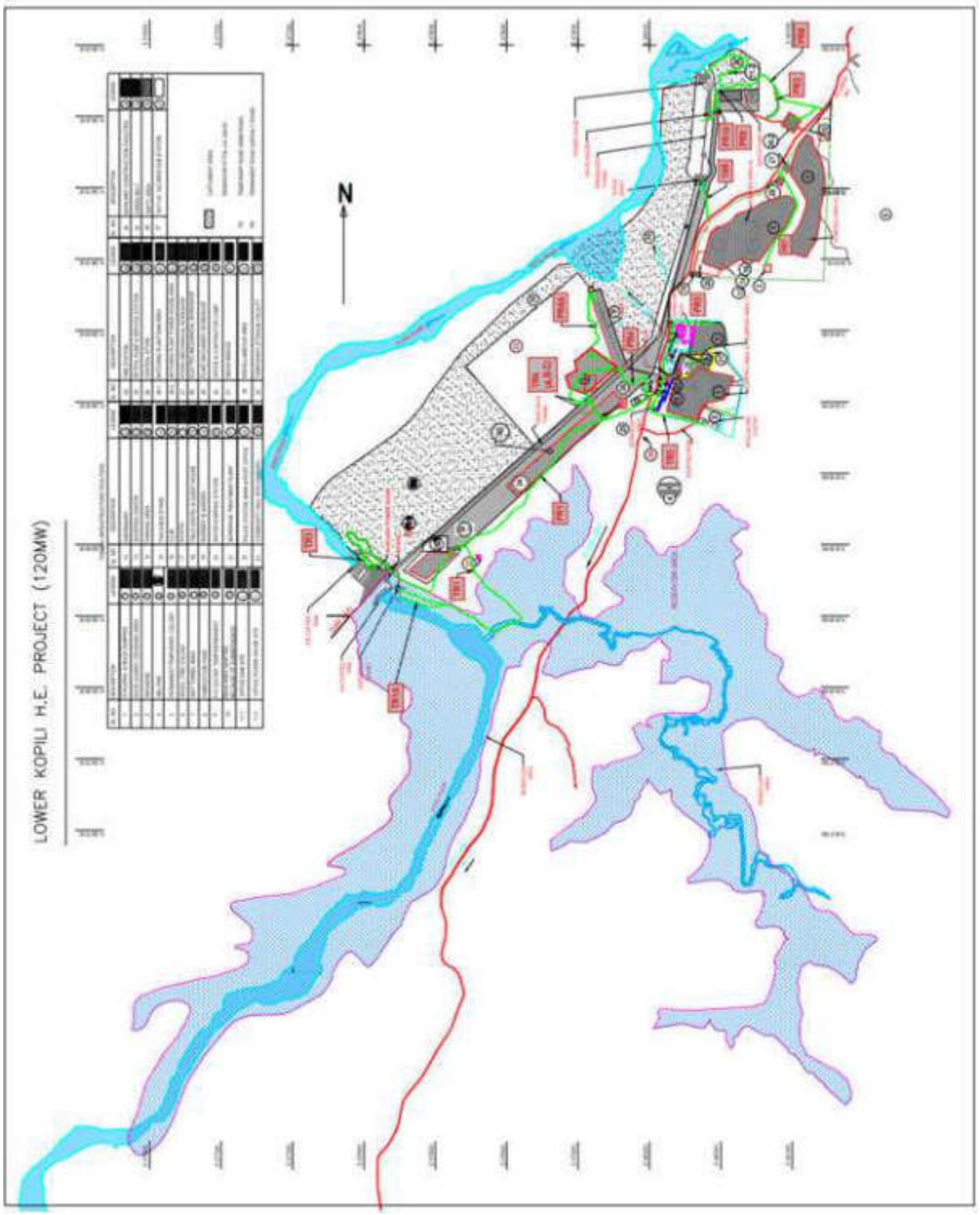


Figure 4 : Layout of Transmission line



The comprehensive environmental management plan (EMP) includes plans and programs for physical and biological mitigation for aquatic habitat, terrestrial fauna and flora, and hydrological impacts both upstream and downstream of the subproject as well as prescribes quality monitoring activities. As required by ADB's SPS 2009 and the Access to Information Policy 2018, draft EIA was disclosed in April 2018. As per GOI requirements EIA was also

approved by MoEF&CC and the EIA was disclosed in the Pollution Control Board of Assam site (http://pcbassam.org/EIAREPORT/EIA%20Report_APGCL/Draft%20EIA%20Report%20Lower%20%20Kopli.pdf). Summary EIA in English, Hindi and Assamese was disclosed in web site (https://ercindia.org.in/archive.ercindia.org.in/index.php/public-hearings-main?start=22). June 2018 EIA disclosed in the ADB site was uploaded in the APGCL web site (https://old.apgcl.org/EIA.pdf; https://old.apgcl.org/EIA%20annexures.pdf ; https://old.apgcl.org/EIA%20Transmission%20line.pdf) with all the supplementary EIA studies. Environment Clearance was accorded for the project on 4th September, 2019. As the project requires diversion of forest land stage 1 and stage 2 Forest Clearance was also accorded for the project on 5th February, 2019 and 4th December, 2020 respectively by MoEF&CC. APGCL will adhere to the EIA/EMP and will be responsible for timely implementation to ensure that all activities are in compliance with the applicable national and local policy, legal and administrative framework as well as ADB's SPS 2009.

A grievance redress mechanism (GRM) is established to deal with complaints on environmental and social issues in a timely manner and adequately publicized amongst the affected peoples.

Organogram of environmental safeguards staffing and relationships between executing and implementing agencies, consultants, contractors, subcontractors (Figure 5A, 5B). Contact details of Environment Safeguard team is given in the table 1.

Figure 5A : Organogram of environmental safeguards staffing

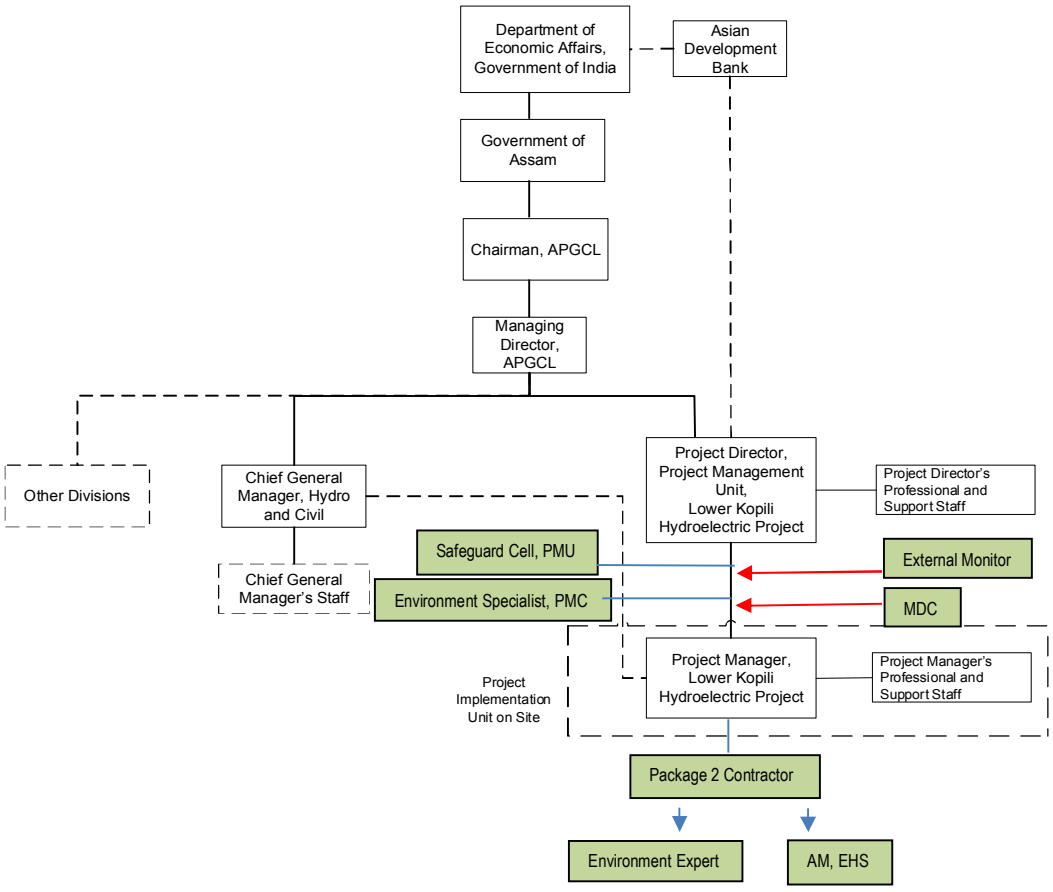


Figure 5B : Organogram of Package 2 Contractors Safeguard Team

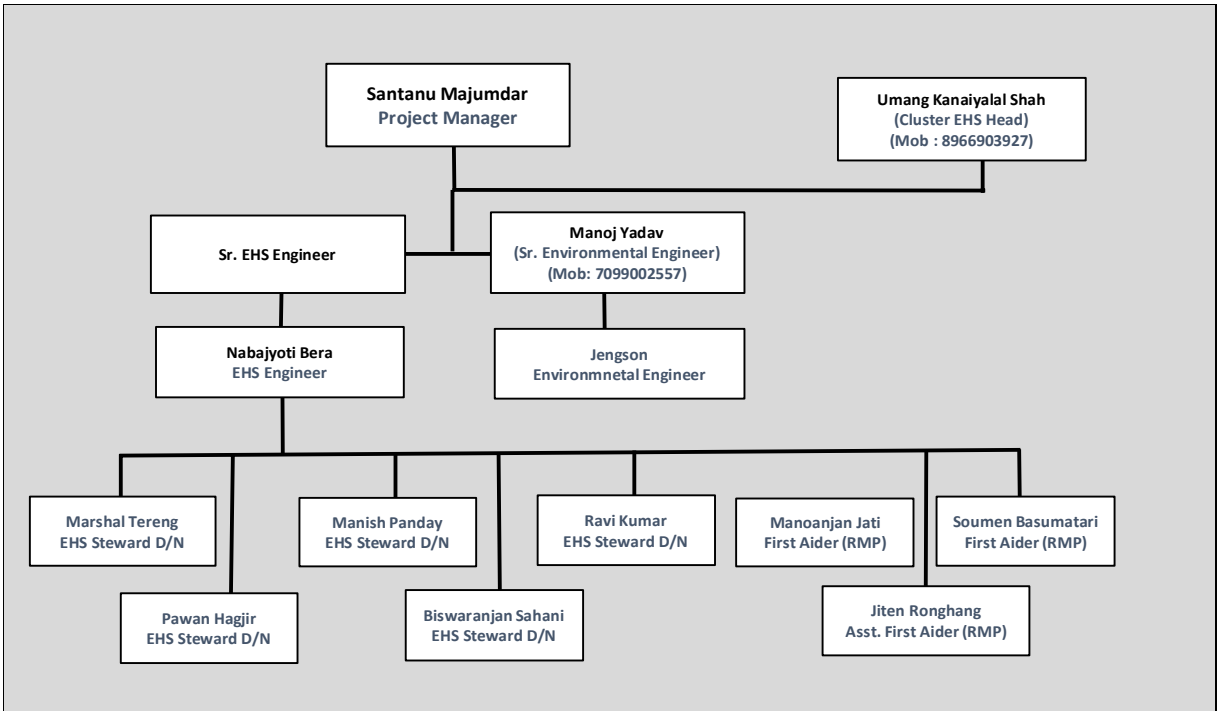


Table 1: Contact Details of the Environment Team under Project Director.

	Name	Contact no	Email Address
PMU	Dr Deepak Kumar Baruah	9435113521	deepakbaruah007@gmail.com
PMU, EHS	Mr. Dhiraj Borthakur	9435526416	
PMC	Dr Jayanta Das	9435406966	gibbonconservation@gmail.com
Contractor	Mr Manoj Yadav Environment Engineer L&T	7838013312	manojyadav@lntecc.com
	Mr. Naba Jyoti Bera Assistant Manager EHS L&T	7099002556	nabajyotibera@lntecc.com

(Note : Contract of External monitor signed and kick-off meeting was held on 28.12.21 at APGCL, Assam.)

Field level supervision are carried out by the Environment Engineer and Assistant Manager EHS of the contractor and they prepare monthly Environment Report and Monthly Safety Reports and submit it to APGCL. PMC environment specialist visit the sites and prepare field reports. PMC also carry out joint visit with APGCL environment expert, APGCL EHS Officer and monitor the compliances. Monthly reports submitted by the contractor and field information received from the PMC staff and APGCL staff on the EHS issues are regularly reviewed and necessary actions are being suggested for the compliance and proper implementation of EMP. Trainings are also given on the implementation of EMP, EHS

issues, Test of ambient environment for the contractor personal as well as APGCL and PMC staff.

Contractor carry out EHS inspection by EHS Engineer and supervision one per week; EHS inspection by Project EHS 2 per month and Executive EHS inspection 1 per month.

1.2 Project Progress Status and Implementation Schedule

Project progress status are shown in table 2.

Table 2 : Project Progress status

Project Component/Stage	Awarded on	Target Completion Date	Progress Status	Physical Progress	Remarks
• Contract award (Package 2) (Civil and Hydromechanical) (Construction phase)	• 5.8.2020	• 31st December 2023 (as per Loan agreement) • 30th June 2024 (as per PAM) • 31st August 2024 (as per Contract agreement with Contractor)	Ongoing	23%	Contract awarded to L&T contractor, Relevant section of the EMP included
• Contract Package 3 (Electro Mechanical)	• 9.9.2021	• 30th June 2024	Ongoing	1%	Contract awarded to M/s Andritz Hydro Private Limited contractor, Relevant section of the EMP included
• Contract Package 1 (Buildings)			Yet to be awarded		EMP provisions included in the Tender Document.
• Contract Package 4 (Transmission Line)			Yet to be awarded		EMP provisions included in the Tender Document.
• Contract Package 5 (ERP)					
Lot 1 & ERP Consultancy	31.07.2019	June 2022		24.36 %	
Lot 2			Yet to be awarded		
Lot 3					
Lot 4					
• Asset Valuation	17.01.2020	March 2022		75 %	
• Resources and Community			Being administered by ADB. Offers		

Resilience (under JFPR)			received and under evaluation.		

ERP - Enterprise resource planning

Physical Progress of Package 2 :

A. Main work

Sl No	Description of Work	Progress
1	Temporary & Permanent Road excavation	93%
2	Inlet & Outlet open excavation including Portal Construction	100%
3	DT Heading Excavation	19%
4	DT Benching Excavation	0%
5	Intake Structure- Excavation & Slope Stabilization	14%
6	Adit to HRT open Excavation	100%
7	Adit Tunnel Excavation	25%
8	Surge Shaft Open Excavation	100%
9	Valve House Open Excavation	100%
10	Penstock open Excavation	70%
11	Power House open Excavation	5%

B. Site Infrastructure Facility Work:

Employer/PMC Office: Handed over to Employer/PMC.
Employer/PMC Accommodation Status: Current Construction status are as follows [Already occupied by PMC & Employer]:

1. **APGCL Camp (Kopili Block):** Handed over to the Employer on 01st September 2021 including AC & Geyser fittings.
2. **Dihing Block-1 (10 Units Double bedroom accommodation for Bachelors):** Competed in all respect including AC fitting. 7 units are handed over to Employer.
3. **Barak Block (4 Units 2 BHK Family Accommodation):** Handed over to the Employer; Work in progress on minor observations.
4. **Bhogdoi Block (3 Units 2 BHK family Accommodation cum 2 Units Double bedroom bachelors Accommodation):** Handed over to the Employer; Work in progress on minor observations.
5. **Diyung Block (Mess cum 6 units of Double bedroom bachelors Accommodation):** Handed over to the Employer.
6. **Fencing Work:** Completed

Contractor's Worker Camp Accommodation Status:

- Labour Block No.1 (Manas Block): Completed in all respect.
- Labour Block No.2 (Lohit Block): Completed in all respect.
- Labour Block No.3: False ceiling works and drainage works are in progress.

- Labour Block No.4: Completed in all respect.
- Labour Block No.5: Completed in all respect.
- Labour Block No.6 (Mess cum 6 units of accommodation): Completed in all respect.
- Labour Block No.7: Foundation and truss erection works completed.
- Labour Block No.8: Foundation and truss erection works completed.
- Labour Block No.9: Foundation works completed; Truss fabrication works in progress.
- Labour Block No.10: Foundation works completed; Truss fabrication works in progress.
- Labour Block No.11 (Toilet Block): Completed in all respect.
- Labour Block No.12 (Shower Block): Completed in all respect.
- Labour Block No.13 (Toilet Cum Shower Block): Completed in all respect.
- Labour Block No.14 (Toilet Block): Foundation works completed.
- Labour Block No.15 (Shower Block): Foundation work in progress.
- Labour Block No.16 (Mess Block-1 & 2): Completed in all respect.
- Labour Block No.17 (Mess Block-3): Completed in all respect.
- Labour Block No.18 (Mess Block-4): Completed in all respect.

Contractor's site Office: Completed.
Staff Mess: Completed.
RMP Centre: Completed.
Staff - Manager Accommodation-1: Completed.
Staff - Manager Accommodation-2: Completed.
Staff - Manager Accommodation-3: Completed.
Staff - Bachelor Accommodation-1: Completed.
Staff - Bachelor Accommodation-2: Completed.
Staff - Bachelor Accommodation-3: Completed.
Staff - Bachelor Accommodation-4: Foundation works, Truss erection works, Side walls, Roof and Partition walls completed; Floor tiling and plumbing works in progress.
Staff - Bachelor Accommodation-5: Completed.
Staff - Bachelor Accommodation-6: Foundation and truss erection works completed.
Staff - Bachelor Accommodation-7: Foundation and truss erection works completed.
Guest House/Manager Block: Foundation works in progress.
P&M Workshop: Completed.
Fabrication Workshop: Completed.
Main store: Completed.
Store No. 2: Completed.
Quality Assurance & Quality Control Lab: Foundation works, truss erection and roof works, partition walls and electrical works completed; Plumbing works in progress. Temporary setup for QA/QC activities established at site.
Crusher Plant (200 TPH): Completed in all respect.
Batching Plant (60 cum/hr Capacity) at Powerhouse complex: Completed in all respect.
Batching Plant (120 cum/hr Capacity) at Dam complex: Excavation works in progress.
Explosive Magazine: Completed in all respect.
Weigh Bridge: Completed in all aspect.
P&M/Store Office: Foundation works completed.

During July 2021 to December 2021 there was no change in the scope of the works, location and alignment of the components, construction method and implementation schedule. But

between June 2018 and December 2020 the layout was changed as per recommendation of Forest Advisory Committee, MoEF&CC in 2019. During the period June 2018 to December 2020 the layout of the project changed as per recommendation of Forest Advisory Committee. The F.C proposal was examined at the different level of forest department GOA, and GOI. Site visit was conducted both by the officials of State and Central government Regional office MoEF & CC during the year 2018. The F.C proposal was discussed in the Forest Advisory Committee (FAC) meeting held on 26.10.2018. FAC raised certain observations/Suggestions. Finally, the proposal for division of 523.046 Ha of forest land for construction of Lower Kopili H.E Project was deliberated in the FAC MoEF&CC meeting held on 19.12.2018. After thorough deliberations and interaction with APGCL, APCCF, Regional Office, representative of Govt. of Assam, Recommended to grant in Principal approval in favour of APGCL, with the certain suggestions. Which were compiled by APGCL. In this process the layout was modified. The EIA is being updated to reflect the change in layout.

There was no change in the environmental safeguards staffing during the reporting period.

Moreover no unanticipated impacts and updates to EIA/EMP that were required during the reporting period. During the Biodiversity study 3 additional threatened species of mammals were reported from the project area and within 10 km radius of the project site. They are Western Hoolock gibbon (*Hoolock hoolock*) Endangered, Bengal Slow loris (*Nycticebus bengalensis*) Endangered, Leopard (*Panthera pardus*) Vulnerable. All the 3 species are under Schedule I of the Wildlife Protection Act, 1972 and its amendments.

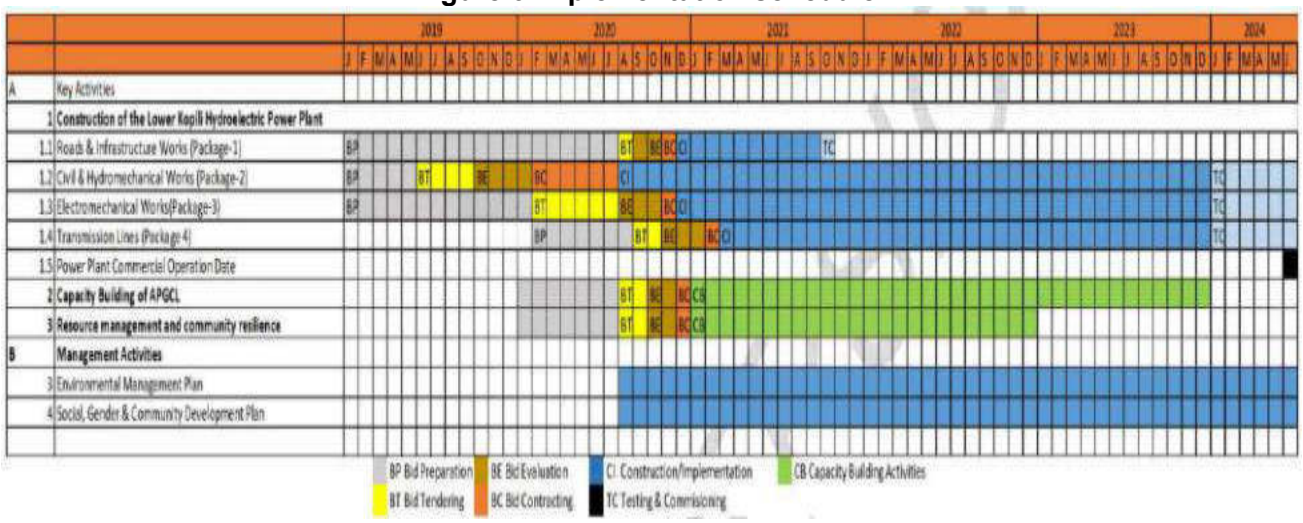
Contractor's Resource Mobilization :

Subcontractors – 50 nos for the month of December 2021. It is 50 subcontractors, out of which few are company and rest are labour contractors.

Number of workers on site – 628 for the month of December 2021 and 30 key personnel for the Contractor.

Implementation schedule is shown in the figure 6.

Figure 6 Implementation schedule



(As per PAM)



(As per QPR Oct- Dec 2021)

2.0 Compliance to National Regulations and International Agreements

This section describes only the compliances of the national regulatory requirements.

Status of international agreement compliance are given below.

Table 3.1: International Treaties and Agreement Signed and Ratified by India

S. No.	International Agreements and Commitments	Applicability	Date of Signing / Ratifying
	Nature Conservation		
1	Convention on International Trade in Endangered Species of Fauna and Flora (CITES)	Yes	Signed by India in 1976
2	The Wildlife Trade Monitoring Network (TRAFFIC)	Yes	-
3	Convention on Migratory Species (CMS)	Yes	-
4	Coalition Against Wildlife Trafficking (CAWT)	Yes	-
5	Convention on Biological Diversity (CBD)		Ratified February 1994 and September 2003 by Protocol.
6	International Tropical Timber Organization (ITTO)	Yes	-
7	United Nations Forum on Forests (UNFF)	Yes	-
8	International conventions such as the International Union for Conservation of Nature and Natural Resources (IUCN)	Yes	-
	Hazardous Material		
9	Strategic Approach to International Chemicals Management (SAICM)	Yes	-
10	Basel Convention on the Control of Trans- boundary Movement of Hazardous Waste and Their Disposal	Yes	Adopted on 22 March 1989
11	Rotterdam Convention on Prior Informed Consent (PIC) for certain Hazardous Chemicals and Pesticides in International Trade	Yes	Adopted in 1998

	Atmospheric Emissions		
12	United Nations Framework Convention on Climate Change (UNFCCC)	Yes	
13	Kyoto Protocol	Yes	Signed by India in August 2002 and ratified in February 2005.
14	Paris Agreement	Yes	Ratified by India on 2 October 2016. The agreement entered into force on 4 November 2016.
15	Montreal Protocol (on Ozone Depleting Substances)	Yes	India signed on 17-9- 1992 and also ratified on 3rd March, 2003

Source: MoEF&CC, India.

Status of the statutory clearances are shown in the table 3.2.

Table 3.2 : Statutory Clearances

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
1	Environment Clearance	Environment Protection Act 1986	MoEF&CC, GOI	Accorded	EC No. J-12011/26/2012-IA-I dated 04th September, 2019 Few EC conditions are in process for compliance.
2	Forest Clearance	Forest Conservation Act, 1980	MoEF&CC, GOI	Accorded	• Stage 1 F.No.8-53/2018-FC dated 5th February, 2019 • Stage 2 File No. 8-53/2018FC dated 4th December, 2020 • Certificate of possession of Forest Land Dima Hasao vide letter No. FRS/D/10/LKHEP/ APGCL/2021/404 date 10.06.2021. • Certificate of possession of Forest Land Karbi Anglong vide letter No. A/HRN/LKHEP/20 20-21/490 dated

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
					03.07.2021. Annexure 1 FC conditions complied.
3	**Quarry**				
A	Permission of the State Government for extraction of boulders from quarry. Location: Longku, Dima Hasao	1.NOC from North Sachar Hills Autonomous Council 2. Mining Plan approval from department of geology and mining, Assam. Assam Minor Minerals commencement Concession Rules, 2013	Stage-1. North Cachar hills Autonomous Council Stage-2. Department of geology and mining, govt. of Assam	Approval Awaited from North Cachar Hill Autonomous us council (NCHAC).	
B	Permission of the State Government for extraction of Fine aggregate from quarry. Location: Up Stream and Downstream of Dam, Dima Hasao. (2 quarries)	1.NOC from North Sachar Hills Autonomous Council 2. Mining Plan approval from department of geology and mining, Assam. Assam Minor Minerals commencement Concession Rules, 2013	Stage-1. North Cachar hills Autonomous Council Stage-2. Department of geology and mining, govt. of Assam	After receipt of the approval Mining plans will be submitted for approval.	
4	**Batching Plant**				

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
A	Permission of Village Panchayats (Gaon burah) for installation of batching plant. Location: Totelangso, Dima Hasao	Permission from Village Panchayats.	Applied to Village Panchayats for installation of Crushers on 30-06-2021	Approval Received on 30.06.2021	NOC Received from Village Panchayats for setting up Batching Plant near Totelangso, Dima Hasao.
B	Clearance of Pollution Control Board for setting up Batching Plant. Consent to Establish – (CTE) Location: Powerhouse, Totelangso, Dima Hasao	State Pollution Control Board, Assam	Stage-1. North Cachar Hills Autonomous Council Stage-2. Pollution control board for installation of crusher.	NOC received from NC Hills Autonomous Council vide letter no. FRS.Sectt./S. Crusher/45/2018-19-20/L/2 dated 19th Oct, 2021.	Application submitted to Pollution Control Board Assam, Silchar vide Application No. 590529 dated 2nd June 2021
C	Permission of Pollution Control Board for installation of batching plant. Consent to Establish – (CTE)	Permission from Pollution Control Board, Assam	Applied to Pollution Control Board CTO application submitted on 838921 dated November 2021	No. WB/SLC/T-1191/21-22/17 dated 27th December 2021. Valid till 31.03.2025	
5	**Crusher**				
A1	Permission of Village Panchayats (Gaon burah) for installation of crushers. Location: Totelangso, Dima Hasao.	Permission from Village Panchayats. The Assam Stone Crusher Establishment and regulation rule 2013 (Crusher)	Applied to Village Panchayats for installation of Crushers on 30-06-2021	Approval received.	NOC Received from Village Panchayats for setting up Crusher
A2	Permission of Pollution Control Board for installation of crushers. Consent to establish–(CTE)	Permission from Pollution Control Board, Assam	Applied to Pollution Control Board for installation of Crushers.	CTE obtained from PCBA vide Ref. No. WB/SLC/T-1184/21-22/06/1065 dated 22nd October, 2021	CTO application submitted on 5th November 2021. CTO Application number 810264.
A3	Permission of Pollution Control Board for installation of	Permission from Pollution Control Board, Assam	Applied to Pollution Control Board for installation of Crushers.	CTO received from PCBA on 7/12.2021 vide Ref no. WB/SLC/T-	

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
	crushers. Consent to Operate –(CTO)			1184/21-22/09/1152.	
6	**Fuel dispensing Unit**				
A	(NOC) from Deputy Commissioner Govt of Assam, for setting up Fuel dispensing Unit at Project location.	Deputy Commissioner Govt of Assam / Petroleum Act, 1934 and Rules 2002	The Deputy Commissioner, Dima Hasao, Haflong; Government of Assam.	NOC received from The Deputy Commissioner, Dima Hasao, Haflong; Govt. of Assam	
B				NOC Received from PESO. P/EG/AS/14/1630 (P502141) dated 6/12/21	Valid till 31/12/2021
C				Jt. Chief Controller of Explosives, Guwahati	Permission of storage of 20 kl. Valid till 31/12/2021
7	**Magzine**				
A	No Objection Certificate Obtained from "PESO" for establishment of Explosive magazine.	Petroleum and Explosives Safety Organization / Explosive Rules, 2008 (under act of 1884)	Petroleum and Explosives Safety Organization, Kolkata.	NOC obtained from Employer, further NOC from PESO is under progress.	NOC applied to PESO for establishment of Explosive magazine. Storage approval pending from PESO.
B	Permission for storage of Explosives (Explosive Van) at Longku police station for blasting operation for construction 120 MW Lowe Kopili Hydel Electric Project at Longku, Dima Hasao	The Superintendent of Police, Dima Hasao District, Haflong. / Explosive Rules, 2008 (under act of 1884)	The Superintendent of Police, Dima Hasao District, Haflong.	Permission Received vide letter No. HFG/DSB /80/2021 /1122dated 02.06.2021	Permission Received from Superintendent of Police, Dima Hasao District, Haflong.
C	No objection Certificate for third party handling of explosives and its blasting operation		District Magistrate, Dima Hasao, Halflong	NOC received on 22nd October 2021 vide letter no. NCH/M-8/2021/6378-83	

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
	which will be carried out by M/s. R.L. Poddar and North East Associates, Shillong				
D	No objection Certificate for grant of Explosive license and Magazine construction in favour of M/S R.L. Poddar for L&T.		District Magistrate, Dima Hasao, Halflong	NOC received on 27th October 2021 vide letter no. NCH/M-3/20-21/L/2-A	
E	Fire NOC / Fire License	As per NOC of District Magistrate, Dima Hasao, a fire tendering facility is essential for storage of explosives in the Magazine	Sr. Station Officer, Fires and Emergency Service Station, Halflong, Dima Hasao	Application submitted on 19th November 2021 vide letter no LKHEP-PKG2/LNT/155/GL/085.	NOC pending
8	**Blasting**				
	Non Objection Certificate for blasting operations for construction of 120 MW Lowe Kopili Hydel Electric Project at Longku Dim Hasao	Deputy Commissioner, Dima Hasao District, Haflong. / Explosive Rules,2008 (under act of 1884)	Deputy Commissioner, Dima Hasao District, Haflong.	Approval Obtained. Letter no. NCH/M-8/2021 dated 14th Jul'21	Application submitted vide Letter No.: LKHEP-PKG2 /LNT /153 /GL/21 dtd. 31st May'21
			The Superintendent of Police, Dima Hasao District, Haflong, Assam	Permission received vide letter No. HFG/DSB/80/2021/1122	Permission Received from Hon'ble Superintendent of Police, Dima Hasao District, Haflong.
			Sr. Station Officer, Fire & Emergency Service Station, Dima Hasao, Haflong, Assam	Permission received.	Application for Granting No objection for blasting operation vide Letter No: LKHEP-PKG2/LNT/153/GL/26 dtd. 2nd July'21
			The District Magistrate, Dima	Permission received.	Application for Granting No

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
			Hasao, Haflong, Assam		objection for blasting operation vide Letter No: LKHEP-PKG2/LNT/153/GL/NIL dtd. 13th July'21
			ASI L Bishuk Singha In-Charge, Longku out post.		Intimated vide letter No. LKHEP-PKG2/LNT/153/LL/33 dtd. 15th July'21
			Gaon Burah, Village- SAPRU	Intimated Blasting Timing 07 am to 8 am 1 pm to 2 pm 4 pm to 5 pm	Intimated vide letter No. LKHEP-PKG2/LNT/153/LL/34 dtd. 15th July'21
			Office-in-Charge Umrangsu Police Station	Intimated Blasting Timing 07 am to 8 am 1 pm to 2 pm 4 pm to 5 pm	-Intimated vide letter No. LKHEP-PKG2/LNT/153/LL/35 dtd. 15th July'21
		Request for issuing No Objection Certificate for explosive supply chain management & blasting operation	The Hon'ble Deputy Commissioner, Dima Hasao District, Haflong, Assam	Permission Received vide letter No. NCHM/M-8/2021/6378-83 dtd. 22nd Oct'21	
9	**Labour License**				
A	Permission of Labor commission for labour license	Labour Laws / Factories Act, 1948 and Amendments (1987)	Government of Assam Office of the Labour Commissioner Assam Gopinath Nagar, Guwahati 781016	S.No.327 2 License No. CLL (Assam)06/2020/3272 dt. 9.12.20	Valid till 9/12/2022 Covered 500 workers. Annexure 2 For Labour license application was submitted on 17.12.21 to increase of

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
					workforce from 500 to 1000.
B	Building and other construction works	Building and other construction works (Regulation of Employment & Conditions of Service) Act, 1996 and the Rules made thereof.	Government of Assam Office of the Labour Officer, Dima Hasao, Halflong	Sl No. 133 License No. B&OCW-133 Dated 21st September 2021	Validity 1/11/2021 to 31/08/2024 For 500 workers / day. Annexure 3 For BOCW application was submitted on 17.12.21 to increase of workforce from 500 to 1000.
10	**Tree Cutting**				
	NOC for tree cutting	Indian Forest Act, 1927	Forest Department Assam		Tree cutting in progress with assistance/ presence of officials of Forest Department, Panimur Range, Dima Hasao (West) Division and APGCL. All the trees are marked and felled by the respective Forest Department.
11	**Ground water extraction**				
	Permission of the State Government for drawing water from river.	Water (Prevention & Control of Pollution) Act, 1974; and Amendments (1988)	Central Ground water Board or District Administration	Application for Permission of ground water extraction submitted vide Letter No: LKHEP-PKG2/LNT/153/GL/78 dtd. 09th Nov'21	
12	NOC for surface Water use for construction				Yet to obtain NOC from Water Resource Department and instruction given to the contractor to comply.

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
13	The following permissions or Clearances are pending as on 31.12.21.				a. CTE and CTO for Batching Plant at Dam site. b. Permission of the State Government for extraction of boulders from quarry. c. Magazine storage approval pending from PESO. d. NOC for Magazine from the Office of the Director, Fire and Emergency Services, Assam, Guwahati. e. Night blasting permission. (ii) Compliance status of the specific conditions of each clearance/ permits in Appendix 3. Copies of CTO and CTEs in Appendix 4.
14	PUC of the vehicles				PUC status of 14 vehicles given in the Table 7A. Compliance to Environmental Management Plan
15	**Insurance Policies**				
	Policy Name		**Policy Number**	**Coverage Period**	
	Group Personal Accident Policy for staff		411400/48/2022/83	01-04-2021 to 31-03-2022	
	Group Personal Accident Policy for workers		411400/48/2022/43	31-03-2021 to 30-03-2022	

Sl. No	Activities for which clearances are required	Statutory Requirement under the Act	Statutory Authority	Compliance Status as on 31st December 2021	Remarks
	Contractor's Plant and Machinery		5011/R/150019780/03/000	01-04-2020 to 31-03-2022	
	CAR Insurance		12070044200300000015	28-10-2020 to 31-08-2024	

3.0 Compliance to Environmental Covenants from the ADB Loan Agreement

Compliance to the environment safeguard loan covenants are shown in the table no 4.

Table 4 : Compliance of Loan Covenants

Schedule #, Para. #	Covenant	Compliance Status	Remarks
Schedule 4, Para 6	The Borrower shall ensure or cause the EA to ensure that it shall not allow commencement of civil works under a Works contract which involves environmental impacts until the EA has obtained the final approval of the EIA from the relevant environmental authority of the Borrower and the State and ADB :	Complied	Environment Clearance received on 04th September, 2019. Contract awarded in 2020.
	ii)The EA has incorporated the relevant provisions form the EMP into the Works contract	Complied	
	iii)The EIA is updated to reflect the turnkey contractor's detail design and uptodate baseline.	Being complied	EIA addendum under process and supporting feedbacks with documents submitted to ADB.
	iv) such updated EIA is cleared by ADB	Will be complied	
Schedule 4, Para 8	The Borrower shall ensure or cause the EA to ensure to recruit a consulting firm for external validation of the environmental monitoring reports produced by APGCL.	Being complied	Contract awarded on 24th December 2021. External Monitor will validate the environmental monitoring report for the period July to December 2021. External Monitor has validated the Environment Monitoring Report July to December, 2021.

Schedule #, Para. #	Covenant	Compliance Status	Remarks
	The Borrower shall ensure or cause the EA to apply individual consultant selection for Consulting Services.	Will be complied	
Schedule 5, Para 5	The Borrower shall ensure, or cause the EA to ensure, that the preparation, design, construction, implementation, operation and decommissioning of the project , and all Project facilities comply with (a) all applicable laws and regulations of the Borrower and the State relating to environment, health and Safety,	Being Complied	Section 6, general Specification, clause 6.1.10. Few noncompliance reported during July to December 2021 as reported in the table 7A, 7B, 8 will be complied within the timeline. EA will facilitate wherever necessary to obtain the required clearances / CTE / CTO, etc.
	(b) the Environmental Safeguards,	Being Complied	
	(c) the EARF, and	Complied	EARF 2013
	(d) all measures and requirements set forth in the EIA and EMP, and any corrective or preventive actions set forth in a Safeguards Monitoring Report.	Being Complied.	Second one is compiled for the period July 2021 to December 2021. Few noncompliance reported during July to December 2021 in the Table 7A, 7B, 8 (corrective actions required section) will be complied.
Schedule 5, Para 9	The Borrower shall ensure or cause the EA to ensure that all necessary budgetary and human resources to fully implement the EMP, and the RIPP as required, are made available on a timely basis.	Being complied	
Schedule 5, Para 10	Safeguard related provisions in Bidding Documents and Works Contracts. The Borrower shall ensure, or cause the EA to ensure, that all the bidding documents and contracts for works contain provisions that require contractors to :	Complied.	<u>For Package 2</u> Section 6 general Specification clause 6.1.3.2.; 6.1.10.; 6.26.3.; EMP in the Annexure F of the Bidding document. <u>Other packages</u> Similarly for Package 1 (Building), Package 3

Schedule #, Para. #	Covenant	Compliance Status	Remarks
	(a) comply with the measures and requirements relevant to the contractor set forth in the EIA, EMP and the RIPP and any corrective or preventive actions set forth in a safeguard Monitoring Report.		(Electro Mechanical) and Package 4 (Transmission Line) tender documents prepared incorporating the measures suggested in EIA, EMP and the RIPP. Package 3 already awarded.
	(b) make available a budget for all such environmental and social measures.	Complied	EMP budget is part of EIA Report.
	(c) provide the EA with a written notice of any unanticipated environmental or resettlement risks or impacts that arise during construction, implementation or operation of the Project that were not considered in the EIA, EMP, RIPP, RF or the IPPF.	NA till 31st December 2021.	
	(d) adequately record the condition of roads, agricultural land the other infrastructure prior to starting to transport materials and construction and	Complied.	
	(e) fully reinstate pathways, other local infrastructure and agricultural land to at least their pre project condition upon the completion of construction.	NA	NA as the project is in construction phase.
Schedule 5, Para 11	Safeguard Monitoring and Reporting. The Borrower shall ensure or cause the EA to ensure the following : (a) submit semi annual Safeguard Monitoring Reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission.	Being compiled.	Second report compiled for the period July 2021 to December 2021.
	(b) if any unanticipated environmental and or social risks and impacts arise during construction, implementation, or operation of the Project that were not considered in the EIA, EMP, RIPP,RF or the IPPF as applicable	Being communicated to ADB	b) Due to recommendations of FAC, MoEF&CC there is change in layout which has been communicated to ADB.

Schedule #, Para. #	Covenant	Compliance Status	Remarks
	promptly inform ADB of the occurrence of such risks or impacts with detailed description of the event and proposed corrective action plan and		c) EIA addendum is being prepared with the necessary updates.
	(c) report any breach of compliance with the measures and requirements set forth in the EMP or RIPP promptly after becoming aware of the breach.	Will be complied if situation arises.	
Schedule 5, Para 12	The Borrower shall ensure, or cause the EA to ensure, that no proceeds of the Loan under the Project are used to finance any activity included in the list of prohibited investment activities provided in Appendix 5 of the SPS.	Being complied	
Schedule 5, Para 13	Labour Standards Health and Safety. The Borrower shall ensure or cause the EA to ensure that works contracts under that Project follow all applicable labour laws of the Borrower and the State and that these further include provisions to the effect that the contractors : (a) carry out HIV / AIDS awareness programmes for labour and disseminate information at worksites on risks of sexually transmitted diseases and HIV / AIDS as part of health and safety measures for those employed during construction. and	Health camps organised. AIDS awareness camp was organised on 11.12.2021 during the reporting period July 2021 to December 2021.	During the health camps and AIDS awareness camps, workers were given instructions related to communicable diseases including HIV and its preventive measures.
	(b) follow and implement all statutory provisions on labour (including not employing or using children as labour, equal pay for equal work) health, safety welfare, sanitation, and working conditions.	Being complied	
	Such contracts shall also include clauses for termination in case of any breach of the stated provisions in the contract	Complied	

4.0 Compliance to Project Administration Manual (PAM)

Compliance to the Project Administration Manual on Environment Safeguards are shown in table 5.

Table 5 : Compliance to PAM

Organization		Tasks	Compliance Status	Remarks
Executing Agency	Government of Assam			
	Project steering committee- Comprising Principal Secretary, Energy with Managing Director, APGCL and AEGCL		Complied	The committee is in place.
	Grant fund related advisory committee- Comprising Principal Secretary, Energy; Managing Director, APGCL; Principal Secretary, Water Resources Department; representatives of Dima Hasao and Karbi Anglong ADC as well as districts of Nagaon, Morigaon and Hojai			Will be formed after the receipt of the Grant.
Implementing Agency	Assam Power Generation supported by PMC Corporation	(i) Conduct overall coordination, preparation, planning, and implementation of all field level activities; (ii) Implement EMPs following ADB's Safeguards Policy	Complied Being complied	Adhered

Organization		Tasks	Compliance Status	Remarks
	Limited (APGCL)	Statement 2009, IFC's Environment, Health and Safety general guidelines and national regulations etc. at the project site; (iii) Undertake and supervise compensation to the affected persons based on the entitlement matrix in the RIPP; (iv) Oversight construction contractor(s) on monitoring and implementing mitigation measures during design, construction and operation phases of the project before contracts completed; (v) Advise and coordinate to finalize survey and detailed design and update that safeguard documents following detailed design and survey result; (vi) Engage in grievance redress and ensure the prompt resolution of complaints; (vii) Set up appropriate record keeping system; (viii) Disclose relevant information to the affected people and continue consultations; (ix) Provide training and awareness on environmental and social issues to the project staff and EPC contractor(s); (x) Preparation of semi-annual and annual environmental monitoring reports and semi-annual social monitoring reports; and (xi) Liaise with the concerned ministries, authorities, and government departments for the environmental and resettlement related issues of the project implementation.	Being complied Being complied Complied and ongoing Complied through APGCL and ongoing Complied through MPR Ongoing Ongoing Complied and ongoing Being complied	Since the EIA was based on environmental surveys completed in 2015, given the passage of time, APGCL will undertake an up-to-date suite of surveys

Organization		Tasks	Compliance Status	Remarks
				(including flora and fauna surveys following previous methodologies) to confirm if there have been any significant changes to the environmental baseline in the past 5 years and the impact assessment remains valid. These surveys will also provide an up-to-date baseline for the purposes of monitoring the project's environmental impacts during construction and operation. The EIA will be updated to reflect the detailed designs and survey results for review and clearance of ADB prior to works, including any temporary enabling works. Before the award of

Organization		Tasks	Compliance Status	Remarks
				contract, the EMP will be updated by APGCL to include the environmental clearance and forest clearance conditions and, in response to the ongoing COVID- 19 pandemic.
		The designated dedicated social and environmental safeguards cell (SESC) with a full-time environmental specialist and a full-time social specialist. The SESC will implement EMP and RIPP and be responsible for safeguards monitoring.	Social and environmental safeguards cell (SESC) formed within PMU	Dr Deepak Kumar Baruah as Environment Exert and Mr Pankaj Kumar Hazarika as Social Expert with a support team from APGCL.
Para 49. GRM		A grievance redress mechanism (GRM) will be established to deal with complaints on environmental and social issues in a timely manner and adequately publicized amongst the affected peoples.	Being complied. The structure of the GRM and methodology for grievance redress are described in section 8 of this report below.	Resettlement NGO gave awareness training on the GRM of the LKHEP. No grievances reported on environment.
Para 53.		a) training and capacity building b) Dam safety expert c) External monitor appointment	a) Ongoing b) Will be engaged c) External monitor engaged.	As per the provision of the Dam Safety Act 2021, APGCL has proposed to the Government of Assam to constitute a interdisciplinary team of experts for the state

Organization		Tasks	Compliance Status	Remarks
				level committee on dam safety. Nominations for the members of the committee has been forwarded to the Government for necessary approval. As soon as the approval and notification comes from the Government training and capacity building will be carried out. External Monitor was engaged in the month of December, 2021 and the kick-off meeting was on 28th December, 2021.
Para 56. Unanticipated impact		In the event of any unanticipated environmental impacts during project implementation, including change in project scope or design, APGCL will update the EIA/EMP as appropriate, which will be disclosed on the ADB website. For any non-compliance with the EMP APGCL will take necessary corrective actions to bring the project back into compliance.	Project layout changed for the compliance of FAC, MoEF&CC. Addendum for EIA update is under process.	
Para 62. HIV/ AIDS		NGO will carry out HIV/AIDS awareness for their laborers at work sites	Being complied and ongoing	

Organization		Tasks	Compliance Status	Remarks
Para 63. Health		APGCL will ensure that contractors provide adequately for the health and safety of construction workers	Being complied	
Para 64. Labour		APGCL will ensure that civil works contractors comply with all applicable labor laws and regulations, do not employ child labor for construction and maintenance activities, and provide appropriate facilities for women and children in construction campsites; contractors do not differentiate wages between men and women for work of equal value.	Being complied	
Para 67. Safeguards monitoring.		APGCL must adhere to the EMP and CRTDP during contract implementation as prepared in accordance with ADB's SPS 2009 and as agreed and/or endorsed by the government. APGCL will provide environmental and social monitoring reports to ADB on a semi-annual basis during construction phase and on an annual basis during operation phase. The reports will describe implementation progress of environment and resettlement activities and compliance issues and include quantitative monitoring data in accordance with the EIA/EMP and CRTDP and CRIPP, respectively. The environmental and social monitoring reports and other relevant safeguard reports will be posted to the ADB website and disclosed locally by APGCL. In the event of any unanticipated environmental or resettlement impacts during implementation, or if monitoring identifies a breach of performance standards that should be complied with by APGCL and/or their contractors, APGCL will submit to ADB an updated EIA/EMP, CRTDP and CRIPP or a time-bound corrective action plan. The External Monitor will also prepare semi-annual	Being complied. External monitor engaged and will prepare	

Organization		Tasks	Compliance Status	Remarks
		monitoring validation reports during project construction and annual monitoring validation reports during project operation for submission to ADB for disclosure on the ADB website.	the validation reports.	

Sample field visit report of 24th December 2021 is given in Annexure -4.

5.0 Compliance to Contract

The table 6 shows the compliance to the contract provision during the period July 2021 to December 2021.

Table 6 : Compliance to Contract provisions

Contract Package	Contract Provisions / Status of the contract package	Compliance Status	Remarks
Package 1			(Building and colony roads) Yet to be awarded
Package 2	Construction phase : Section 6, General conditions clause 6.1.3.2. • The Contractor shall within one month of receipt of Commencement Date, appoint an Environmental Officer	Complied	L&T appointed Mr Manoj Yadav as Environment Expert.
	• Environmental Officer will submit a Monthly Environment Report every month.	Complied	Submission of monthly Environment Report started from November 2020. The 14th MER was submitted for the month of December 2021. Annexure 5
	Clause 6.1.10.1.a. • The Employer has a goal to create a zero-incident work environment with a safety culture	Being complied	App based safety monitoring system of L&T
	Clause 6.1.10.1.b. • The Contractor will be responsible for the security, safety & health and Group insurance of his Employees.	Complied	Package 2 CEMP and H&S Plans submitted by the contractor and it has been approved by APGCL and PMC. Appendix 1 - CEMP, Appendix 2 - H&S Plan
	Clause 6.1.10.1.c. • Provide and maintain at his own cost, fencing,	Being complied	After reviewing all the monthly safety and Monthly Environment reports PMC

Contract Package	Contract Provisions / Status of the contract package	Compliance Status	Remarks
	warning signs and watch & ward. Clause 6.1.10.1.d. • Take all reasonable steps to protect the environment. Clause 6.1.10.1.e. • The contractor will protect the environment following the principles of Approved Environment Management Plan. Clause 6.1.10.1.f. • The Officer-in-Charge of Safety will submit monthly safety report Clause 6.26.3 • Environmental obligations	Being complied Being complied Being complied Being complied	and APGCL observations are made and communicated to the contractor for compliance and update. All the observations are also mentioned in the PMC's MPRs and QPRs. Those which are not complied are flagged in the Six monthly monitoring reports. Non compliance with corrective actions are reported in Table 7A, 7B, 8. Although L&T has online safety reporting system, Monthly Safety Report submitted for the month of December, 2021. Annexure 6
Package 3			ADB approved Tender Document. Contract awarded.
Package 4	Approved by ADB and the contract yet to be awarded.		

6.0 Compliance to Environmental Management Plan

Table 7A. Compliance to Environmental Management Plan

(Note : Right now only package 2 contractor is in place so it is now combined one. From the next Six monthly reports all the contract packages compliance will be dealt separately.)

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
DESIGN AND PRE-CONSTRUCTION PHASE				
1	Impact on air, water, noise, soil	Location and design of power house, office, substation and colony	• Siting of colony away from construction areas including plantation all around colony. • Drainage system with de-silting chamber, will be provided all around power	Planned and is in tender doc and in contract EMP.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
	Exposure to safety related risks		house, office, substation and colony. • Solid waste storage bin system will be provided at required location. • All buildings are designed and will be constructed as per seismic zone provision. • The site-specific earthquake study has been completed by Department of Earthquake Engineering, IIT Roorkee. The site-specific design parameters recommended by IIT for MCE and DBE conditions are recommended as 0.36g and 0.18g for horizontal and 0.24g and 0.12g for vertical ground motion, respectively have been considered. The design has been reviewed by independent experienced dam expert appointed by ADB and found to be adequate. • Dam safety surveillance and monitoring aspects are included. Personnel Safety equipment will be provided at required location.	  Plantation all around colony.
2	Release of chemicals ashes in receptors (air, water, land)	Equipment specifications and design parameters.	• CFC not used in substation transformers or other project facilities or equipment by concerned agencies. • Processes, equipment, and systems will not to use chlorofluorocarbons (CFCs), including halon, and their use.	Incorporated in tender doc
3	Exposure to noise	Power Plant /Substation location	Design of plant enclosures to comply with IFC EHS noise regulations (85 dB(A) at work sites for heavy industry.	Planned and is in tender doc EMP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
4	Acquisition of private land	Location of powerhouse, head works.	Acquisition of agricultural and cultivable land minimized.	Construction work zones are clustered to minimized the agricultural and cultivable land. Package 1, 2 & 3 facilities are concentrated in two patches in revenue land. 
5	Social inequities	Involuntary resettlement or land acquisition.	• Compensation will be paid for temporary / permanent loss of productive land as per Govt. rules and regulation. • A list of all the affected persons by type of losses and extent of damages has been prepared through and the same will be compensated as per Resettlement and Tribal Development Plan prepared as per GoI and ADB SPS 2009 requirements.	Compensation done as per entitlement matrix of CRDTP. Mostly completed. Land compensation completed 100 %. But other R&R assistance will be initiated soon.
6	Loss of precious Ecological values/impacts on precious species due to acquisition of 523 ha of forest land	Encroachment into precious ecological areas.	• Minimize acquisition of forest areas. • Avoid encroachment by careful site and alignment selection of access roads, and transmission lines. • Afforestation of 1,046 ha (1:2 tree planting ratio) of degraded forest land.	If both permanent (including underground areas) and temporary use areas are included, only 297.75 Ha will be required rest will be kept as Green Belt (198.746 Ha) and Safety Area (26.55 Ha) out of 523.465 ha forest land. As per Government norms it is 1:1 is for

<table>
<tr><th>Sl.</th><th>Environmental Issue</th><th>Activity/ Location</th><th>Mitigation Measures</th><th>Compliance as on 31st December 2021</th></tr>
<tr><td></td><td></td><td></td><td>
A compensatory afforestation and biodiversity conservation and management plan has been prepared (Annex 9).
<table>
<tr><td colspan="6">Impact on Tree Cover for the LKHEP</td></tr>
<tr><td></td><td>Forest Area</td><td>Ha</td><td></td><td>Revenue Area</td><td>Ha</td></tr>
<tr><td>1</td><td>Impacted / Forest area used</td><td>117.46</td><td>1</td><td>Impacted Revenue Area</td><td>41.92</td></tr>
<tr><td>2</td><td>Submergence</td><td>167.2</td><td>2</td><td>Submergence Area</td><td>452.8</td></tr>
<tr><td></td><td></td><td>284.66</td><td></td><td></td><td>494.72</td></tr>
<tr><td colspan="5">A. Total impacted area under Forest and Revenue</td><td>779.38</td></tr>
<tr><td colspan="6">Compensated area</td></tr>
<tr><td></td><td>In Forest area</td><td>Ha</td><td></td><td>In Revenue Land</td><td>Ha</td></tr>
<tr><td>1</td><td>Green Belt (Protected Forest area)</td><td>198.746</td><td>1</td><td>CA area (Revenue area converted to Reserved Forest)</td><td>524</td></tr>
<tr><td>2</td><td>Safety area</td><td>26.55</td><td>2</td><td>CAT plan Plantations</td><td></td></tr>
<tr><td>3</td><td>HRT</td><td>11</td><td>2a</td><td>Afforestation with 5 years maintenance</td><td>683</td></tr>
<tr><td>4</td><td>Not in use</td><td>1.59</td><td>2b</td><td>Gap Plantation with 3 years maintenance</td><td>281</td></tr>
<tr><td>5</td><td>Restoration area</td><td>58.95</td><td>2c</td><td>Pasture development</td><td>574</td></tr>
<tr><td></td><td></td><td></td><td>3</td><td>Plantation along the reservoir, roadside, etc</td><td>25</td></tr>
<tr><td></td><td></td><td>296.836</td><td></td><td></td><td>2087</td></tr>
<tr><td colspan="5">B. Total compensated are under Forest and Revenue</td><td>2383.836</td></tr>
<tr><td colspan="5">Compensatory Afforestation (A : B)</td><td>1 : 3.06</td></tr>
</table>
Cut only trees marked by
</td><td>Compensatory afforestation of Government projects. If CAT plan plantation areas are included it comes around 1:3.

Compensatory Afforestation plan is planned to be included in the Annual Operation Plan of the Forest Department, Govt. of Assam for the year 2022-2023.

Biodiversity Conservation plan is yet to be initiated.

Trees are marked and cut by the Forest Department only.</td></tr>
</table>

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			the Forest Department • Ensure that the area is cleared as per directives/delineation of Forestry staff	
7	Nuisance to neighbouring properties	Noise related	• Substations, powerhouse, head works designed to ensure noise will not be a nuisance. Noise will be controlled within IFC • EHS noise standards. In any case, there is no proximity of residences to these features.	Quarterly test are being carried out and so far found within the CPCB norms.
8	Flooding hazards/ loss of agricultural production	Interference with drainage patterns/ Irrigation channels	• The alignment of river channel and siting of project facilities are done to avoid any flooding hazard. Detailed hydrological assessments have been carried out as part of detailed design. Additional IWRM management plan has been prepared. • Dam Break Analysis and disaster management plan has been prepared (Annex 30).	Followed Dam Break Analysis and Disaster Management Plan already done in EIA consultant. The plan is available in the EIA Annexure 30.
9	Environmental pollution	Escape of polluting materials	• Transformers designed with oil spill containment systems, and purpose-built oil, lubricant and fuel storage system, complete with spill cleanup equipment • Construct 110% fenced and bermed area with impermeable concrete floor. • Powerhouses/substations to include drainage and sewage disposal systems (septic tanks, sewage treatment plant) to avoid offsite land and water pollution.	Designed and implemented for the construction power substation.  Fence constructed.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
				 
10	Contamination of receptors (land, water)	Equipment submerged under flood	Powerhouses/substations constructed above the high flood level (HFL) i.e. 185.34 m, by raising the foundation pad. This level also includes any possible effects from future climate change.	Designed and implemented or will be implemented 
11	Natural disaster frequently observed	Ground subsidence/ landslide	Civil design and sitting of project facilities has been done with due considerations to earthquake and landslide so as to avoid any hazard.	Designed and implemented
12	Fire hazards	Explosions/fire	• Design of Powerhouses/ substations has included modern fire control systems/firewalls in accordance with the norms of National Fire Protection Association (NFPA) and Tariff Advisory Committee (TAC). • Provision of fire fighting equipment to be located within 20 m of transformers, power generation equipment. • Fire protection and Safety practice have been prepared (Annex 28, 29).	Designed and implemented. All the measures were taken into consideration during the pre construction and design.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
13	Tree cutting	Cutting of trees during site clearance	• Restricting tree cutting within construction limit. • Avoiding tree cutting at ancillary sites. • Providing and maintaining compensatory tree plantation i.e. three times of cutting. • Compensatory afforestation plan prepared.	Planned and under implementation. Compensatory afforestation plan prepared by the Forest Department and the cost for implementation was deposited to CAMPA account by APGCL.
14	Removal of vegetative covers (dust, pollution)	Work site clearance	• Use of controlled clearing activities • Use of dust controlled measures • Collection and disposal of debris and muck.	Planned and being implemented.
15	Removal of utilities	Work site clearance	• Necessary planning and coordination with concerned authority and local body. • Prior notice to and consultation with concerned authority, local body and public to be affected so as to ensure that work does not get affected and impact on public is minimum.	No such places seen so far.
16	Religious places	Work site	• Suitable mitigation measures have been incorporated in social impact assessment report.	Office site plan approved by PMC and APGCL. Construction EMP approved by APGCL. Additional Plans like Muck Management Plan, Influx management plan, Solid waste Management Plan etc are under preparation and will be submitted to APGCL by Package 2 contractor.
17	Camp site and contractor facilities	Establishment of contractors' facilities	• Obtain permits and NOCs from ASPBC and other statutory agencies. • Contractor to submit a camp and site office plan defining all facilities to be created. These include human waste disposal facilities and solid waste management facilities. The basic plans provided in Annex 17) to be	Office site plan approved by PMC and APGCL. Site EMP being modified as per observation and submitted by Package 2 contractor and approved by APGCL after review of Environment cell of APGCL & PMC. Solid waste Management Plan is under preparation and

<table>
<tr><th>Sl.</th><th>Environmental Issue</th><th>Activity/ Location</th><th>Mitigation Measures</th><th>Compliance as on 31st December 2021</th></tr>
<tr><td></td><td></td><td></td><td>updated and finalized by contractor.</td><td>will be submitted to APGCL by Package 2 contractor.
All the toilets have the septic tanks and potable water are connected to all the toilets. Drinking water was supplied from the RO Plant.</td></tr>
<tr><td>18</td><td>Project facilities and commencement of construction</td><td>Clearances and permits</td><td>• Obtain environmental clearance from MoEF&CC
• Obtain forest clearance from forest departments
Include EMP in the contract documents.</td><td>Obtained EC and FC.
EMP included in the Contract document.</td></tr>
<tr><td colspan="2">CONSTRUCTION PHASE</td><td></td><td></td><td></td></tr>
<tr><td>1.</td><td>Impact and air, water, noise, soil</td><td>Civil construction work for power house, tunnel, office, substation, access roads, colony etc.</td><td>Air Pollution:
• All the vehicles must have valid PUC certificates at all the time during construction phase of the project.</td><td>PUC monitored for vehicles time to time.
CTO for DG sets attached in Annexure 15.2.</td></tr>
<tr><td></td><td></td><td></td><td colspan="2">
<table>
<tr><th>No</th><th>Registration No</th><th>Certificate No</th><th>S/c Name</th><th>PUC Date</th><th>PUC Expired date</th></tr>
<tr><td>1</td><td>NL 01 AE 5223</td><td>AS012500370001796</td><td>ECO Green</td><td>07.07.2021</td><td>06.07.2022</td></tr>
<tr><td>2</td><td>NL 01 AE 5206</td><td>AS012500370001795</td><td>ECO Green</td><td>07.07.2021</td><td>06.07.2022</td></tr>
<tr><td>3</td><td>RJ 14 GH 9976</td><td>D4RJ41104008</td><td>ECO Green</td><td>05.07.2021</td><td>04.01.2022</td></tr>
<tr><td>4</td><td>RJ 14 GH 6353</td><td>D4RJ41104006</td><td>ECO Green</td><td>05.07.2021</td><td>04.01.2022</td></tr>
<tr><td>5</td><td>RJ 14 GH 0194</td><td>D4RJ41104013</td><td>ECO Green</td><td>06.07.2021</td><td>05.01.2022</td></tr>
<tr><td>6</td><td>RJ 14 GH 0193</td><td>D4RJ41104010</td><td>ECO Green</td><td>05.07.2021</td><td>04.01.2022</td></tr>
<tr><td>7</td><td>RJ 14 GH 6354</td><td>D4RJ41104009</td><td>ECO Green</td><td>05.07.2021</td><td>04.01.2022</td></tr>
<tr><td>8</td><td>RJ 14 GH 9978</td><td>D4RJ41104011</td><td>ECO Green</td><td>05.07.2021</td><td>04.01.2022</td></tr>
<tr><td>9</td><td>RJ 14 GH 9975</td><td>D4RJ41104007</td><td>ECO Green</td><td>05.07.2021</td><td>04.01.2022</td></tr>
<tr><td>10</td><td>AS 01 DC 6771</td><td>D68RJ23104353</td><td>Shree Balaji Construction</td><td>27.06.2021</td><td>26.06.2022</td></tr>
<tr><td>11</td><td>AS 01 LC 9682</td><td>AS00100540002516</td><td>DN Shama</td><td>11.08.2021</td><td>10.08.2022</td></tr>
<tr><td>12</td><td>AS 01 LC 9684</td><td>AS00100540002518</td><td>DN Shama</td><td>11.08.2021</td><td>10.08.2022</td></tr>
<tr><td>13</td><td>AS 01 MC 3159</td><td>AS03100010001368</td><td>Kartik Biswas</td><td>09.07.2021</td><td>08.07.2022</td></tr>
<tr><td>14</td><td>AS 02 CC 6159</td><td>AS03100010001367</td><td>Kartik Biswas</td><td>09.07.2021</td><td>08.07.2022</td></tr>
</table>
</td></tr>
<tr><td></td><td></td><td></td><td>• Water sprinkling shall be done to suppress the dust emissions from the site.</td><td>Water sprinkling -Being mostly complied.
  </td></tr>
<tr><td></td><td></td><td></td><td>• All the DG sets used for construction shall have</td><td></td></tr>
</table>

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			valid consents from Assam State Pollution Control Board and shall have built-in stacks to reduce the air emission impacts. • Refer to Annex 24: Measures for Air Pollution Control.	 Annexure 7 sample PUC. 8 DG sets got CTO from PCBA. Annexure -15. Complied
			Control of Emission • The contractor will be responsible for maintaining properly functioning construction equipment to minimize exhaust.	Complied
			• Construction equipment and vehicles will be turned off when not used for extended periods of time.	Complied
			• Unnecessary idling of construction vehicles to be prohibited.	Complied
			• Effective traffic management to be undertaken to avoid significant delays in and around the project area.	Mostly complied. For internal road 100 % complied.
			• Road damage caused by sub-project activities will be promptly attended to with proper road repair and maintenance work.	Complied
			DG sets : • Location of DG sets	

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			and other emission generating equipment should be decided to keep in view the predominant wind direction so that emissions do not effect nearby residential areas.	Complied
			• Stack height of DG sets to be kept in accordance with CPCB norms.	Finalized
			Dust Control :	Complied
			• Identification of construction limits (minimal area required for construction activities).	
			• When practical, excavated spoils will be removed as the contractor proceeds along the length of the activity.	Stockpiled
			• When necessary, stockpiling of excavated material will be covered or stacked at offsite location with muck being delivered as needed during the course of construction.	Not initiated
			• Excessive soil on paved areas will be sprayed (wet) and/or swept and unpaved areas will be sprayed and/or mulched.	Not initiated
			• Contractors will be required to cover stockpiled soils and trucks hauling soil,	Complied

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			sand, and other loose materials. • Clean the wheels of vehicles leaving the site to control the mud spread onto the public road. • Contractor shall ensure that there is effective traffic management at site. • Dust Suppression – The roads, construction area and vicinity (access roads, and working areas) shall be swept, sprinkled with water on daily basis to suppress dust.	Complied Complied
			Noise Pollution: • Construction materials shall be properly maintained and noise barriers, if needed, shall be provided around worksites, to reduce the noise levels. Design of such barriers will be finalized by CSC environment specialist. • All the workers will be provided with personal protective equipment including ear plugs and other necessary provisions by the contractor. • Refer to Annex 25: Measures for Noise Pollution Control	• DG sets has aquistic enclosures to prevent noise. Workers are using ear plug at drilling and blast sites along with other safety equipment.   • PPE- Mostly complied. PPE kits are used 95 %. Use of hand gloves 100 %. Use of proper ear muffler/ plug -50%. Use oh Jackets, helmet and safety shoes-100 %.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
				 
			Water Quality: • Quality of water (river and wastewater discharged from the construction site) shall be analyzed monthly during construction, for its compliance to the disposal standards of pollution control authority. • Refer to Annex 26: Measures for Water Pollution Control	Waste water generation from the construction site not yet occurred. Will be monitored as seen as generated. Waste water from labour camp are kept in a stabilization pond adjacent to the colony and the overflow is chlorinated before reaching the receiving body. Grey water from the camp do not go through the septic tank But all the toilets are connected with Septic Tank.
	Exposure to safety related risks		**Others**: • Proper plantation all around colony. Refer to Annex 21: Green Belt Development Plan • Drainage with De silting chamber, will be provide all around power house, office, substation and colony.	Plantation initiated as per green belt development plan in some areas.  Drainage provided in the substation and camp area but outlet and desilting chambers to be constructed.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			• Solid waste storage bean system will be provided at required location. Refer to Annex 22: Solid Waste Management Plan • All buildings designed constructed as per seismic zone provision. • Safety system will be provided at required location. Refer to Annex 18, Annex 28, Annex 29 for Occupational, Health and Safety Plans.	 Solid waste storage bean kept at different sites  Waste are segregated designated bins at source and then biodegradable waste are taken to composting area and recyclable wastes are sent to vendors. All the building designs are constructed as per seismic zone provision.  Safety systems are provided at site. 

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
2.	Infrastructure provisions at labor camps	Health and hygiene at workers camps	• Contractor during the progress of work will provide, erect and maintain necessary living. • Accommodation and ancillary facilities for labor as per the requirements of applicable labor regulations of Government of India. • All the work sites and camp sites shall also be provided with basic sanitation and infrastructure as per the requirements of Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996. • Refer to Annex 12: Public Health Delivery System • Refer to Annex 18: Project Personnel Health Plan • Refer to Annex 28: Fire Protection in Labor Camps and Staff Colonies • Refer to Annex 29: Safety Practices during Construction	  Housekeeping and Hygiene at workers camps and bathrooms/toilets to be improved.  Accommodation facilities have proper celling to control heat. Before there was no celling but after our observation celling were placed.  Drainage facilities to be constructed/ completed at camps and facilities. Camp sites also be provided with basic

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
				sanitation and infrastructure as per the requirements of Building and other Construction Workers. Facilities provided.  Sub contractors kitchens
	Fire Protection in Labor Camp and Staff Colonies	• Safety Practices During Construction Phase	• Safety Practices During Construction Phase • Refer to Annex 28: Fire Protection in Labor Camps and Staff Colonies	Fire extinguishers are placed at vulnerable sites. Status of Fire Extinguisher at Project sites (Table 20).  One set of the fire extinguisher was sent for refilling by the agency.  
3.	Solid Waste Management	Construction camps	• Collection and disposal of human waste as per waste management plan. • Refer to Annex 22: Solid Waste Management Plan	Solid waste disposal mechanism is only dumping in a pit. MSW management plan is being developed and will be implemented soon.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
				Due to lack of authorised land fill sites and municipalities nearby the site, inhouse facilities to be developed as per municipal waste management rules, 2016. Which is being implemented now. After development of Captive landfill site all the already dumped or stored materials will be collected and processed in the Solid waste Management Site.
4.	Muck disposal	Tunneling and excavation activities	• Muck generated from various tunnelling and excavation activities would be dumped suitably to designated sites • Refer to Annex 13: Muck Disposal Plan	4 muck dumping sites identified and currently 2 are being used. Muck disposal plan under preparation and will be submitted soon. Muck disposal plan will be submitted soon. Dumping in the designated dumping yard. Requested the contractor to immediately replant the slope up with grass to prevent soil erosion and replacement trees to compensate for numbers that were lost due to muck disposal.  For levelling of the road 60% of the materials were used and the usable stones were taken to crusher plant. Rest are at site. Contractor will collect the remaining materials to the dumping yrad and left over materials after

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
				compaction will be revegetated.
5.	Construction sites	Restoration of sites	• Restoration of construction sites. • Refer Annex 19: Construction Site Restoration Plan.	Not yet arises.
6.	Noise and vibrations	Equipment layout and installation	• Construction techniques and machinery selection seeking to minimize ground disturbance. • Refer to Annex 25: Measures for Noise Pollution Control	Being complied mostly. Construction activities done in barren areas only and on acquired land. Document related to the construction methodology and machine specification will be prepared and submitted.
7.	Disturbed farming activity	Physical construction	• Construction activities on cropping land time to avoid disturbance of field crops (within 1 month of harvest wherever possible).	Being complied.
8.	Noise vibration and operator safety, efficient operation, equipment wear and tear	Mechanized construction	• Construction Mechanized maintenance and turning of plant. • Proper maintenance and turning of plant • Implement environmental mitigation and good-construction as integral component of each civil activity and as day-to-day activity	Being complied and monitored.
9.	Increase in airborne dust particles	Construction of access roads	• Existing roads and tracks used for construction and maintenance access to the site wherever possible. • Refer to Annex 24: Measures for Air Pollution Control	Being mostly complied. Water sprinkling to reduce dust.
10.	Increased land requirement for temporary accessibility	Construction of access roads	• New access ways restricted to a single /intermediate carriageway width. Refer to Annex 20: Road Construction Management Plan	Being complied. Permanent and temporary roads are constructed as per plan approved. As per EMP roads under EIA 2018.
11.	Temporary blockage of utilities	Construction work	Temporary placement of fill in drains/canals not permitted	Being complied. Whenever observed, immediately cleared.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
12.	Loss of vegetative cover	Site clearance	Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	Being complied. Tree cutting are done in presence of Forest Department only after enumeration and recording.  Tree marking & cutting at Power house area in presence of Panimure Forest Deparment Team    
13.	Fire hazards	Trimming/cutting of trees	• Trees allowed growing up to a specified height within the work areas by maintaining adequate clearance between the top of tree and the conductor as per the regulations.	Will be complied.
14.	Loss of vegetation and deforestation		• Trees that can survive pruning to comply should be pruned instead of cleared.	Being complied.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			• Felled trees and other cleared or pruned vegetation to be disposed of as authorized by the statutory bodies.	
	Loss of vegetation and deforestation	Reservoir clearing	• Removal of maximum commercially viable timber. • All remaining timber, after commercial and salvage logging operations have been completed, will be cut as necessary and burnt. • Avoid removing stumps, as disturbed soil may release far more nutrients in water.	Will be complied.
15.	Loss of vegetation and deforestation	Wood/vegetation harvesting	• Construction workers prohibited from harvesting wood in the project area during their employment, (apart from locally employed staff continuing current legal activities). • Contractor should arrange LPG gas for cooking of food for their workers. • Refer to Annex 17: Plan for Construction Camp Management	Fire wood collection not allowed. LPG are used for cooking. In few cases Kerosene stoves are used by the subcontractor.
16	Loss of Biodiversity, Disturbance / accidents/ injury, to wildlife and avian fauna	Construction and clearing of forest areas	• Implementation of Compensatory afforestation plan. • Creation of a greenbelt around the perimeter of various project appurtenances, selected stretches along reservoir periphery, access roads to compensate for the loss of habitat • Provisions of adequate signages and speed limit on road sections within forest areas to avoid accidental roadkills . • Poaching activities should be monitored in workers areas and well as community areas (as per Annex 9).	• Not yet initiated by the Forest Department. Letter given to Nodal Officer to initiate the CA works. Annexure 8 • Not yet initiated. • Signages placed in the forest area to reduce the speed limit. • Poaching activities monitored and awareness carried out among the

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			• Implementation of Biodiversity Conservation and Management Plan (Annex 9) • Compliance with guidelines issued by the National Wildlife Board of India for linear intrusion in natural area pertaining to roads and power lines. • Compliance with guidelines issued by the Central Electricity Authority (CEA) for laying transmission lines in areas critical from the point of view of saving wildlife. • Provision of wild fruit plantation for wildlife • Annual bird count of migratory birds by involving locals and bird experts • Rehabilitation with local fruit bearing species in gaps Anti-grazing drive in drawdown area to protect the bird breeding areas in proximity to reservoir during breeding season – only in winter season. Grazing by local people will be allowed during dry season. • Construction of check posts / watch towers in key locations • Conservation actions as proposed by IUCN (during construction and during the initial project operation) such as conducting a comprehensive survey and monitoring in and around the project area to establish range, distribution and	workers. • BMP not yet initiated. Plantation initiated and discussion with forest department going on for the implementation for BMP. • NABL clearance not taken as there is no WLS in 10 km radius. • CEA guideline will be complied during construction of transmission line. • Wild fruit plantation initiated. • Annual Bird count not initiated. Annual bird count will be initiated in the winter months with support of forest department. • Rehabilitation with local fruit bearing species in gaps not initiated. • Anti-grazing drive in drawdown area to protect the bird breeding areas in proximity to reservoir – not initiated. • Construction of check posts – not initiated • Implementation of Conservation action plan – not initiated.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			population status of vulnerable and critical habitats in the project area for assessing its habitat requirements and identifying threats are proposed. • Establishment of biodiversity conservation committee. • Refer to Annex 9: Biodiversity Conservation and management Plan • Refer to Annex 21: Green Belt Development Plan	Biodiversity conservation committee – will be constituted shortly. Discussion with forest department going on for the implementation for BMP.
17.	Runoff to cause water pollution, solid waste disposal	Surplus earth work/soil	• Excess fill from excavations disposed of next to roads or on barren land or personal in agreement with the local community or land owner. • Soil excavated from power houses will be disposed as safe & scientific manner by placement on barren land or along back fill trench weir etc.	• Does not arise as entire land is acquired for the project including the dumping area. • Will be adhered. • Material has been stocked as backfilling will be required in the Power House.
18.	Loss of soil and water pollution	Substation construction	• Fill for the substation foundation obtained by creating or improving local water supply ponds or drains, with the agreement of local communities. • Construction activities involving significant ground disturbance (i.e., substation land forming) not undertaken during the monsoon season.	- Does not arise. - Followed during construction of construction power substation.
19.	Contamination of receptors (land, water, air)	Storage of chemicals and materials	• Fuel and other hazardous materials securely stored above high flood level with safety measures. • Refer to Annex 18: Project Personnel Health Plan	Mostly followed for fuel. Fuel dispensing unit approval received. All Hazardous chemicals are stored on concrete floor with tarpaulin cover shade.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
				20KL petrol pump station is established.  For hazardous chemical materials stores to be constructed.
20.	Noise nuisance	Construction schedules	During work near settlements construction activities only undertaken during the day and local communities will be informed of the construction schedule.	Construction scheduled for day only in the revenue land near villages. Construction during night are done in the areas away from the human habitation. Local people were informed about the daily construction schedule and the blasting timings. Sign boards were also installed with the blasting timongs.
21.	Contamination of receptors (land, water, air)	Provision of facilities for construction workers	• Construction workforce will be provided for certain facilities it includes proper sanitation, water supply and waste disposal facilities. • Refer to Annex 17: Construction Camp Management Plan	Housekeeping and Hygiene at workers camps and bathrooms/toilets to be improved. Drainage facilities to be constructed/completed at camps and facilities. Sedimentation tanks to be constructed. Municipal Solid Waste Management facility to be developed as per rule. Mentioned in Sl no. 3 under Construction Phase EMP of Table 7A.
22.	Loss of agricultural productivity	Encroachment into agricultural land	• Use of existing roads wherever possible. • Ensure existing irrigation facilities are maintained in working condition. • Protect/Preserve topsoil	- Followed. - Does not arise so far. - Top soil preservation not initiated. Instructed to contractor to adhere. - Will be followed if

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
			and reinstate after construction completed. • Repair/reinstate damaged bunds, etc. after construction completed	bunds are damaged.
23.	Social inequities	Encroachment into agricultural land	Compensation for temporary loss in agricultural production as per provisions of Resettlement and Tribal Development Plan	Followed
24.	Soil loss, downstream siltation; etc.	Uncontrolled erosion/silt runoff	• Need for access tracks minimised, use of existing roads. • Limit site clearing to work areas regeneration of vegetation to stabilize works areas on completion (where applicable). • Avoidance of excavation in wet seasons. • Water courses protected from siltation through use of bunds and sediment ponds. Refer to Annex 26: Water Pollution Control Measures	- Followed - Site clearing is done where necessary. - Excavations are avoided during wet season. - Water courses will be protected from siltation through use of bunds and sediment ponds. - Bund prepared for construction of culverts.
25.	Losses to neighbouring land uses/values	Nuisance to nearby properties.	• Contract clauses specifying careful construction practices on every stage. • Maximum existing access ways will be used. • Productive land will be reinstated following completion of construction.	- Followed. - Existing access roads are mostly used. - Productive land will be reinstated following completion of construction.
26.	Social inequities	Nuisance to nearby properties.	Compensation will be paid for loss of production, if any as per provisions of Resettlement and Tribal Development Plan	Being followed.
27.	Flooding and loss of soils, contamination of receptors (land, water)	Flooding hazards due to construction impediments of natural drainage.	• Avoid natural drainage pattern/ facilities being disturbed/ blocked/ diverted by ongoing construction activities. Refer to Annex 30: Dam Break Analysis And Disiaster Management Plan	Natural drainages are not blocked through any kind of construction activity.

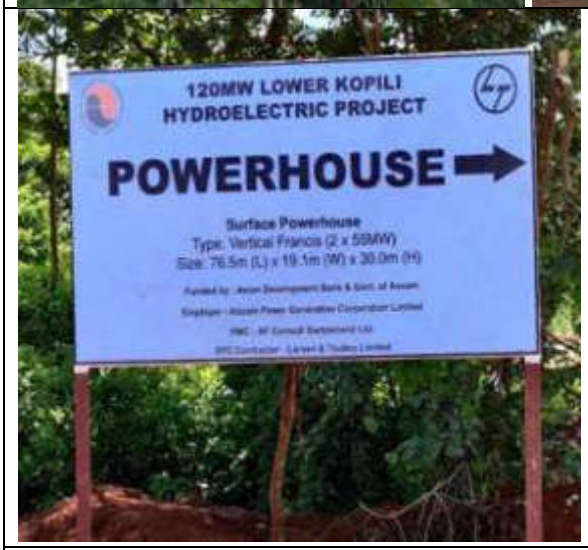
Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
28.	Contamination of receptors (land, water)	Equipment submerged under flood	Equipment stored at secure place above the high flood level (HFL) i.e. 185.34 m.	Complied. Storage facility are above the HFL.
29.	Loss of land values	Inadequate siting of borrow areas	Existing sites (if available) will be used, therefore, no need to develop new sources of aggregates.	Existing quarries will be used. Tunnel excavation initiated. Aggregates are used from the excavated materials. For use of existing quarries fresh permissions are required.
30.	Injury and sickness of workers and members of the public.	Environment, Health and safety	• Arrangement of Environment awareness programme. • Contract provisions specifying minimum requirements for construction camps. • Preparation and implementation of health and safety plan. • Arrangement of primary health centre with medicine and instrument with a knowledgeable health staff. • Arrangement for health and safety training sessions. • Refer to Annex 12: Public Health Delivery System • Annex 16: Plan for Environmental Training of Workers	- Arrangement of Environment awareness programme- will be initiated. - Followed. - Health and safety plan prepared and implementation is ongoing. - Primary health centre constructed with trained health staff. - Health camps are being organised by the contractor for the community people. - Anti malarial measures taken by the contractor foe the labours. - Health Facilities at Construction sites and labor camp established - For implementation of Public Health Delivery system discussion with respective departments will be initiated soon.  - Health and safety training conducted by L&T - Training were also given to the subcontractor personals.

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Compliance as on 31st December 2021
				- PMC and PMU will also arrange Health and Safety trainings. - Sample First Aid Box 
31.	Likely to maximize damages	Inadequate construction stages monitoring.	• Training to personal of implementing agency for environmental monitoring work. • Implementation of effective environmental monitoring and reporting system using checklist of all contractual environmental requirement. • Appropriate contact clauses to ensure satisfactory implementation of contractual environmental mitigation measures.	- Informal Trainings are conducted by the PMC and PIU regularly. - PMC and PIU carried out formal training on EHS and implementation of EMP on 17.11.21.  - Check list prepared and implementation monitored. - Letters issued to the contractor on the contractual obligations of noncompliance and this will be continued.
OPERATION PHASE				***Operation phase monitoring will be carried out during operation.***

Other initiatives :









Project sign board displayed at various location (Dam, Powerhouse, HRT, Valve House, & near camp)

Table 7B, 7C, 7D describes the Corrective actions on compliances to EMP and table 8 shows other compliances.

Table 7B : Corrective Actions to be taken

Action taken on ADB Aide Memoire for the ADB Mission 13th – 17th December 2021

Sr.	Actions Required	Timeline	Status as on 31.12.2021
For APGCL & PMC			
1	Finalization of EIA Addendum, reviewedand cleared for disclosure on the ADB's website	Overdue; final draft to be submitted to ADB no later than 31 January 2022 for ADB disclosure within Q1 2022	APGCL has not received further observations from ADB on EIA addendum. All the queries were addressed. The status of the EIA

Sr.	Actions Required	Timeline	Status as on 31.12.2021
			addendum as on 31st December 2021 was discussed in the report.
2	Mobilization of External Environmental Monitor per loan covenants and issuingof first external EMR validating monitoring results from project commencement to Q4 2021	Overdue; to be undertaken immediately with first external EMR submitted together with Q4 2021 EMR before 31 January 2022, then on an ongoing basis in parallel with APGCL EMR submission	EMR for the period of July to December 2021 will be submitted to ADB from APGCL by February, 2022. External monitoring consultant will visit the site in the month of February 2022 onwards. After review by the consultants the EMR will be sent to ADB.
3	Ensured that all dam design revisions continue to be reviewed by an independent engineer to the designer, independent engineer to also superviseand monitor construction of the dam	Immediately for current dam design to inform finalization of EIA addendum, then on ongoing basis	Agreed and will be incorporated.
4	Clarify area and quality of forest habitat impacted, including outside forest land defined as “highland crops” by the resettlement plan. Resolve how to achieve “no net loss” of biodiversity considering the amount andquality of forest habitat that is being lost.	Immediately to inform finalization of EIA addendum	Already intimated to ADB on ‘no net loss’.
5	Collection of daily flow variation and other hydrological data by APGCL at dam site area to inform downstream impact study	Immediately to enable downstream impact study to commence	Collection of Daily flow data initiated from November 2021 after a gap of few months due to COVID. Annexure 11. IIT Guwahati agreed to carry out the study.
6	Completion of	Within Q2 2022	IIT Guwahati agreed to

Sr.	Actions Required	Timeline	Status as on 31.12.2021
	downstream impact study and peaking power operation, confirmation of operational protocol thatwill ensure “not net loss” of downstream biodiversity		carry out the study. Proposal will be submitted soon.
7	Ensure GRC contacts are being well disseminated to the local community and that all grievances no matter how minor and easily resolved be recorded.	Immediately	GRC contacts are being well disseminated to the local community.
	Placing of GRC complaint box and display board with contact details at site entrances, APGCL site office at Longku, and in adjacent villages for registering/submitting of complaints.		GRC complaint box is already placed in the APGCL Engineers Mess at Longku.
8	Onsite EHS training for the Contractor’s safeguard team on the implementation of EMP including updates as a result of the EIA Addendum For existing contract award contractor to be instructed to follow updates as a result of the EIA Addendum, draft until finalized	Further training onclearance of EIA addendum by ADB	Already taken up with the 7 critical species. More trainings will be carried out. As soon as the EIA addendum is finalized and disclosed al the CEMPs will be updated.
9	Incorporate latest EMP including updates as a result of the EIA Addendumin the contract documents for Packages 1, 3 and 4 which have not yet been awarded	Prior to issue of biddingdocuments and/or contract award	Updates will be shared with package 3 and 4 contractors. As the 2 packages tender were uploaded so it will not be possible to add EMP updates at this stage. As soon as the EIA addendum is approved by ADB and disclosed additional EMP measures

Sr.	Actions Required	Timeline	Status as on 31.12.2021
			will be communicated to the contractors. For package. 1 EMP will be updated after disclosure of EIA addendum provided the EIA addendum is disclosed before tender.
10	Establish multidisciplinary committee to oversee environment safeguards implementation per national environment clearance	Immediately	Nomination of one Social Expert was pending as on 31.12.21.
11	Review and approve contractor's updated CEMP covering all sub-plans (i.e., worker camp, muck disposal, solid waste, biomedical waste, hazardous waste, hazardous chemicals, batching plants, crusher units, labor influx management, etc.) CEMP to cover all EMP and EMoP provisions per the latest EMP including additional mitigation and monitoringmeasures as a result of the EIA Addendum, refer to draft until finalized.	Immediately with copy of final approved CEMPto be attached to the Q42021 EMR	Muck Management Plan, Biomedical waste plan and Influx management plan pending from Package 2 contractor. Rest CEMP approved by APGCL. CEMP attached in Appendix-1. As soon as the EIA addendum is disclosed we will ask contractor to incorporate the additional mitigation measures in the CEMP.
12	Ensure EMP mitigation and monitoring measures being implemented in full, payparticular attention to those flagged for attention during ADB Staff Consultant's site visit and/or as not yet initiated per APGCL presentation to the ADB Mission with particular	Immediately and prior to commencing any related operations	Ongoing

Sr.	Actions Required	Timeline	Status as on 31.12.2021
	attention to the biodiversity related measures		
For Contractor under Supervision/Monitoring of APGCL/PMC			
13	Before commencing operations CTO for batching plant unit at power house to be obtained from PCBA	CTE - prior to establishment	CTE and CTO obtained for batching plant unit at powerhouse. Batching Plant CTE – 11.11.2021 CTO- 27.12.2021 validity till 31.03.2025.
	Obtain CTE for batching plant at dam site from PCBA and subsequently obtain CTO	CTO - prior to commencing operations	CTE for batching plant at dam site under process and subsequently CTO will be obtained from PCBA. Except ground clearing no works initiated.
14	Obtain outstanding permissions for quarrying and aggregate extraction	Prior to commencing related operations	NOC from NCHAC yet to be obtained and is under process.
15	Obtain outstanding permissions for the use of explosives – explosives storage and fire licenses	Prior to commencing related operations	Obtained. NOC for Explosive license and Magazine construction from District Magistrate, Dima Hasao, Halflong on 19.11.2021.
16	Obtain outstanding permissions for vehicle registration, ensure that all vehicles and plant including DG sets being used have requisite pollution consent in place	Prior to commencing related operations Construction vehicles and plant for which permissions are not in place are not to be used until they are obtained.	Vehicle registration under Bhutan Govt. already changed for 2 nos. of vehicles and rest 4 nos. of vehicles are under process for registration change. CTO for 8 DG sets obtained from PCBA. 4 DG sets CTO with Crusher Plant 7.12.21, 4 DG sets CTO with Batching plant 27.12. 2021.
17	Obtain outstanding permissions for ground water abstraction	Prior to commencing related operations	Under process. Persuasion needed from the Package 2 contractor.

Sr.	Actions Required	Timeline	Status as on 31.12.2021
		Groundwater abstraction for which permissions are not in place to be ceased untilthey are obtained, an alternative source is to be provided in the interim	Detail of alternate source to meet the requirement will be submitted by the contractor. Application for clearance submitted on 9th November, 2021.
18	CEMP to be updated as required to reflect any changes in mitigation measures as a result of the final EIA Addendum	Immediately on ADBclearance of final EIA addendum	Will be done after disclosure of the EIA addendum.
19	Development of storage facilities for hazardous fuels, oils, chemicals, and waste with impermeable surface and bunded to 110% of capacity, display of hazard warning signs, MSDS etc. No fuel or empty fuel, oils, chemicals to be left lying around project site; they are to be kept in storage facilities or temporarily on drip trays and adequately labelled with their contents	Immediately	Storage facilities for hazardous fuels, oils, chemicals, and waste with impermeable surface to be completed soon as informed by the contractor. To be complied.
20	Development of solid waste management systems including disposal and storage facilities with transport and disposal to suitably licensed waste management facilities	Immediately	Area selected for Solid waste disposal and management and will be implemented soon. Mentioned in SI no. 3 under Construction Phase EMP of Table 7A.
	No waste to be disposed of onsite; all ofthe waste disposed of to date in a pit is to be removed from project site for transport and disposal to suitably licensed waste management facilities		Authorized solid waste management sites not available in and around the project area. As such a captive management site is proposed for the compliance. Mentioned in SI no. 3 under Construction Phase EMP of Table 7A.

Sr.	Actions Required	Timeline	Status as on 31.12.2021
21	Regular housekeeping and cleaning at workers camps including toilets and washing facilities; toilets and washing facilities need to be cleaned regularly minimum of twice per day	Immediately	Ongoing
22	All sanitation and welfare facilities including toilets and canteen to be connected to minimum of septic tankwith soak away for sewage treatment. Ensure discharged wastewater is being monitored per the EMoP to ensure discharge standards being met. No untreated sewage is to be disposed to surface water or ground.	Immediately	Toilets waste water goes through septic tank with soak pit. Instructed contractor not to contaminate the natural stream with Canteen waste water. Soak pit for canteen wastewater will be installed. Sewage treatment to be initiated and discharged wastewater to be monitored as per the EMoP to ensure discharge quality complying the standard limit as prescribed by CPCB. Package 2 contractor was instructed not dispose any untreated sewage water to surface water or ground.
23	All worker accommodation, sanitation,and welfare facilities to meet national and International Labor Organization (ILO) standards	Immediately	Ongoing. ILO Standard Document shared with the contractor.
	Ensure clear and safe are walkways provided to access these facilities		Already exists.
	Drinking water provided must be in accordance with Indian drinking water standards and the water tested after aswell as prior to treatment		Test results of the RO plant comply with the Indian drinking water standards. Tested by Jal Board and one NABET accredited agency.

Sr.	Actions Required	Timeline	Status as on 31.12.2021
24	Worker accommodation facilities to have proper ceilings to control heat.	Immediately	Completed for already constructed camps and ongoing for new ones.
25	Drainage facilities of adequate design and capacity such that there is no standing water on-site to be constructed/ completed at the worker camps and other construction facilities	Immediately	Under construction. All the drains are yet to be connected in labour camp and in the APGCL/PMC colony. Before the monsoon drains will be completed.
26	Complete initial AIDS / HIV awareness training for all workers on site and then undertake regular refreshers	30 January 2022	One training completed. Refresher trainings will be carried out.
27	Complete initial biodiversity awareness training for all workers on site and then undertake regular refreshers	30 January 2022	Biodiversity awareness training given to 50 % the workers. Rest trainings are ongoing.
28	Installation of effectively designed and operated sedimentation tanks for sediment laden runoff from concrete batching and exposed soils across theconstruction site.	30 January 2022.	Not complied but will be initiated soon.
	Ensure discharged water from sedimentation tanks being monitored to demonstrate sediment load being adequately reduced.		To be monitored after construction of sedimentation tank.
	Ensure that soils exposed on slopes are immediately vegetated or temporarily covered with geotextile to help stabilizethem and		To be initiated.

Sr.	Actions Required	Timeline	Status as on 31.12.2021
	prevent sediment laden surface water runoff.		
29	Shifting of all overburdens after utilization to muck storage or disposal sites; the muck currently stacked alongthe road in the forest area contrary to the EMP to be utilized or shifted to themuck storage or disposal sites	Immediately	Ongoing and instructed for their landscaping and stabilization
30	Surfacing of the permanent and temporary access roads to reduce dust emissions	Immediately before traffic volumes increaseas a result of construction work	Ongoing
	Sprinkling of water to be undertaken regularly on all access roads to and within the project site, minimum of twice per day but more frequently on dry or windy days		Ongoing
31	Ensure H&S of tunnel works with all persons entering tunnels to have training in confined spaces, a tag-in-tag-out system implemented, adequate ventilation, lighting levels, and oxygen monitoring etc.	Immediately prior to undertaking further tunneling operations	Ongoing
32	Ensure H&S of all excavations which are to be adequately shored up and barricaded	Immediately prior to undertaking further excavation operations	All the excavated sites are already barricaded. Culvert construction areas are temporarily barricaded with safety tapes.
33	Ensure all trip and fall hazards are removed, good housekeeping to remove debris lying around project site, covering of openings in	Immediately	Ongoing

Sr.	Actions Required	Timeline	Status as on 31.12.2021
	floors etc.		
34	Ensure traffic controls in place with flagmen at all site entrances off the public highway	Immediately	Instructed contractor to deploy flagmen at all site entrances off the public highway.
35	Ensure valid labor license maintained for number of workers that are on site (current license for 250 workers expiresduring December 2021)	Immediately	License renewed. 500 labour covered and valid up to 9 Dec 2022. Labour license application was submitted on 17.12.21 to increase of workforce from 500 to 1000. Till 31.12.21 the contractor has not got the approval of 1000 workers.
36	Ensure that polychlorinated biphenols and asbestos containing materials arenot being used in construction works	Ongoing	Not yet used and the condition will be adhered.

Table 7C : Corrective Actions Plan (CAP) prepared during monthly meeting on the Implementation of EMP

(Date : 24.12.2021)

Sl. No.	Points discussed	Completion date
1	River crossing – will be covered following the best practices to safeguard the river ecology	agreed by contractor
2	Batching Plant- Sedimentation tank to be constructed. But as per CTO waste water also to be treated before disposal complying the standards.	Sedimentation tank will be constructed by 15th January, 2022.
3	Batching Plant – Labour shed and toilet to be constructed.	15th January, 2022
4	Royalty submission copies to be submitted.	30th December, 2021 Royalty submission copies submitted by 3rd January, 2022.
5	Drinking water quality test report to be submitted	26th December 2021. Monitoring of ambient air, water and noise completed by 31st December 2021 and

Sl. No.	**Points discussed**	**Completion date**
		reports submitted in the second week of January,2022.
6	Weekly test of the drinking water to be carried out (only pH)	Will be initiated from 20th January, 2022
7	pH of dam site and powerhouse will be carried out weekly and reported in the MER	Will be initiated from 20th January, 2022
8	Muck management Plan will be prepared as per drawing submitted by PMC after joint survey at site.	15th January, 2022.
9	Blasting permits to be submitted of Alberin Explotech Private Limited	30th December, 2021
10	Ear plugs, whistles to be provided to all the tunnel workers	31st December, 2021
11	Solid wastes management site to be developed at PR7 and explore the possibility of sending wastes to Umrangso or other site after segregation.	15th January, 2022
12	Shade for storage of chemicals to be developed.	25th January, 2022
13	Final Layout Plan of APGCL/ PMC colony and workers to be submitted immediately.	7th January, 2022
14	Sand quarry – It is expected that after washing the crusher dust required specific gravity will be attained. If not as a precautionary measure L&T to apply for the river sand quarry.	25th January, 2022
15	Reflective tapes to be fixed on the unsafe rods at adit.	7th January, 2022
16	Expansion in front of the Dam Batching plant to be stopped . Plan to be submitted (with coordinates) before execution of the works in the forest diverted land.	7th January, 2022
17	Copy of renewal application of the labour license to be submitted for record.	31st December, 2021.
18	Contact No and email address of all support staff responsible for implementation of EMP to be provided and updated in the MER.	31st December, 2021.
19	Conditions of the clearances to be adhered and if followed differently justification to be given. i.e. Boundary wall of the explosive magazine.	Earthen mud bund will be prepared instead of wall.
20	Red dust bin to be replaced by Blue and Green bins at all the kitchens.	31st December, 2021.
21	Fires extinguishers to be placed in front of the kitchen of APGCL/ PMC campus.	31st December, 2021.
22	Sediments to be cleared from the DT outlet side drain and Adit tunnel side drains and it is to be regularly cleared.	31st December, 2021.
23	Safety barriers to be checked regularly.	
24	Stack height of the 2nd compressor at Adit to be increased.	10th January, 2022.
25	PUC of the vehicles to be renewed and the revised table of all the vehicles to be submitted in the next MER.	

Sl. No.	Points discussed	Completion date
26	Safety plan and security plan to be combined and EMP provisions must be kept and submitted to APGCL for approval.	31st December, 2021.
27	Quarry NOC for aggregates is still pending with North Cachar Hills Autonomous Council.	Pending

Table 7D : Corrective Action Plan Suggested by External Monitor after review of SEMR

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
1	Consent to Operate (CTO) on Batching Plant, Crusher Plant, Operation Quarry Operation, etc.	This need to be expedited. Continuous follow ups and coordination is required.	Contractor		Consent to Operate (CTO) was accorded for Batching Plant (Near Powerhouse) on 27.12.21 and for Crusher Plant on 7.12.21. For Quarry operation, CTO is not required in Assam.
2	Noise and vibrations	Construction methodology and machine specification need to be prepared and submitted for approval.	Contractor		Construction methodology and machine specification prepared and submitted by the package 2 contractor, and it was approved by PMC and APGCL during the tender process. Moreover, Contractor submits Method statement before starting of each component and they are reviewed and approved by PMC and APGCL. Sample of method statement is provided as annexure I.
3	CTO for batching plant at Dam site	Latest status to be provided	Contractor	Application of CTE submitted in March 22 to PCBA.	CTE obtained from PCBA and subsequently the contractor will obtain CTO.

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
4	Obtain outstanding permissions for ground water abstraction.	Latest status to be provided	Contractor	Contractor pursuing the matter with CGWB for the same.	Application submitted to CGWB in November 2021.
5	Obtain outstanding permissions for vehicle registration; ensure that all vehicles being used have requisite PUC (pollution under control) in place.	All such vehicles with registered in Bhutan must be registered with Indian numbers and PUC to be obtained.	Contactor	Will be complied by the end of July 22.	Letter has been issued to Contractor to obtain Indian registration of the vehicles along with PUC.
6	Compliance to Environment Clearance specific condition.	Status of wildlife clearance as stipulated under specific condition of Environment Clearance accorded to the project needs to be updated.	PMU (APGCL)		a). As per stipulation of MoEF&CC it is clearly mentioned that "The project proponent shall obtain clearance from the National Board for Wildlife, **if applicable**." b). While applying for Environment Clearance and Forest Clearance it was mentioned that there is no Wildlife Sanctuary or National Park within 10 km radius of the project. c). DFO and Conservator of Dima Hasao and Karbi Anglong; Nodal Officer FC Act, Govt of Assam and the CCF of Regional Office of MoEF &CC, Shilong had also put forward their views in this regard. d). As per requirement APGCL had submitted a MZ file to ministry to scertain the situation nd verify the facts in

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
					heir DMS (Decision Management System). e). The ministry said that prior wildlife clearance will be required by projects located within 10 km of national park/wildlife sanctuary which need environmental clearance. f). Based on the aforesaid facts Ministry has accorded both EC and FC for LKHEP. **Please note that the condition given in 'Annexure I are all Standard EC Conditions for River Valley and Hydro Electric Projects' are not project specific.** **In such circumstance it will not be justified to ask Ministry to modify the stipulation as asked for.**
7	NOC for surface water use	NOC for surface water use for construction is yet to be obtained.	Contractor	Before the use of surface water from river Kopili.	Package 2 contractors was already intimated, and they are in touch with the Water Resource Department, Govt. of Assam for obtaining NOC for the use of river water for processing to use in construction purpose only.
8	Water Quality: Measures for Water Pollution Control	As per the CTO attached in SEMR, the unit must construct an	Contractor	Constructi on will be completed by end of	Treatment facility of wastewater generated from Batching plant is under construction.

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		Effluenttreatment plant for the treatment of wastewater generated from theplant and the parameter should met the general discharge standards as given in Appendix D of the CTO. For the current project the discharge standard for releasing in surface water body shall be taken. Current progress towards the establishing the treatment plant as well as discharge quality need to be updated. Also, **Wastewater** shall always bewritten as **wastewater** with no gap in between.		June 2022 and subsequen tly test will be carried out by the recognized laboratory through the Contractor .	

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
9	Drinking water quality test reports to be submitted	The water quality test report is provided for the APGCL Engineer camp, APGCL colony, RO plant, Labour and Staff Colony, Revenue Land. Except for the Revenue Land sample, for the rest of places water quality is potable. However, weekly pH data fromthese selected sources, not reported. Further, the SEMR should also need to report the physical progress of safeguard measures taken up by contractor to protect the plant equipment's (mechanicaland electrical) and dam from the acidic water.	Contractor	July 2022.	Weekly pH data not reported as it is not mentioned in the EMoP. But daily pH data were collected for the RO water. Physical progress of safeguard measures taken up by contractor to protect the plant equipment's (mechanicaland electrical) and dam from the acidic water will be reported in the next Six-monthly report.
10	Direction of Honorable NGT to Government of Meghalaya to implement afforestation program and rejuvenation of all the polluted river stretches in Meghalaya along with regular monitoring of the	1). Afforestation with Conventional method needs to be taken up for plantation in 224.26 Ha of land across 8 districts of Meghalaya; in the upcoming SEMR, the progress of such afforestation program needs to	PMU (APGCL), PMC		The entire work is under the supervision of NGT and accordingly they have constituted a committee for proper implementation. So APGCL cannot enter in this matter.

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
	water quality of river (pH).	be captured with administrative support from APGCL. 2). Rejuvenation of degraded coal mines through soil amendment and microbial technology to be taken up in Meghalaya, therefore progress of such activities also needs to be reported in the next SEMR. 3). The River Rejuvenation Committee (RCC) of Govt. of Meghalaya has recommended the proposal of M/s Trinity Impex International for a Pilot Project of Phytoremediation through Micro Algae treatment of the acidic water for Kyrhuhkhla River. The progress also to be monitored from the next SEMR.			
11	Environmental Flow	How much flow of water will be allowed during lean period?	PMU (APGCL).		The environmental release for the lean period, computed as 20% of the average flow of the four leanest months, is 5.345 m3/s. (Already mentioned in EIA and DPR)

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
12	Drainage system	Drainage system needs to be provided with de-silting chamber all around powerhouse, office, substation, and colony however no such progress was observed during field visit in February 2022.	Contractor	Drainage system will be completed by end of October 2022 around office and colony.	
13	Muck Management Plan, Biomedical waste plan and Influx management plan pending from Package 2 contractor.	Status to be provided, whetherthey are part of C-EMP.	Contractor	Muck management plan will be approved 30th July 2022. Biomedical waste plan and Influx management plan will be submitted by the contractor by 30th July 2022.	Muck management plan submitted, reviewed by PMC and APGCL and returned to Contractor to incorporate the observations and submit it for approval. Biomedical waste plan and Influx management plan under preparation.
14	Muck Disposal Plan	It should be prepared and shared for approval. It should be part of C-EMP. Native grass seeds need to scatter on naked slopes of muck disposal sites once site has accommodated	Contractor	After completion of all excavation works landscaping of the muck disposal sites will be	After approval of the Muck Management Plan, it will be annexed to the CEMP. Muck disposal plan is part of Muck Management Plan. As the Muck disposal sites are in the revenue land provisions for discussion with Forest

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		the estimated quantity after discussing with forest authority at local level.		initiated.	Department were not kept in the plan. Only during selection of native and value-added plants forest departments will be consulted during stabilization and landscaping of the muck disposal areas.
15	The miscellaneous area and Muck disposal site has been shifted from Forest Land to Revenue Land as per the suggestion of Forest Advisory Committee's (MoEF&CC) suggestion. The EPCcontractor of Package 2 selected 4 additional muck disposal sites in Revenue land. According to ADB SPS 2009 the impacts associated with the change in the project's footprints termed as "unanticipated impacts" and requires EIA update	Possible impacts due to muck disposal and mitigating measures for the same needs to be updated in the EIA before execution of any such activity.	PMC, APGCL, ADB	Disclosure of the EIA addendum depends on the time taken for approval of ADB and ADB consultant . All the supportive informatio n and required feedbacks were provided to ADB consultant on 9th May 2022.	As the muck disposal facility has been shifted to revenue land the expected impact has been minimized and as per recommendation of FAC the 22 Ha of the earlier muck disposal site inside the forest has been kept and maintained as green belt by the EA. Subsequently the disposal sites will be converted to green cover with plantation of value-added native tree species for the conservation of in-situ biodiversity. EIA update is under process through ADB consultant and will be finalized and disclosed as EIA addendum.
16	Muck disposal	At muck disposal site protectionwall provide to valley side sospillage of into the river	Contractor	Muck managem ent plan will be approved	Designs are under preparation for the protection of spillage of soil, etc. from the Disposal sites.

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		muck can be avoided.		30th July 2022.	
17	Compensatory AfforestationPlan.	This is seasonal activity only can becarried out during pre-monsoon season to ensure high survival rate. Hence, it is suggested to plant at least 3-4 months before the onset of the pre-monsoon.	Forest Department	Six monthly and yearly compliance reports to MoEF&CC under EC and FC.	APGCL has already paid necessary amount for compensatory Afforestation under CAMPA fund of MoEF&CC. The Forest Department, Govt. of Assam has taken up the CA for Dima Hasao and Karbi Anglong in the APO of 2022-2023. As per departmental norms Forest Department will implement the CA. APGCL will monitor the activities and the Department will submit the six-monthly progress report to APGCL, so that APGCL can update the status of CA to the Ministry.
18	Biodiversity Management Plan	It needs to be initiated and planned for coming rainy season being a seasonal activity. One season missed means one year lost. The following activities inclose coordination with the Department of Forest to be initiated: 1). Formulation of Biodiversity Monitoring	APGCL, PMC	By 30th July 2022 By 20th August 2022.	Biodiversity Monitoring Committee has already been proposed and after obtaining the nominations from the concerned department's notification will be issued. After constitution of the Biodiversity Monitoring Committee

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		Committee to monitor the BMP activities at project site. 2). Biodiversity Monitoring awareness program to be developed with timeline to provide awareness of biodiversity to localcommunity, school and other institutions actively engaged atlocal levels (if any). 3). Self-help groups to be formed for implementing and monitoring the Biodiversity Monitoring activities at local level. If possible and available women may be motivated to participate in self-help groupetc. 4). It is also suggested to constructwater holes, wherever possibleand applicable inside the forestfor quenching wild animalthirst, which may also greatly avoid human animal		By 20th August 2022. By 20th August 2022.	all the activities under the BMC including awareness will be planned and implemented. The committee will decide on the formation of SHGs under BMP. However, there is no provision for formation of SHGs for monitoring the biodiversity. Proposal for construction of water holes inside the forest will be discussed with the committee and finalize the implementation plan.

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		encounterand conflicts.			
19	Loss of Biodiversity, Disturbance / accidents/injury, to wildlife and avian fauna	To avoid road killing subways/culvert should be constructed for road crossing for wildlife. Information on Critical habitat assessment study required for the project needs to be updated.	APGCL, PMC, Forest Department	By 20th August 2022. ADB will disclose the EIA addendum after their review.	APGCL will take up the issue during the Biodiversity Monitoring Committee meeting and explore the feasibility. Based on the Biodiversity Assessment carried out during February 2021, the Critical habitat assessment was updated by ADB, and additional measures were suggested by the ADB experts. This will be part of the EIA addendum.
20	Catchment Area Treatment(CAT) Plan implementation	Regular follow up with the concerned agency for the concurrence of the CAT plan and closely monitor the implementation.	APGCL, PMC, Forest Department	Six monthly and yearly compliance reports to MoEF&CC under EC and FC	The CAT Plan implementation authority is the Forest Department. APGCL has deposited the amount for implementation in the CAMPA fund of MoEF&CC. As intimated by the Forest department CAT Plan implementation will start this year and it approved in the AOP of 2022-2023. APGCL will monitor during implementation.
21	Camp site facilities	The rooms at camp site should be provided with proper illumination, smoke detector, proper insulation	Contractor, PMC, PIU, APGCL	Contractor will be requested to install the smoke detector in the	All the necessary requirements in the camps were initiated to the contractor. Installation of smoke detector in the rooms will be intimated to the

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		of electrical system. Labor should be provided with provision of clean water, adequate toilet facilities with respect of number oflabor ratio and clean bedding facilities with proper space between two beds.		rooms by 20th June 2022. PMC and APGCL will monitor the implement ation.	contractor.
22	Installation of effectively designed and operated sedimentation tanks for sediment laden runoff from concrete batching andexposed soils across the construction site and monitoring.	Latest status to be provided	Contractor	By 30th June 2022	Already intimated to the contractor long back for execution. Updated status will be provided soon.
23	Soak pit for canteen wastewater will be installed	Latest status to be provided	Contractor	By 30th June 2022	Already intimated contractor to treat the wastewater and comply the standard limit before discharge. Updated status will be provided soon.
24	Ensure that soils exposed on slopes are immediately vegetated or temporarily covered with geotextile to help stabilize them and prevent sediment	Excavated soil should be graded according to soil type and stored separately. Heaps of soil should be covered with geotextile or and grass and	Contractor Sri@2020	By 30th June 2022	All the observations made by External Monitor related to contractor were intimated to the contractor for implementation. Updated status will be provided soon.

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
	laden surface water runoff.	vegetation. Latest status to be provided.			
25	Soil and Sediment testing Pre-construction phase- At identified locations 1 km upstream of submergence site Submergence area: 1 and 3 km downstream of dam site.	It is mentioned in the report that "***As testing of soil was in the scopeof the External Monitor it was notinitiated. Sample will be taken from the undisturbed site".*** To clarify it, it should be undertaken by PIU or PMC responsible for executing the project. The external monitoring agency will scrutinize it.	PIU, PMC		Soil and Sediments monitoring during pre-construction was the responsibility of PMSC/External Monitor as mentioned in the ADB approved EMP.
26	Downstream impact study on aquatic ecology	Latest status?? It is mentioned thatit was carried out in Feb. 21. Reportto be shared.	APGCL, PIU and PMC	Please update status & Timeline	As, both the upper HEP are not in operation, downstream Impact study cannot be initiated now. Considering the facts ADB has extended the period till Q4, 2022 to execute the study.
27	Environmental pollution	For hazardous material a separate storage space with impermeable concrete floor and proper bund to be constructed to avoid oil spillages	Contractor	By 30th June 2022	Intimated to the Contractor for implementation. Updated status will be provided soon.
28	EMP Expenditure	Detailed information of the EMP	APGCL and PIU		Details of EMP expenditure are provided in the SEMR

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		expenditure is missing.			table 20 A & 20 B, pages no 112-114.
29	Environment, Health, and Safety	1.) Peripheral drain around the canteen needs to be provided with fenced to avoid accident. 2). Labor and other project site official must be provided with medicated mosquito nets for protection against malaria, dengue and other vector bornediseases. 3). The safety signage and other instruction displayed at the Project site needs to be updated/replaced withmultilingual signs mainly with the local language which Local residents can read andunderstand. 4). Training should be provided to kitchen staff, regarding how fire extinguishers operate. 5). AIDS / HIV awareness	APGCL, PIU, PMC, and Contractor	31st July 2022.	All the observations of the External Monitor related to Contractor have been intimated to package 2 contractor for implementation.

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		training for workers needs to be incorporated during induction training. 6). First Aid Boxes needs to be handled and maintained properly, timely trainings to First Aider and other site staff should be provided and allLogs/Records to be maintained properly. 7). Emergency Contact of First Aider should be reachable to alland may to be updated as and when needed 8). For underground works permit system must be implemented. 9). To ensure traffic controls is in place, training program on traffic management for alldrivers should be planned. 10). All staffs & labors working at the site should be			

Sl. No.	Activity	External Monitoring Agency Remarks	Responsibility	Timeline	APGCL Response
		trained on Prevention of Sexual Harassment at Workplace (POSH). Orientation of all staff on local culture & heritage.			

Table 8 : Other Safety compliances

	Safety Compliances	
1	Illumination monitoring on night shift work	
2	Prestart briefing	
3	Automatic safe load indicators installed at all lifting crane	

4	Noxious gas monitoring and Oxygen level before entering drift tunnel	
5	Periodical Electrical ELCB/RCCB Testing	
6	Predeployment alcohol monitoring	

7.0 Environmental Supervision and Monitoring Results

7.1 Environmental Supervision

Site inspections and audits completed during the reporting period July, 2021 to December, 2021 in table 9.

Table 9 : Site inspection and audit.

Date	Type and Purpose of Visit	Location/s Visited	EA, IA, Consultant Staff Participating
29.07.2021	Monitoring the test of ambient environment by third party; Monitoring of the labour camps and construction facilities. Calibration of the instruments checked	7 locations as mentioned in EMP (Dam site, Power house, submergence are, kala nullha, batching plant site, etc)	Dr Deepak Baruah, Environment Expert, APGCL; Dr Jayanta Das Environment Specialist, PMC; Mr. Manoj Yadav, Environmental Engineer of Contractor; Mr. Nabajyoti Bera, EHS Engineer of Contractor. Ambient environment test monitoring Team. 

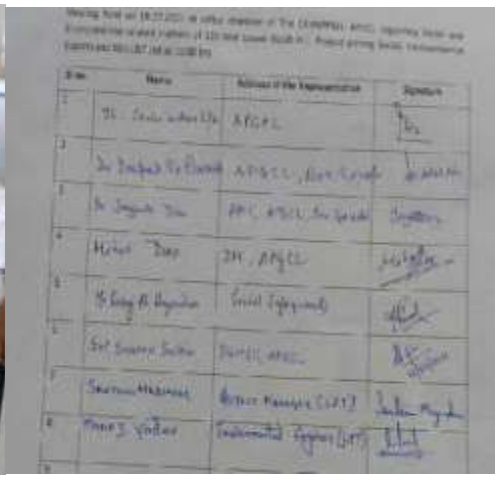
Date	Type and Purpose of Visit	Location/s Visited	EA, IA, Consultant Staff Participating
22.09.2021	Joint visit for verifying the present location of the quarries of Fine aggregates (Sand)	Quarry of Fine Aggregates. Location : near Panimur And near Miyungma Daogah Water fall	Mr. K.C.D. Difussa, AM, Civil of APGCL; Mr. Anjaiah Lukka, Quarry and Mining Manager, L&T; Mr. Vickey Sharma, Material Engineer & Quality Control, PMC; Dr. Jayanta Das, Environment Specialist, PMC  Joint visit report. Annexure 9.
23.09.2021	EMP implementation	Project components	Mr Dhiraj Borthakur, EHS Officer, APGCL, Dr Jayanta Das Environment Specialist, PMC; Mr. Manoj Yadav, Environmental Engineer of Contractor; Mr. Nabajyoti Bera, EHS Engineer of Contractor.
05.10.2021	EMP implementation before Honourable Finance Minister, GOI; CM, GOA; CEMs of Dima Hasao and Karbi Anglong visit on 7.10.21	Project components	Mr V. Reddy, RE, PMC; Mr. Sashi Sharma, DTL, PMC; Mr Dhiraj Borthakur, EHS Officer, APGCL, Dr Jayanta Das Environment Specialist, PMC; Mr. Manoj Yadav, Environmental Engineer of Contractor; Mr. Nabajyoti Bera, EHS Engineer of Contractor. 
23.10.2021	Monitoring the test of Stack emission by Green Tech Environmental Engineer & Consultants	All DG sets at project area	Mr Dhiraj Borthakur, EHS Officer, APGCL, Dr Jayanta Das Environment Specialist, PMC; Mr. Manoj Yadav, Environmental Engineer of Contractor

Date	Type and Purpose of Visit	Location/s Visited	EA, IA, Consultant Staff Participating
			
19.11.2021	EMP implementation, Labour colonies	Project components	Mr Dhiraj Borthakur, EHS Officer, APGCL, Dr Jayanta Das Environment Specialist, PMC; Mr. Sangram Singh, Social Expert, PMC; Mr. Manoj Yadav, Environmental Engineer of Contractor.  
22.12.2021 & 24.12.2021	EMP implementation, Labour colonies	Project components	Mr Dhiraj Borthakur, EHS Officer, APGCL, Dr Jayanta Das Environment Specialist, PMC; Mr. Sangram Singh, Social Expert, PMC; Mr. Manoj Yadav, Environmental Engineer of Contractor.
29.12.2021	Monitoring the test of ambient environment by third party; Monitoring of the labour camps and construction facilities. Calibration of the instruments checked.	7 locations as mentioned in EMP (Dam site, Power house, submergence are, kala nullha,	Dr Deepak Baruah, Environment Expert, APGCL; Dr Jayanta Das Environment Specialist, PMC; Mr. Manoj Yadav, Environmental Engineer of Contractor; Mr. Nabajyoti Bera, EHS Engineer of Contractor. Ambient environment test monitoring Team.

Date	Type and Purpose of Visit	Location/s Visited	EA, IA, Consultant Staff Participating
		batching plant site, etc)	

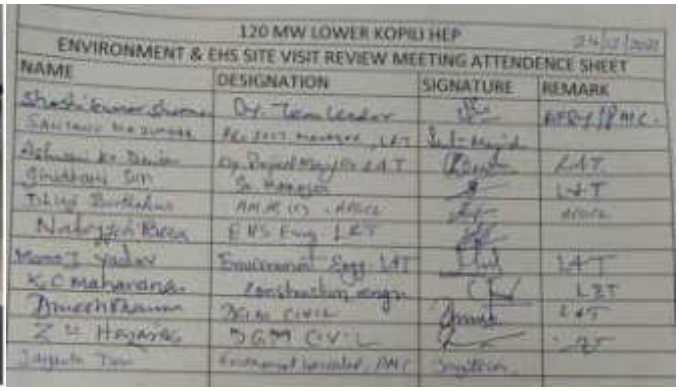
Meetings on EHS issues :





Meeting held on 19.07.2021 at APGCL, Guwahati





Monthly Meeting on Implementation of EMP- 24th December, 2021 at Langku

7.2 Quantitative Environmental Monitoring

A. Baseline Monitoring : Test of ambient environment of Air, Water, Noise in all the 7 locations were carried out in the month of October, 2020 and again in December, 2021. Test results are within the CPCB standards except for Kopili river water quality . Baseline monitoring was in July, 2021.

Table 10 : Pre Construction Monitoring

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Status as on 31st December 2021
Soil and Sediment					
Pre-construction Stage	pH, Electrical Conductivity, Nitrogen, Phosphates, Potassium, Organic matter, water content, silt content, average grain size, heavy metals, Al, Fe, Cu, Mn, As, Zn, Ni, Pb, Cr, C, Cd	At identified locations 1 km upstream of submergence site Submergence area 1 and 3 km downstream of dam site	Once prior to start of construction	-	Not initiated but will be carried out as soon as the External monitor engaged. As testing of soil was in the scope of the External Monitor it was not initiated. Sample will be taken from the undisturbed site.
Air Quality and Noise Levels					
Pre-construction Stage	• $PM_{2.5}$, PM_{10}, SO_2, NOx, CO, HC (Standards given in Annex 2) • Leq - Noise levels day time and noise time on dB (A) scale (GoI and IFC Standards given in Annex 2)	• Wherever the contractor decides to locate the Hot mix plant • At major construction sites as suggested by CSC for regular monitoring • At hot mix plant and equipments yards • At sensitive receptor locations	Once prior to start of construction	Continuous 24 hours/ or for 1 full working day – twice in a week.	Test carried out between 12.06.21 to 5.07.21
Water Quality					
Pre-construction Stage	pH, Temperature, DO, Oil & Grease, Conductivity, TSS, TDS, Alkalinity, Total Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, heavy metals, COD, BOD, Iron, Total	At identified water bodies locations • 1 km upstream of submergence site • Submergence area • 1, 3 and 8 km downstream of	Once prior to start of construction	-	Test carried out between 26.06.21 to 5.07.21.

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Status as on 31st December 2021
	Coliform, Faecal Coliform, Salinity (Surface Quality Standards by CPCB as given in Annex 2)	dam site • At identified water bodies locations (wells and other ground water sources in project area)			
Terrestrial Ecology					
Pre-construction	Terrestrial Flora and fauna (using camera traps, incidental observations)	At selected locations in the project area, near proposed worksites, along the transmission line route, along access roads, and in the forest south of the project area, for determination of baseline	Once prior to start of construction	-	Camera trap not initiated but will be carried out as soon as the External monitor engaged. But monitoring done during Biodiversity study in February, 2021. As forest land was not handed over by the Forest Department till 11th June 2021 all the activities were concentrated in the revenue land area only.
Aquatic Ecology					Carried out during biodiversity study in February, 2021.
Pre-construction	Phytoplankton, zooplankton, benthic animals, fish composition	• 1 km upstream of reservoir site • downstream of dam site	Once prior to start of construction	-	Although carried out during biodiversity study but detail study will be covered on the Down stream impact study within 31st December, 2021.

B. Construction phase Monitoring :

Environmental monitoring results are summarized in the table 11 (air quality), 12 (noise quality), 13 (drinking water quality), 14A, 14B (surface water quality) in the reporting period's quantitative monitoring activities and data obtained in accordance with the Environmental Monitoring Plan (EMoP) of the project. Tests were carried out twice during

(October 2021 & December 2021) July to December, 2021.
Air quality monitoring are done as per EMoP.
Surface water quality is carried out for 7 sites as per EMoP in the month of December, 2021.
From June 2022 onwards all parameters of drinking water will be assessed.
Aquatic ecology was done in February, 2021 and it was planned to be done again during the down stream impact study. But now onwards it will be done seasonally asper EMoP.
Regarding hydrology, discharge data is taken on daily basis.
Test reports are shown in Annexure 10.

Table 11 : Results of the Ambient Air quality

Date of sampling	Location	Weather	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	HC (mg/m^3)	CO (mg/m^3)
4.10.2021	Worker Camp	Clear	28.9	17.7	10.2	BDL	BDL
5.10.2021	APGCL Camp (Near Hospital / Highway)	Clear	34.2	18.8	10.9	0.03	0.04
6.10.2021	Surge Shaft	Clear	35.8	19.3	11.9	BDL	BDL
8.10.2021	Power House	Clear	36.5	19.2	10.8	BDL	BDL
9.10.2021	Power intake / Dam site	Clear	30.6	18.9	10.6	BDL	BDL
10.10.2021	Crusher	Clear	38.0	20.5	12.7	BDL	BDL
	HRT Adit	Clear	34.7	19.0	11.4	BDL	BDL
11.10.2021	Quarry site	Clear	39.4	21.6	12.0	BDL	BDL
11.10.2021	Switch Yard / Valve House	Clear	34.9	18.0	8.6	BDL	BDL
17.12.2021	Power intake / Dam site	Clear	31.3	17.1	11.2	BDL	BDL
18.12.2021	HRT Adit	Clear	39.3	19.4	12.5	BDL	BDL
20.12.2021	Crusher	Clear	37.0	21.3	13.2	BDL	BDL
22.12.2021	APGCL Camp (Near Hospital / Highway)	Clear	35.6	19.2	11.6	0.02	0.03

Date of sampling	Location	Weather	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	HC (mg/m^3)	CO (mg/m^3)
23.12.2021	Batching Plant	Clear	32.3	18.6	12.3	BDL	BDL
24.12.2021	Surge Shaft	Clear	36.7	19.5	12.8	BDL	BDL
25.12.2021	Workers camp	Clear	29.8	16.3	11.4	BDL	BDL
27.12.2021	Switch Yard / Valve House	Clear	36.1	19.2	8.7	BDL	BDL
Baseline data	Worker camp	Clear	27.6	17.1	10.2	BDL	BDL
	APGCL Camp (Near Hospital, Highway)	Clear	33.1	19.1	9.2	0.01	0.03
	Surge shaft area	Clear	34.3	17.5	10.1	BDL	BDL
Standard			Concentration in Industrial, Residential, Rural and other area				
		Annual	60	40	40		
		24 hours	100	60	80		
		8 hours				2.0	

WHO recommended 2021 AQG levels

Pollutant	Averaging Time	2021 AQGs
$PM_{2.5}$ $\mu g/m^3$	Annual	5
	24 Hour	15
PM_{10} $\mu g/m^3$	Annual	15
	24 Hour	45
O_3 $\mu g/m^3$	Peak season	100
	8 hour	10
NO_2 $\mu g/m^3$	Annual	10
	24 Hour	25
SO_2 $\mu g/m^3$	24 Hour	40
CO mg/m^3	24 Hour	4

Table 12 : Results of ambient noise level

Location	Noise Level in dB (A)Leq (6:00 AM to 10 PM) Baseline	Date of sampling	Noise Level in dB (A)Leq (6:00 AM to 10 PM)
Power intake / Dam site		08.10.2021	48.8
Power intake / Dam site		17.12.2021	49.2
Power House		09.10.2021	48.0
Quarry site		10.10.2021	51.3
Crusher		11.10.2021	52.6
Crusher		20.12.2021	51.0
HRT/ Adit		11.10.2021	49.1
HRT/ Adit		18.12.2021	48.3
APGCL Camp (Near Hospital / Highway)	55.2	06.10.2021	56.0
APGCL Camp (Near Hospital / Highway)		22.12.2021	57.2
Batching Plant		10.10.2021	47.2
Batching Plant		23.12.2021	48.3
Surge Shaft	44.6	04.10.2021	45.9
Surge Shaft		24.12.2021	46.7
Workers camp	51.2	05.10.2021	52.6
Workers camp		25.12.2021	53.6
Switch Yard / Valve House		08.10.2021	52.7
Switch Yard / Valve House		27.12.2021	54.3
Standard	Day (6:00 AM to 10 PM) dB (A)Leq		Night (10:00 PM to 6:00 AM) dB (A)Leq
Industrial Area	75		70
Commercial Area	65		55
Residential Area	55		45
Silence Zone	50		40

WHO guidelines for Noise

Specific Environment	Time Base (hours)	Standard limits as per WHO guidelines	
		LAeq[dB]	LAmax, fast [dB]
Industrial, commercial, shopping and traffic areas, indoors and outdoors	24	70	110

(Note : In addition to LAeq daytime also present maximum LAeq 1 hour since that is WHO guideline will be followed).

Table 13 : Water quality of drinking water / Ground Water

Date of sample collection		Parameters	Unit	Baseline (from RO Plant)	Results	Acceptable	Permissible
10.10.2021	APGCL Engineer Camp	p^H	--	7.16	6.35	6.5-8.5	No Relaxation
		Turbidity	NTU	0.4	1.6	1.0	5.0
		Total hardness	mg/L	159.6	64.3	200	600
		Total Alkalinity	mg/L	310.5	88.9	200	600
		Residual Chlorine	mg/L	<0.1	BDL	0.2	1.0
		Fluoride	mg/L	0.34	0.36	1.0	1.5
		Chloride	mg/L	18.2		250	1000
		Iron (as Fe)	mg/L	0.12	0.04	0.3	No Relaxation
		Total Coliform	MPN/100 ml	Nil	Absent	Shall not be detectable	Shall not be detectable
10.10.2021	Ground water at Revenue Land	p^H	--		5.83	6.5-8.5	
		Turbidity	NTU		0.84		5
		TDS	mg/L		226.2	1500	2000
		TSS	mg/L		55.7		---
		Oil & Grease	mg/L		<5		---
		Total hardness	mg/L		187.3		600
		Calcium	mg/L		86.9		200
		Magnesium	mg/L		45.2		100
		Total Alkalinity	mg/L		122.5		600
		Sulphate	mg/L		14.3		400
		Nitrate	mg/L		5.5		No relaxation
		Phosphate	mg/L		0.03		No relaxation
		Conductivity	µS		81.6		No relaxation
		Arsenic	mg/L		BDL		No relaxation
		Iron (as Fe)	mg/L		0.31		No relaxation

Date of sample collection		Parameters	Unit	Baseline (from RO Plant)	Results	Acceptable	Permissible
		Total Coliform	MPN/100		2	Shall not be detectable	Shall not be detectable
		Fecal Coliform	Absent				Nil
18.12.2021	APGCL Engineer Camp	p^H	--		6.57	6.5-8.5	No Relaxation
		Turbidity	NTU		1.92	1.0	5.0
		Total hardness	mg/L		83.3	200	600
		Total Alkalinity	mg/L		BDL	200	600
		Residual Chlorine	mg/L		BDL	0.2	1.0
		Fluoride	mg/L		0.34	1.0	1.5
		Chloride	mg/L		15.8	250	1000
		Iron (as Fe)	mg/L		0.02	0.3	No Relaxation
		Total Coliform	MPN/100 ml		Nil	Shall not be detectable	Shall not be detectable
29.12.2021	APGCL Colony	p^H	--		6.65	6.5-8.5	No Relaxation
		Turbidity	NTU		2.13	1.0	5.0
		TDS	mg/L		211.7	200	600
		TSS	mg/L		42.5	200	600
		Total Hardness	mg/L		117.2	200	600
		Calcium	mg/L		63.4		
		Magnesium			45.2		
		Total Alkalinity	mg/L		277.5	200	600
		Chloride	mg/L		10.3	250	1000
		Phosphate	mg/L		0.02		
		Sulphate	mg/L		18.6		
		Nitrate	mg/L		4.1		
		Conductivity	µS		20.8		

Date of sample collection		Parameters	Unit	Baseline (from RO Plant)	Results	Acceptable	Permissible
		Arsenic			BDL		
		Iron (as Fe)	mg/L		0.33	0.3	No Relaxation
18.12.2021	Labour and Staff Colony	p^H	--		6.55	6.5-8.5	No Relaxation
		Turbidity	NTU		0.43	1.0	5.0
		Total hardness	mg/L			200	600
		Total Alkalinity	mg/L		43.3	200	600
		Residual Chlorine	mg/L		BDL	0.2	1.0
		Fluoride	mg/L		0.34	1.0	1.5
		Chloride	mg/L		15.8	250	1000
		Iron (as Fe)	mg/L		0.02	0.3	No Relaxation
		Total Coliform	MPN/100 ml		Nil	Shall not be detectable	Shall not be detectable

APGCL Engineer Camp, APGCL Colony, Labour and Staff Colony are used as potable and drinking water. Ground water at Revenue Land not used for any purpose except water for sprinkling (pH 5.83).

Best used water Criteria – CPCB

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH betwwn 6.0 to 8.5 Electrical Conductivity at 25C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

There is no national Surface water quality standard in India.

WHO Drinking Water Specification

Parameters	Standard limits as per WHO guidelines (mg/L)
Acrylamide	0.0005
Alachor	0.02
Aldicarb	0.01
Aldrin and Dieldrin	0.00003
Ammonia	1.5
Antimony	0.02
Arsenic	0.01
Atrazine	0.002
Barium	0.7
Benzene	0.01

Parameters	Standard limits as per WHO guidelines (mg/L)
Benzo(?)pyrene	0.0007
Boron	0.5
Bromate	0.01
Bromodichloromethane (BDCM)	0.06
Bromoform	0.1
Cadmium	0.003
Carbofuran	0.007
Carbon tetrachloride	0.004
Chlorate	0.7
Chlordane	0.0002
Chloramines	0.5 - 1.5
Chloride	200 - 300
Chlorine	5
Chlorite	0.7
Chloroform	0.3
Chlorotoluron	0.03
Chlorpyrifos	0.03
Chromium	0.05
Colour in drinking water	No visible colour
Copper	2.0
Cyanazine	0.0006
Cyanide	0.07
1,2-Dichlorobenzene	1.0
1,4-Dichlorobenzene	0.3
1,2-Dichloroethane	0.03
Dichloromethane	0.02

Parameters	Standard limits as per WHO guidelines (mg/L)
2,4-Dichlorophenoxyacetic acid	0.03
DDT and metabolites	0.001
Di(2-ethylhexyl)phthalate	0.008
1,2-Dichloroethylene	0.05
1,2-Dichloropropane	0.04
Dimethonate	0.006
1,4-Dioxane	0.05
Dissolved oxygen	No health-based guideline value is recommended
Edetic acid (EDTA)	0.6
Endrin	0.0006
Epichlorohydrin	0.0004
Ethylbenzene	0.3
Fenoprop	0.009
Fluoride	1.5
Hexachlorobutadiene	0.0006
Iron	No health-based guideline value is proposed
Isoproturon	0.009
Lead	0.01
Lindane	0.002
Manganese	0.4
Mercury	0.006
Methoxychlor	0.02
Metolachlor	0.01
Microcystin-LR	0.001
Molinate	0.006
Molybdenum	0.07
Monochloroacetate	0.02

Parameters	Standard limits as per WHO guidelines (mg/L)
N-Nitrosodimethylamine	0.0001
Nickel	0.07
Nitrate	50
Nitrilotriacetic acid (NTA)	0.2
Nitrite	3
Pendimethalin	0.02
Pentachlorophenol	0.009
Permethrin	0.3
pH	No health-based guideline value is proposed
Pyriproxyfen	0.3
Selenium	0.01
Simazine	0.002
Sulphate	No health-based guideline value has been derived
Styrene	0.02
Terbuthylazine	0.007
Tetrachloroethylene	0.04
Toluene	0.7
Total dissolved solids (TDS)	No health-based guideline value is proposed
Trichloroacetate	0.2
Trichloroethylene	0.02
2,4,6,-Trichlorophenol	0.2
Trifluralin	0.02
Trutuim	10000 Bq/L
Uranium	0.015
Vinyl chloride	0.0003
Xylenes-total	0.5

Parameters	Standard limits as per WHO guidelines (mg/L)
Zinc	No health-based guideline value is proposed

Table 14.A : Surface Water Quality (October, 2021)

Parameters	Unit	Results					
		Submergence area, Dam site	**1 km D/S of Dam**	**1 km U/S of Dam**	**3 Km D/S of Dam**	**Kala Nala**	**Lonku Nala**
Sample collection Date		09.10.2021	10.10.2021	9.10.2021	10.10.2021	10.10.2021	10.10.2021
Temperature		29°C	28°C	27°C	29°C	28°C	28°C
p^H	--	7.22	6.98	7.24	6.86	6.8	6.83
Turbidity	NTU	2.05	2.7	2.16	1.85	31	4.9
TDS	mg/L	35.6	32.5	31.9	29.4	150.3	114.5
TSS	mg/L	68.4	74.6	86.7	81.2	34.3	91.6
Oil and Grease	mg/L	<5	<5	<5	<5	<5	<5
Dissolved Oxygen	mg/L	7.3	7.2	6.6	7.7	6.7	7.7
Total Hardness	mg/L	62.7	68.5	63.4	58.7	71.5	82.5
Calcium	mg/L	36.5	35.2	32.7	26.4	31.2	26.4
Magnesium	mg/L	25.6	19.4	17.8	13.6	17.4	17.6
Total Alkalinity	mg/L	23.2	31.6	22.5	25.8	124.8	117
Chloride	mg/L					17.6	26.3
Sulphate	mg/L	8.7	19.2	12.6	14.3	14.2	12.8
Nitrates	mg/L	6.9	3.8	4.3	7.1	5.1	7.3
Phosphates	mg/L	<0.02	<0.02	<0.02	<0.02	0.01	<0,02
Salinity	%	0.4	0.2	0.3	0.2	0.15	125
Conductivity	µS/cm	95.6	79.3	72.6	88.6	163	BDL
Arsenic	µg/L	<0.001	BDL	BDL	BDL	BDL	1.1
Iron (As Fe)	mg/L	0.37	0.71	1.1	0.97	1.3	0.3
Total Coliform	MPN/100 ml	Nil	2	2	4	3	3
Fecal Coliform	MPN/100 ml	Nil	Nil	Nil	Nil	Nil	Nil
BOD	mg/L	4.6	4.2	5.9	5.1	10	9.1
COD	mg/L	132	61	46	55	65	24

Although the turbidity of the surface water is high in Kala Nala, the water after primary treatment subsequently treated in RO plant before use.

Table 14.B : Surface Water Quality (December 2021)

Parameters	Unit	Results						
		Submergence area, Dam Site	**1 km D/S of Dam**	**1 km U/S of Dam**	**3 Km D/S of Dam**	**8 Km D/S of Dam**	**Kala Nala**	**Lonku Nala**
Sample collection Date		17.12.2021	17.12.2021	17.12.2021	17.12.2021	17.12.2021	10.10.2021	10.10.2021
Temperature		18°C	19°C	19°C	20°C	21°C	20°C	20°C
p^H	--	6.13	4.38	4.54	4.19	4.09	6.77	6.95
Turbidity	NTU	2.13	1.45	2.11	2.13	3.61	29.6	2.6
TDS	mg/L	55.9	36.7	38.6	22.6	41.5	154.8	131.3
TSS	mg/L	74.3	81.2	92.5	79.4	56.7	32.5	97.4
Oil and Grease	mg/L	<5	<5	<5	<5	<5	<5	<5
Dissolved Oxygen	mg/L	7.1	7.6	6.1	7.1	5.9	6.9	6.5
Total Hardness	mg/L	66.9	69.3	72.6	63.5	88.6	66.2	75.2
Calcium	mg/L	32.4	32.9	35.3	30.7	43.9	33.5	29.6
Magnesium	mg/L	16.7	16.7	18.1	15.8	20.2	15.2	18.5
Total Alkalinity	mg/L	94.2	34.5	28.6	31.5	125	120.6	128
Chloride	mg/L	15.8	12.3	18.5	15.2	12.9	15.3	21.1
Sulphate	mg/L	11.5	15.2	9.2	14.3	14.3	17.7	13.7
Nitrates	mg/L	6.3	3.4	3.3	10.9	6.6	4.6	4.5
Phosphates	mg/L	<0.02	<0.02	<0.02	<0,02	BDL	<0.01	<0.02
Salinity	%	0.4	0.3	0.5	0.4	0.4	0.11	0.4
Conductivity	µS/cm	102	84.7	70.5	85.2	116	160	119
Arsenic	µg/L	<0.001	BDL	BDL	BDL	<0.001	BDL	BDL
Iron (As Fe)	mg/L	0.71	0.63	0.93	0.88	1.3	1.6	1.5
Total Coliform	MPN/100 ml	3	3	3	3	2	2	4
Fecal Coliform	MPN/100ml	Nil	Nil	Nil	Nil	Nil	Nil	Nil
BOD	mg/L	2.2	3.6	6.1	5.5	3.2	9.2	11
COD	mg/L	6.7	52	54	60	104	56.8	23

Sharp decline in the pH level in the river water is due to upstream activities related to rat hole coal mining in Meghalaya.

Table 15 : Stack Emission and Noise Level of DG sets monitoring

Location and KVA	Date	PM in g/kw-hr	CO in g/kw-hr	Noise Level
Surge Shaft area (40 KVA)	26.10.2021	0.18	1.30	69
Airtel Tower (125 KVA)	26.10.2021	0.10	0.30	67.1
Valve House (125 KVA)	26.10.2021	0.17	0.82	68.9
Workshop (30 KVA)	26.10.2021	0.15	1.74	72.9
Standard Limit		≤ 0.2	≤ 3.5	< 75 dB(A) 1 m distance

গ্রীনটেক্ এনভাইৰনমেণ্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেণ্টছ্

GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS

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TC-5991

GEEC/FM49

ULR Number: TC599121000000883F			
Report No: GECC/FL/22/STK/2021/10/13		Date:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab ID	GECC/STK/2021/10/13
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling:	23/10/2021
		Date of Receipt:	25/10/2021
		Test Start Date:	25/10/2021
Sampling Location	**Tower**	Test End Date:	26/10/2021
STACK MONITORING REPORT			
Stack Details:	**DG-(125KVA)** **M/C No-E835118IP143466**	Fuel Used:	HSD
Stack Height, m (Approx.)	3.6	Stack Dia, m	0.12
Sample Porthole height (GL) m	-	Area in m^2	0.011
Flow Characteristics			
Velocity in m/sec	**17.8**	**Flow rate**	**0.201**
Ambient Temperature, °C	**33.4**	Stack Temperature, °C	**252.3**
SAMPLING RESULT			
Sl. No.	**Parameter**	**Results**	**Emission Limit**
1	PM in g/kw-hr	**0.10**	≤ 0.2
2	CO in g/kw-hr	**0.30**	≤ 3.5
********** End of report **********			
Sl. No.	**Type of Instrument**	**Model No.**	**Model Make**
1	Stack Gas Analyzer	Testo 340 & Stack Monitoring Kit: SMS-4	Testo Instruments Pvt. Ltd. & Poltech Pvt.Ltd

Checked by:
Sanjib Saikhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

* The results relate only to the item tested.
* The test report shall not be produced except in full, without written approval of the laboratory.
* The test report cannot be used as evidence in the court of law without prior written approval of the laboratory.
* Deviation: Sampling was done directly from exhaust/opening.

Page 1 of 1

Photographs of test of ambient environment



Air monitoring and Noise sampling at Surge shaft area (December 2021)



surface water sampling



Water Sampling

Biodiversity study :

Analysis of the critical habitat and associated mitigation measures is underway and will be reflected in the EIA addendum. After disclosure of EIA addendum, the additional EMP measures will be followed at site.

Construction Biodiversity study not yet initiated by package 2 contractor, but will be initiated soon, after deployment of all the contractors.

7.3 Pollution Control Monitoring

Ambient Test results are within permissible limit for the air quality, surface water quality, noise and drinking water quality. Test of all the 7 sites were carried out. Those tests which were conducted during July to December 2021 were presented here only, rest will be in the next EMR. Duration of sampling, parameters measured, equipment used, standards, and limits used etc are mentioned in the test reports in the Annexure 10. The method statement for analysing the samples and accreditation of Envision Enviro Technologies North East was disclosed in earlier six monthly Environment Monitoring Report. As all the parameters are within the standard limits no corrective actions suggested. Regarding pH of the Kopili river which is acidic range and is due to upstream activities beyond the control of contractor.

Pollution control trainings are part of the tool box training (Table 18) and conducted during the induction training. Frequency of training will be increased to cover more workers.

Table 16 : Pollution control training / awareness

Trainings/Drills/ Inspections	Number of Participant/s	Location/s and Date/s	Month
Waste Management	8 Laborers	Dam site / 17.7.2021	July
General Environmental Awareness	8 Labours	Adit / 25.07.2021	
Environmental Management System	15 Labours	Shurge Shaft / 10.08.2021	August
Waste Management	19 labours	Dam area / 26.08.2021	
General Environmental Awareness	10 Labours	PR1 / 26.08.2021	
Environmental Management System	25 labour	Labour camp / 14.09.2021	September
Waste Management	30 Labour and supervisors	Labour camp / 24.09.2021	
General Environmental Awareness	18 Labour and supervisors	Dam area / 29.09.2021	
Environmental Management System	30 Labour and supervisors	Adit / 5.10.2021	October
Waste Management	8 Labour	PR7 / 11.10.2021	
General Environmental Awareness	21 Labour and supervisors	Adit / 11.10.2021	
Environmental Management System	14 Labour and supervisors	Dam area / 19.11.2021	November

Trainings/Drills/ Inspections	Number of Participant/s	Location/s and Date/s	Month
Waste Management	19 Labour and supervisors	PR5 / 19.11.2021	
General Environmental Awareness	10 Labour and supervisors	Labour colony / 19.11.2021	
Fire Safety Training	25 supervisors and labour	Dam site / 29.12.2021	December
Critically Endangered Species awareness training	30 supervisors and labour	Adit / 10.12.2021	
Environmental Inspection	30 supervisors and labour	Adit / 21/12/2021	
General Environmental Awareness	30 supervisors and labour	Adit / 16.12.2021	

During the reporting period July 2021 to December 2021 only domestic waste generated from the camps. Biodegradable and non degradable wastes are separated at source and bio degradable wastes are dumped in a pit separately. All the toilets are fitted with safety tank. Hazardous wastes are sent to authorised recycler. Detail of the solid waste management described above.

Other Pollution control measures adopted by the contractor at site :

1. Water sprinkling near the locality where dust is generated.
2. Drains are constructed but sedimentation tanks are yet to construct.
3. Solid waste management at site is it be improved.
4. 4 numbers of muck disposal sites were approved by PMC and APGCL, but Muck Management plan is to be submitted.
5. Dustbins are kept in all the work places.
6. Mobile bio toilets are installed at all the work locations.
7. Sedimentation tanks for waste water not constructed but will be constructed soon.

7.4 Occupational and Community Health and Safety Monitoring

L&T uses app based monitoring for safety. Following 2 applications are used

1. L&T Safety App
   a. Prestart Briefing
   b. Work Permit system
   c. Near Miss case Reporting
   d. EHS Observation
   e. Covid 19 Check list





2. IB4U
   A. Fire Extinguisher Inspection
   B. Safety Full body Harness Inspection
   C. Vehicles and Earth moving Equipment inspection
   D. Crane Inspection
   E. DG Inspection
   F. Earthing Inspection
   G. Electrical Inspection
   H. Mobile Crane Inspection
   I. RCCB/ELCB Inspection
   J. Scaffold Inspection

Monthly Safety report for the month of December 2021 is given in the Annexure 6.

List of fire extinguishers installed at site in table 17.

Table 17 : Fire extinguishers installed at site

Sl	Location	Type	Capacity (kg)	nos
1.	Surge Shaft Container	CO2	6.5	2
		DCP	1.0	4
2.	Valve House Container	CO2	6.5	1
		DCP	1.0	3
3.	Crusher Plant Area	CO2	6.5	2
		DCP	1.0	3
4.	HRT Adit	CO2	6.5	2
		DCP	1.0	3
5.	Kopili Block	DCP	1.0	4
6.	APGCL Canteen	DCP	6.0	1
7.	APGCL Barak	DCP	6.0	2
8.	Eco Green Canteen	DCP	6.0	1
9.	Lohit Block	DCP	1.0	4
10.	Manas Block	DCP	1.0	4
11.	Dihing Block	DCP	1.0	4
12.	Store Container	DCP	1.0	1

Sl	Location	Type	Capacity (kg)	nos
13.	P&M Container	DCP	1.0	1
14.	Store	CO2	6.5	2
		DCP	1.0	3
		FOAM	6.2	2
		Fire Bucket		2
15.	P&M Workshop	DCP	1.0	1
16.	Fabrication Yard	DCP	1.0	1
17.	Bhuoender Singh Container	DCP	1.0	1
18.	Diesel Browser	DCP	1.0	2
19.	Kolong Block	DCP	2.0	4
20.	Kamang Block	DCP	2.0	4
21.	Subansiri Block	DCP	2.0	3
22.	Brahmapurta Block	DCP	2.0	4
23.	DT Out let Fire Stand	DCP	2.0	2
		CO2	6.0	1
		Fire sand Bucket	5.0	1
24.	Dam Site Office	DCP	2.0	2
		Fire sand Bucket	5.0	2
25.	Dame Site DG	CO2	6.5	1
26.	Digaru Block	DCP	1.0	4
27.	Dhansiri Block	DCP	1.1	4
28.	Explosive Magazine	DCP	2.0	4
		Fire Sand Bucket	5.0	4
29.	Fuel Substation	DCP	5.0	2
		Foam	9.0	2
		Fire Sand Bucket	5.0	2
30.	PMC Blocks	DCP	1.0	14

Health and Safety related issued are monitored and reported in the Monthly Environment Report by the Contractor. To contain further spread of COVID 19 at worksite COVID 19 SOP has been prepared. Compliance to COVID 19 SOP are also reported along with the Monthly Environment Report. Summary of HSE at site is shown in the table 18.

20. A. Safety incidents :

Table 18 : Summary of HSE at site

Month	Non-Work Related Incident	First Aid Cases	Near Miss Reports
July 2021	0	1	1
August 2021	1	1	0
September 2021	0	1	1

Month	Non-Work Related Incident	First Aid Cases	Near Miss Reports
October 2021	0	2	1
November 2021	0	1	1
December 2021	0	1	0
July – Dec Total	1	7	4

PMC/APGCL observation on H&S issues are communicated to the contractor. Few examples are given below :

- Reflective tapes to be fixed on the unsafe roads at adit.
- Ear plugs, whistles to be provided to all the tunnel workers.
- Fires extinguishers to be placed in front of the kitchen of APGCL/ PMC campus.
- Safety barriers to be checked regularly.

As per Safety Report contractor is taking corrective action in relation to near misses reported.

20.B. COVID 19 incidents :

Month	COVID 19 +ve	Recovered
July 2021	-	-
August 2021	1	-
September 2021	3	3 +1
October 2021	-	-
November 2021	-	-
December 2021	-	-
July – Dec Total	4	4

COVID vaccination status of the staff and workers given in page 26-35 in the Monthly Safety Report of Dec 2021.

Timely implementation of COVID SOP and vaccination of the staff and workers were useful. During the reporting period no person died due to any incident. Due to prior trainings and use of safety measures no causality reported so far. Contractor need to train the staff regularly of EHS issues and Environment issues and EMP guidelines.

7.5. Training on EHS

Trainings were carried out and the details are shown in table 19.

Table -19 : Training conducted during the reporting period from July 2021 to December 2021

Table 19.A. Training given by PMC/ APGCL

	Trainings	Number and Position of Participant/s	Location/s and Date/s
1	Muck Management	3 nos. Environment Expert, Assistant Manager EHS of Contractor, Surveyor of the package 2 Contractor	Longku, 29.07.2021
2	Solid waste management	6 nos. Environment Expert, Assistant Manager EHS of Contractor, Site supervisors 4 nos of the package 2 Contractor	Longku, 09.09.2021
3	On reporting format of EHS. Monthly Environment Report and Monthly Safety Report	2 nos. Environment Expert, Assistant Manager EHS of Contractor	Longku, 20.09.2021
4	Safety aspects	5 nos. Assistant Manager EHS of Contractor, EHS support staff 4 nos.	Longku, 04.10.2021
5	Waste management of Batching plant and Crusher Plant	4 nos. Environment Expert, Assistant Manager EHS of Contractor, Supervisor of Crusher Plant and Batching plant	Longku, 22.10.2021
6	EHS	2 nos. Environment Expert, Assistant Manager EHS of Contractor	Longku, 17.11.2021
7	Implementation of EMP	2 nos. Environment Expert, Assistant Manager EHS of Contractor	Longku, 20.12.2021

Table 19.B. Training given by Contractor

S No	EHS Training by Contractor	No. of People attended July 21		No. of People attended Aug 21		No. of People attended Sept 21		No. of People attended Oct 21		No. of People attended Nov 21		No. of People attended Dec 21	
		Worker	Staff	Worker	Staff	Worker	Staff	Worker	Staff	Worker	Staff	Worker	Staff
01	Front Line Supervisor EHS Training	18	18	4	22								

S No	EHS Training by Contractor	No. of People attended July 21		No. of People attended Aug 21		No. of People attended Sept 21		No. of People attended Oct 21		No. of People attended Nov 21		No. of People attended Dec 21	
		Worker	Staff	Worker	Staff	Worker	Staff	Worker	Staff	Worker	Staff	Worker	Staff
02	L&T LIFE EHS Risk management	7	7	4	11								
03	ATL EHS online Safety Training	2	13	2	13								
04	Work with Electricity	15	15	11	26								
05	Work with crane & Lifting	12	12		12								
06	Welding and Gas Cutting	22	22	13	45					11			
07	Defensive Driving			9	9					26			
08	Work at Height			22	22								
09	Online EHS Training										18		
10	Online Functional Module on Bling Spot Safety										6		
11	Fire Safety									9	1	8	1
12	Drill, Charging and Blusting							6	1				
13	Awareness programme on CR species							11	1				
14	Risk Management								7				
15	Fall protection and using full body harness							8					
16	Safety of underground works											16	2
17	Safety of grinding works											23	2
18	Pre deployment induction											154	7
	Total	**76**	**87**	**65**	**160**	**0**	**0**	**25**	**9**	**46**	**25**	**201**	**12**

Note : Training given by EHS manager, Environment Engineer and EHS team (Total 706 nos)
Contractor will increase the ambit of training to cover more workers.

Photographs of the trainings

July 2021	
	
Training on Emergency Preparedness	S/C Supervisors and on job training on Electrical Safety
	
Training on Welding and Gas cutting	Safety on Drilling and Blasting
	
Training on Tunnel Safety at Drift Tunnel	
August 2021	
	
Training on Electrical Safety	Work at height for fabrication People

	
Training for Safety Supervisors	Training on Welding and Gas cutting
September 2021	
	
Safety during working near Deep Excavation	Pre Start Briefing
	
Pre Start Briefing before start of work	EHS executive Tour by L&T Senior Management
October 2021	
	
Safety on Drilling, Charging and Blasting	Training risk management
	
Trainung and Awareness programme : Fall protection and using full body harness	
November 2021	

	
Defenseive driving	Defenseive driving
	
Safety during Hot work (Welding and Gas cutting)	Safety during Hot work (Welding and Gas cutting)
December 2021	
	
Safety on underground work	Defense driving
	
Fire Safety	Pre-deployment Induction training



Training and awareness on Critical Species conservation around the project area

Sample attendance sheets of the trainings

120 MW LOWER KOPILI HEP

Critically Endangered Species Awareness Training Attendence sheet

NAME	LOCATION	SIGNATURE	REMARK
Sri N. Barman	Adit		
Mridul Rajkhowa	Adit		
Anup Barman	Adit		
Chongjon Kgadu	Adit		
Tatoo Swer Ary	"		
Utpal Das	"		
	"		
Anig Khan	"		
Indian Buddhajan	"		
Soul Repot Pocet	"		
Kolkata	"		
Ramesh Kish Gupta	"		
Rahitan Nuha Ring	"		
HC-G	"		
Madhab Boruah	"		
	"		
	"		
N Akul	"		
	"		
Dignity Saikia	"		
	"		
Mitul DAS	"		
Manoj Yadav	"		
Sougram Adik	"		
Z H Hazarika	Adit		
giridhari Sm	"		
Tapuikant Tajang	"		
Dipu Barman	"		
	"		

8. EMP Expenditure :

EMP Expenditure table (Table 20 A , 20 B) summarize details of budget allocated for EMP implementation and the current spend profile.

The EMP Budget is revised as per recommendation and direction of MoEF&CC for the Environmental Clearance.

The originally EMP Budget (as per disclosed EIA, 2018) was US$12.90 m and now it is US$16.76 million incorporating the revised compensatory afforestation cost, biodiversity conservation cost, cost for external monitor, LAD, etc.

Table 20A : EMP Expenditure

S. No.	Item Cost	Revised (₹ Million)	Remarks	Expenditure so far (₹ Million)
1	Compensatory Afforestation, and Bio-diversity conservation, etc.	390.259	CA 159.42, Biodiv. 190.979, SMC 39.86	390.259
2	Catchment Area Treatment	282.960		282.960
3	Public health delivery system	42.360		
4	Muck management	34.000		*
5	Stabilization of quarry sites	11.500		
6	Restoration and Landscaping of construction sites	10.000		
7	Environmental management in road construction	16.952		* details in table 10 B
8	Greenbelt development	2.000		
9	Solid Waste Management	23.484		* details in table 10 B
10	Water pollution control	18.500		
11	Energy Conservation measures	10.000		
12	Disaster Management Plan	37.000		
13	Local Area Development Plan	37.400	As per approved CRDTP (May 2017)	
14	Plan to preserve cultural identity of the locals	12.286		
15	Environmental Monitoring during construction phase	10.992		* details in table 10 B
16	Monitoring and Evaluation Aspects	6.000		
17	Purchase of meteorological instruments	1.000		
18	Purchase of noise meter	0.100		
19	Water Quality Restoration Plan	65.000		
20	Training and Awareness Building	2.000		
21	External Monitor	159.800	As per PAM	
22	Pre-construction baseline monitoring	50.000		0.300

S. No.	Item Cost	Revised (₹ Million)	Remarks	Expenditure so far (₹ Million)
23	Environmental Monitoring during operation phase (for initial three years)	6.849		
	Total	**1230.442**		673.519 (54.73%)

Note :

1. As per the Stage I condition of the Forest Clearance Project Proponent has to deposit the CAT (Catchment Area Treatment) Plan budget in the CAMPA Fund prior to Stage II Forest Clearance. Accordingly the amount was deposited CAMPA fund of MoEF&CC. The work on Catchment Area treatment has not been initiated by the Forest Department. APGCL will pursue the matter with the Forest Department for implementation.
2. Biodiversity study was carried out and the expenditure incurred is reflected in the expenditure statement. As soon as the External Monitor is engaged the baseline studies will be carried out before initiation of contract packages 1, 3, 4. Test of Environment parameters were also carried out as per EMP in the month of October, 2020 as a baseline study through the third party engaged by the L&T so the expenditure was not incorporated.
3. BMP will be implemented by APGCL and Forest Department jointly but CAT Plan will be implemented by Forest Department alone. The required amount for implementation of CAT Plan has been deposited to CAPMA, MoEF&CC, Govt. of India.

Table 20 B : Details of the *EMP Expenditure till December 2021.

S.I	Item	Amount (Rs. lakh)
1	Expenditure for Environmental Monitoring (Air, Water & Noise)	2.61
2	Expenditure for DG Stake Monitoring	1.03
3	Portable bio toilet , (4 no.)	1.69
4	Portable prefab toilet , (2 no.)	0.95
5	Making road for local village.	0.25
6	Cement bag Provided for community toilet construction	0.15
7	DRDO Bio tank 4000 litre (2 no.)	3.37
8	Prefab container toilet (2 no.)	7.71
9	Plantation on spoil tips (plain area) including bio-fertilizer cost & tree guard cost	0.70
10	Fencing cost for 3000 sqm	7.56
11	Cost of two portable water pumps, (flow 20 cum/hr, 20m head, along with 200 m pipe, 100 mm dia, HDPE)	1.56
12	Watch & Ward for tree plantation	2.4
13	Safety Supervisor	1.60

S.I	Item	Amount (Rs. lakh)
14	Regular water sprinkling through water tanker on entire roads and NH (water tank capacity 20000 Litter & 12000 litter)	6.50
15	Fire extinguisher DCP 1KG 50 no./ 2KG 50 no./6KG 30 no./ 9 KG 20 no./BUCKET 20no.	1.3
a)	Fire extinguisher CO2 6.5 KG 20 no.	1.2
16	PPE for staff & workmen (Jacket, Helmet, Shoe, Hand gloves, mask, face shield, ear muffs, ear plugs, safety google, face shield, rain coat, face mask, gum boot, umbrella)	12.48
17	First Aid medicine	1
18	Two First aider	1.5
	TOTAL	**55.56**

9. Meaningful Consultation and Grievance Redress

Few consultations were carried out during the reporting period July 2021 to December 2021 (Table 21).

Table 21 : Consultation carried out during the reporting period

Date	Format/Venue	Participants (Occupation, M/F)	Main Issues Raised
15.11.2021	Conference Hall APGCL, Longku	villagers, gaon buras and the representatives of PAPA, APGCL, PMC	R&R assistance, Rehabilitation site, Environmental issues, Dust suppression was raised. APGCL responded that reducing dust on the National Highway is not possible, still contractor sprinkles water in sensitive areas i.e., settlement areas, school, hospital and market.



Grievance Redress Mechanism

A three-tier grievance redress mechanism has already been notified for handling grievances. The first tier is the grassroots level mechanism. Grievances of the APs are first dealt with by gaon buras in consultation with the field officials, and the contractors of the project. Complaints that cannot be addressed at the level of gaon buras are forwarded to the Project-level grievance redress committee (GRC) which is the second tier. The third tier is the appellate GRC at the state level. APGCL deal with the complaints and grievances as the appellate GRC. The presence of GRM or seeking relief from GRM is not a bar to take grievances and complaints to national courts for arbitration.

Details of the GRM given in the last EMR.

Land related grievances are resolved at first tie itself. No cases registered so far.

Site Register is maintained in the contractor's camp and in APGCL office. All the complaints are recorded. A format has been developed by Social Expert to record the grievances. Grievance Box was placed at APGCL site office. GRM training given by APGCL Social Expert and R&R NGO to all the affected villages. All the complaints lodged by the workers/labour are addressed by admin department of the contractor. Registers are maintained at site.

10. Positive Community Intervention

A. Tree plantation programmes are done regularly.



Plantation by L&T staff on occasion of World Nature Conservation Day (July, 2021)



Plantation in the month of August 2021



Maintenance of plantation in the month of September 2021

Plantation in the month of November 2021

B. Community toilets constructed for the villagers by L&T



11.0 Conclusions and Recommendations

This is the second six monthly Environment Monitoring Report for the period July to December 2021. During this period few noncompliance on the environment safeguard issues were observed and are listed in Table 7B and 7C Results of the test of ambient air, noise and water also found within the permissible limit except the water quality of the Kopili river during December, 2021. Regarding safety there is no casualty reported during this reporting period. Contractor followed COVID 19 SOP and reported monthly on the compliance, vaccination status, etc. During this reporting period 19 COVID 4 positive patients recovered and after complete recovery they joined the work. Most of the facilities are under final stage of construction. Provisions are kept for environmental compliance. Besides tree plantation, awareness programmes were held. Critical habitat assessment is under way and it will be reflected in the EIA addendum. Further continuous monitoring of biodiversity covering all the aspects during the implementation of the project will be carried out. So far the environmental safeguards measures taken by the contractor was mostly satisfactory but in some fields improvements can be done.

Annexure

Annexure 1 – Posession certificate from Forest Department, Karbi Anglong



KARBI ANGLONG AUTONOMOUS COUNCIL
OFFICE OF THE DIVISIONAL FOREST OFFICER:: HAMREN DIVISION::
H A M R E N

No. A/HRN/LKHEP/2020-21/ 490 Dated:Diphu the 03/07/2021

CERTIFICATE OF POSSESSION

Today on 3rd July,2021, we have delivered and received over possession of the diverted Charchim District Council Reserve Forest land measuring 45.28 hectares as specified in the schedule below as per the Govt. of India Letter No. 8-53/2018FC, dated 02.12.2020, Govt. of Assam letter No.FRS. 152/2018/360 dated 25.05.2021, CCF & Nodal Officer (FC. Act), Assam, o/o the Principal Chief Conservator of Forest & Head of Forest Force, Assam letter No. FG. 27/Nodal/Lower Kopili HE Project/Part-III dated 01.06.2021 and the Special Principal Chief Conservator of Forests, Karbi Anglong, Diphu Letter No. Spl PCCF/KA/LKHP/Forest Diversion/2021/22/2609, dated 14.06.2021 for construction of Lower Kopili Hydro Electric Project (120 MW) at Longku, Dima Hasao under Dima Hasao West Forest Division, Haflong and Hamren Forest Division,Hamren West Karbi Anglong.

Schedule of Forest Land
District: West Karbi Anglong
Mouza: Charchim
Forest Division: Hamren Division
Name of RF: Charchim District Council Reserve Forest
Total area in Ha: 45.28 Ha.

Possession handed over

Divisional Forest Officer.
Hamren Division, Hamren

Divisional Forest Officer
Hamren Division, Hamren

Possession taken over

General Manger
Lower Kopili Hydro Electric Project
APGCL, Longku, Dima Hasao

General Manager
L.K.H.E.P.APGCL,Longku
Dima Hasao, Assam

Annexure 2 -Renewed Labour License

FORM VI

[See rule 25 (1)]

Government of Assam

Office of the Labour Commissioner, Assam
Gopinath Nagar, Guwahati - 781016

Sl. No.: 3272

Licence No. CLL(ASSAM)06/2020/3272 Date 10/12/2020 Fee paid Rs 1100/-

LICENCE

1. Licence is hereby granted to Larsen & Toubro Ltd. - L&T Construction Longku, District- Dima Hasao - 788931 under section 12 (1) of the Contract Labour (Regulation and Abolition) Act, 1970, subject to the condition specified in Annexure.

2. This licence is for doing the work of Civil, Hydro, Mechanical & Electrical (nature of work to be indicate) Works for 120MW Lower Kopili Hydroelectric Project in the establishment of Chief General Manager (PP&D), APGCL, Guy-1 (name of the principal employer to be indicated) at All Assam (place of work to be indicated)

3. The licence shall remain in force till 09/12/2021 (date to be indicated)

Date 10/12/2020

Signature and Seal of the Licensing Officer.
Licensing Officer, Assam
Guwahati-16.

RENEWALS [rule 29]

Sl No.	Date of renewal	Fee paid for renewal	Date of expiry	Signature and seal of the Licensing Officer, Assam
1.	18/11/2021	Rs 2100/-	9/12/2022	Licensing Officer, Assam Guwahati-16
2.				
3.				
4.				
5.				
6.				
7.				

ANNEXURE

The licence is subject to the following conditions :

1. The licence shall be non-transferable.

2. The number of workmen employed as contract labour in the establishment shall not, on any day exceed ..... 250 (Two hundred fifty) Nos + 150 = 400 [Four hundred] 400+100 = 500 (five hundred)

3. Except as provided in the rules the fees paid for the grant, or as the case may be, for renewal of the licence shall be non-refundable.

4. The rate of wages payable to the workmen employed by the contractor shall not be less than the rates prescribed for the Schedule of Employment under the Minimum Wages Act, 1948, where applicable, and where the rates have been fixed by agreement, settlement of award, not less than the rates fixed.

5. In cases where the workmen employed by the contractor perform the same or similar kind of work as the workmen directly employed by the principal employer of the establishment the wage-rates, holidays, hours of work and other conditions of service of the workmen of the contractor shall be the same as applicable to the workmen directly employed by the principal employer of the establishment on the same or similar kind of work.

   Provided that in the case of any disagreement with regard to the type of work the same shall be decided by the Labour Commissioner, (Assam) whose decision shall be final.

6. In other cases the wage-rate, holidays, hours of work and conditions of service of the workmen of the contractor shall be such as may be specified in this behalf by the Labour Commissioner (Assam).

7. In every establishment where 20 or more women are ordinarily employed as contract labour there shall be provided 2 rooms of reasonable dimensions for the use of their children under the age of six years. One of such rooms would be used as a playroom for the children and the other as bedroom for the children. For this purpose the contractor shall supply adequate number of toys and games in the playroom and sufficient number of cots and beddings in he sleeping room. The standard of construction and maintenance of the crèches may be such as may be specified in this behalf by the Labour Commissioner (Assam).

8. The licence shall notify any change in the number of workmen or the conditions of work to the Licensing Officer.

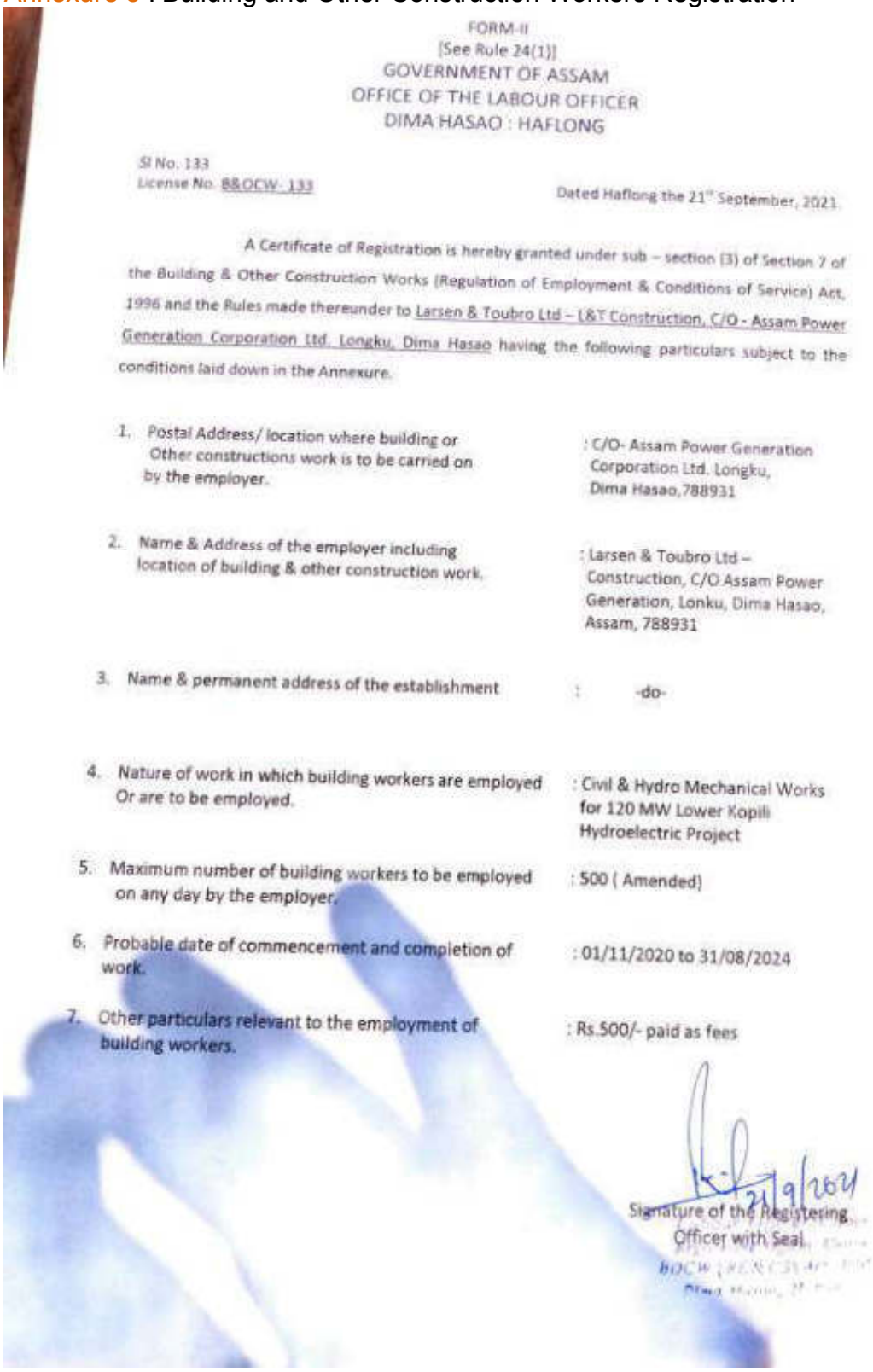
9. A copy of the licence shall be displayed prominently at the premises where the contract work is being carried on.

10. The licensee shall, within fifteenth day of the commencement and completion of each contract work submit a return to the Inspector appointed under section 28 of the Act intimating the actual date of commencement or as the case may be completion of such contract work in Form VI-A

Date

Signature of Contractor

Annexure 3 : Building and Other Construction Workers Registration



FORM-II
[See Rule 24(1)]
GOVERNMENT OF ASSAM
OFFICE OF THE LABOUR OFFICER
DIMA HASAO : HAFLONG

Sl No. 133
License No. B&OCW- 133

Dated Haflong the 21st September, 2021.

A Certificate of Registration is hereby granted under sub – section (3) of Section 7 of the Building & Other Construction Works (Regulation of Employment & Conditions of Service) Act, 1996 and the Rules made thereunder to Larsen & Toubro Ltd – L&T Construction, C/O - Assam Power Generation Corporation Ltd. Longku, Dima Hasao having the following particulars subject to the conditions laid down in the Annexure.

1. Postal Address/ location where building or Other constructions work is to be carried on by the employer. : C/O- Assam Power Generation Corporation Ltd. Longku, Dima Hasao,788931
2. Name & Address of the employer including location of building & other construction work. : Larsen & Toubro Ltd – Construction, C/O Assam Power Generation, Lonku, Dima Hasao, Assam, 788931
3. Name & permanent address of the establishment : -do-
4. Nature of work in which building workers are employed Or are to be employed. : Civil & Hydro Mechanical Works for 120 MW Lower Kopili Hydroelectric Project
5. Maximum number of building workers to be employed on any day by the employer. : 500 (Amended)
6. Probable date of commencement and completion of work. : 01/11/2020 to 31/08/2024
7. Other particulars relevant to the employment of building workers. : Rs.500/- paid as fees

21/9/2021

Signature of the Registering Officer with Seal.

ANNEXURE

The Registration granted herein above subject to the following conditions, namely :-

a. The Certificate of Registration shall be non-transferable.

b. The number of workmen employed or building workers in the establishment shall not on any day exceed the maximum number specified in the Certificate of Registration.

c. Safe of provided in these Rules, the fees paid for the grant of Registration Certificate shall be non-refundable.

d. The rates of wages payable to building workers by the employer shall not be less than the rates prescribed by the Minimum Wages Act, 1948 (II of 1948) for such employment where applicable, and where the rates have been fixed by agreement, settlement or award, not less than the rates so fixed : and

e. The Employer shall comply with the provisions of the Act and the Rules made thereunder.



Annexure 4: Sample Field Visit Report (9.9.2021)

1. Overburden in the powerhouse area are disposed in the bank of the river kopili. During rain it will be slipped down to the river which will deteriorate the water quality and impact on aquatic ecology. Further dumping or stacking near the river side to be avoided. Usable boulders to be sorted and stacked properly before disposal in a safe area.




Muck disposal near Power House area

2. Moreover, dumping was observed near PR 8 and near TR 6 in the Forest Land. Which is a noncompliance. This muck must be removed to designated location.




TR-6 | PR-8




Dumping near TR-6 | Dumping near PR-8

3. L&T is requested to do the following :
   a. Aware the workers and site in charges not to slide overburden in the valley along the road or along the river.
   b. Environment officer should report additional number of trees / poles lost by the project as a result of muck disposal along the road and along the river bank.
   c. Immediately replant the slope with grass to prevent soil erosion and replant trees to compensate for numbers that were lost due to muck disposal.

d. Documentation of the above protection measures to be submitted in the subsequent Monthly Environment Report.
e. Diverted Forest Land for the project as per Forest Clearance be marked on the ground so that activities beyond the forest clearance area can be monitored during execution of the work by contractor, PMC and PIU.

4. **Muck Management Plan** : Till now Muck Management Plan has not been submitted by L&T. The capacity of the proposed 5.8 ha Filling site at Revenue Land -01 is a capacity of 200000m^3 only. Designated dumping site / sites with proper muck management will be required to accommodate remaining excavated materials.

Contactor has been advised to submit the Muck Management Plan for the entire project. Muck Management Plan should include the following principles :

a. Disposal of Muck should not destroy the cultivation areas in the valley below.
b. If required proper protection measures to be proposed in the Muck Management Plan for the protection of the rolling of muck in the natural stream or agricultural field.
c. Bio engineering measures may be taken for protection.
d. The plan should also cover method of compaction and future plantation for converting it into a green belt at the end of the project.
e. No overburden to be stacked near the river.
f. For segregation of the overburden designated temporary storage facility may be used in the Forest Land or for segregation Revenue Land may be used.
g. Emphasis to be given for maximum use of the overburden in the project activities so that minimum unusable overburden be dumped at designated dumping yard.
Muck Management Plan to submitted to APGCL by 30th September, 2021.

5. **Water Sprinkling** : To suppress the dust pollution by sprinkling of water to be done on the roads and open excavation areas near working zones immediately. Sprinkling to be properly documented on daily basis and reported in the MER.



Dust generated due to plying of vehicles

6. **First Aid Center** : First Aid Center at the project site is a primary requirement. L&T to ensure that it becomes functional with immediate effect. An old Ambulance has been placed on 27th August, 2021, but it should be replaced with a good conditioned ambulance as there is no good health facility near the project site.

Package 2 contractor (L&T) to take necessary measures to incorporate the above information in the Monthly Safety Report.

Annexure 5 : Monthly Environment Report of Contractor – December 2021

Monthly Environment Report (Dec'21)

120MW LOWER KOPILI HYDROELECTRIC PROJECT, (PACKAGE-2)

L&T LIFE Work Incident Free to Live Injury Free Each day	Reference: **IM 27 A**

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1. **Status on Statutory Clearance:**

Sl. No.	Activities for which clearances are required	Statutory Requirement	Location (Km.)	Under the Act	Statutory Authority	Approval Status	Approval Consent Letter No	Valid till	Remark/Annexure
1	Permission of the State Government for extraction of boulders from quarry.	1.NOC from North Sachar Hills Autonomous Council 2. Mining Plan approval from department of geology and mining, Assam	Longku, Dima Hasao (45 km from Lanka Railway Station)	Assam Minor Minerals commencement Concession Rules, 2013	**Stage-1.** North Cachar hills Autonomous Council **Stage-2.** Department of geology and mining, govt. of Assam	Approval Awaited from North Cachar Hill Autonomous council (NCHAC).			- Date: 27th Oct'20: APGCL Request to NCHAC issue NOC for Quarry Operations of Lower Kopili HEP. (Extension of the earlier proposed area for extraction of coarse aggregate). - Date: 05th Jul'21: L&T Request to DFO issue a consent letter for operation of Quarry to extract minor minerals from the identified / approved Quarry for the project. - Date: 20th Oct'21: L&T Request to DFO issue a consent letter for operation of Quarry to extract minor minerals from the identified / approved Quarry for the project. - Date: 29th Oct'21: Follow-up letter to DFO for Letter Sl No 4 above. -Date: 18th Nov'21: APGCL Request to DFO permit L&T to reuse the muck extracted from LKHEP site for construction purposes and make necessary arrangements to charge Royalty for the same from L&T. -Date: 19th Nov'21: Follow-up letter TO DFO against letter Sl NO: 3, 4, 5 & 6 mentioned above. - Dated: 27th Nov'21: NCHAC given permission to L&T for reuse of 80,000 Cum mask boulder.

Sl. No.	Activities for which clearances are required	Statutory Requirement	Location (Km.)	Under the Act	Statutory Authority	Approval Status	Approval Consent Letter No	Valid till	Remark/Annexure
2	Permission of Village Panchayats (Gaon Burah) for installation of crushers & batching plant	Permission from Village Panchayats.	Longku, Dima Hasao (45 km from Lanka Railway Station)		Applied to Village Panchayats for installation of Crushers on 30-06-2021	Received	-	-	- NOC Received from Village Panchayats for setting up Crusher plant and Batching Plant near Totelangso, Dima Hasao.
3	Permission of Pollution Control Board for installation of crusher.	Permission from Pollution Control Board, Assam	Longku, Dima Hasao (45 km from Lanka Railway Station)		Applied to Pollution Control Board for installation of Crushers.	CTE & CTO Permission received.	-	-	- CTO – Crusher Permission received from PCB Refer. No. WB/SCL/T-1184/21-22/09/1152 dtd. 07th Dec'21
4	Clearance of Pollution Control Board for setting up Batching Plant (Powerhouse)	State Pollution Control Board, Assam	Longku, Dima Hasao (45 km from Lanka Railway Station)	The Assam Stone Crusher Establish ment and regulation rule 2013 (Crusher)	**Stage-1.** North Cachar hills Autonomous Council **Stage-2.** Pollution control board for installation of crusher.	CTE & CTO Permission received.	-	-	- CTO -Batching Plant Permission received from PCB Refer. No. WB/SLC/T-1191/21-22/17-A/1947 dtd. 27th Dec'21

Sl. No.	Activities for which clearances are required	Statutory Requirement	Location (Km.)	Under the Act	Statutory Authority	Approval Status	Approval Consent Letter No	Valid till	Remark/Annexure
5	Clearance of Pollution Control Board for setting up Batching Plant (DAM)	State Pollution Control Board, Assam	Longku, Dima Hasao (45 km from Lanka Railway Station)	The Assam Stone Crusher Establishment and regulation rule 2013 (Crusher)	**Stage-1.** North Cachar hills Autonomous Council **Stage-2.** Pollution control board for installation of crusher.	Stage-1 : Approval Awaited. Stage-2: Approval Awaited.	NOC obtained from Gaon Baruah		- Application submitted to North Cachar Hills Autonomous Council for NOC vide Letter No. LKHEP-PKG2 LNT 155 GL B6 on 25th Nov'21
6	Permission of the State Government for drawing water from river.	Central Ground water Board or District Administration		Water (Prevention & Control of Pollution) Act, 1974; and Amendments (1988)	-	-	-	-	- Application for Permission of ground water extraction submitted vide Letter No: LKHEP- PKG2/LNT/153/GL/78 dtd. 09th Nov'21

Sl. No.	Activities for which clearances are required	Statutory Requirement	Location (Km.)	Under the Act	Statutory Authority	Approval Status	Approval Consent Letter No	Valid till	Remark/Annexure
7	Permission of Labor commission for labour license	Labour Laws	Longku, Dima Hasao (45 km from Lanka Railway Station)	Factories Act, 1948 and Amendments (1987)	Government of Assam Office of the Labour Commissioner, Assam Gopinath Nagar, Guwahati 781016	Received	S.No.3272 License No. CLL (Assam)06/2020/3272	-	- License renewal application submitted to labour office vide letter no LKHEP PKG2 LNT 153 GL 046 on 21st Sep'21
8	NOC for tree cutting	Forest Department		Indian Forest Act, 1927	Forest Department Assam	Received	-	-	- Tree cutting in progress with assistance/ presence of officials of Forest Department, Panimur and APGCL.
9	Application submitted Regarding **No Objection Certificate** (NOC) from Deputy Commissioner Govt of Assam, for setting up Fuel dispensing Unit at Project location.	Deputy Commissioner Govt of Assam.		Petroleum Act, 1934 and Rules 2002	**The Deputy Commissioner**, Government of Assam, Haflong.	Received	CTO Received	31-12-2022	- Fuel storage license accorded from Chief controller of Explosives Petroleum & Explosives Safety Organization License No. P/EC/AS/14/1630 (P502141).

Sl. No.	Activities for which clearances are required	Statutory Requirement	Location (Km.)	Under the Act	Statutory Authority	Approval Status	Approval Consent Letter No	Valid till	Remark/Annexure
10	**No Objection Certificate** Obtained from **"PESO"** for establishment of Explosive magazine.	-	Longku, Dima Hasao (45 km from Lanka Railway Station)	Explosive Rules, 2008 (Under act of 1884)	Petroleum and Explosives Safety Organization, Kolkata.	Received			- NOC obtained from APGCL. -NOC obtained from Hon'ble Deputy Commissioner. - Storage approval pending from PESO. - Construction of Explosive magazine completed. - As instructed by District Magistrate, Application submitted to Sr. Station officer, Fire & Emergency service station, Haflong. Vide Letter No. LKHEP PKG2 LNT 155 GL 085 on 19th Nov'21 regarding NOC for storage of explosive.
11	Request for issuing Non-Objection Certificate for blasting operations	-			Deputy Commissioner, Dima Hasao District, Haflong.	Received			
12	Request for permission for blasting during night in tunnel of 120 MW Lower Kopili HE Project.				The Hon'ble Deputy Commissioner, Dima Hasao District, Haflong, Assam-788819	Received			

Sl. No.	Activities for which clearances are required	Statutory Requirement	Location (Km.)	Under the Act	Statutory Authority	Approval Status	Approval Consent Letter No	Valid till	Remark/Annexure
13	Submission of Photocopy of Vehicle Document for changing registration no.	-	Longku, Dima Hasao (45 km from Lanka Railway Station)		The District Transport Officer, Haflong	Received			letter No. LKHEP-PKG2/LNT/153/LL/41 dtd. 31st July'21
14	Requesting to issue NOC for explosive license and magazine construction approval				The District Magistrate, Dima Hasao, Haflong, Assam	Received	Permission Received vide letter No. NCH/M-3/2021/6580-83 dtd. 27th Oct'21		
15	Application for Amendment of labour license	Labour Laws		Factories Act, 1948 and Amendments (1987)	Labour Commissioner, Guwahati, Assam	Received	S.No. 133 License No. B&OCW-133 dtd. 21st Sep'21	The validity of the above License is from 01.11.21 to 31.08.24	Copy of Permission enclosed as Annexure-3

Sl. No.	Activities for which clearances are required	Statutory Requirement	Location (Km.)	Under the Act	Statutory Authority	Approval Status	Approval Consent Letter No	Valid till	Remark/Annexure
16	Request for issuing No Objection Certificate for Blasting Operation	-	Longku, Dima Hasao (45 km from Lanka Railway Station)		Hon'ble Deputy Commissioner West Karbi Anglong District, Hamren, Assam	Approval Awaited.			LKHEP PKG2 LNT 111 GL 49 dtd. 22nd Sep'21
17	Request for issuing No Objection Certificate for explosive supply chain management & blasting operation	-			The Hon'ble Deputy Commissioner, Dima Hasao District, Haflong, Assam	Approval Awaited.	Permission Received vide letter No. NCHM/M 8/2021/6 378-83 dtd. 22nd Oct'21		
19	Application for fire NOC in respect of Fire Safety measures in the storage and handling of explosives at 120 MW Lower Kopili HE Project.			To The Fire Station Officer, Fire & Emergency Service Station, Dima Hasao District, Umrangso, Assam		Approval Awaited			Application for NOC submitted vide Letter No: LKHEP- PKG2/LNT/153/GL/102 dtd. 23th Dec'21

2. Status of permits/licenses of the quarries:

2.1 Quarry selected for Coarse Aggregates by Employer

Name of the quarry	Near Kala Nala [3 km d/s of proposed Powerhouse]
Location	Village- Longku, District- Dima Hasao, Assam
Size of the Mining Area	4.6 hectare
GPS Coordinate	Lat: 25°41'53.56" N; Long: 92°48'47.50 E
Operated by	L&T
EC Status	Handover of Forest Land from State Forest Department to APGCL is awaited.
Quantity approved under EC	15,58,037 m^3
CTE/CTO (where applicable)	NA
Name of the landowner	Assam Power Generation Corporation Limited (APGCL)
Agreement with the landowner	In Employer Scope
Permit No. with date	NOC awaited from North Cachar Hill Autonomous Council.
Validity till	NOC awaited from North Cachar Hill Autonomous Council.
Status	NOC awaited from North Cachar Hill Autonomous Council.

2.2 (A) Quarry selected for Fine Aggregates by Employer

Name of the quarry	Near Sudariang Nala [10 km u/s of dam axis]
Location	Village- Longku, District- Dima Hasao, Assam
Size of the Mining Area	40,500 m^3/year
GPS Coordinate	Lat: 25°35'30" N; Long: 92°44'30 E
Operated by	To be reviewed after feasibility study
EC Status	To be applied.
Quantity approved under EC	40,500 m^3/year
CTE/CTO (where applicable)	NA
Name of the landowner	Assam Power Generation Corporation Limited (APGCL)
Agreement with the landowner	In Employer Scope
Permit No. with date	To be applied.
Validity till	To be applied.

Status	Trial Mix programme with crushed sand in progress. Requirement of river sand material shall be informed after completion of mix design.

2.2 (B) Quarry selected for Fine Aggregates by Employer

Name of the quarry	Near Langpher Nala [7 km d/s of proposed Powerhouse]
Location	Village- Panimur, District- Dima Hasao, Assam
Size of the Mining Area	55,000 m^3/year
GPS Coordinate	Lat: 25°42'49" N; Long: 92°50'21 E
Operated by	To be reviewed after feasibility study
EC Status	To be applied
Quantity approved under EC	55,000 m^3/year
CTE/CTO (where applicable)	NA
Name of the landowner	Assam Power Generation Corporation Limited (APGCL)
Agreement with the landowner	In Employer Scope
Permit No. with date	To be applied.
Validity till	To be applied.
Status	Trial Mix Programme with Crushed Sand in Progress. Requirement of River Sand Material shall be informed after Completion of Mix Design.

3. Status use of natural resource:

Natural Resources	Sources	Cumulative Purchase Qty (MT)	Own Crushing	Quantity used in the reporting month (MT)	Cumulative Consumption Qty (MT)	Royalty Paid
Aggregate (10 mm Size)	M/s D.H Stone Crusher and L&T Crusher	927	836	120	913	Reimbursed to supplier based on physical submission of chalan by the vendor /supplier
Aggregate (20 mm Size)	M/s D.H Stone Crusher and L&T Crusher	2,039	545	56	2,039	
Aggregate (40 mm Size	M/s D.H Stone Crusher and L&T Crusher	409	396	-	409	
River Sand	M/s Bhanujit Sand supply and L&T Crusher	3,225	-	-	1,811	
Crusher sand		1,251	320	-	1,251	
Boulder	L&T Crusher	-	19633	-	-	

4. Status of Aggregate Crusher/ Concrete Batching plant setting up application.

4.1 Status of setting up Crusher Application.

Land Handing Over Status by Employer	Handed over on 2nd Jan 2021
Search of PP Land date with date and Location	Within Project area and approved by Project Proponent
Joint Verification Status with copy	Refer Employer letter no. APGCL/LKHEP/PD/2020-21/56/Part-I/19 dtd. 12th Jan'2021
Submission to North Cachar Hills Autonomous Council for Approval	Refer EPC Contractor letter no. LKHEP-PKG2/LNT/155/LL/40 dtd. 15th Jan'21
Status	- Approved (CTE & CTO Received)

4.2 Status of setting up Batching Plant (Powerhouse) Application

Land Handing Over Status by Employer	Handed over on 2nd Jan 2021
Search of PP Land date with date and Location	Within Project area and approved by Project Proponent
Joint Verification Status with copy	Refer Employer letter no. APGCL/LKHEP/PD/2020-21/56/56 dtd. 08th Jan'2021
Submission to North Cachar Hills Autonomous Council for Approval	Refer EPC Contractor letter no. LKHEP-PKG2/LNT/155/LL/41 dtd. 15th Jan'21
Status	- Approved (CTE & CTO Received)

5. Environmental Initiative, Energy Consumption, Water, Wastewater, and Waste Management Summary.

Environment	For the Month of Dec'21	Cumulative 2021-22
Environmental Initiative		
No of trees cut	15	200
No of trees planted	150	628
No of community clean-up activity organised	-	1
No of awareness campaign organised for school children /slum dwellers/local community/vendors	-	17
Any other Environmental initiative (Road Show/ Animal Rescue/Award/Critical species awareness etc.)	1	4
Energy Consumption		
Electricity Consumption for the Project (Grid Source) Kwh	14,333	66,657
Non-Renewable Source of Energy Produced and used at Project - (Solar Heater, Solar Lighting etc.) Kwh	-	-
Diesel Consumption for Generators & Construction Equipment's (Litre)	1,51,298	8,49,199
Water and Wastewater		
Treated or Partially Treated Wastewater Discharged to Land/Surface Water/Marine /Sewer/Storm Water etc. (Litre)	3,84,000	87,48,000
Treated Wastewater Recycled/Reused (Irrigation, Toilet Flushing, Cleaning Etc.) (Litre)	4,80,000	9,60,000
Waste Management		
General C&D Waste Sent for Land Disposal/Dumping- m^3	-	-
Segregated Waste Concrete Sent for Disposal - m^3	-	-
Waste Concrete Recycled at Site or Sent to 3rd Party for Recycling- m^3	-	-
E-waste for Recycling- m^3	-	-
Metal Scrap for Recycling (Steel + Aluminium + Copper)- kg	1,686	6,350
Used Lubricating Oil for Recycling- Litres	-	250

Other Hazardous Waste (Paint, Construction Chemicals etc. Sent for Treatment/Disposal- m^3)	-	-
Bio-Medical Waste for Disposal- Kg	0.5	1.1
Food Waste for Disposal- m^3	4.5	16.05
Training and Awareness		
Environmental Management System (Training Hours)	4	13
Waste Management (Training Hours)	4	17
General Environmental Awareness (Training Hours)	4	27
Environmental Sustainability Skills for Managers (Training Hours)	1	3
Environmental Inspection		
Environmental Inspection Conducted	3	23
No of Non-Conformance Raised	-	-
No of Non-Conformance Closed	-	-
Regulatory Violation		
Number of NC/Violation/Warning/Prohibition Notice Received from Authority (MoEF & CC, SPCB, CPCB, Local Municipality etc.)	-	-
Total Fine/Penalty Amount if any	-	-
Environmental Monitoring		
Total number of ambient air quality monitoring conducted	7	26
Total number of noise monitoring conducted	7	26
Total number of water quality monitoring conducted (Surface Water, Ground water & Drinking water)	13	37
Total number of water related disease	1	3
DG Stake Emission	-	3

6. Environmental Monitoring water Spot test result Month of Dec'21

S.N	Type of Test	Sample Collection Location at Site	Date of Collection	pH	TDS	EC
1	Water Quality – Surface/Ground	1 km u/s of submergence site	31.12.2021	5.5	120	72.6
2		Submergence area (Dam Site)	31.12.2021	5.5	35	95.6
3		1 km d/s of dam site	31.12.2021	5.5	32	79.3
4		3 km d/s of dam site	30.12.2021	5.5	47	120
5		8 km d/s of dam site	31.12.2021	5.5	50	110
6		DT Inlet Tunnel	31.12.2021	7.9	119	240
7		DT Outlet Tunnel	31.12.2021	7.7	145	60
8		Adit to HRT tunnel	31.12.2021	7.9	550	256
9		Kala Nala	30.12.2021	7.5	89	200
10		Longku Nala	30.12.2021	7.1	82	360
11		APGCL camp	30.12.2021	7.5	156	210
12		PMC Colony	30.12.2021	7.5	118	260
13	Drinking Water	RO Water Near L&T Office	31.12.2021	7.7	53	140












For taking the photograph of the reading the noise meter was hand held otherwise placed in tripod.







Fig: Environmental Monitoring conducted at all components.



Fig: Water sample collected from kopili river.

7. EMP Expenditure till Dec'21

S.I	Item	Amount (Rs. lakh)
1	Expenditure for Environmental Monitoring (Air, Water & Noise)	2.61
2	Expenditure for DG Stake Monitoring	1.03
3	Portable bio toilet , (4 no.)	1.69
4	Portable prefab toilet , (2 no.)	0.95
5	Making road for local village.	0.25
6	Cement bag Provided for community toilet construction	0.15
7	DRDO Bio tank 4000 litre (2 no.)	3.37
8	Prefab container toilet (2 no.)	7.71
9	Plantation on spoil tips (plain area) including bio-fertilizer cost & tree guard cost	0.70
10	Fencing cost for 3000 sqm	7.56

11	Cost of two portable water pumps, (flow 20 cum/hr, 20m head, along with 200 m pipe, 100 mm dia, HDPE)	1.56
12	Watch & Ward for tree plantation	2.4
13	Safety Supervisor	1.60
14	Regular water sprinkling through water tanker on entire roads and NH (water tank capacity 20000 Litter & 12000 litter)	6.50
15	Fire extinguisher DCP 1KG 50 no./ 2KG 50 no./6KG 30 no./ 9 KG 20 no./BUCKET 20no.	1.3
a)	Fire extinguisher CO2 6.5 KG 20 no.	1.2
16	PPE for staff & workmen (Jacket, Helmet, Shoe, Hand gloves, mask, face shield, ear muffs, ear plugs, safety google, face shield, rain coat, face mask, gum boot, umbrella)	12.48
17	First Aid medicine	1
18	Two First aider	1.5
	TOTAL	**55.56**

1. Contractor's Equipment available at Project Site:

Sl No	Major Equipment	Specification	Nos	Received on
1	Excavator	45T - PC 450 Komatsu	1	24-Feb-21
		20T - PC 210 Komatsu	1	29-Dec-20
		20T - CAT 320	1	18-Jan-21
		20T - CAT 320	1	04-Feb-21
		20T - CAT 320	1	04-Feb-21
		20T - CAT 320	1	07-Jul-21
		20T - SANY 220	1	12-Feb-21
		20T -EX215LC	1	14-Jul-21
		20T - PC 210 Komatsu	1	05-Aug-21
		20T - PC 210 Komatsu	1	05-Aug-21
		20T - PC 210	1	23-Aug-21
		20T - Hyundai Smart 215	1	10-Sep-21
		20T - PC 210 Komatsu	2	24-Sep-21
		20T -TATA EX210	1	07-Dec-21
		13T - SANY SY140	2	15-Dec-21
2	Rock Breaker	20T	1	19-Feb-21
		20T	1	27-Jan-21
3	Dumpers	18 cum	1	13-Jan-21
		18 cum	3	23-Jan-21
		18 cum	3	30-Jan-21
		18 cum	1	03-Jul-21

		18 cum	2	29-Sep-21
		12 cum	1	29-Sep-21
		12 cum	1	05-Oct-21
		10 cum	2	03-Sep-21
		10 cum	1	03-Jul-21
		10 cum	2	16-Jul-21
		10 cum	1	06-Sep-21
		10 cum	1	09-Sep-21
		6 cum	2	05-Jul-21
4	Truck	10 T	1	13-Mar-21
5	DG	180 kva	1	17-Nov-20
		250 kva	1	26-Nov-20
		40 kva	1	01-Dec-20
		15 kva	1	02-Jan-21
		15 kva	1	16-Jun-21
		125 kva	2	01-Mar-21
		1000 kva	1	07-Aug-21
		500 kva	1	08-Aug-21
		500 kva	1	15-Dec-21
6	Air Compressor	Diesel - 1000 cfm	1	27-Jan-21
		Electric - 500 cfm (17.1 cum /min)	1	27-Nov-20
		Electric - 500 cfm (17.1 cum /min)	1	09-Dec-21
		Atlas Copco Screw Compressor - 600 cfm	1	13-Mar-21
		Tractor Mounted - 450 cfm	1	01-Jul-21
		Diesel - 600 cfm	1	07-Jul-21
		Diesel - 600 cfm	2	21-Sep-21
		Diesel - 600 cfm	1	05-Oct-21
		Electric - 500 cfm	1	29-Sep-21
		Diesel - 475 cfm	2	12-Oct-21
7	Rock Crawler Drill	ROC 203	1	06-Mar-21
		ROC 203	1	31-May-21
		ROC 203	2	17-Dec-21
		D35	1	04-Jul-21
		D35	1	27-Jan-21
		D35	2	23-Sep-21
		D35	1	12-Oct-21
8	Dozer	Bull Dozer - 165 HP	1	27-Jan-21
		Tyre mounted Dozer - 2 cum	1	09-Feb-21
		Crawler Dozer - 230 HP	1	11-Nov-21
9	Crusher	Primary - 200 TPH (Wheeler Mounted)	1	14-May-21
		Teritery - 200 TPH (Wheeler Mounted)	1	14-May-21
		Secondary - 200 TPH (Wheeler Mounted)	1	20-Apr-21
		Wet Classifier - 100 TPH	1	16-Mar-21
10	Water Tanker	5 KL	1	04-Mar-21
		10 KL	1	02-Sep-21
		15 KL	1	11-Dec-21
11	Diesel Tanker	5 KL	1	16-Jan-21
		9 KL	1	26-Mar-21

12	Loader	Wheel Loader - 1.7 m3	1	09-Mar-21
		Backhoe Loader JCB 3DX - 1 cum / 0.25 cum	1	15-Jan-21
		Backhoe Loader JCB 3DX - 1 cum / 0.25 cum	1	12-Oct-21
13	Crane	Tyre Mounted - 30T	1	28-Dec-20
		Gantry Crane for Surge shaft-25T	1	04-Aug-21
		Hydra Crane - 15T	1	16-Oct-21
14	Welding Machine	Electrical - 400 Amps (Inverter)	8	17-Mar-21
		Electrical - 400 Amps (Inverter)	2	12-Feb-21
		Electrical - 400 Amps (Inverter)	2	08-Aug-21
		ESAB Welding Generator - 400 Amps	1	27-Mar-21
15	Survey Equipments	Total Station LC 5 Sec	2	27-Apr-21
		Total Station TCRA1201+R400	1	08-Aug-21
		Auto Level	1	08-Aug-21
16	Hydraulic Drill Jumbo	2 Boom Drill Jumbo - 158 kw	1	09-May-21
		2 Boom Drill Jumbo - 158 kw	1	08-Oct-21
		2 Boom Drill Jumbo - 158 kw	1	02-Dec-21
17	Shotcrete Machine	Truck Mounted Robo Arm - 30 cum/hr	1	14-May-21
		Truck Mounted Robo Arm - 30 cum/hr	1	07-Nov-21
18	Low Bed Trailer	60'	1	11-Dec-21
19	Motor Grader	-	1	27-Dec-21
20	Batching Plant	60 cum / hr	1	25-Aug-21
21	Transit Mixer	6 cum capacity	3	19-Oct-21
22	Weigh Bridge	80T	1	04-Mar-21
23	Vibratory Roller	10T	1	06-Jan-21
24	Bar Bending Machine	B-42	2	30-Jan-21
25	Bar Cutting Machine	C-42	2	30-Jan-21
26	Telehandler	11 Meter	1	05-Jun-21
27	Cement Feeding Pump	30 TPH	1	27-Nov-20
28	Portable Mixer Machine	0.25 cum	3	09-Dec-20
29	Self Loading Transit Mixer	4 cum	1	17-Jun-21
30	Putzmeister Concrete Pump	60 m3/hr	1	19-Jul-21
31	Fuel Dispenser Unit	55-65 LP	1	26-Mar-21
32	Light mast	3.5 KW	2	23-Mar-21
33	Ventilation Fan	55KW	3	10-Feb-21
34	Chaser Machine	12mm - 38mm	1	12-Dec-20
35	Chopsaw Machine	14"	1	12-Dec-20
36	Mahindra Scorpio	S10	1	13-Mar-21
		S10	1	27-Aug-21
37	Ambulance	-	1	27-Aug-21
38	Bolero Camper	-	1	02-Sep-21
39	Bolero Camper	-	2	15-Oct-21
40	Bus	32 Seater	1	02-Sep-21
41	Bus	32 Seater	1	01-Dec-21
42	Bus	57 Seater	1	01-Dec-21
43	Explosive Van	1.1 T	2	26-Jul-21

2. **Status of the labour camp:**

Contractor's Worker Camp Accommodation Status: The Contractor is Constructing 6 no. of Block for workers.

- Manas & Lohit Block: Completed in all aspect.
- Labour Block No-3: Completed in all aspect.
- Labour Block No-4: Completed in all aspect.
- Labour Block No-5: Completed in all aspect.
- Labour Block No-6: Foundation works completed, and truss erection in progress.
- Toilet and Shower Block-1: Completed in all aspect.
- Toilet Cum Shower Block-2: Completed in all aspect.
- Labour Mess Block-1 & 2: Completed in all aspect.
- Labour Mess Block-3: Completed in all aspect.
- Labour Mess Block-4: Completed in all aspect.



Fig: Staff Colony & workmen colony



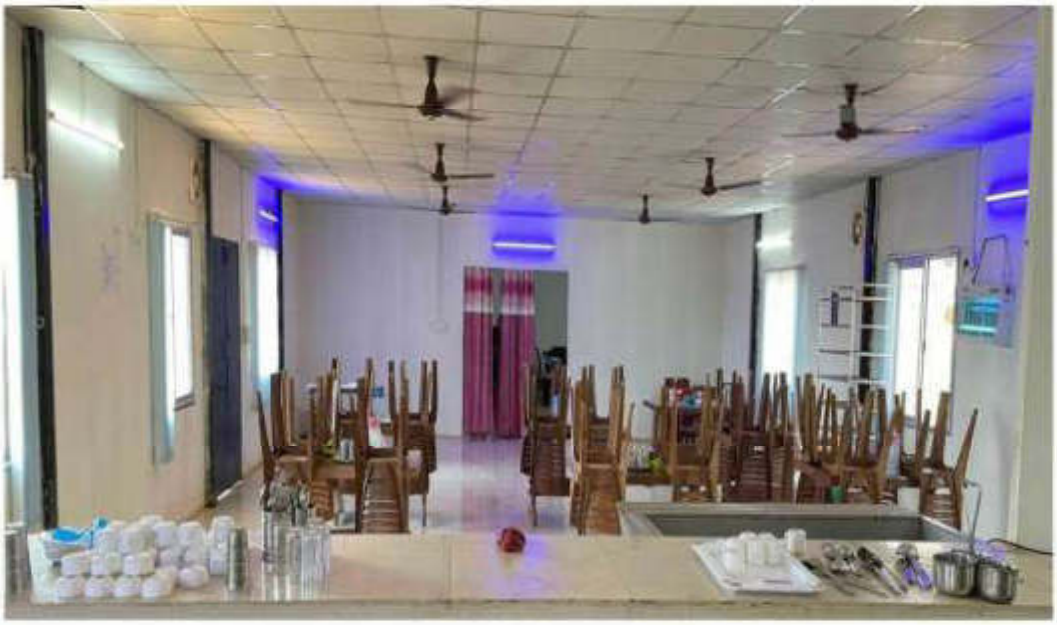


Fig: Mess for Staff.



Fig: Mess for workmen



Fig: Portable toilet installed at Adit to HRT location.

10. Project Drain work status:







Fig: Culvert & drain work inprogress.



Fig: Tree Plantation around office area.



Fig: Plantation by L&T staff near office area

11. Dec'21 month activities at site:

- Lower Kopili Project team along with PMC has planted around 150 no. sapling at Project site on occasion of *National Energy Conservation Day* 14th Dec'21 of 120 MW Lower Kopili Hydro Electric Project.





12. Medical Camp Organized By 120 Mw Lower Kopili Hep Project Team

On 11 / 12 / 2021 Saturday, 120 MW Lower Kopili Hydroelectric Project and Umrangso Civil Hospital Team jointly organized a free medical camp and Covid-19 vaccination drives were conducted at L&T Camp site and for the community at Longku Village in the district of Dima Hasao. There were two separate teams of Doctors deployed for the health check-up and vaccination drive. The team were assisted by the First Aider and his support first aider at L&T camp site. Overall supervision from L&T site was done by Mr. Manoj Yadav, (Sr. Environmental Engineer), Mr. Naba Jyoti Bera (EHS In charge) and Mr. Sangram Singh (Social & Resettlement Expert, from PMC)

The event was pre-scheduled and PAPA president Shri Bida Singh Engti was also present at Longku village health camp. The women's participation was also noticed at the Longku village.

The following Doctors team were presents:

Team 1 (L&T Camp)	Team 2 (Village Camp)
1. Dr. N. K. Bailung, Sub-Divisional Medical Health officer,	1. Dr. Dais Nagpui
2. Mr. Gopal Roy, Lab-Technician, Integrated Counselling and Testing Centres (ICTC), Umrangso	2. Mr. B. Bhowrmik, Pharmacist, CHC Umrangso 3. Mr. Raju Joishi, CHC Umrangso
3. Mrs. Tribeni Thaosen, Surveillance Worker (M), 8011381084	4. Mr. V. Hramghal, Surveillance Inspector, CHC Umrangso
4. Mrs. Heguajile Riame (ANM), 9678575767	5. Mr. Dipak Kr Das H/A, CHC Umrangso
	6. Mrs. Marnkin, Asha Supervisor, CHC Umrangso
	7. Mrs. Demisha Phoagh ASHA, CHC Umrangso
	8. Mrs. Bisthy Timmagsi, ANM, CHC Umrangso

All the protocols and guidelines issued by Government of Assam and Central Government on the Covid-19 were followed and social distancing along with the proper use of mask and hand sanitizer were adhered.

The event has been monitored by the Social and Environment Management Cell, APGCL. The following numbers of workers and community/villages were conducted health checkups and administered the Covid-19 vaccination.

Health check-up		Vaccination	Women participation %
Male	Female		
135	23	65	15%

Dr. N. K. Bailung, Sub-Divisional Medical health officer has enlightened the labour and villages about the symptoms of various diseases and regarding the emergency responses in case of illness and any accident to the workers.

Mr. Gopal Roy, Lab-Technician, Integrated Counselling and Testing Centers (ICTC) highlighted the issue of HIV / AIDS and its methods of spread, prevention, and cure. He emphasizes the use of condom every time in case of its unknown partner. Safe use of condom and its proper disposal was also demonstrated.

Related IEC materials were distributed and tea, snacks were arranged for all the participants.

Some glimpses of the awareness campaign are presented below:



Health and HIV-AIDS awareness Campaign Banner Displayed-Team-1 at L&T Camp



Health and HIV-AIDS awareness Campaign Banner Displayed-Team-2 at Longku



Mr. Sangram Singh (PMC) and Mr Gopal Roy (Lab-Technician, ICTC Umrangso) shares the HIV/AIDs related awareness



Under Covid-19 vaccination drive Labours were administered the vaccine at L&T camp



Under Covid-19 vaccination drive villagers were administered the vaccine



View of Health and HIV-AIDS awareness camp at L&T Camp





View of Health and HIV-AIDS awareness camp at Longku village



A dimasa kochari person showing the medicines given as prescription by Doctor



Under Covid-19 vaccination drive labour were administered the vaccine at L&T Camp

13. Community toileted Constructed by L&T for local villagers:



Fig: Community toileted Constructed by L&T for local villagers.



OFFICE OF THE
LOWER KOPILI HYDRO ELECTRIC PROJECT AFFECTED PEOPLES' ASSOCIATION

To

The Project Manager (P.M),
L&T, Lower Kopili HE Project,
Longku, Dima Hasao (Assam).

Sub:- Prayer for the use of Excavator (JCB) for field leveling and road excavation at Borolongku Village.

Respected Sir,

With reference to the subject cited above , I have the honour to state you that, I on behalf of LKHEPAPA president, would like to draw the attention that, due to the deplorable conditions of Borolongku Village field and road we could not able to conduct any festival, sports etc. Due to this the scenario of the Borolongku Village become unorganized under such situation.

Hope you will scrutinize the subject matter properly.

Thanking you.

Yours Faithfully

(Sri. Bidyasing Engti)
President, LKHEPAPA
Longku, Dima Hasao (Assam)

Date:- 4/12/21

Thanking you for your good gesture through the community development under Larsen & Toubro Ltd.

Fig: Excavator provided by L&T for LKHEPAPA regarding local road development (thanks letter attached)

14. PUC of the vehicles:

No	Registration No	Certificate No	S/c Name	PUC Date	PUC Expired date
1	NL 01 AE 5223	AS012500370001796	ECO Green	07.07.2021	06.07.2022
2	NL 01 AE 5206	AS012500370001795	ECO Green	07.07.2021	06.07.2022
3	RJ 14 GH 9976	D4RJ41104008	ECO Green	05.07.2021	04.01.2022
4	RJ 14 GH 6353	D4RJ41104006	ECO Green	05.07.2021	04.01.2022
5	RJ 14 GH 0194	D4RJ41104013	ECO Green	06.07.2021	05.01.2022
6	RJ 14 GH 0193	D4RJ41104010	ECO Green	05.07.2021	04.01.2022
7	RJ 14 GH 6354	D4RJ41104009	ECO Green	05.07.2021	04.01.2022
8	RJ 14 GH 9978	D4RJ41104011	ECO Green	05.07.2021	04.01.2022
9	RJ 14 GH 9975	D4RJ41104007	ECO Green	05.07.2021	04.01.2022
10	AS 01 DC 6771	D68RJ23104353	Shree Balaji Construction	27.06.2021	26.06.2022
11	AS 01 LC 9682	AS00100540002516	DN Shama	11.08.2021	10.08.2022
12	AS 01 LC 9684	AS00100540002518	DN Shama	11.08.2021	10.08.2022
13	AS 01 MC 3159	AS03100010001368	Kartik Biswas	09.07.2021	08.07.2022
14	AS 02 CC 6159	AS03100010001367	Kartik Biswas	09.07.2021	08.07.2022

15. Drinking water facility at work site:

S.I	Location	Boring Depth	Per day extraction	Test Report	Remarks / present condition
1	Near Store	213m	-	Sample collected for Q3 Monitoring, result analysis InProgress	Stopped
2	Crusher Plant	200m	50,000		Working
3	Kala Nala	-	-		Stopped
4	Longku Nala	11*10000 5*20000	2,10,000		Working
5	Brahmaputra Block	140m	5,000		Working
6	Kopili Block	200m	5,000		Working
7	Pit near PMC Colony	-	10,000		Working



Fig: Installed 2,000 liter/hour capacity RO water plant for drinking water supply to all staff & workmen.





Fig: Water Storage tank one for treated water and second for waste water collection from RO plant, which will be use for non-drinking purpose (sprinkingl, gardening & dish washing in mess)

16. Water sprinkling:



Fig: Water sprinkling on road to reduce dust pollution.

17. Training & Awarness:



Fig: Training & Awarness on Critical Species around project area.

18. Site Visit :



Fig: Weekly site visit along with PMC & APGCL

Procurement of the camera for tunnels initiated in December, 2021.
Entry and exit camera installed in the tunnels in the month of March, 2021.

To record Tag in tag out in the tunnel one software will be installed which will display how many vehicles and workers are inside the tunnel in any point of time.
Proper lighting are provided in the tunnel, ventilator fans will be installed shortly.



Fig: Environment & Safety walk along with PMC & APGCL.



Fig: FirstAid Center visit along with PMC.



Fig: after site visit Review meeting along with Execution team.

19. COVID related Notification/guidline:-

S. No	Description	Remark
1	Govt. of Assam, Health & family order No. HLA.301/2020/177, Dated 21st April'2021 **(compulsory home quarantine for 7 days)**	Standard Operating Procedures (SOPs) for person arriving in Assam, All Passengers arriving by flight/train and vehicles from outside the state of Assam will have to undergo compulsory home quarantine for 7 days even if the result of COVID test undergone on arrival is negative
2	District Disaster Management Authority (DDMA) Dima Hasao, Haflong vide letter no. DDMA/COVID-19/2021-2022/Pt.1/02/4 dated 22nd April'2021.	7-day Mandatory quarantine as per Assam state govt. COVID SOPs
3	Govt. of Assam Office Order No. ASDMA.28/2021/11, dated: 20.04.2021 regarding issue of the guidelines for effective control of COVID-19. **(All offices, both government and private, to function with a maximum staff strength of 50%)**	State Disaster Management Authority, Assam, hereby issues the revised and consolidated directives as follows which shall come in force with immediate effect and remain in force till 30th April, 2021
4	Govt. of Assam Office Order No. ASDMA.28/2021/18, dated: 26.04.2021 regarding issue of the guidelines for effective control of COVID-19 in force till 01.05.2021. **(All offices, both government and private, to function with a maximum staff strength of 50%)**	State Disaster Management Authority, Assam, hereby issues the revised and consolidated directives as follows which shall come in force with immediate effect and remain in force till 1st May, 2021
5	Govt. of Assam Office Order No. ASDMA.28/2021/27, dated: 27.04.2021 regarding issue of the guidelines for effective control of COVID-19 in force till 01.05.2021. **(All offices, both government and private, to function with a maximum staff strength of 50%. Total Ban on movement of individuals from 8 pm to 5 am daily)**	State Disaster Management Authority, Assam, hereby directs that there shall be total ban on movement of individuals from 8.00 PM to 5.00 AM daily till 1st May'2021
6	Govt. of Assam Office Order No. ASDMA.28/2021/41, dated: 30.04.2021 regarding issue of the guidelines for effective control of COVID-19 in force till 07.05.2021. **(All offices, both government and private, to function with a maximum staff strength of 50%. Total Ban on movement of individuals from 8 pm to 5 am daily)**	State Disaster Management Authority, Assam, hereby directs that there shall be total ban on movement of individuals from 8.00 PM to 5.00 AM daily remain in force till 7th May'2021
7	Govt. of Assam Office Order No. ASDMA.28/2021/63, dated: 04.05.2021 regarding issue of the guidelines for effective	State Disaster Management Authority,

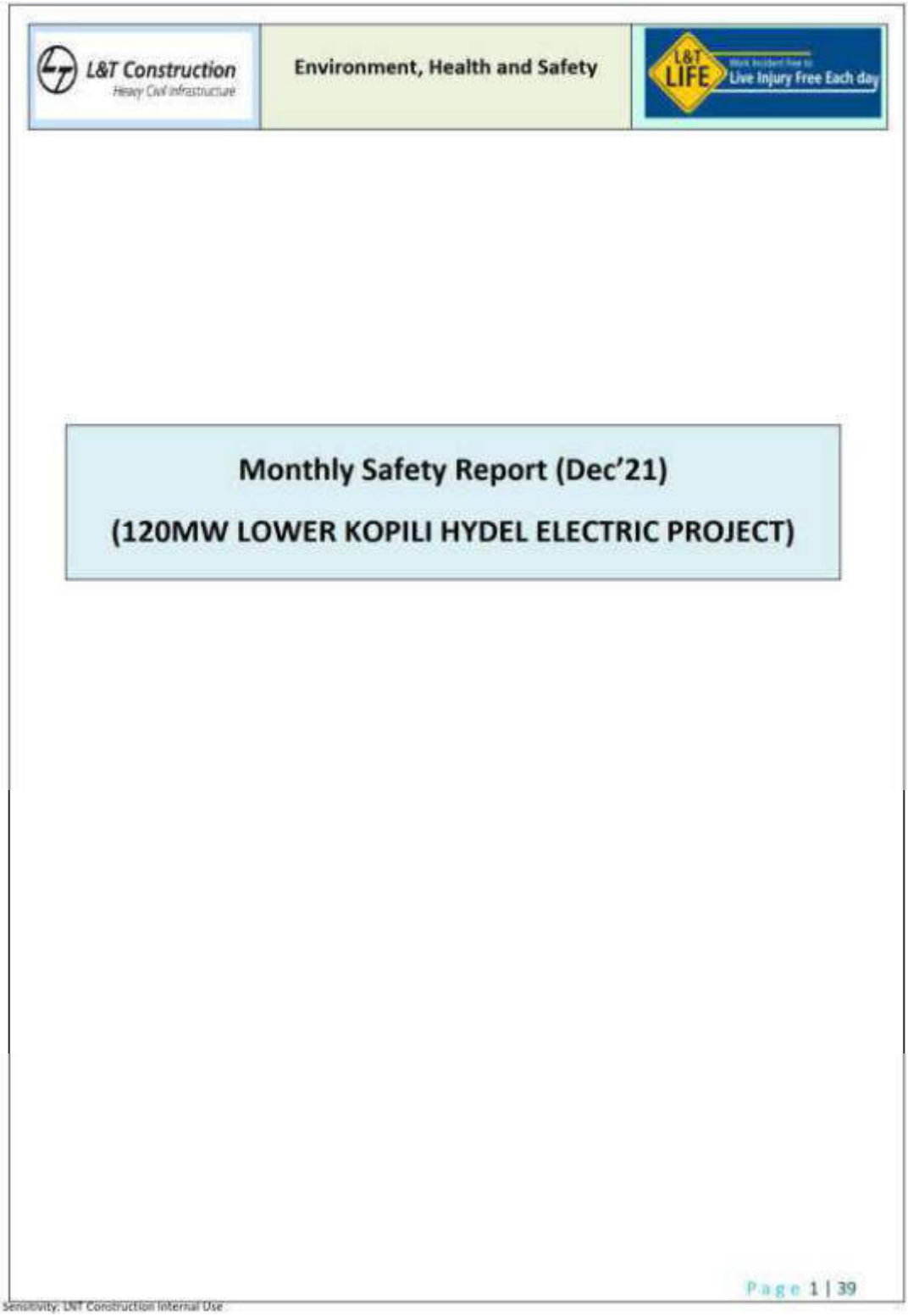
	control of COVID-19 with effect from 05:00 AM of 5th May 2021 and remain in force until further orders. **(All offices both private and Government shall shut down at 2.00 PM on all days.)**	Assam, hereby issues the revised and consolidated directives as follows which shall be in supersession of all earlier orders and shall come in force from 5.00 AM of 5th May 2021 and remain in force until further orders.
8	Govt. of Assam Office Order No. ASDMA.24/2020/Pt-2/241, dated: 12.05.2021 regarding issue of the guidelines for effective control of COVID-19 with effect from 05:00 AM of 13th May 2021 and remain in force until further orders. **(All offices both private and Government shall shut down for 15 days.)**	State Disaster Management Authority, Assam, hereby issues the revised and consolidated directives as follows which shall be in supersession of all earlier orders and shall come in force from 5.00 AM of 13th May 2021 and remain in force until further orders.
9	District Disaster Management Authority (DDMA) Dima Hasao, order no. DDMA/COVID-19/2021-2022/Pt.2/ dtd. 12.05.2021 regarding issue of the guidelines for effective control of COVID-19 with effect from 05:00 AM of 13th May 2021 and remain in force until further orders. **(Restriction in regard to plying of private/personal vehicles have been made from 5:00 AM to 2:00 PM)**	District Disaster Management Authority (DDMA), Dima Hasao, hereby directs that Vehicle with odd number will be allowed to ply on odd dates. Vehicle with even number will be allowed to ply on even dates.
10	Govt. of Assam Office Order No. ASDMA.24/2020/Pt-2/253, dated: 15.05.2021 regarding issue of the guidelines for effective control of COVID-19 with effect from 05:00 AM of 16th May 2021 and remain in force until further orders. **(There shall be total ban on movement of individual from 12 Noon to 5 PM daily.)**	State Disaster Management Authority, Assam, hereby directs that there shall be total ban on movement of individuals from 12 Noon to 5 AM daily with effect from 16th May 2021 and remain in force until further orders.
11	Govt. of Assam Office Order No. ASDMA. 24/2O2O/Pt-2/255 dtd. 17.05.2021 regarding issue of the guidelines for effective control of COVID-19 with effect from 05:00 AM of 13th May 2021 and remain in force until further orders. **(Inter-district transport services and movement of people to and from other districts shall remain suspended for 15 days with effect from 5 AM of May 21, 2021, and remain in force until further orders)**	State Disaster Management Authority, Assam, hereby directs that there shall be total ban on movement of individuals from 12 Noon to 5 AM daily with effect from 21st May 2021 and remain in force until further orders.
12	Govt. of Assam Office Order No. ASDMA.28/2021/86 Dated 25th May'21 regarding issue of revised and consolidated directives for containment of COVID 19 cases across the state and shall come into force w.e.f till 5th June,2021. **(All offices both Government & Private shall open till 1 PM on all days)**	State Disaster Management Authority, Assam, hereby issue the following directive which will be applicable across the state and shall come into force with immediate effect till 5th Jun'2021

13	Govt. of Assam Office Order No. ASDMA.28/2021/90 Dated 04th June'21 regarding issue of revised and consolidated directives for containment of COVID 19 cases across the state and shall come into force w.e.f till 16th June'21 **(All offices both Government & Private shall remain closed till 15th June)**	State Disaster Management Authority, Assam, hereby issue the following directive which will be applicable across the state and shall come into force with immediate effect till 16th Jun'2021
14	Govt. of Assam Office Order No. ASDMA.28/2021/92 Dated 15th June'21 regarding issue of revised and consolidated directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of June 16, 2021, till 5 AM of June 22, 2021 **(All offices both Government & Private shall open till 12 PM on all days)**	State Disaster Management Authority, Assam, hereby issue the following directive which will be applicable across the state and shall come into force with immediate effect till 22nd Jun'2021
15	Govt. of Assam Office Order No. ASDMA.28/2021/108 Dated 21st June'21 regarding issue of revised and consolidated directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of 22nd June'21 until further order. **(All offices both Government & Private shall open till 12 PM on all days)**	State Disaster Management Authority, Assam, hereby issue the following directive which will be applicable across the state and shall come into force with immediate effect Unit further order
16	Govt. of Assam Office Order No. ASDMA.28/2021/126 Dated 26th June,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of June 28, 2021, until further order. **(All offices both Government & Private shall open till 12 PM on all days)**	
17	Govt. of Assam Office Order No. ASDMA.28/2021/148 Dated 6th July,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of July 7, 2021, until further order **(All offices both Government & Private shall open till 4 PM on all days)**	
18	Govt. of Assam Office Order No. ASDMA.28/2021/179 Dated 19th July,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of July 20, 2021, until further order. **(All offices both Government & Private shall open till 4 PM on all days)**	
19	Govt. of Assam Office Order No. ASDMA.28/2021/199 Dated 27th July,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of July 28, 2021 until further order. **(All offices both Government & Private shall open till 4 PM on all days)**	

20	Govt. of Assam Office Order No. ASDMA.28/2021/203 Dated 2nd August,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of August 3rd ,2021 until further order. **(All offices both Government & Private shall open till 4 PM on all days)**	
21	Govt. of Assam Office Order No. ASDMA.28/2021/207 Dated 9th August,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of August 10,2021 until further order. **(All offices both Government & Private shall open till 5 PM on all days)**	
22	Govt. of Assam Office Order No. ASDMA.28/2021/219 Dated 17th August,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of August 18,2021 until further order. **(All offices both Government & Private shall open till 6 PM on all days)**	
23	Govt. of Assam Office Order No. ASDMA.28/2021/228 Dated 1st September,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 11 AM of 2nd September,2021 until further order. **(All offices both Government & Private shall open till 8 PM on all days)**	
24	Govt. of Assam Office Order No. ASDMA.28/2021/247 Dated 01st October,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of 2nd October,2021 until further order. **(curfew time 10 PM – 5 AM)**	State Disaster Management Authority, Assam, hereby issue the following directive which will be applicable across the state and shall come into force with immediate effect Unit further order
25	Govt. of Assam Office Order No. ASDMA.28/2021/273 Dated 25th October,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f of 26th October,2021 until further order. **(curfew time 11 PM – 5 AM)**	
26	Govt. of Assam Office Order No. ASDMA.28/2021/304 Dated 27th October,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 5 AM of 28th October,2021 until further order. **(curfew time 11 PM – 5 AM)**	
27	Govt. of Assam Office Order No. ASDMA.28/2021/321 Dated 9th November,2021 regarding issue of new directives for containment of COVID 19 cases across the state during the upcoming Chath Puja and Rass festival until further order.	
28	Govt. of Assam Office Order No. ASDMA.28/2021/326 Dated 12th November, 2021 regarding COVID-19 SOP for	

	withdrawing the relaxation given to the pregnant woman employee and woman employees with children below 3 yrs to work from home.	
29	Govt. of Assam Office Order No. ASDMA.28/2021/334 Dated 25th December,2021 regarding issue of new directives for containment of COVID 19 cases across the state and shall come into force w.e.f 6 AM of 26th December,2021 until further order.	

Annexure – 6 : Monthly safety Report December 2021 of Package 2 Contractor



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Sensitivity: LNT Construction Internal Use

1. **Project EHS Statistics Details:**

S.N.	Total Man hours	Dec'21	FY 2021-22	Remark
1	No. of workforce (including staff and workmen)	693		
2	Total Man hours worked (Man hours)	2,56,332	11,62,447	Since inspection: 14,13,619
3	Safe Man hours from last Reportable Lost Time Injury (Man hours)	2,56,332	11,62,447	Since inspection: 14,13,619
	Incident details			
4	No. of Fatalities	-	-	
5	No. of Reportable Lost Time Injuries	-	-	
6	No. of Man days Lost	-	-	
7	Dangerous Occurrences	-	-	
8	Reportable Sick Cases	-	-	
9	Major Environment Incidents	-	-	
10	Non-Work-Related Incident (not included in statistics)	0	02	
11	First Aid Cases	1	10	
12	Near Miss Reports	0	07	
13	Minor Environment Incidents	-	-	
14	Frequency Rate - No. of RLTI	0	0	
15	Severity Rate - No. of Man days lost per million Man hours worked	0	0	

Sensitivity: LNT Construction Internal Use

2. Training Updates:

S No.	EHS Training	No. of People attended this month	No of staff completed in This Month
1.	Safety on Underground Work	16	2
2.	Safety on Grinding Work	23	2
3.	Fire Safety	8	1
4.	Pre-Deployment Induction Training	154	7



Fig -1. Safety on underground work

Sensitivity: LNT Construction Internal Use

Environmental Monitoring Report

Project No. 47101-004
Semi-Annual
January 2022

India: Assam Power Sector Investment Program - Tranche 3

PART B

Prepared by the Assam Power Generation Corporation Limited (APGCL) for the Asian Development Bank.

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Fig -2. Defensive Driving



Fig -3. Fire Safety

Sensitivity: LNT Construction Internal Use



Fig -4. Pre-Deployment Induction Training

3. Hazard Identification and Risk Assessment (HIRA) /Safe Working Method (SWM) Details:

Total no. of Risk Assessment (RA) & SWM available	New SWM checklist developed & implemented	Reason for updating/development (New activity/General revision/ revised after incident / change in work activity method)
11	0	0

4. Unsafe Act / Unsafe Condition - EHS Observations:

Unsafe Acts observed	Unsafe Acts complied	% of compliance	FY 2021-22 Months	Unsafe conditions observed	Unsafe conditions complied	Compliance	Total EHS Observations
12	12	100%	Apr	4	4	100%	16
6	6	100 %	May	1	1	100%	7
10	10	100%	Jun	18	18	100%	28
12	12	100%	Jul	27	27	100%	39
11	11	100 %	Aug	15	15	100%	26

Sensitivity: LNT Construction Internal Use

20	20	100 %	Sept	9	9	100%	29
20	20	100 %	Oct	4	4	100 %	24
23	23	100 %	Nov	5	5	100 %	28
53	53	100 %	Dec	21	21	100 %	74

5. EHS Initiatives / Good EHS Practices:

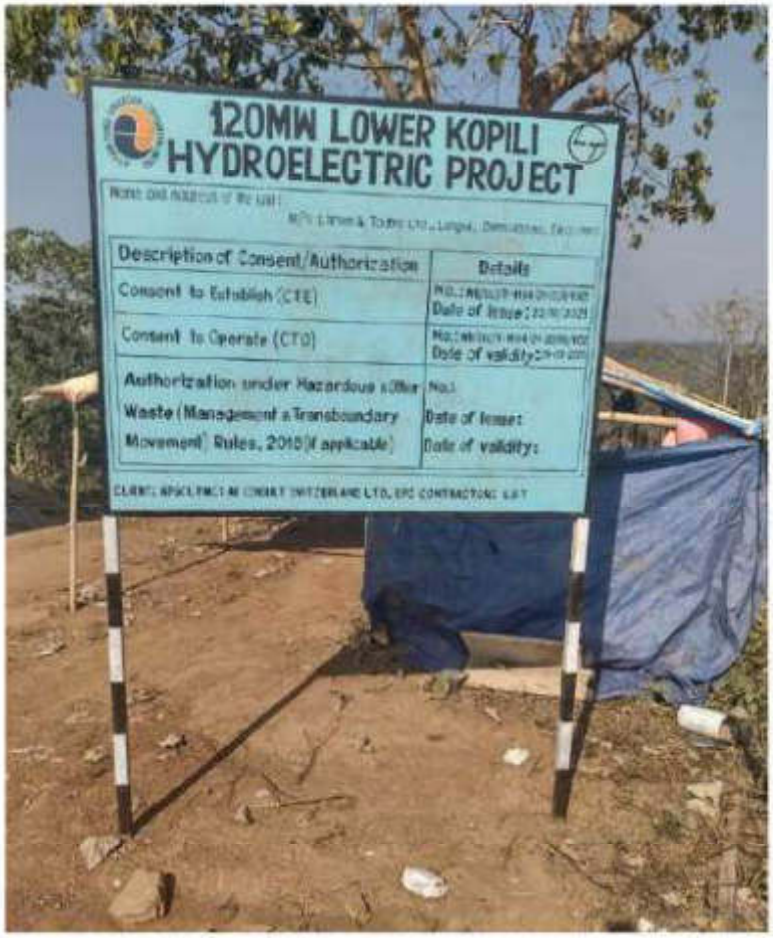


Fig -1. Safety Signe board display

Sensitivity: LNT Construction Internal Use



Fig -2. Cautionary Signe board display



Fig -3. Display of Safety Warning and Cautionary Signe board for Explosive Magazine.

Sensitivity: LNT Construction Internal Use



Fig -4. Safety Cautionary Massage display at Batching plant.

Sensitivity: LNT Construction Internal Use



Fig -5. Display of Safety Message.

Sensitivity: L&T Construction Internal Use



Fig -6. Display Safety Message

6. HARD BARRICATION AND EDGE PROTECTION



Fig -7. Edge protection for weighbridge

Sensitivity: L&T Construction Internal Use



Fig -8. Barricading by Cautionary Tape



Fig -9. Temporary edge protection by Cautionary tap

Sensitivity: LNT Construction Internal Use



Fig -10. Standard Cylinder Store

7. Daily Prestart Briefing various locations both shift:



Fig -1. Daily Prestart Briefing before start of work.

Sensitivity: LNT Construction Internal Use



Fig -2. Daily Prestart Briefing before start of work.



Fig -3. Daily Prestart Briefing before start of work.

Sensitivity: LNT Construction Internal Use



Fig -4. Daily Prestart Briefing before start of work.

8. Safety Measures:



Fig -5. Illumination Monitoring on Night shift work



Fig-16: Automatic Safe Load Indicates Installed at all Lifting Crane

Sensitivity: LNT Construction Internal Use



Fig -6. Fig-17: Noxious Gas Monitoring and Oxygen Level before Entering on Drift Tunnel

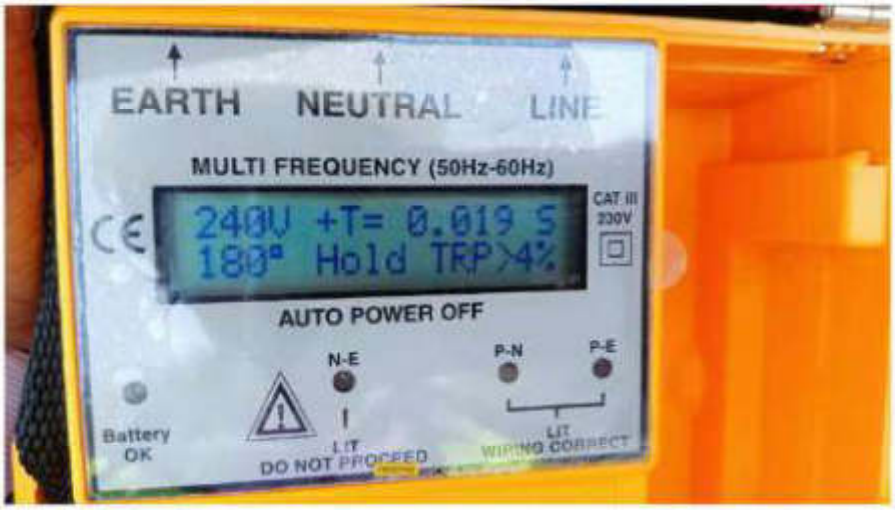


Fig -7. Periodical Electrical ELCB/RCCB Testing

Sensitivity: LNT Construction Internal Use



Fig -8. Pre-deployment Alcohol Monitoring



Fig -9. Lightning Arrested installed on Explosive Magazine

Sensitivity: LNT Construction Internal Use



Fig -10. Slandered Earth Pit for Electrical equipment



Fig -11. Periodical Earthing Resistance Monitoring



Fig -12. Rector reflective triangular for Transit miller for night Visibility

Sensitivity: L&T Construction Internal Use





Fig -13. Daily Thermal Screening



Fig -14. Fire Extinguisher provided for Fuel substation

Sensitivity: LNT Construction Internal Use



Fig -15. Fire Extinguisher provided for all PMC Blocks



Fig -16. Fire Extinguisher provided for all PMC Blocks

Sensitivity: LNT Construction Internal Use



Fig -17. Fire Stand at Valve house Office



Fig -18. Fire Stand at Explosive Magazine

Construction of Magazine was under way. Contractor being instructed to clear the wastes and debris from the construction sites.

Sensitivity: LNT Construction Internal Use



Fig -19. Fire Stand at Surge Shaft



Fig -20. Stracher Provided for Drift Tunnel for Emargency

9. Emergency Properness

Status of Fire Extinguisher at Project sites

sl	Location	Type	Capacity (kg)	nos
1.	Surge Shaft Container	CO_2	6.5	2
		DCP	1.0	4

Sensitivity: LNT Construction Internal Use

sl	Location	Type	Capacity (kg)	nos
2.	Valve House Container	CO_2	6.5	1
		DCP	1.0	3
3.	Crusher Plant Area	CO_2	6.5	2
		DCP	1.0	3
4.	HRT Adit	CO_2	6.5	2
		DCP	1.0	3
5.	Kopili Block	DCP	1.0	4
6.	APGCL Canteen	DCP	6.0	1
7.	APGCL Barak	DCP	6.0	2
8.	Eco Green Canteen	DCP	6.0	1
9.	Lohit Block	DCP	1.0	4
10.	Manas Block	DCP	1.0	4
11.	Dihing Block	DCP	1.0	4
12.	Store Container	DCP	1.0	1
13.	P&M Container	DCP	1.0	1
14.	Store	CO_2	6.5	2
		DCP	1.0	3
		FOAM	6.2	2
		Fire Bucket		2
15.	P&M Workshop	DCP	1.0	1
16.	Fabrication Yard	DCP	1.0	1
17.	Bhuoender Singh Container	DCP	1.0	1
18.	Diesel Browser	DCP	1.0	2
19.	Kolong Block	DCP	2.0	4
20.	Kamang Block	DCP	2.0	4

Sensitivity: L&T Construction Internal Use

sl	Location	Type	Capacity (kg)	nos
21.	Subansiri Block	DCP	2.0	3
22.	Brahmapurta Block	DCP	2.0	4
23.	DT Out let Fire Stand	DCP	2.0	2
		CO_2	6.0	1
		Fire sand Bucket	5.0	1
24.	Dam Site Office	DCP	2.0	2
		Fire sand Bucket	5.0	2
25.	Dame Site DG	CO_2	6.5	1
26.	Digaru Block	DCP	1.0	4
27.	Dhansiri Block	DCP	1.1	4
28.	Explosive Magazine	DCP	2.0	4
		Fire Sand Bucket	5.0	4
29.	Fuel Substation	DCP	5.0	2
		Foam	9.0	2
		Fire Sand Bucket	5.0	2
30.	PMC Blocks	DCP	1.0	14

Sensitivity: LNT Construction Internal Use

10. ELCB/RCCB Testing records

RCCB No.	Location	Brief Details of equipment connected	Date of Testing	Sensitivity of RCCB	Test Remarks
1.	P&M Workshop 01	Electrical Equipment and Light	26.09.2021	0.007Sec @ 30mA	Fit
2.	P&M Workshop 02	Welding Machine/Grinding Machine	26.09.2021	0.040Sec @35mA	Fit
3.	Cement Go down	Area Lighting	26.09.2021	0.038Sec @ 30mA	Fit
4.	QA/QC Lab Inside	Lab equipment's and lighting	26.09.2021	0.018Sec @ 30mA	Fit
5.	Store Container	Container and Store lighting Light	26.09.2021	0.026Sec @ 30mA	Fit
6.	Brahmaputra Block outside.	Area Lighting	26.09.2021	0.023Sec @ 30mA	Fit
7.	Brahmaputra Block inside ISD room after UPS	All Computers	26.09.2021	0.007Sec @ 30mA	Fit
8.	Brahmaputra Block inside Main gate	All office lighting and Fans	26.09.2021	0.027Sec @ 30mA	Fit
9.	Dhansiri Block	Mess Lighting / equipment	26.09.2021	0.024Sec @ 30mA	Fit
10.	New camp construction area	Area lighting / hand grinding making / pipe cutting machine	26.09.2021	0.008Sec @ 30mA	Fit
11.	Manas Block	Room Lighting and Fans	26.09.2021	0.020Sec @ 30mA	Fit
12.	Manas Block Back side	Room Lighting and Fans	26.09.2021	0.021Sec @ 30mA	Fit
13.	Sub-contractor Mess	Eco Green Mess Water purifier, Lighting and Fans	26.09.2021	0.021Sec @ 30mA	Fit
14.	Digaru Block	Room Lighting and Fans	26.09.2021	0.042Sec @ 30mA	Fit
15.	Digaru Block Back side	Room Lighting and Fans	26.09.2021	0.018Sec @ 30mA	Fit

Sensitivity: LNT Construction Internal Use

11. COVID Positive case under LKHEP

Sl No	Name	Designation	COVID Positive (date)	SRF NO.	Treatment (Home Isolation/ Hospital)	Name of Hospital/Consultation with Doctor	Joined service (Date)
1	No Positive Case in this Month						

12. Status of COVID positive cases and recovery

Number of New COVID cases in the Reporting Month	Cumulative COVID Positive cases at LKHEP	Number of patients recovered in the Reporting Month	Cumulative recovered at LKHEP	Number of Migrated cases (if any)
0	12	0	12	-

13. Records of Monthly status of COVID vaccination Staff and Workmen

a. Vaccination details for staff

Sl No	Name	Designation	No of Vaccination Dose	1st Dose	2nd Dose
1.	SANTANU MAJUMDAR	Project Manager	2	13.05.2021	11.06.2021
2.	DINESH SHARMA	DGM (Civil)	2	08.04.2021	09.05.2021
3.	ZAKIR HUSSAIN HAZARIKA	DGM (Civil)	2	08.04.2021	18.07.2021
4.	AKHILESH PATHAK	Sr. Manager (Accounts & Admin)	2	08.04.2021	09.05.2021
5.	B UMAMAHESHWARAN	Sr. Manager (QA/QC)	2	11.04.2021	7.08.2021
6.	ACHARYA JAYDIP BHIKHALAL	Manager (IR & Admin)	2	29.05.2021	27.07.2021
7.	PRATIK KUMAR BHUNIA	Manager (P&M)	2	08.04.2021	09.05.2021
8.	KAILAS CHANDRA MAHARANA	Construction Manager (Civil)	1	18.05.2021	10.11.2021
9.	RITUPAM BARTHAKUR	Construction Manager (Mech)	2	13.05.2021	26.09.2021
10.	DEVRAJ SINGH CHAUHAN	Manager (Geologist)	2	09.05.2021	09.08.2021
11.	ABHIJIT MAJUMDER	Manager (Systems)	2	08.04.2021	09.05.2021
12.	VELUGURI VENKATA RAMARAO	Manager (Accounts)	2	30.04.2021	29.05.2021
13.	SUDIP KR DAS	Asst. Manager (P&M)	2	08.04.2021	09.05.2021
14.	SANTANU BORAH	Asst. Manager (IR)	2	21.04.2021	25.05.2021
15.	MANOJ YADAV	Asst. Manager (Civil)	2	13.05.2021	16.06.2021
16.	PRANJIT SAVAPANDIT	Asst. Manager (Admin)	2	08.04.2021	09.05.2021
17.	NABAJYOTI BERA	Asst. Manager (EHS)	2	15.04.2021	06.09.2021
18.	ANANDHAPANDI R	Sr. Engineer (QAQC)	2	15.04.2021	7.08.2021
19.	LAXMI KANT TAGORE	Sr. Engineer (Civil)	2	15.04.2021	9.08.2021
20.	JITHIN B A	Sr. Engineer (Civil)	2	17.05.2021	04.09.2021

Sensitivity: L&T Construction Internal Use

Sl No	Name	Designation	No of Vaccination Dose	1st Dose	2nd Dose
21.	NARENDER KUMAR	Sr. Engineer (Civil)	2	18.05.2021	17.05.2021
22.	RAJU PANIGRAHI	Sr. Engineer (Quarry)	2	11.06.2021	06.07.2021
23.	NITYA SUNDAR PARAMANIK	Sr. Engineer (QAQC)	2	15.05.2021	13.08.2021
24.	MANOJ KUMAR	Asst. Officer (Stores)	2	18.05.2021	08.09.2021
25.	MD MUBARAQ ANSARI	Engineer (Civil)	1	30.05.2021	11.10.2021
26.	SHATRUDHAN PANDEY	Engineer (Survey)	2	18.05.2021	18.08.2021
27.	SUMIT KUMAR	Engineer (P&M)	2	15.04.2021	09.08.2021
28.	MANAS MAJUMDAR	Sr. Supervisor (P&M)	2	08.04.2021	11.05.2021
29.	ALIP KUMAR TALUKDER	Asst. Supervisor (Mines)	2	07.06.2021	30.08.2021
30.	SATYAM TIWARI	Graduate Engineer Trainee (Civil)	2	15.05.2021	12.08.2021
31.	JOHNS K JOSE	Graduate Commercial Trainee	2	18.05.2021	17.08.2021
32.	JOSEPH SEBASTIAN	Graduate Commercial Trainee	2	18.05.2021	23.08.2021
33.	KANAGRAJ A	Assistant manager (planning)	1	07.09.2021	03.12.2021
34.	AYON CHOWDHURY	Engineer (civil)	2	07.05.2021	16.08.2021
35.	TANIA MODO	Foreman civil	2	03.05.2021	09.08.2021
36.	DIP PAUL CHOUDHURY	SURVEY ENGINEER	1	24.05.2021	30.08.2021
37.	MONIKANTA GOSWAMI	Mining Manger	2	22.04.2021	15.07.2021
38.	ASHOK KUMAR SINGH	MANAGER-GEOLOGY	2	05.04.2021	06.05.2021
39.	GIRIDHARI SEN	Civil Manger	2	11.04.2021	05.07.2021
40.	ANJAIAH LUKKA	Mining Manger	2	09.03.2021	17.04.2021
41.	MONU KUMAR MONDAL	GET	2	10.06.2021	24.09.2021
42.	KUMAR ADARSH	GET	2	10.06.2021	2.09.2021
43.	B. NIKHIL KUMAR	PGET	2	21.09.2021	22.12.2021
44.	ANUBHAV MUKHERJEE	ASST. MANAGER-FORMWORK	2	04.05.2021	27.07.2021
45.	RAJESH KUMAR ROUT	PGT-IR	2	15.05.2021	3.09.2021
46.	AADEEP KUMAR	SR POWERHOUSE ENGINEER	2	02.04.2021	26.06.2021
47.	SANJAY SINGH	CONSTRUCTION MANAGER	2	26.04.021	26.07.2021
48.	NITESH PATHAK	DET	2	02.06.2021	01.09.2021
49.	RAHUL MAN	DET	1	27.08.2021	11.12.2021
50.	DIPTA PRADHAN	DET	1	13.09.2021	11.12.2021
51.	SUBHANKAR CHAKRABORTY	DET	1	26.07.2021	19.10.2021
52.	ASHISH RAJ	DET	2	20.03.2021	02.09.2021

Sensitivity: L&T Construction Internal Use

b. Vaccination details for Workmen

Sl. No.	NAME OF WORKMEN	No of Vaccination Dose	1st DOSE	2nd DOSE
1.	SARDAR MAL	2	DONE	DONE
2.	MOHAN DAS	2	DONE	DONE
3.	BINEN KHERSA	2	DONE	DONE
4.	AJAY NARAH	2	DONE	DONE
5.	PRADIP TAMULI	2	DONE	DONE
6.	DEBEN SAIKAIA	2	DONE	DONE
7.	AMERIKA PAYENG	2	DONE	DONE
8.	DHANANJAY DAS	2	DONE	DONE
9.	ADITYA PATRA	2	DONE	DONE
10.	AJIT BISWAS	2	DONE	DONE
11.	ASHOK KARKI	2	DONE	DONE
12.	RAM YADH PRASHAD	2	DONE	DONE
13.	BHUPENDRA SINGH	2	DONE	DONE
14.	TAMAL MUKHERJEE	2	DONE	DONE
15.	RAJESH SRIVASTAV	2	DONE	DONE
16.	RAM BABU SINGH	2	DONE	DONE
17.	AJAY RAI	2	DONE	DONE
18.	BHARAT DEHERA	2	DONE	DONE
19.	MRIDUL RAJKHOWA	2	DONE	DONE
20.	ARUP RAJKHOWA	2	DONE	DONE
21.	BABA RAJKHOWA	2	DONE	DONE
22.	DIPAK MONDAL	2	DONE	DONE
23.	ALOK ROY	2	DONE	DONE
24.	SATEYNDRA DAS	2	DONE	DONE
25.	PRABAL SINGHA	2	DONE	DONE
26.	RAMBILASH YADAV	2	DONE	DONE
27.	RANJAN DEBNATH	2	DONE	DONE
28.	RAJESH MAHTO	2	DONE	DONE
29.	NANDA SARKAR	1	DONE	
30.	NIBASH DAS	2	DONE	DONE
31.	MONGOLSING DERA	1	DONE	
32.	PROBUDHIOY KEMPRAI	2	DONE	DONE
33.	KASHRING KEMPRAI	2	DONE	DONE
34.	BASANTA SAIKIA	2	DONE	DONE
35.	MOTISH DAULAGUPU	2	DONE	DONE
36.	KHORSING RONGHANG	2	DONE	DONE
37.	SHAMBHU NATH SINGH	2	DONE	DONE
38.	SACHIN KUMAR	2	DONE	DONE
39.	LONGKI TERANG	2	DONE	DONE
40.	RENSING RONGHANG	2	DONE	DONE

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Sl. No.	NAME OF WORKMEN	No of Vaccination Dose	1st DOSE	2nd DOSE
41.	RAMSING CHINTHONG	2	DONE	DONE
42.	JOYSING TIMUNG	2	DONE	DONE
43.	ARUP BHUYAN	2	DONE	DONE
44.	AMIT CHETRI	2	DONE	DONE
45.	RANJIT LAMA	2	DONE	DONE
46.	SONTOSH CHETRI	2	DONE	DONE
47.	SANJAY KUMAR YADAV	2	DONE	DONE
48.	HANSRAJ	1	DONE	
49.	GAGAN KUMAR	1	DONE	
50.	RAJINDER SINGH	2	DONE	DONE
51.	MAHENDRA	2	DONE	DONE
52.	PARMOD KUMAR	1	DONE	
53.	PROBIT KEMPRAI	2	DONE	DONE
54.	ROSTAM ALI	2	DONE	DONE
55.	REKIBUDDIN	2	DONE	DONE
56.	AMIR ALI	2	DONE	DONE
57.	SAPAN DIBRA	2	DONE	DONE
58.	DEBLAL WARISA	2	DONE	DONE
59.	POLBENDRO DAULAGUPU	2	DONE	DONE
60.	REBA HATI BORUAH	2	DONE	DONE
61.	PROJIT MOCHARY	2	DONE	DONE
62.	PRASSANA DAS	2	DONE	DONE
63.	UTPAL DAS	2	DONE	DONE
64.	APODRO WARISA	2	DONE	DONE
65.	CHANDAN BODOSA	2	DONE	DONE
66.	BOLENDRA PHONGLO	2	DONE	DONE
67.	MOHIT LANGTHASA	2	DONE	DONE
68.	ASHOK LAMPHUSA	2	DONE	DONE
69.	BIKUL BEY	2	DONE	DONE
70.	CHARAWAFANG RONGPI	2	DONE	DONE
71.	AJIJUL ISLAM	2	DONE	DONE
72.	SHYFUL	2	DONE	DONE
73.	MAJIBUR REHEMAN	2	DONE	DONE
74.	JOYON PHONGLO	2	DONE	DONE
75.	MOSES TERON	2	DONE	DONE
76.	JOYSING TERON	2	DONE	DONE
77.	JOYSING ENGLENG	2	DONE	DONE
78.	AMOS RONGHANG	2	DONE	DONE
79.	BERENSING ENGTI	2	DONE	DONE
80.	VINOSH RONGPI	2	DONE	DONE
81.	FRANSIS TIMUNG	2	DONE	DONE
82.	THOMAS RONGPI	2	DONE	DONE

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Sl. No.	NAME OF WORKMEN	No of Vaccination Dose	1st DOSE	2nd DOSE
83.	SAMSON ENGLENG	2	DONE	DONE
84.	SORDER ENGLENG	2	DONE	DONE
85.	AFZOL HUSSAIN MAZUMDER	2	DONE	DONE
86.	DHARAM SINGH	2	DONE	DONE
87.	PRESANJIT BENARJEE	2	DONE	DONE
88.	SHISHPAL BAJIYA	2	DONE	DONE
89.	TAMAL MUKHERJEE	2	DONE	DONE
90.	PROJIT MOCHARY	2	DONE	DONE
91.	STARSON LEKTHE	2	DONE	DONE
92.	BIPUL MANDAL	2	DONE	DONE
93.	RAJINDER SINGH	2	DONE	DONE
94.	ABHIJIT RABHA	2	DONE	DONE
95.	MURALI KUMAR SINGH	2	DONE	DONE
96.	ANAND KUMAR	2	DONE	DONE
97.	AVANEESH KUMAR	2	DONE	DONE
98.	ANAND PAL	2	DONE	DONE
99.	UJIR MONDAL	2	DONE	DONE
100.	MANOJ KUMAR SINGH	2	DONE	DONE
101.	SUMAN BARMAN	2	DONE	DONE
102.	TRINATH NAIK	2	DONE	DONE
103.	GANESH BARMAN	2	DONE	DONE
104.	PUSHPA BARMAN	2	DONE	DONE
105.	RAMESH PARIYAR	2	DONE	DONE
106.	MITHU DAS	2	DONE	DONE
107.	CABRIEL LYNGDOH	2	DONE	DONE
108.	TULKI KHARSYIEMIONG	2	DONE	DONE
109.	BIJAY NAYAK	1	DONE	
110.	RAHUL BASUMATARY	1	DONE	
111.	PANIRAM HAZARIKA	1	DONE	
112.	BHAG CHAND JAT	1	DONE	
113.	RANVIR SINGH	1	DONE	
114.	VIKASH	1	DONE	
115.	GIRDHARI SINGH	2	DONE	DONE
116.	PRAVIN MADHUKARRAO SONARE	1	DONE	
117.	ASHOKE BARMAN	1	DONE	
118.	SHANKAR	1	DONE	
119.	PRASENJIT MANDAL	1	DONE	
120.	CHANDAN KUMAR VERMA	1	DONE	
121.	ABHISHEK KUMAR SINGH	1	DONE	
122.	SHASHI BHUSHAN SINGH	1	DONE	
123.	SUBODH DAS	1	DONE	
124.	DHANANJAI BARMAN	1	DONE	

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Sl. No.	NAME OF WORKMEN	No of Vaccination Dose	1st DOSE	2nd DOSE
125.	SANOJ KUMAR SINGH	1	DONE	
126.	DINA HAZARIKA	1	DONE	
127.	NAVNEET KUMAR	1	DONE	
128.	TAIJUL HOQUE	1	DONE	
129.	MAHUR UDDIN	1	DONE	
130.	BITTU KUMAR SINGH	1	DONE	
131.	KIRAN DAS	1	DONE	
132.	LITAN DAS	1	DONE	
133.	TAPAN KUMAR DAS	1	DONE	
134.	AJMIR RAHAMAN	1	DONE	
135.	DEEPAK KUMAR YADAV	1	DONE	
136.	SAROJ PASWAN	1	DONE	
137.	NAROTTAM DAS	1	DONE	
138.	MAHENDRA	1	DONE	
139.	MAKHAN	1	DONE	
140.	HIREN HAZARIKA BAYAN	1	DONE	
141.	UPENDRA YADAV	1	DONE	
142.	BABULAL NITHARWAL	2	DONE	DONE
143.	BHUBAN DAS	1	DONE	
144.	RAJEN BORA	1	DONE	
145.	REBA DOLOI	1	DONE	
146.	PRANJAL TAMULI	1	DONE	
147.	VINOD	1	DONE	
148.	TANKESWAS DOLEY	1	DONE	
149.	LAKHIRAM GUWALA	1	DONE	
150.	BISWAJIT HAZARIKA	1	DONE	
151.	BISHAJAI BAISHYA	1	DONE	
152.	PADUM BAISHYA	1	DONE	
153.	NAVALESH	1	DONE	
154.	GANESH RABIDAS	1	DONE	
155.	RINKU MECH	1	DONE	
156.	TOMOJIT DAS	1	DONE	
157.	RAJESH RABIDAS	1	DONE	
158.	RATUL SAIKIA	1	DONE	
159.	JINTU KARMAKAR	1	DONE	
160.	HIMEN GOWALA	1	DONE	
161.	CHANDRA BORA	1	DONE	
162.	SANATAN DAS	1	DONE	
163.	AJAY BHUMES	1	DONE	
164.	BIDYUT HAZARIKA	1	DONE	
165.	JAVED SAIFI	1	DONE	
166.	IBRAN KHAN	1	DONE	

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Sl. No.	NAME OF WORKMEN	No of Vaccination Dose	1st DOSE	2nd DOSE
167.	MOHD KASIM	1	DONE	
168.	SALMAN	1	DONE	
169.	HASABUDDIN	1	DONE	
170.	MD. ZAHID	1	DONE	
171.	HASAN	1	DONE	
172.	BALRAM NAYAK	1	DONE	
173.	PEERMOHAMMAD ANSARI SHAH	1	DONE	
174.	PURUSHOTAM POONIA	2	DONE	17-07-2021
175.	GAJEN HAZARIKA	1	DONE	
176.	JOYRASH KEMPRAI	1	DONE	
177.	SORONJIT PORBO	1	DONE	
178.	MUNNA KUMAR	1	DONE	
179.	KHADIMUL ALI	1	DONE	
180.	BOLIN DOLEY	1	DONE	
181.	KABAR MILI	1	DONE	
182.	RUKMABIR BRAHMA	1	DONE	
183.	RANJAN MILI	1	DONE	
184.	AJAY GHOSH	1	DONE	
185.	ALIVARISH	1	DONE	
186.	PARESH DAS	1	DONE	
187.	MAMMOHANDAS MANGAL CHAN	1	DONE	
188.	BULAN DAS	1	DONE	
189.	SOUTAM DAS	1	DONE	
190.	SHANIYA DAS	1	DONE	
191.	PUSHKAR DAS	1	DONE	
192.	CHANDAN DAS	1	DONE	
193.	HAGEN MASALAI	1	DONE	
194.	SUSEN AMPHI	1	DONE	
195.	PRADUT KUMAR DAS	1	DONE	
196.	SRESTHA DAS	1	DONE	
197.	PULEN CHANDRA DAS	1	DONE	
198.	RAPHIK ANSARI	1	DONE	
199.	PRASENJEET DEY	1	DONE	
200.	RANJIT HAZARIKA	1	DONE	
201.	MAHANTA HUKAI	1	DONE	
202.	DIP AMSI	1	DONE	
203.	DEBASHISH ROY	1	DONE	
204.	PRASENJIT DAS	1	DONE	
205.	SUBHAH	2	DONE	DONE
206.	KARAN SINGH	2	DONE	DONE
207.	BHAWANI SINGH	2	DONE	DONE
208.	NAGENDRA SINGH	2	DONE	DONE

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Sl. No.	NAME OF WORKMEN	No of Vaccination Dose	1st DOSE	2nd DOSE
209.	AMIYA HAZARIKA	2	DONE	DONE
210.	BUDDHA RAM	2	DONE	DONE
211.	BHADESWAR BARUAH	2	DONE	DONE
212.	SUMIT NAIDING	1	DONE	
213.	RAJKAMAL BORDOLOI	2	DONE	DONE
214.	KARUNA BORDOLOI	2	DONE	DONE
215.	BINTU DEKA	2	DONE	DONE
216.	PANKAJ PATAR	1	DONE	DONE
217.	DEBAJYOTI BORDOLOI	2	DONE	DONE
218.	CHITRA HIRA	2	DONE	DONE
219.	MADHAB BORA	2	DONE	DONE
220.	JIBAN HAZARIKA	2	DONE	DONE
221.	SHIBIR AHMED	1	DONE	
222.	DIMBESWAR HAZARIKA	1	DONE	
223.	RAM DAS	2	DONE	DONE
224.	RAM DAS	2	DONE	DONE
225.	SUJAN DAS	1	DONE	
226.	BHAKTA HAZARIKA	1	DONE	
227.	ARUP HAZARIKA	1	DONE	
228.	SAMRULIAH	1	DONE	
229.	DINEN RABHA	1	DONE	
230.	DRETTA KUMAR RABHA	1	DONE	
231.	SABIKSON R MARAK	1	DONE	
232.	MUNNA BARMAN	1	DONE	
233.	RAMSUJAN SINGH GOND	1	DONE	
234.	RAVENDRA KUMAR SINGH GOND	1	DONE	
235.	REBAJYOTI PATAR	2	DONE	DONE
236.	NABA DEKA	2	DONE	DONE
237.	AJIT DAS	2	DONE	DONE
238.	PRADIP SARKAR	2	DONE	DONE
239.	SOMEREN BASUMATARY	2	DONE	DONE
240.	OM PRAKASH SINGH	2	DONE	DONE
241.	PABITRA MOHAN SWAIN	2	DONE	DONE
242.	SATYANATH BARMEN	2	DONE	DONE
243.	AVDESH SINGH	2	DONE	DONE
244.	KAMAL PRAKASH	2	DONE	DONE
245.	SANOJ KR YADAV	2	DONE	DONE
246.	SANTOSH KR RAI	2	DONE	DONE
247.	NIKHIL SINGH MAHAPATRA	2	DONE	DONE
248.	ANUP BARMEN	2	DONE	DONE
249.	ROBERT SAHANI	2	DONE	DONE
250.	RAVINDRA SINGH RANA	2	DONE	DONE

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Sl. No.	NAME OF WORKMEN	No of Vaccination Dose	1st DOSE	2nd DOSE
251.	SAWPAN KR ROY	2	DONE	DONE
252.	CHAMPAK KR SINGH	2	DONE	DONE
253.	RAHUL BASUMATARY	2	DONE	DONE
254.	JHANGIR ALOM	2	DONE	DONE
255.	JESU DOSS	2	DONE	DONE
256.	SAMIR KUJUR	2	DONE	DONE
257.	PABITRA DAS	2	DONE	DONE
258.	PRABIR DUTTA	2	DONE	DONE
259.	SUSHIL BARMEN	2	DONE	DONE
260.	SUDHAM SARKAR	2	DONE	DONE
261.	SURESH GR	2	DONE	DONE
262.	ARIJIT HAIT	2	DONE	DONE
263.	ARUP HAIDER	2	DONE	DONE
264.	SAURAV THAKUR	1	DONE	
265.	MOHAN SARKAR	1	DONE	
266.	DEBASISH KAR	1	DONE	
267.	MUMTAJ ALI	1	DONE	
268.	PABITRA KR PARIDA	1	DONE	
269.	MANSID KISPOTTA	2	DONE	DONE
270.	PAIKASH KUJUR	2	DONE	DONE
271.	SONDOR TERON	2	DONE	DONE
272.	MARSHAL TERANG	2	DONE	DONE
273.	ANANGA KUMAR DEY	2	DONE	DONE
274.	SAYEED AHMED BARLASKAR	1	DONE	
275.	JELINA TIMUNGPI	2	DONE	DONE
276.	MANOD NAIDING	1	DONE	
277.	RAJIB TERON	1	DONE	
278.	DEBEN ENGTI	1	DONE	
279.	GAURI KUMARI SAHA	1	DONE	
280.	SK. SABDUL	1	DONE	
281.	SULAGNA THAKUR	1	DONE	
282.	SHANKAR KUMAR SAHU	1	DONE	
283.	GOPAL RONGHANG	1	DONE	
284.	ANUSHMITA SARMA	1	DONE	
285.	RIJU NARZARY	1	DONE	
286.	MANDOP CH DEKA	1	DONE	
287.	GIRIN GOGOI	1	DONE	
288.	SASHI KANTA BODO	2	DONE	DONE
289.	SHIVNATH RAY	1	DONE	
290.	SUBBIAH PILLAI SUBBIAH VALLINAYAGAM PILLAI	1	DONE	
291.	BIRABAL KUMAR	1	DONE	
292.	SHYAMAL MONDAL	1	DONE	

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Sl. No.	NAME OF WORKMEN	No of Vaccination Dose	1st DOSE	2nd DOSE
293.	MAHADEV KUMAR PANDIT	1	DONE	
294.	POLTHAN JAIDUNG	1	DONE	
295.	RAM TERANG	2	DONE	DONE
296.	TARUN KUMAR DEY	1	DONE	
297.	SANJENBAM SHYAMSON SINGH	2	DONE	DONE
298.	SUBRATA KUMAR PALAI	2	DONE	DONE
299.	ABU NASAR GILANI	2	DONE	DONE
300.	PRITAM BHOWMIK	2	DONE	DONE
301.	RANJIT ROY	2	DONE	DONE
302.	RAJAT ROY	2	DONE	DONE
303.	HARUN BASUMATA	1	DONE	
304.	SANJU BARA	1	DONE	
305.	MAHADEV KUMAR PANDIT	2	DONE	DONE
306.	SHYAMAL MONDAL	2	DONE	DONE
307.	MADAN RAY YADAV	1	DONE	
308.	BIRABAL KUMAR	1	DONE	
309.	VISHAL KUMAR MISHRA	1	DONE	
310.	METHEW	2	DONE	DONE
311.	PABAN KUMAR HAGJER	1	DONE	
312.	DHARMENDRA PANDIT	2	DONE	DONE
313.	MD. MOTIM	1	DONE	
314.	GANGA BAHADUR CHATRI	1	DONE	
315.	MANIK DEBNATH	1	DONE	
316.	SANJAY KUJUR	1	DONE	
317.	MUSTAK AHMMED	1	DONE	
318.	EMANUVAL BAA	2	DONE	DONE
319.	DILIP DAS	1	DONE	
320.	PRADIP DAS	1	DONE	
321.	PALANI NADARAJ	2	DONE	DONE
322.	AKSHAY SINGH	2	DONE	DONE

Sensitivity: LNT Construction Internal Use

14. Arogyasetu Status:

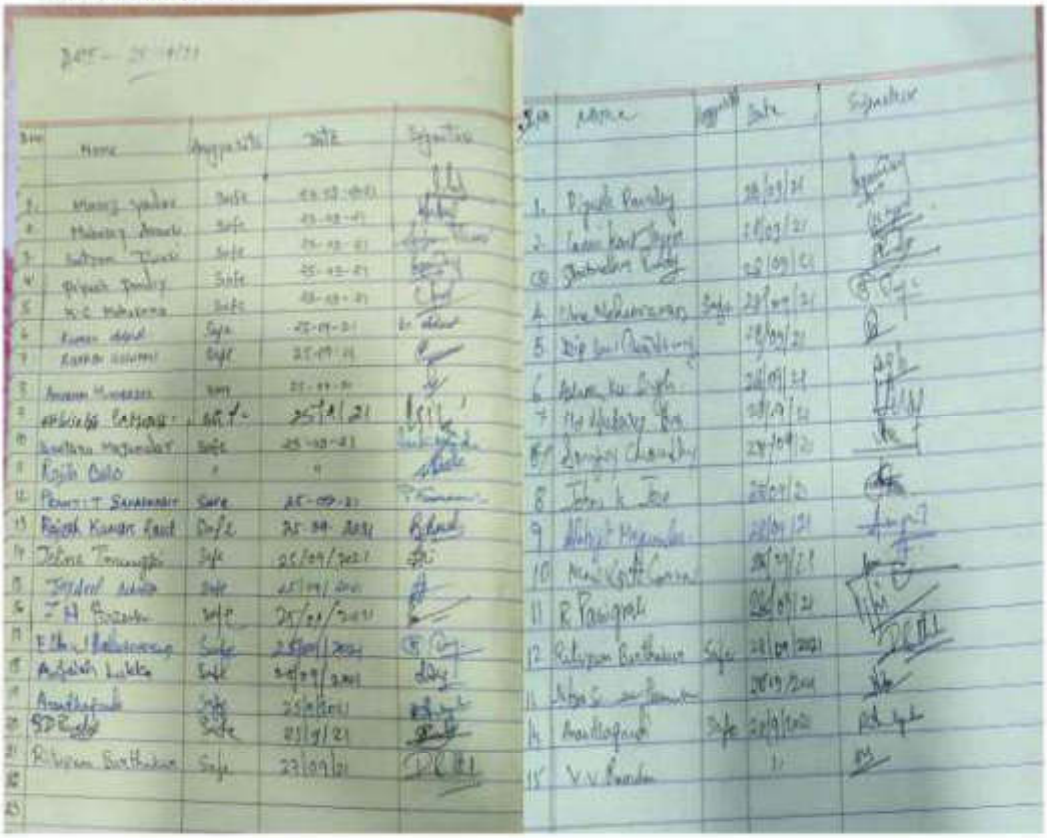


Fig -21. Arogyasetu app status of employee

Sensitivity: LNT Construction Internal Use

15. Online EHS Observation System Tracking System:



Fig -22. Class 1 Risk wise Observation Analysis

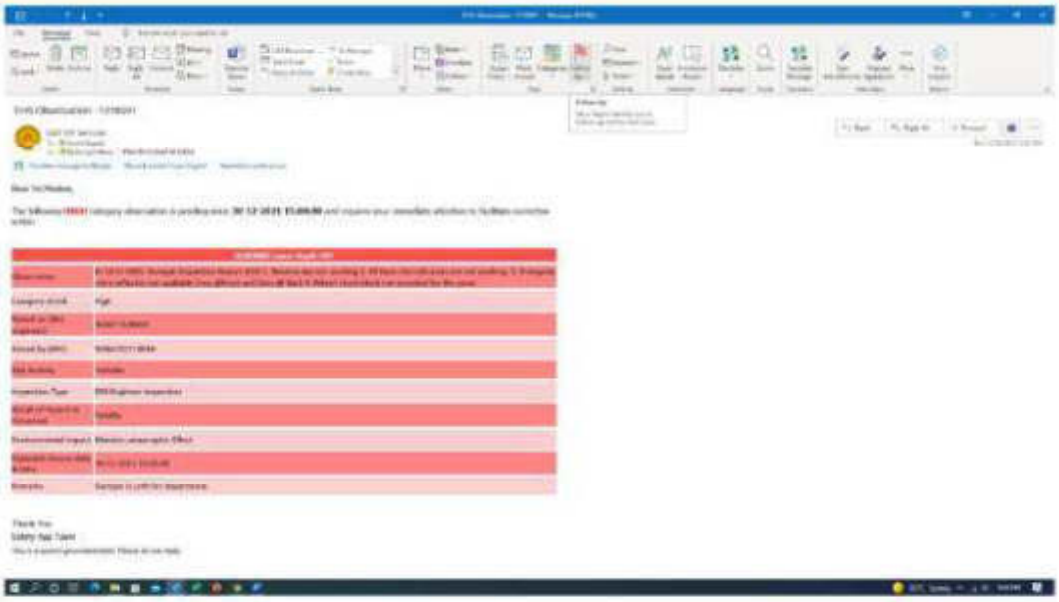


Fig -23. Online EHS Observation system : Observation Created by EHS Engineer from L&T Safety Mobile apps

Sensitivity: LNT Construction Internal Use

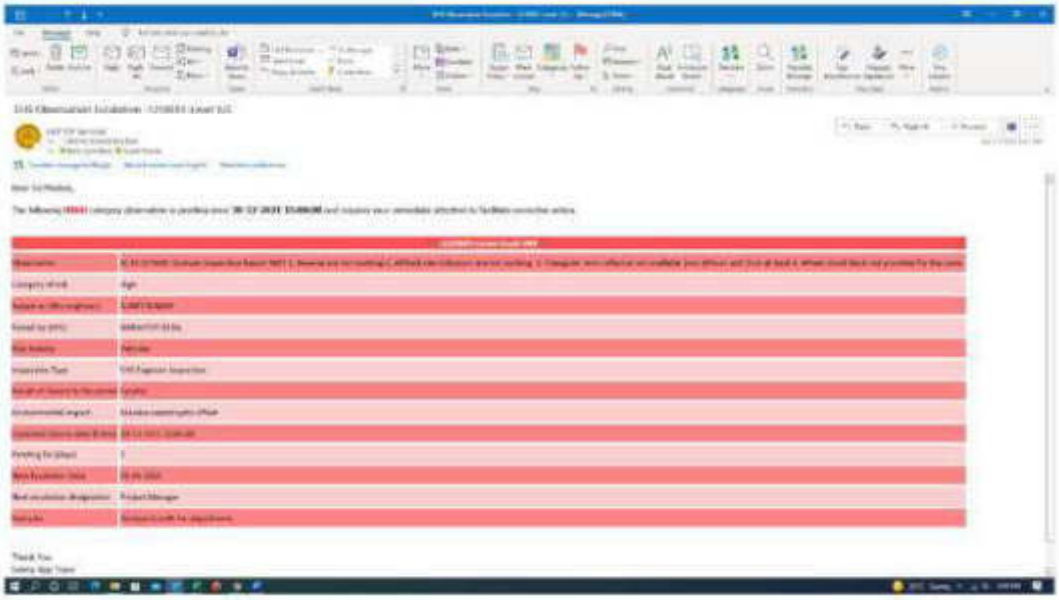


Fig -24. Online EHS Observation system : Level 1/3 : Escalation to Section Head

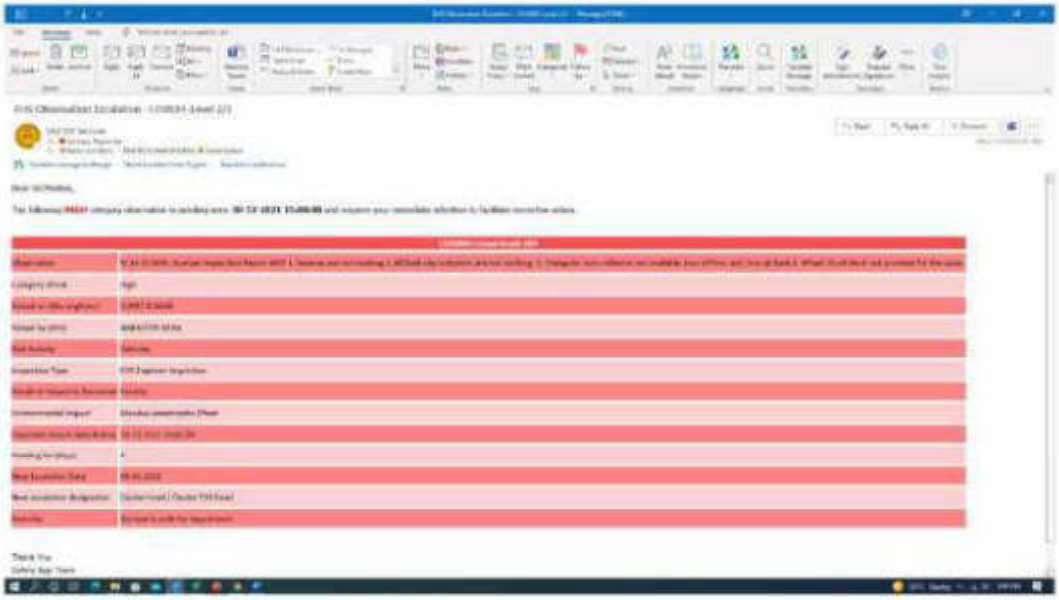


Fig -25. Online EHS Observation system : Level 2/3 : Escalation to Project Manager

Sensitivity: L&T Construction Internal Use

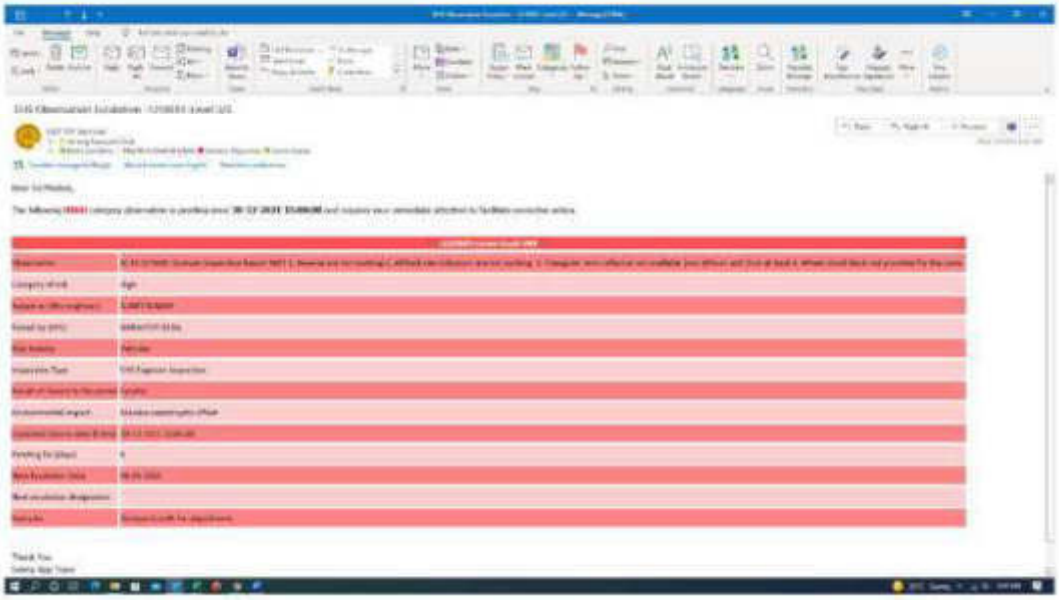


Fig -26. Online EHS Observation system : Level 03 : Escalation to Head Office

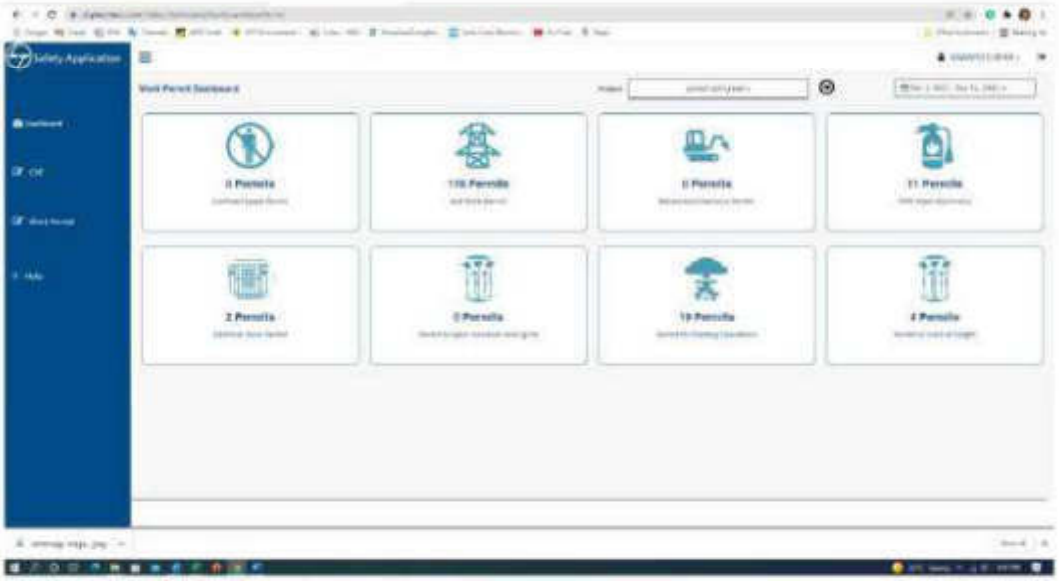


Fig -27. Activity wise workpermit System

Sensitivity: L&T Construction Internal Use

Annexure – 7 : PUC of the vehicles

Pucc No :	D4RJ41104467
Vehicle No :	RJ14GG1308
Customer Name :	EECOGREEN IN.PVT
Customer Mobile :	1800000000
Year of Regn :	08-01-2015
Type of Vehicle :	TRUCK
Make :	Tata Motors
Model :	TRUCK
Test Date :	25-12-2021
Time :	03:29:15 PM
Valid UpTo :	24-06-2022
Center Name :	Shri Balaji Pollution Center
Center Address :	Indira colony,Chomu,Jaipur
Licence No :	RJ41-0005/0004
Test Result :	Pass

VALID IN ALL INDIA

Photo of Vehicle

Flushing Cycle

Avg	RPM Min	RPM Max	Temp
	986	2656	26

Sr. No.	RPM Min	RPM Max	Km	HSU%	Temp
1	990	2670	0.05	2.04	26
2	990	2630	0.06	2.49	26
3	1030	2600	0.05	2.15	26
Mean			0.05	2.22	

Prescribed Limit for Diesel vehicle	1/m(Light Absorption Co-efficient)	Hartridge Units (HSU)%
Free Acceleration BS II & III	2.45	65
Free Acceleration BS IV	1.62	50
Free Acceleration BS VI 4/3 wheelers	0.7 / 1.5	26 / 48

Validity Six Months for Bharat Stage III or below and one year for Bharat Stage IV/VI vehicles.

Certificate price: ₹ 100

Get Certificate renewed within the expiry date.

Seal of Testing Station	Testing Station Code	Authorised Signatory
	D4RJ41	

CERTIFICATE IS ONLY VALID IF SMS RECEIVED FROM REL. TRANSPORT DEPT. KINDLY DESTROY THE INVALID CERTIFICATE.

Transport Dept. Govt. of Rajasthan

Veh Reg No : RJ14GG1308
PUC No. : D4RJ41104467
Valid up to : **24-06-2022**
Scan QR Code to Validate

Transport Dept. Govt. of Rajasthan

Veh Reg No : RJ14GG1308
PUC No. : D4RJ41104467
Valid up to : **24-06-2022**
Scan QR Code to Validate

POLLUTION UNDER CONTROL CERTIFICATE

Authorised By: KAMRUP(RURAL)
Transport Commissionerate, Assam

TEST RESULT : PASS
VALID TILL: 06/Jul/2022

Certificate Sl. No.:	AS02500370001796
Registration No.:	**RL01AE5223**
Owner Name	M/S GANPATI EARTH MOVERS
Chassis No.:	MAT479187K3K*****
Engine No.:	ISBE5.9230d91K638*****
Class of Vehicle:	Goods Carrier
Make:	TATA MOTORS LTD
Model:	2207963800GBP90
Vehicle Category:	HEAVY GOODS VEHICLE
Date of Registration:	28/Apr/2020
Emission Norms:	BHARAT STAGE IV
Fuel:	DIESEL
Date of Testing:	07/Jul/2021

DIESEL DRIVEN VEHICLES

Certified that the vehicle conforms to the standards prescribed under rule 115(2) of CMV Rules 1989 :

FUEL	Light Absorption Coefficient (Permissible Limit)	Measured Value
DIESEL	1.62	0.82001

Time of Testing:	08:01:49
Govt Fees:	40.0
Center Fees:	90.0
Fee Charged:	Rs.130.0 (one hundred thirty rupees only)

In case of any complain Please write to Transport Commissioner Assam

Auto Emission Testing Centre Code: AS0250037
Testing Centre Name: TRINAYAN AUTO EMISSION TESTING STATION
Centre Address: BIJOYNAGAR, DIST. KAMRUP(RURAL), ASSAM,BIJOYNAGAR, KAMRUP(RURAL), ASSAM,781122
Test Conducted By: MR. JAGADISH DEKA



TEST RESULT FOR DIESEL VEHICLE

	IDLE RPM	MAX RPM	K_VALUE	OIL TEMP
TEST 1	730.0	2260.0	0.81	0.0
TEST 2	800.0	2040.0	0.83	2.0
TEST 3	700.0	2190.0	0.82	1.0
AVG	743.33334	2163.33334	0.82001	1.0

This is a computer generated certificate and does not require signature

POLLUTION UNDER CONTROL CERTIFICATE

Authorised By: KAMRUP(RURAL)
Transport Commissionerate, Assam

TEST RESULT : PASS
VALID TILL: 06/Jul/2022

Certificate Sl. No.	AS02500370001795
Registration No.	**NL01AE5206**
Owner Name	M/S GANPATI EARTH MOVERS
Chassis No.	MAT479187K3K*****
Engine No.	ISBES.92304091K638*****
Class of Vehicle	Goods Carrier
Make	TATA MOTORS LTD
Model	2207963800GBP90
Vehicle Category	HEAVY GOODS VEHICLE
Date of Registration	28/Apr/2020
Emission Norms	BHARAT STAGE IV
Fuel	DIESEL
Date of Testing	07/Jul/2021

DIESEL DRIVEN VEHICLES
Certified that the vehicle conforms to the standards prescribed under rule 115(2) of CMV Rules 1989

FUEL	Light Absorption Coefficient (Permissible Limit)	Measured Value
DIESEL	1.62	0.80667

Time of Testing	08:00:19
Govt. Fees	40.0
Center Fees	90.0
Fee Charged:	Rs.130.0 (one hundred thirty rupees only)

In case of any complain Please write to Transport Commissioner Assam

Auto Emission Testing Centre Code: AS02500037
Testing Centre Name: TRINAYAN AUTO EMISSION TESTING STATION
Centre Address: BIJOYNAGAR, DIST. KAMRUP(RURAL), ASSAM,BIJOYNAGAR, KAMRUP(RURAL), ASSAM,781122
Test Conducted By: MR. JAGADISH DEKA



TEST RESULT FOR DIESEL VEHICLE

	IDLE RPM	MAX RPM	K_VALUE	OIL TEMP
TEST 1	700.0	2250.0	0.8	2.0
TEST 2	730.0	2329.0	0.81	0.0
TEST 3	720.0	2140.0	0.81	1.0
AVG	716.66667	2236.66667	0.80667	1.0

This is a computer generated certificate and does not require signature

Pucc No :	D68RJ23104353
Vehicle No :	AS01GC6771
Customer Name :	SHREE BALAJEE CONTRUCTION
Customer Mobile :	9636686936
Year of Regn :	12-01-2016
Type of Vehicle :	L.G.V
Make :	Mahindra & Mahindra
Model :	BOLERO CAMPER
Test Date :	27-06-2021
Time :	10:51:06 AM
Valid UpTo :	26-06-2022
Center Name :	Chhotu Ram Mobile Vahan Pradushan Janch Kendra (RJ18-GA-7262)
Center Address :	Gokulpura, Sikar
Licence No :	RJ23-0068/0068
Test Result :	Pass

VALID IN ALL INDIA

Photo of Vehicle



Flushing Cycle

Avg	RPM Min	RPM Max	Temp
	3420		00

Sr. No.	RPM Min	RPM Max	Km	HSU%	Temp
1		1730	0.15	06.1	00
2		6040	0.18	07.5	00
3		600	0.24	09.8	00
Mean			0.19	07.8	

Prescribed Limit for Diesel vehicle	1/m(Light Absorption Co-efficient)	Hartridge Units (HSU)%
Free Acceleration BS II & III	2.45	65
Free Acceleration BS IV	1.62	50
Free Acceleration BS VI 4/3 wheelers	0.7 / 1.5	26 / 48

Validity Six Months for Bharat Stage III or below and one year for Bharat Stage IV / VI vehicles.

Certificate price: ₹ 100

Get Certificate renewed within the expiry date.

Seal of Testing Station	Testing Station Code	Authorised Signatory
	D68RJ23	

CERTIFICATE IS ONLY VALID IF SMS RECEIVED FROM REGD.TRANSPORT DEPT. KINDLY DESTROY THE INVALID CERTIFICATE.

Transport Dept. Govt. of Rajasthan

Veh Reg No : AS01GC6771
PUC No. : D68RJ23104353
Valid up to : 26-06-2022
Scan QR Code to Validate

Transport Dept. Govt. of Rajasthan

Veh Reg No : AS01GC6771
PUC No. : D68RJ23104353
Valid up to : 26-06-2022
Scan QR Code to Validate

Annexure 8 : Letter to Nodal Officer on CA status

ASSAM POWER GENERATION CORPORATION LIMITED
Registered Office: Bijulee Bhawan, 3rd floor, Paltanbazar, Guwahati-781 001, Assam
Mridul Saikia
Project Director(PMU)
LOWER KOPILI HYDRO ELECTRIC PROJECT
E-mail: projectdirector@apgcl.com

No: APGCL/CGM (H)/W/2007/140/Pt-VI/42 Dated: 10/01/2022

To
The Chief Conservator of Forests & Nodal Officer (FC Act),
O/o PCCF &HoFF, Assam
Aranya Bhawan, Panjabari,
Guwahati, Kamrup (Metropolitan)

Sub : Implementation of (Catchment Area Treatment) CAT Plan and Compensatory Afforestation (CA) Programme for Lower Kopili Hydro Electric Project, 120 MW.

Ref : 1. MoEF&CC Forest Clearance Stage 2 vide No. 8-53/2018FC dated 4th December, 2020.0
2. Environment Clearance issued by MoEF&CC vide No.J-12011/26/2012-IA-I dated 4th September, 2019.

Sir,

With reference to the subject cited above, it is for your kind information that the construction work of the 120 MW LowerKopili Hydro Electric Project has been already initiated. As such the implementation of Catchment Area Treatment Plan, Soil & Moisture Conservation Plan and Compensatory Afforestation programme in 8 patches of Reserved Forests declared by Govt of Assam in Dima Hasao and KarbiAnglong districts shall be implemented in synchronization with the construction of the project as per requirement of MoEF&CC, Govt. of India, New Delhi.

Therefore, you are requested kindly to appraise the status of implementation of the above mentioned plans to APGCL for onward transmission to MoEF & CC along with the six monthly compliance report of the project.

Thanking You,

Yours Faithfully,

Project Director (PMU)
Lower Kopili H.E. Project, APGCL

Copy to:

1. The Principal Secretary, Department of Power, Govt. of Assam, Secretariat. P.O. Assam Sachivalaya, Block-C, Ground Floor, Dispur, Guwahati-781006, Assam for favour of kind information.
2. The Principal Secretary, Department of Environment and Forest, Govt. of Assam, Secretariat. P.O. Assam Sachivalaya, Block-C, Ground Floor, Dispur, Guwahati-781006, Assam for favour of kind information.
3. Relevant File.

Annexure – 9 : Joint Visit Report to verify the fine aggregate quarries

Joint Visit Report – Fine Aggregate (Sand) Quarries

Joint visit vide L&T's letter dated 15th September, 2021

Date of visit : 22.09.2021

Representatives present during the visit		
APGCL	Mr. K.C.D. Difussa,	AM, Civil
Contractor	Mr. Anjaiah Lukka	Quarry and Mining Manager
PMC	Mr. Vickey Sharma	Material Engineer & Quality Control
PMC	Dr. Jayanta Das	Environment Specialist

Purpose of the visit : To verify the present location of the quarries of Fine aggregates (Sand)

1. Quarry of Fine Aggregates - D/S of the Dam
   Location : near Panimur
   Coordinate - 25°44'57.1" N; 92°50'33.1"E





Site Photographs



Ariel distance from the APGCL office at Langku – 9.1 Km
Access road exists.

2. Quarry of Fine Aggregates - U/S of the Dam
Location : near Miyungma Daogah Water fall
Coordinate - 25°35'51.6" N; 92°44'54.3"E





Site Photographs



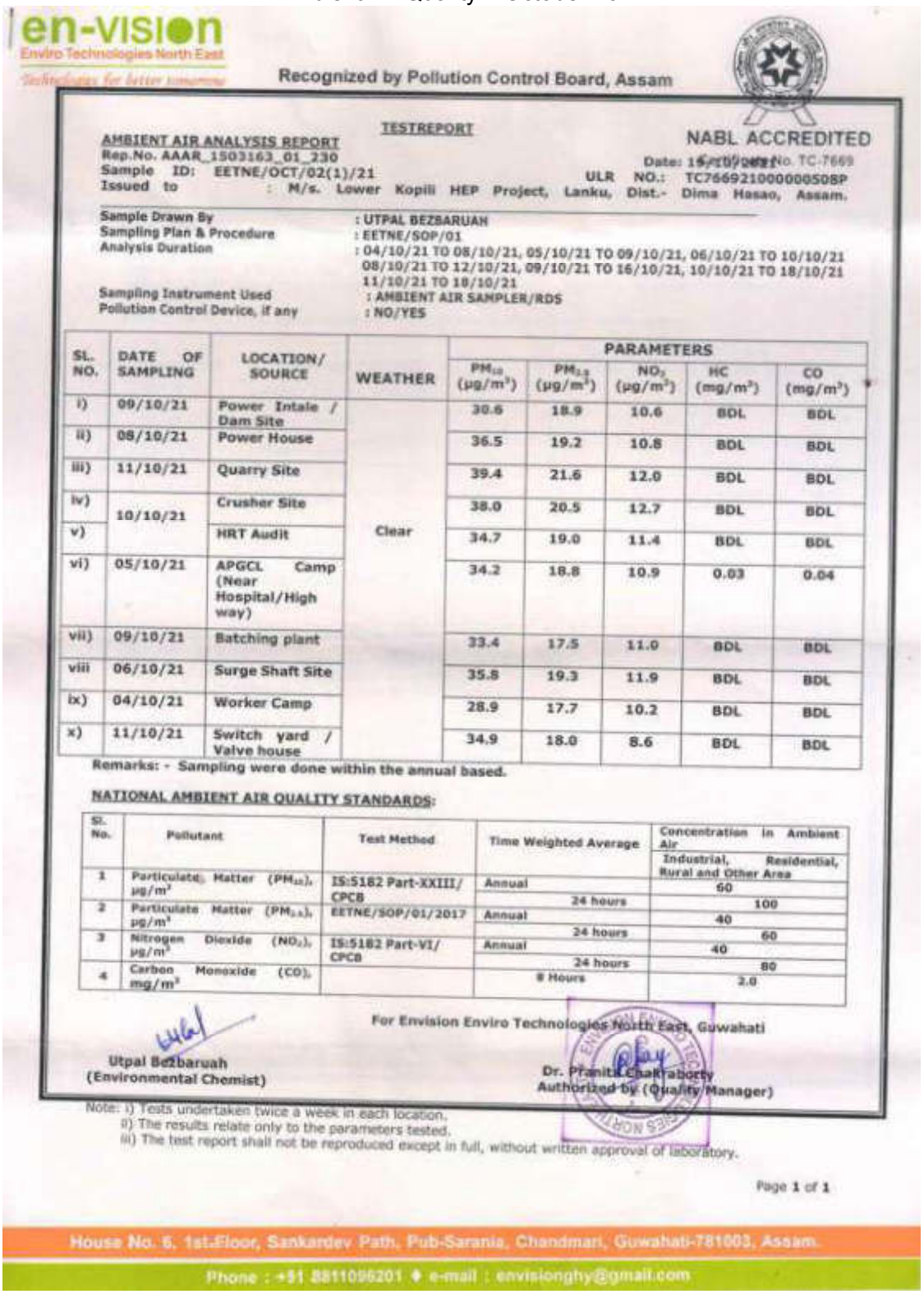
Ariel distance from the APGCL office at Langku – 10.24 Km
Access road exists.

Location of quarries (Sand quarry and Stone quarry)



Annexure – 10 : Test results of Ambient environment during July to December 2021.

Ambient Air Quality – October 2021



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NABL ACCREDITED
Certificate No. TC-7669

TESTREPORT

AMBIENT AIR ANALYSIS REPORT
Rep.No. AAAR_1503163_01_230
Sample ID: EETNE/OCT/02(1)/21
Issued to : M/s. Lower Kopili HEP Project, Lanku, Dist.- Dima Hasao, Assam.

Date: 15/10/2021
ULR NO.: TC766921000000508P

Sample Drawn By : UTPAL BEZBARUAH
Sampling Plan & Procedure : EETNE/SOP/01
Analysis Duration : 04/10/21 TO 08/10/21, 05/10/21 TO 09/10/21, 06/10/21 TO 10/10/21 08/10/21 TO 12/10/21, 09/10/21 TO 16/10/21, 10/10/21 TO 18/10/21 11/10/21 TO 18/10/21
Sampling Instrument Used : AMBIENT AIR SAMPLER/RDS
Pollution Control Device, if any : NO/YES

SL. NO.	DATE OF SAMPLING	LOCATION/ SOURCE	WEATHER	PARAMETERS				
				PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	HC (mg/m^3)	CO (mg/m^3)
i)	09/10/21	Power Intale / Dam Site	Clear	30.6	18.9	10.6	BDL	BDL
ii)	08/10/21	Power House		36.5	19.2	10.8	BDL	BDL
iii)	11/10/21	Quarry Site		39.4	21.6	12.0	BDL	BDL
iv)	10/10/21	Crusher Site		38.0	20.5	12.7	BDL	BDL
v)		HRT Audit		34.7	19.0	11.4	BDL	BDL
vi)	05/10/21	APGCL Camp (Near Hospital/High way)		34.2	18.8	10.9	0.03	0.04
vii)	09/10/21	Batching plant		33.4	17.5	11.0	BDL	BDL
viii	06/10/21	Surge Shaft Site		35.8	19.3	11.9	BDL	BDL
ix)	04/10/21	Worker Camp		28.9	17.7	10.2	BDL	BDL
x)	11/10/21	Switch yard / Valve house		34.9	18.0	8.6	BDL	BDL

Remarks: - Sampling were done within the annual based.

NATIONAL AMBIENT AIR QUALITY STANDARDS:

Sl. No.	Pollutant	Test Method	Time Weighted Average	Concentration in Ambient Air
				Industrial, Residential, Rural and Other Area
1	Particulate Matter (PM_{10}), $\mu g/m^3$	IS:5182 Part-XXIII/ CPCB	Annual	60
			24 hours	100
2	Particulate Matter ($PM_{2.5}$), $\mu g/m^3$	EETNE/SOP/01/2017	Annual	40
			24 hours	60
3	Nitrogen Dioxide (NO_2), $\mu g/m^3$	IS:5182 Part-VI/ CPCB	Annual	40
			24 hours	80
4	Carbon Monoxide (CO), mg/m^3		8 Hours	2.0

For Envision Enviro Technologies North East, Guwahati

Utpal Bezbaruah
(Environmental Chemist)

Dr. Pranita Chakraborty
Authorized by (Quality Manager)

Note: i) Tests undertaken twice a week in each location.
ii) The results relate only to the parameters tested.
iii) The test report shall not be reproduced except in full, without written approval of laboratory.

Page 1 of 1

House No. 6, 1st Floor, Sankardev Path, Pub-Sarania, Chandmari, Guwahati-781003, Assam.
Phone : +91 8811096201 ♦ e-mail : envisionghy@gmail.com

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Certificate No. TC-7669

TESTREPORT

AMBIENT AIR ANALYSIS REPORT
Rep.No. AAAR_1503163_01_360 Date: 31/12/2021
Sample ID: EETNE/DEC/15(1)/21 ULR NO.: TC766921000000568P
Issued to : M/s. Lower Kopili HEP Project, Lanku, Dist.- Dima Hasao, Assam.

Sample Drawn By : UTPAL BEZBARUAH
Sampling Plan & Procedure : EETNE/SOP/01
Analysis Duration : 17/12/21 TO 21/12/21, 18/12/21 TO 23/12/21, 20/12/21 TO 24/12/21 22/12/21 TO 27/12/21, 23/12/21 TO 28/12/21 24/12/21 TO 29/12/21, 25/12/21 TO 29/12/21, 27/12/21 TO 30/12/21
Sampling Instrument Used : AMBIENT AIR SAMPLER/RDS
Pollution Control Device, if any : NO/YES

SL. NO.	DATE OF SAMPLING	LOCATION/ SOURCE	WEATHER	PARAMETERS				
				PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	HC (mg/m^3)	CO (mg/m^3)
i)	17/12/21	Power Intale / Dam Site	Clear	31.3	17.1	11.2	BDL	BDL
ii)	20/12/21	Crusher Site		37.0	21.3	13.2	BDL	BDL
iii)	18/12/21	Adit to HRT		39.3	19.4	12.5	BDL	BDL
iv)	22/12/21	APGCL Camp (Near Hospital/High way)		35.6	19.2	11.6	0.02	0.03
v)	23/12/21	Batching plant		32.3	18.6	12.3	BDL	BDL
vi)	24/12/21	Surge Shaft Site		36.7	19.5	12.8	BDL	BDL
vii)	25/12/21	Worker Camp		29.8	16.3	11.4	BDL	BDL
viii	27/12/21	Switch yard / Valve house		36.1	19.2	8.7	BDL	BDL

Remarks: - Sampling were done within the annual based.

NATIONAL AMBIENT AIR QUALITY STANDARDS:

Sl. No.	Pollutant	Test Method	Time Weighted Average	Concentration in Ambient Air: Industrial, Residential, Rural and Other Area
1	Particulate Matter (PM_{10}), $\mu g/m^3$	IS:5182 Part-XXIII/ CPCB	Annual	60
			24 hours	100
2	Particulate Matter ($PM_{2.5}$), $\mu g/m^3$	EETNE/SOP/01/2017	Annual	40
			24 hours	60
3	Nitrogen Dioxide (NO_2), $\mu g/m^3$	IS:5182 Part-VI/ CPCB	Annual	40
			24 hours	80
4	Carbon Monoxide (CO), mg/m^3		8 Hours	2.0

For Envision Enviro Technologies North East, Guwahati

Utpal Bezbaruah
(Environmental Chemist)

Dr. Pranita Chakraborty
Authorized by (Quality Manager)

Note: i) Tests undertaken twice a week in each location.
ii) The results relate only to the parameters tested.
iii) The test report shall not be reproduced except in full, without written approval of laboratory.

Page 1 of 1

House No. 6, 1st.Floor, Sankardev Path, Pub-Sarania, Chandmari, Guwahati-781003, Assam.
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TEST REPORT

AMBIENT NOISE LEVEL MEASUREMENT REPORT
Rep.No. ANLMR_1503163_06A_231 Date: 12/10/2021
Sample ID: EETNE/OCT/02(1)/21 ULR NO.: TC766921000000508P

Issued to : M/s. Lower Kopili HEP Project, Lanku, Dist.- Dima Hasao, Assam.

SL. NO.	DATE OF SAMPLING	LOCATION /SOURCE	NOISE LEVEL in dB(A)Leq
			Day Time (6:00 am to 10:00 pm)
i)	08/10/21	Power Intale / Dam Site	48.8
ii)	09/10/21	Power House	48.0
iii)	10/10/21	Quarry Site	51.3
iv)	11/10/21	Crusher Site	52.6
v)		HRT Audit	49.1
vi)	06/10/21	APGCL Camp (Near Hospital/High way)	56.0
vii)	10/10/21	Batching plant	47.2
viii)	04/10/21	Surge Shaft Site	45.9
ix)	05/10/21	Worker Camp	52.6
x)	08/10/21	Switch yard/Valve house	52.7

Remarks: Noise level is carried out during 75% of the Day Time.
Method of analysis : CPCB July 2015 guideline.
Sampling Instrument Used : Lutron SL-4033SD, HTC SL 1350

Ambient Noise Standards:

Area Code	Category of area	Limits in dB(A) Leq	
		Day (6:00 am to 10:00 pm)	Night (10:00 pm to 6:00 am)
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

For Envision Enviro Technologies North East, Guwahati

Utpal Bezbaruah
(Environmental Chemist)

Dr. Pranita Chakraborty
Authorized by (Quality Manager)

Note: i) The results relate only to the parameters tested.
ii) The test report shall not be reproduced except in full, without written approval of laboratory.
iii) Monitoring is performed twice in each location.

Page 1 of 1

House No. 6, 1st Floor, Sankardev Path, Pub-Sarania, Chandmari, Guwahati-781003, Assam.
Phone : +91 8811096201 ♦ e-mail : envisionghy@gmail.com

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NABL ACCREDITED
Certificate No. TC-7669

Recognized by Pollution Control Board, Assam

TEST REPORT

AMBIENT NOISE LEVEL MEASUREMENT REPORT
Rep.No. ANLMR_1503163_06A_361
Sample ID: EETNE/DEC/15(1)/21

Date: 31/12/2021
ULR NO.: TC669210000005689

Issued to : M/s. Lower Kopili HEP Project, Lanku, Dist.- Dima Hasao, Assam.

SL. NO.	DATE OF SAMPLING	LOCATION /SOURCE	NOISE LEVEL in dB(A)Leq
			Day Time (6:00 am to 10:00 pm)
i)	17/12/21	Power Intale / Dam Site	49.2
ii)	20/12/21	Crusher Site	51.0
iii)	18/12/21	Adit to HRT	48.3
iv)	22/12/21	APGCL Camp (Near Hospital/High way)	57.2
v)	23/12/21	Batching plant	48.3
vi)	24/12/21	Surge Shaft Site	46.7
vii)	25/12/21	Worker Camp	53.6
viii)	27/12/21	Switch yard/Valve house	54.3

Remarks: Noise level is carried out during 75% of the Day Time.
Method of analysis : CPCB July 2015 guideline.
Sampling Instrument Used : Lutron SL-4033SD, HTC SL 1350

Ambient Noise Standards:

Area Code	Category of area	Limits in dB(A) Leq	
		Day (6:00 am to 10:00 pm)	Night (10:00 pm to 6:00 am)
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

For Envision Enviro Technologies North East, Guwahati

Utpal Bezbaruah
(Environmental Chemist)

Dr. Pranita Chakraborty
Authorized by (Quality Manager)

Note: i) The results relate only to the parameters tested.
ii) The test report shall not be reproduced except in full, without written approval of laboratory.
iii) Monitoring is performed twice a week in each location.

Page 1 of 1

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Phone : +91 8811096201 ♦ e-mail : envislonghy@gmail.com

Stack Monitoring Results of DG Sets
Stack Emission of DG set at Adit

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
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Telefax -03613515022 Mobile: 9435046677, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in
TC-5991

GEEC/FM/49

ULR Number: TC599121000000882F

Report No: GECC/FL/22/STK/2021/10/12		Date:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab ID	GECC/STK/2021/10/12
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling:	23/10/2021
		Date of Receipt:	25/10/2021
		Test Start Date:	25/10/2021
Sampling Location	**ADIT**	Test End Date:	26/10/2021

STACK MONITORING REPORT

Stack Details:	**DG-(250 KVA) SL.NO.:25922106**	Fuel Used:	HSD
Stack Height, m (Approx.)	2.5	Stack Dia, m	0.08
Sample Porthole height (GL) m	-	Area in m^2	0.005

Flow Characteristics

Velocity in m/sec	**11.1**	**Flow rate**	**0.056**
Ambient Temperature, °C	**33.1**	Stack Temperature, °C	**189.0**

SAMPLING RESULT

Sl. No.	Parameter	Results	Emission Limit
1	PM in g/kw-hr	**0.07**	**≤ 0.2**
2	CO in g/kw-hr	**0.36**	**≤ 3.5**

********** End of report **********

Sl. No.	Type of Instrument	Model No.	Model Make
1	Stack Gas Analyzer	Testo 340 & Stack Monitoring Kit: SMS-4	Testo Instruments Pvt. Ltd. & Polltech Pvt Ltd

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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* The test report cannot be used as evidence in the court of law without prior writtten approval of the laboratory
* Deviation: Sampling was done directly from exhaust/opening

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TC-5991

TEST REPORT

ULR Number: TC599121000000871F			
Ref. No.:	GEEC/FL/32/2021/10/06	Date of Reporting:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab Id No.	GEEC-SLM/2021/10/06
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Sampling Location:	**ADIT**
Sound Level Report			
SLM Model	4023 SD	Date of Monitoring	23/10/2021
Monitored by	Mr.P.Buragohain	Sl.No.	Sl.No.Q656054

Measurement Results

Sl.No.	Location	Leq (dBA)	
		At Source	1 m from Acoustic Enclosure
1	**DG-(250 KVA) SL.NO.:25922106**	104.7	**74.4**
Remark:	CPCB Limit Leq <75 dBA 1 m from the Acoustic Enclosure		

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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Stack Emission of DG set at Crusher – 15 KVA

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TC-5991

GEEC/FM/47/A

TEST REPORT

ULR Number: TC599121000000870F			
Ref. No.:	GEEC/FL/32/2021/10/05	Date of Reporting:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab Id No.	GEEC-SLM/2021/10/05
Address	120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Sampling Location:	**Crusher**
Sound Level Report			
SLM Model	4023 SD	Date of Monitoring	23/10/2021
Monitored by	Mr.P.Buragohain	Sl.No.	Sl.No.Q656054

Measurement Results

Sl.No.	Location	Leq (dBA)	
		At Source	1 m from Acoustic Enclosure
1	**DG-(15 KVA) SL.NO.:G20F263085 STAMFORD**	94.4	**72.4**
Remark:	CPCB Limit Leq <75 dBA 1 m from the Acoustic Enclosure		

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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TC-5991

GEEC/FM/49

ULR Number: TC599121000000881F			
Report No: GECC/FL/22/STK/2021/10/11		Date:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab ID	GECC/STK/2021/10/11
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling:	23/10/2021
		Date of Receipt:	25/10/2021
		Test Start Date:	25/10/2021
Sampling Location	Crusher	Test End Date:	26/10/2021
STACK MONITORING REPORT			
Stack Details:	**DG-(15 KVA) SL.NO.:G20F263085 STAMFORD**	Fuel Used:	HSD
Stack Height, m (Approx.)	1.7	Stack Dia, m	0.06
Sample Porthole height (GL) m	-	Area in m^2	0.003
Flow Characteristics			
Velocity in m/sec	**2.8**	**Flow rate**	**0.008**
Ambient Temperature, °C	**33.4**	Stack Temperature, °C	**89.9**
SAMPLING RESULT			
Sl. No.	**Parameter**	**Results**	**Emission Limit**
1	PM in g/kw-hr	**0.15**	**≤ 0.2**
2	CO in g/kw-hr	**1.00**	**≤ 3.5**
********** End of report **********			
Sl. No.	**Type of Instrument**	**Model No.**	**Model Make**
1	Stack Gas Analyzer	Testo 340 & Stack Monitoring Kit: SMS-4	Testo Instruments Pvt. Ltd. & Polltech Pvt.Ltd

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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Stack Emission of DG set at Crusher- 1000 KVA

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FORMAT NO GEEC/FM/49

ULR Number: TC599121000000880F			
Report No: GECC/FL/22/STK/2021/10/10		Date:	30/10/2021
Name of the Industry	**Larsen & Toubro Limited**	Lab Id	GECC/STK/2021/10/10
Address	120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling	23/10/2021
		Date of Receipt	25/10/2021
		Test Start Date	25/10/2021
Sampling Location	**Crusher**	Test End Date	26/10/2021
STACK MONITORING REPORT			
Stack Details:	**DG Set -1000 KVA Sl.No. 25261872 Model: KTA-3067-G CUMMINS**	Stack Height (GL) m (Approx.)	**3.5 (Approx)**
Fuel Used	**HSD**	Stack Dia, m	**0.3**
Sample Porthole height (GL) m	-	Area in m^2	**0.071**
Flow Characteristics			
Ambient Temp, °C	**33.4**	Velocity in m/s	**12.8**
Stack Temp, °C	**2.7**	Flow rate m^3/s	**0.91**
Emission Details			
Parameter		Results	CPCB General Standards
Particulate Matter, mg/Nm^3		27	75
Oxides of Nitrogen, (NOx) ppm		76	710
Carbon Monoxide, (CO) mg/Nm^3		108	150
Carbon Dioxide, (CO_2) %		4.32	-
Oxygen, O_2 %		16.48	-
Sampling and analysis is carried out as per IS: 11255 (Part-1, 2, 3 & 7) 1985, IS: 13270:1992(Reaffirmed 1999)			
Equipment Details:	Stack Monitoring Kit: SMS-4 Make: Polltech Pvt.Ltd. & Testo-340		
Monitored by:	Mr.P.Buragohain		

Checked by
Sanjib B.Rajkhowa
Chemist

Reviewed by
Dr. Belinda Lahon
Quality Manager

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TC-5991

GEEC/FM/47/A

TEST REPORT

ULR Number: TC599121000000869F			
Ref. No.:	GEEC/FL/32/2021/10/04	Date of Reporting:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab Id No.	GEEC-SLM/2021/10/04
Address	120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Sampling Location:	**Crusher**
Sound Level Report			
SLM Model	4023 SD	Date of Monitoring	23/10/2021
Monitored by	Mr.P.Buragohain	Sl.No.	Sl.No.Q656054

Measurement Results

Sl.No.	Location	Leq (dBA)	
		At Source	1 m from Acoustic Enclosure
1	**DG Set -1000 KVA Sl.No. 25261872 Model: KTA-3067-G CUMMINS**	102.1	**73.1**
Remark:	CPCB Limit Leq <75 dBA 1 m from the Acoustic Enclosure		

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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Stack Emission of DG set at Magazine

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GEEC/FM/47/A

TEST REPORT

ULR Number: TC599121000000874F			
Ref. No.:	GEEC/FL/32/2021/10/09	Date of Reporting:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab Id No.	GEEC-SLM/2021/10/09
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Sampling Location:	**Magazine**
Sound Level Report			
SLM Model	4023 SD	Date of Monitoring	23/10/2021
Monitored by	Mr.P.Buragohain	Sl.No.	Sl.No.Q656054

Measurement Results

Sl.No.	Location	Leq (dBA)	
		At Source	1 m from Acoustic Enclosure
1	**DG-(15 KVA) SL.NO.:MJEM201233 Model No: AL26DG1**	93.9	**66.7**
Remark	CPCB Limit Leq <75 dBA 1 m from the Acoustic Enclosure		

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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GEEC/FM/49

ULR Number: TC599121000000885F			
Report No: GECC/FL/22/STK/2021/10/15		Date:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab ID	GECC/STK/2021/10/15
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling:	23/10/2021
		Date of Receipt:	25/10/2021
		Test Start Date:	25/10/2021
Sampling Location	**Magazine**	Test End Date:	26/10/2021
STACK MONITORING REPORT			
Stack Details:	**DG-(15 KVA) SL.NO.:MJEM201233 Model No: AL26DG1**	Fuel Used:	HSD
Stack Height, m (Approx.)	2.5	Stack Dia, m:	0.06
Sample Porthole height (GL) m	-	Area in m^2	0.003
Flow Characteristics			
Velocity in m/sec	**2.9**	**Flow rate**	**0.008**
Ambient Temperature, °C	**33.5**	Stack Temperature, °C	**62.5**
SAMPLING RESULT			
Sl. No.	**Parameter**	**Results**	**Emission Limit**
1	PM in g/kw-hr	**0.14**	**≤ 0.2**
2	CO in g/kw-hr	**0.39**	**≤ 3.5**
********** End of report **********			
Sl. No.	**Type of Instrument**	**Model No.**	**Model Make**
1	Stack Gas Analyzer	Testo 340 & Stack Monitoring Kit: SMS-4	Testo Instruments Pvt. Ltd. & Polltech Pvt.Ltd

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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Stack Emission of DG set at Surge Shaft

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্

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TC-5991

GEEC/FM/49

ULR Number: TC599121000000884F			
Report No: GECC/FL/22/STK/2021/10/14		Date:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab ID	GECC/STK/2021/10/14
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling:	23/10/2021
		Date of Receipt:	25/10/2021
		Test Start Date:	25/10/2021
Sampling Location	**Surge Shaft**	Test End Date:	26/10/2021
STACK MONITORING REPORT			
Stack Details:	**DG-(40 KVA) SL.NO.:16L496444**	Fuel Used:	HSD
Stack Height, m (Approx.)	2.5	Stack Dia, m	0.1
Sample Porthole height (GL) m	-	Area in m^2	0.008
Flow Characteristics			
Velocity in m/sec	**4.7**	**Flow rate**	**0.037**
Ambient Temperature, °C	**34.4**	Stack Temperature, °C	**115.7**
SAMPLING RESULT			
Sl. No.	**Parameter**	**Results**	**Emission Limit**
1	PM in g/kw-hr	**0.18**	**≤ 0.2**
2	CO in g/kw-hr	**1.30**	**≤ 3.5**
********** End of report **********			
Sl. No.	**Type of Instrument**	**Model No.**	**Model Make**
1	Stack Gas Analyzer	Testo 340 & Stack Monitoring Kit: SMS-4	Testo Instruments Pvt. Ltd. & Polltech Pvt.Ltd

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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TEST REPORT

ULR Number: TC599121000000873F			
Ref. No.:	GEEC/FL/32/2021/10/08	Date of Reporting:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab Id No.	GEEC-SLM/2021/10/08
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Sampling Location:	**Surge Shaft**
Sound Level Report			
SLM Model	4023 SD	Date of Monitoring	23/10/2021
Monitored by	Mr.P.Buragohain	Sl.No.	Sl.No.Q656054

Measurement Results

Sl.No.	Location	Leq (dBA)	
		At Source	1 m from Acoustic Enclosure
1	**DG-(40 KVA) SL.NO.:16L496444**	97.5	**69.0**
Remark	CPCB Limit Leq <75 dBA 1 m from the Acoustic Enclosure		

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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Stack Emission of DG set at Airtel Tower

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GEECFM/49

ULR Number: TC599121000000883F			
Report No: GECC/FL/22/STK/2021/10/13		Date:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab ID	GECC/STK/2021/10/13
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling:	23/10/2021
		Date of Receipt:	25/10/2021
		Test Start Date:	25/10/2021
Sampling Location	**Tower**	Test End Date:	26/10/2021
STACK MONITORING REPORT			
Stack Details:	**DG-(125KVA) M/C No-E83S118IP143466**	Fuel Used:	HSD
Stack Height, m (Approx.)	3.6	Stack Dia, m	0.12
Sample Porthole height (GL) m	-	Area in m^2	0.011
Flow Characteristics			
Velocity in m/sec	**17.8**	**Flow rate**	**0.201**
Ambient Temperature, °C	**33.4**	Stack Temperature, °C	**252.3**
SAMPLING RESULT			
Sl. No.	**Parameter**	**Results**	**Emission Limit**
1	PM in g/kw-hr	**0.10**	**≤ 0.2**
2	CO in g/kw-hr	**0.30**	**≤ 3.5**
********** End of report **********			
Sl. No.	**Type of Instrument**	**Model No.**	**Model Make**
1	Stack Gas Analyzer	Testo 340 & Stack Monitoring Kit: SMS-4	Testo Instruments Pvt. Ltd. & Polltech Pvt.Ltd

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
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Quality Manager

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TC-5991

GEEC/FM/47/A

TEST REPORT

ULR Number: TC599121000000872F			
Ref. No.:	GEEC/FU/32/2021/10/07	Date of Reporting:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab Id No.	GEEC-SLM/2021/10/07
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Sampling Location:	**Tower**
Sound Level Report			
SLM Model	4023 SD	Date of Monitoring	23/10/2021
Monitored by	Mr.P.Buragohain	Sl.No.	Sl.No.Q656054

Measurement Results

Sl.No.	Location	Leq (dBA)	
		At Source	1 m from Acoustic Enclosure
1	**DG-(125KVA) M/C No- E83S118IP143466**	100.7	**67.1**
Remark:	CPCB Limit Leq <75 dBA 1 m from the Acoustic Enclosure		

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

The results relate only to the item tested.
The test report shall not be reproduced except in full, without written approval of the laboratory.
The test report cannot be used as an evidence in a court of law without prior written approval of the laboratory.

Stack Emission of DG set at Valve House

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS
House No-11, Champaknagar, Narayan Path, Bhetapara, Guwahati-781028, www.greentecheec.in
Telefax -03613515022 Mobile: 9435046677, 9954089052, E-mail: green_pranjal@hotmail.com, info@greentecheec.in
TC-5991

GEEC/FM/49

ULR Number: TC599121000000887F			
Report No: GECC/FL/22/STK/2021/10/17		Date:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab ID	GECC/STK/2021/10/17
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling:	23/10/2021
		Date of Receipt:	25/10/2021
		Test Start Date:	25/10/2021
Samling Location	VH	Test End Date:	26/10/2021
STACK MONITORING REPORT			
Stack Details:	**DG-(125 KVA) SL.NO.:2273 Model No: KGI-125WS**	Fuel Used:	HSD
Stack Height, m (Approx.)	3.5	Stack Dia, m	0.12
Sample Porthole height (GL) m	-	Area in m^2	0.011
Flow Characteristics			
Velocity in m/sec	**7.3**	**Flow rate**	**0.083**
Ambient Temperature, °C	**34**	Stack Temperature, °C	**146.0**
SAMPLING RESULT			
Sl. No.	**Parameter**	**Results**	**Emission Limit**
1	PM in g/kw-hr	**0.17**	**≤ 0.2**
2	CO in g/kw-hr	**0.82**	**≤ 3.5**
********** End of report **********			
Sl. No.	**Type of Instrument**	**Model No.**	**Model Make**
1	Stack Gas Analyzer	Testo 340 & Stack Monitoring Kit: SMS-4	Testo Instruments Pvt. Ltd. & Polltech Pvt.Ltd

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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* Deviation: Sampling was done directly from exhaust/opening.

Page 1 of 1

গ্রীনটেক্ এনভাইৰনমেন্টল ইঞ্জিনিয়াৰ এণ্ড কন্সালটেন্টছ্
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TC-5991

GEEC/FM/47/A

TEST REPORT

ULR Number: TC599121000000876F			
Ref. No.:	GEEC/FL/32/2021/10/11	Date of Reporting:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab Id No.	GEEC-SLM/2021/10/11
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Sampling Location:	VH
Sound Level Report			
SLM Model	4023 SD	Date of Monitoring	23/10/2021
Monitored by	Mr.P.Buragohain	Sl.No.	Sl.No.Q656054

Measurement Results

Sl.No.	Location	Leq (dBA)	
		At Source	1 m from Acoustic Enclosure
1	**DG-(125 KVA) SL.NO.:2273 Model No: KGI-125WS**	97.2	**68.9**
Remark:	CPCB Limit Leq <75 dBA 1 m from the Acoustic Enclosure		

Checked by:
Sahjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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Stack Emission of DG set at Workshop

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TC-5991

GEEC/FM/47/A

TEST REPORT

ULR Number: TC599121000000877F			
Ref. No.:	GEEC/FL/32/2021/10/12	Date of Reporting:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab Id No.	GEEC-SLM/2021/10/12
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Sampling Location:	**Work Shop**
Sound Level Report			
SLM Model	4023 SD	Date of Monitoring	23/10/2021
Monitored by	Mr.P.Buragohain	Sl.No.	Sl.No.Q656054

Measurement Results

Sl.No.	Location	Leq (dBA)	
		At Source	1 m from Acoustic Enclosure
1	**DG-30 KVA Welding DG Movable**	100.8	**72.9**
Remark:	CPCB Limit Leq <75 dBA 1 m from the Acoustic Enclosure		

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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TC-5991

GEEC/FM/49

ULR Number: TC599121000000888F			
Report No: GECC/FL/22/STK/2021/10/18		Date:	30/10/2021
Name of the Industry:	**Larsen & Toubro Limited**	Lab ID	GECC/STK/2021/10/18
Address	Larsen & Toubro Limited 120 MW LKHEP, Longku Dist. Dima Hasao, Assam – 788931	Date of Sampling:	23/10/2021
		Date of Receipt:	25/10/2021
		Test Start Date:	25/10/2021
Sampling Location	**Workshop**	Test End Date:	26/10/2021

STACK MONITORING REPORT

Stack Details:	**DG-30 KVA Welding DG (Movable)**	Fuel Used:	HSD
Stack Height, m (Approx.)	2.5	Stack Dia, m	0.1
Sample Porthole height (GL) m	-	Area in m^2	0.008

Flow Characteristics

Velocity in m/sec	**4.7**	**Flow rate**	**0.037**
Ambient Temperature, °C	**32.4**	Stack Temperature, °C	**158.0**

SAMPLING RESULT

Sl. No.	Parameter	Results	Emission Limit
1	PM in g/kw-hr	**0.15**	**≤ 0.2**
2	CO in g/kw-hr	**1.74**	**≤ 3.5**

********** End of report **********

Sl. No.	Type of Instrument	Model No.	Model Make
1	Stack Gas Analyzer	Testo 340 & Stack Monitoring Kit: SMS-4	Testo Instruments Pvt. Ltd. & Polltech Pvt.Ltd

Checked by:
Sanjib Rajkhowa
Chemist

Reviewed by:
Dr. Belinda Lahon
Quality Manager

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* Deviation: Sampling was done directly from exhaust/opening.

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TEST REPORT:
Report No: 211022_1503163_0
ULR No:TC766921000000139P
Sample ID No: EETNE/Oct/09/21/D
Test Starting Date: 11/10/21

Date of Report: 22/10/21
Date of sample receipt: 11/10/21
Test completion Date: 18/10/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Drinking Water**				**Source: APGCL Engineer Camp.**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 10/10/2021**	**Time 11:45 A.M**	**Temperature 29°C**	**pH 6.2**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500: 2012	
					Acceptable limit	Permissible limit
1	pH	---	6.35	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5	No relaxation
2	Turbidity	NTU	1.6	APHA 23rd Edition,2130,Page:2-13	1.0	5.0
3	Total hardness	mg/L	64.3	APHA 23rd Edition,2340 B,Page:2-48	200	600
4	Total Alkalinity	mg/L	88.9	APHA 23rd Edition,2320 B,Page:2-37	200	600
5	Residual Chlorine	mg/L	BDL	APHA 23rd Edition,4500-Cl B,Page:4-63	0.2	1.0
6	Fluoride	mg/L	0.36	APHA 23rd Edition,4500-F D,Page:4-90	1.0	1.5
7	Iron(as Fe)	mg/L	0.04	APHA 23rd Edition,3500-Fe B,Page:3-80	0.3	No relaxation
8	Total coliform	MPN/100 ml	Absent	APHA 23rd Edition,92228,Page:9-81	Absent	Absent

NOTE:BDL(Below Detection Limit)

For Envision Enviro Technologies North East

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: i) The results relate only to the parameters tested.
ii) The test report shall not be reproduced except in full, without written approval of laboratory.
iv) Parameter no.4 to 8 are analyzed by Department of Chemistry,B. Borooah College as per our MOU.

End of report

Page 1 of 2

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TEST REPORT:
Report No: 211022_1503163_0
ULR No: TC766921000000138P
Sample ID No:EETNE/Oct/08/21/D
Test Starting Date: 11/10/21

Date of Report: 22/10/21
Date of sample receipt: 11/10/21
Test completion Date: 22/11/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Ground Water**				**Source: Reserve Land under Ground Water.**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 10/10/2021**	**Time 02:50 P.M**	**Temperature 28°C**	**pH 5.6**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
1	pH	---	5.83	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5
2	Turbidity	NTU	0.84	APHA 23rd Edition,2130,Page:2-13	5
3	TDS	mg/L	226.2	APHA 23rd Edition,2540 C ,Page :2-69	2000
4	TSS	mg/L	55.7	APHA 23rd Edition,2540,Page:2-70	----
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42	----
6	Dissolved Oxygen	mg/L	4.9	APHA 23rd Edition,4500-O C,Page:4-146	100
7	Total hardness	mg/L	187.3	APHA 23rd Edition,2340 B,Page:2-48	600
8	Calcium	mg/L	86.9	APHA 23rd Edition,3500-Ca B,Page:3-69	200
9	Magnesium	mg/L	45.2	APHA 23rd Edition,3500-Mg B,Page:3-86	100
10	Total Alkalinity	mg/L	122.5	APHA 23rd Edition,2320,Page:2-37	600
11	Sulphate	mg/L	14.3	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199	400
12	Nitrates	mg/L	5.5	APHA 23rd Edition,4500-NO_3^- B,Page:4-127	No relaxation
13	Phosphate	mg/L	0.03	APHA 23rd Edition,4500-P,Page:4-163	No relaxation
14	Conductivity	µS	81.6	APHA 23rd Edition,2520B,Page:2-60	No relaxation

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Sample ID No: EETNE/Oct/08/21/D
Test Starting Date: 11/10/21

Date of sample receipt: 08/10/2021
Test completion Date: 22/10/21

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
15	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36	No relaxation
16	Iron(as Fe)	mg/L	0.31	APHA 23rd Edition,3500-Fe B,Page:3-80	No relaxation
17	Total Coliform	MPN/100	2	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample
18	Fecal Coliform	MPN/100	Nil	APHA 23rd Edition,9222 D,Page:9-89	Shall not be detectable in any 100 ml Sample
19	BOD	mg/L	4.5	APHA 23rd Edition,5210B,Page:5-6	No relaxation
20	COD	mg/L	59	APHA 23rd Edition,5220 b,Page:5-18	No relaxation

NOTE: (BOD) Biochemical Oxygen Demand, (COD) Chemical Oxygen Demand,(TSS)Total Suspended Solids, (TDS) Total Dissolved Solids.

For Envision Enviro Technologies North East

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: : i) The results relate only to the parameters tested.
ii) The test report shall not be reproduced except in full, without written approval of laboratory
iii) Parameter no.11 to 18 were analysed by Department of Chemistry,B.Borooah College as per our MOU.

End of report

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TEST REPORT:
Report No: 211229_1503163_0
ULR No: TC766921000000183P
Sample ID No:EETNE/Dec/12/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Drinking Water**			**Source: APGCL Engineer Camp**		
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 18/12/2021**	**Time 11:55 A.M**	**Temperature 21°C**	**pH 7.5**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Acceptable Limit	IS 10500:2012 Permissible Limit
1	pH	---	6.57	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5	No relaxation
2	Turbidity	NTU	1.92	APHA 23rd Edition,2130,Page:2-13	1.0	5
3	Total Alkalinity	mg/L	83.3	APHA 23rd Edition,2320,Page:2-37	200	600
4	Residual Chlorine	mg/L	BDL	APHA 23rd Edition,4500-Cl B,Page:4-63	0.2	1.0
5	Chloride	mg/L	15.8	APHA 23rd Edition,4500-Cl B,Page:4-75	250	1000
6	Fluoride	mg/L	0.34	APHA 23rd Edition,4500-F D,Page:4-90	1.0	1.5
7	Iron(as Fe)	mg/L	0.02	APHA 23rd Edition,3500-Fe B,Page:3-80	0.3	No relaxation
8	Total Coliform	MPN/100	Nil	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample	Shall not be detectable in any 100 ml Sample
9	Fecal Coliform	MPN/100	Nil	APHA 23rd Edition,9222 D,Page:9-89	Shall not be detectable in any 100 ml Sample	Shall not be detectable in any 100 ml Sample

For Envision Enviro Technologies North East

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: i) The results relate only to the parameters tested.
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TEST REPORT:
Report No: 211229_1503163_0
ULR No: TC766921000000184P
Sample ID No:EETNE/Dec/13/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Ground Water**				**Source: APGCL Colony**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 18/12/2021**	**Time 02:15P.M**	**Temperature 21°C**	**pH 7.5**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	6.65	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	2.13	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	211.7	APHA 23rd Edition,2540 C ,Page :2-69
4	TSS	mg/L	42.5	APHA 23rd Edition,2540,Page:2-70
5	Total hardness	mg/L	117.2	APHA 23rd Edition,2340 B,Page:2-48
6	Calcium	mg/L	63.4	APHA 23rd Edition,3500-Ca B,Page:3-69
7	Magnesium	mg/L	45.2	APHA 23rd Edition,3500-Mg B,Page:3-86
8	Total Alkalinity	mg/L	277.5	APHA 23rd Edition,2320,Page:2-37
9	Chloride	mg/L	10.3	APHA 23rd Edition,4500-Cl B,Page:4-75
10	Phosphate	mg/L	0.02	APHA 23rd Edition,4500-P,Page:4-163
11	Sulphate	mg/L	18.6	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199
12	Nitrates	mg/L	4.1	APHA 23rd Edition,4500-NO_3^- B,Page:4-127
13	Conductivity	µS	20.8	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/13/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
14	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36
15	Iron(as Fe)	mg/L	0.33	APHA 23rd Edition,3500-Fe B,Page:3-80

For Envision Enviro Technologies North East

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: : i) The results relate only to the parameters tested.
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End of report

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TEST REPORT:
Report No: 211029_1503163_0
ULR No: TC766921000000185P
Sample ID No:EETNE/Dec/14/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Drinking Water**			**Source: Labour and Staff Camp**		
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 18/12/2021**	**Time 02:45 P.M**	**Temperature 20°C**	**pH 7.7**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012	
					Acceptable Limit	Permissible Limit
1	pH	---	6.55	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5	No relaxation
2	Turbidity	NTU	0.43	APHA 23rd Edition,2130,Page:2-13	1.0	5
3	Total Alkalinity	mg/L	43.3	APHA 23rd Edition,2320,Page:2-37	200	600
4	Residual Chlorine	mg/L	BDL	APHA 23rd Edition,4500-Cl B,Page:4-63	0.2	1.0
5	Chloride	mg/L	15.8	APHA 23rd Edition,4500-Cl B,Page:4-75	250	1000
6	Fluoride	mg/L	0.34	APHA 23rd Edition,4500-F D,Page:4-90	1.0	1.5
7	Iron(as Fe)	mg/L	0.02	APHA 23rd Edition,3500-Fe B,Page:3-80	0.3	No relaxation
8	Total Coliform	MPN/100	Nil	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample	Shall not be detectable in any 100 ml Sample
9	Fecal Coliform	MPN/100	Nil	APHA 23rd Edition,9222 D,Page:9-89	Shall not be detectable in any 100 ml Sample	Shall not be detectable in any 100 ml Sample

For Envision Enviro Technologies North East

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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End of report

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TEST REPORT:
Report No: 211229_1503163_0
ULR No: TC766921000000187P
Sample ID No:EETNE/Dec/16/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Ground Water**			**Source: Labour and staff Camp**		
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 18/12/2021**	**Time 03:50 P.M**	**Temperature 20°C**	**pH 7.7**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	7.0	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	1.28	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	195	APHA 23rd Edition,2540 C ,Page :2-69
4	TSS	mg/L	54.7	APHA 23rd Edition,2540,Page:2-70
5	Total hardness	mg/L	91.3	APHA 23rd Edition,2340 B,Page:2-48
6	Calcium	mg/L	46.2	APHA 23rd Edition,3500-Ca B,Page:3-69
7	Magnesium	mg/L	22.9	APHA 23rd Edition,3500-Mg B,Page:3-86
8	Total Alkalinity	mg/L	125.1	APHA 23rd Edition,2320,Page:2-37
9	Sulphate	mg/L	9.5	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199
10	Nitrates	mg/L	4.8	APHA 23rd Edition,4500-NO_3 B,Page:4-127
11	Conductivity	µS	26.3	APHA 23rd Edition,2520B,Page:2-60
12	Chloride	mg/L	17.4	APHA 23rd Edition,4500-Cl B,Page:4-75
13	Phosphate	mg/L	0.02	APHA 23rd Edition,4500-P,Page:4-163

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Sample ID No: EETNE/Dec/16/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
14	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36
15	Iron(as Fe)	mg/L	0.26	APHA 23rd Edition,3500-Fe B,Page:3-80

For Envision Enviro Technologies North East

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: : i) The results relate only to the parameters tested.
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TEST REPORT:
Report No: 211229_1503163_0
ULR No: TC766921000000181P
Sample ID No:EETNE/Dec/10/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Ground Water**			**Source: PMC Colony**		
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 18/12/2021**	**Time 10:20 A.M**	**Temperature 19°C**	**pH 7.5**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	6.38	APHA 23rd Edition,4500 H^+,Page:4-95
2	Turbidity	NTU	0.55	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	176.3	APHA 23rd Edition,2540 C ,Page :2-69
4	TSS	mg/L	39.5	APHA 23rd Edition,2540,Page:2-70
5	Total hardness	mg/L	82.3	APHA 23rd Edition,2340 B,Page:2-48
6	Calcium	mg/L	40.6	APHA 23rd Edition,3500-Ca B,Page:3-69
7	Magnesium	mg/L	18.9	APHA 23rd Edition,3500-Mg B,Page:3-86
8	Total Alkalinity	mg/L	116.4	APHA 23rd Edition,2320,Page:2-37
9	Sulphate	mg/L	8.7	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199
10	Nitrates	mg/L	5.1	APHA 23rd Edition,4500-NO_3 B,Page:4-127
11	Phosphate	mg/L	0.02	APHA 23rd Edition,4500-P,Page:4-163
12	Conductivity	µS	25.5	APHA 23rd Edition,2520B,Page:2-60
13	Chloride	mg/L	13.6	APHA 23rd Edition,4500-Cl B,Page:4-75

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Sample ID No: EETNE/Dec/10/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
14	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36
15	Iron(as Fe)	mg/L	1.1	APHA 23rd Edition,3500-Fe B,Page:3-80

For Envision Enviro Technologies North East

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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TEST REPORT:
Report No: 211022_1503163_0
ULR No:TC766921000000132P
Sample ID No: EETNE/Oct/02/21/D
Test Starting Date: 11/10/21

Date of Report: 22/10/21
Date of sample receipt: 11/10/21
Test completion Date: 22/10/21

Name & Address of Client	M/s. Lower Kopili Project, Near Lanka, Dist: Dima Hasao.					
Sample Description	Type: Surface Water(Submergence area, dam site)				Source: Kopili River	
Sample collected by	M/s. En-vision Enviro Technologies North East					
Sample Collection Particulars	Date 09/10/2021	Time 04:45 P.M	Temperature 29°C	pH 6.9	Quantity Drawn:4L	Sampling Method: EETNE/SOP/02

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
1	pH	---	7.22	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5
2	Turbidity	NTU	2.05	APHA 23rd Edition,2130,Page:2-13	5
3	TDS	mg/L	35.6	APHA 23rd Edition,2540 C, Page :2-69	2000
4	TSS	mg/L	68.4	APHA 23rd Edition,2540,Page:2-70	----
5	Oil and GREASE	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42	----
6	Dissolved Oxygen	mg/L	7.3	APHA 23rd Edition,4500-O C,Page:4-146	----
7	Total hardness	mg/L	62.7	APHA 23rd Edition,2340 B,Page:2-48	600
8	Calcium	mg/L	36.5	APHA 23rd Edition,3500-Ca B,Page:3-69	200
9	Magnesium	mg/L	25.6	APHA 23rd Edition,3500-Mg B,Page:3-86	100
10	Total Alkalinity	mg/L	23.2	APHA 23rd Edition,2320,Page:2-37	600
11	Sulphate	mg/L	8.7	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199	400
12	Nitrates	mg/L	6.9	APHA 23rd Edition,4500-NO_3^- B,Page:4-127	No relaxation
13	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163	No relaxation
14	Salinity	%	0.4	APHA 23rd Edition,2520B,Page:2-60	No relaxation
15	conductivity	µS/cm	95.6	APHA 23rd Edition,2520B,Page:2-60	No relaxation

Page 1 of 2

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Sample ID No: EETNE/Oct/02/21/D
Test Starting Date: 11/10/21

Date of sample receipt: 11/10/21
Test completion Date: 22/10/21

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
16	Arsenic	mg/L	<0.001	APHA 23rd Edition,3114A,Page:3-36	No relaxation
17	Iron(as Fe)	mg/L	0.37	APHA 23rd Edition,3500-Fe B,Page:3-80	No relaxation
18	Total Coliform	MPN/100ml	Nil	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample
19	Fecal Coliform	MPN/100ml	Nil	APHA 23rd Edition,9222 D,Page:9-89	Shall not be detectable in any 100 ml Sample
20	BOD	mg/L	4.6	APHA 23rd Edition,5210B,Page:5-6	No relaxation
21	COD	mg/L	132	APHA 23rd Edition,5220 b,Page:5-18	No relaxation

For Envision Enviro Technologies North East, Guwahati

Rimpi sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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TEST REPORT:
Report No: 211022_1503163_0
ULR No:TC766921000000133P
Sample ID No: EETNE/Oct/03/21/D
Test Starting Date: 11/10/21

Date of Report: 22/10/21
Date of sample receipt:11/10/21
Test completion Date: 22/10/21

Name & Address of Client	M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.					
Sample Description	Type: Surface Water (1 km D/S of dam site)				Source: Kopili River	
Sample collected by	M/s. En-vision Enviro Technologies North East					
Sample Collection Particulars	Date 10/10/2021	Time 10:15 A.M	Temperature 28°C	pH 7.0	Quantity Drawn:4Lt	Sampling Method: EETNE/SOP/02

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
1	pH	---	6.98	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5
2	Turbidity	NTU	2.7	APHA 23rd Edition,2130,Page:2-13	5
3	TDS	mg/L	32.5	APHA 23rd Edition,2540 C, Page :2-69	2000
4	TSS	mg/L	74.6	APHA 23rd Edition,2540,Page:2-70	---
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42	---
6	Dissolved Oxygen	mg/L	7.2	APHA 23rd Edition,4500-O C,Page:4-146	---
7	Total hardness	mg/L	68.5	APHA 23rd Edition,2340 B,Page:2-48	600
8	Calcium	mg/L	35.2	APHA 23rd Edition,3500-Ca B,Page:3-69	200
9	Magnesium	mg/L	19.4	APHA 23rd Edition,3500-Mg B,Page:3-86	100
10	Total Alkalinity	mg/L	31.6	APHA 23rd Edition,2320,Page:2-37	600
11	Sulphate	mg/L	19.2	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199	400
12	Nitrates	mg/L	3.8	APHA 23rd Edition,4500-NO_3^-B,Page:4-127	No relaxation
13	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163	No relaxation
14	Salinity	‰	0.2	APHA 23rd Edition,2520B,Page:2-60	No relaxation
15	conductivity	µS/cm	79.3	APHA 23rd Edition,2520B,Page:2-60	No relaxation

Guwahati-3

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Sample ID No: EETNE/Oct/03/21/D
Test Starting Date: 11/10/21

Date of sample receipt: 11/10/21
Test completion Date: 22/10/21

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
16	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36	No relaxation
17	Iron(as Fe)	mg/L	0.71	APHA 23rd Edition,3500-Fe B,Page:3-80	No relaxation
18	Total Coliform	MPN/100	2	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample
19	Fecal Coliform	MPN/100	Nil	APHA 23rd Edition,9222 D,Page:9-89	Shall not be detectable in any 100 ml Sample
20	BOD	mg/L	4.2	APHA 23rd Edition,5210B,Page:5-6	No relaxation
21	COD	mg/L	61	APHA 23rd Edition,5220 b,Page:5-18	No relaxation

NOTE: (BOD) Biochemical Oxygen Demand, (COD) Chemical Oxygen Demand,(TSS) Total Suspended solids (TDS) Total Dissolved Solids.

For Envision Enviro Technologies North East, Guwahati

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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End of report

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TEST REPORT:
Report No: 211022_1503163_0
ULR No:TC766921000000131P
Sample ID No: EETNE/Oct/01/21/D
Test Starting Date: 11/10/21

Date of Report: 22/10/21
Date of sample receipt: 11/10/21
Test completion Date: 22/10/21

Name & Address of Client	M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.					
Sample Description	Type: Surface Water(1 km U/S of dam site)				Source: Kopili River	
Sample collected by	M/s. En-vision Enviro Technologies North East					
Sample Collection Particulars	Date 09/10/2021	Time 03:20 P.M	Temperature 27°C	pH 7.0	Quantity Drawn:4L	Sampling Method: EETNE/SOP/02

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
1	pH	---	7.24	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5
2	Turbidity	NTU	2.16	APHA 23rd Edition,2130,Page:2-13	5
3	TDS	mg/L	31.9	APHA 23rd Edition,2540 C, Page :2-69	2000
4	TSS	mg/L	86.7	APHA 23rd Edition,2540,Page:2-70	----
5	Oil and GREASE	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42	----
6	Dissolved Oxygen	mg/L	6.6	APHA 23rd Edition,4500-O C,Page:4-146	100
7	Total hardness	mg/L	63.4	APHA 23rd Edition,2340 B,Page:2-48	600
8	Calcium	mg/L	32.7	APHA 23rd Edition,3500-Ca B,Page:3-69	200
9	Magnesium	mg/L	17.8	APHA 23rd Edition,3500-Mg B,Page:3-86	100
10	Total Alkalinity	mg/L	22.5	APHA 23rd Edition,2320,Page:2-37	600
11	Sulphate	mg/L	12.6	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199	400
12	Nitrates	mg/L	4.3	APHA 23rd Edition,4500-NO_3 B,Page:4-127	No relaxation
13	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163	No relaxation
14	Salinity	%	0.3	APHA 23rd Edition,2520B,Page:2-60	No relaxation
15	conductivity	µS/cm	72.6	APHA 23rd Edition,2520B,Page:2-60	No relaxation

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Sample ID No: EETNE/Oct/01/21/D
Test Starting Date: 11/10/21

Date of sample receipt: 22/10/21
Test completion Date: 21/10/21

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
16	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36	No relaxation
17	Iron(as Fe)	mg/L	1.1	APHA 23rd Edition,3500-Fe B,Page:3-80	No relaxation
18	Total Coliform	MPN/100ml	2	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample
19	Fecal Coliform	MPN/100ml	Nil	APHA 23rd Edition,9222 D,Page:9-89	Shall not be detectable in any 100 ml Sample
20	BOD	mg/L	5.9	APHA 23rd Edition,5210B,Page:5-6	No relaxation
21	COD	mg/L	46	APHA 23rd Edition,5220 b,Page:5-18	No relaxation

For Envision Enviro Technologies North East, Guwahati

Rimpi sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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TEST REPORT:
Report No: 211022_1503163_0
ULR No: TC766921000000136P
Sample ID No: EETNE/Oct/06/21/D
Test Starting Date: 11/10/21

Date of Report: 22/10/21
Date of sample receipt: 11/10/21
Test completion Date: 22/10/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water (3 km D/S of dam site)**				**Source: Kopili River**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 10/10/2021**	**Time 01:30 P.M**	**Temperature 29°C**	**pH 6.7**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
1	pH	---	6.86	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5
2	Turbidity	NTU	1.85	APHA 23rd Edition,2130,Page:2-13	5
3	TDS	mg/L	29.4	APHA 23rd Edition,2540 C, Page :2-69	2000
4	TSS	mg/L	81.2	APHA 23rd Edition,2540,Page:2-70	----
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42	----
6	Dissolved Oxygen	mg/L	7.7	APHA 23rd Edition,4500-O C,Page:4-146	----
7	Total hardness	mg/L	58.7	APHA 23rd Edition,2340 B,Page:2-48	600
8	Calcium	mg/L	26.4	APHA 23rd Edition,3500-Ca B,Page:3-69	200
9	Magnesium	mg/L	13.6	APHA 23rd Edition,3500-Mg B,Page:3-86	100
10	Total Alkalinity	mg/L	25.8	APHA 23rd Edition,2320,Page:2-37	600
11	Sulphate	mg/L	14.3	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199	400
12	Nitrates	mg/L	7.1	APHA 23rd Edition,4500-NO_3 B,Page:4-127	No relaxation
13	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163	No relaxation
14	Salinity	%	0.2	APHA 23rd Edition,2520B,Page:2-60	No relaxation
15	Conductivity	µS/cm	88.6	APHA 23rd Edition,2520B,Page:2-60	No relaxation

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Sample ID No: EETNE/Oct/06/21/D
Test Starting Date: 11/10/21

Date of sample receipt: 11/10/21
Test completion Date: 22/10/21

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
16	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36	No relaxation
17	Iron(as Fe)	mg/L	0.97	APHA 23rd Edition,3500-Fe B,Page:3-80	No relaxation
18	Total Coliform	MPN/100	4	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample
19	Fecal Coliform	MPN/100	Nil	APHA 23rd Edition,9222 D,Page:9-89	Shall not be detectable in any 100 ml Sample
20	BOD	mg/L	5.1	APHA 23rd Edition,5210B,Page:5-6	No relaxation
21	COD	mg/L	55	APHA 23rd Edition,5220 b,Page:5-18	No relaxation

NOTE: (BOD) Biochemical Oxygen Demand, (COD) Chemical Oxygen Demand,(TSS)Total Suspended Solids, (TDS) Total Dissolved Solids.

For Envision Enviro Technologies North East, Guwahati

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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TEST REPORT:
Report No: 211022_1503163_0
ULR No:TC766921000000013SP
Sample ID No: EETNE/Oct/05/21/D
Test Starting Date: 11/10/21

Date of Report: 22/10/21
Date of sample receipt:11/10/21
Test completion Date: 22/10/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water**				**Source: Kala Nala**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 10/10/2021**	**Time 12:20 P.M**	**Temperature 28°C**	**pH 6.5**	**Quantity Drawn:4Ltg**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
1	pH	---	6.8	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5
2	Turbidity	NTU	31	APHA 23rd Edition,2130,Page:2-13	5
3	TDS	mg/L	150.3	APHA 23rd Edition,2540 C, Page :2-69	2000
4	TSS	mg/L	34.3	APHA 23rd Edition,2540,Page:2-70	----
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42	-----
6	Dissolved Oxygen	mg/L	6.7	APHA 23rd Edition,4500-O C,Page:4-146	100
7	Total hardness	mg/L	71.5	APHA 23rd Edition,2340 B,Page:2-48	600
8	Calcium	mg/L	31.2	APHA 23rd Edition,3500-Ca B,Page:3-69	200
9	Magnesium	mg/L	17.4	APHA 23rd Edition,3500-Mg B,Page:3-86	100
10	Total Alkalinity	mg/L	124.8	APHA 23rd Edition,2320,Page:2-37	600
11	Chloride	mg/L	17.6	APHA 23rd Edition,4500-Cl B,Page:4-75	400
12	Sulphate	mg/L	14.2	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199	No relaxation
13	Nitrates	mg/L	5.1	APHA 23rd Edition,4500-NO_3 B,Page:4-127	No relaxation
14	Phosphate	mg/L	0.01	APHA 23rd Edition,4500-P,Page:4-163	No relaxation
15	conductivity	µS/cm	163	APHA 23rd Edition,2520B,Page:2-60	No relaxation

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Sample ID No: EETNE/Oct/05/21/D
Test Starting Date: 11/10/21

Date of sample receipt: 11/10/21
Test completion Date: 22/10/21

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
16	Arsenic	µg/L	BDL	APHA 23rd Edition,3114A,Page:3-36	No relaxation
17	Iron(as Fe)	mg/L	1.3	APHA 23rd Edition,3500-Fe B,Page:3-80	No relaxation
18	Salinity	%	0.15	APHA 23rd Edition,2520B,Page:2-60	Shall not be detectable in any 100 ml Sample
19	Total Coliform	MPN/100mL	3	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample
20	Fecal Coliform	MPN/100mL	Nil	APHA 23rd Edition,9222 D,Page:9-89	Shall not be detectable in any 100 ml Sample
21	BOD	mg/L	10	APHA 23rd Edition,5210B,Page:5-6	No relaxation
22	COD	mg/L	65	APHA 23rd Edition,5220 b,Page:5-18	No relaxation

NOTE: (BOD) Biochemical Oxygen Demand, (COD) Chemical Oxygen Demand,(TSS) Total Suspended solids (TDS) Total Dissolved Solids.

For Envision Enviro Technologies North East, Guwahati

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: i) The results relate only to the parameters tested.
ii) The test report shall not be reproduced except in full, without written approval of laboratory
iv) Parameter no.11 to 22 are analyzed by Department of Chemistry,B.Borooah College as per our MOU.

End of report

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TEST REPORT:
Report No: 211022_1503163_0
ULR No:TC766921000000134P
Sample ID No: EETNE/Oct/04/21/D
Test Starting Date: 11/10/21

Date of Report: 22/10/21
Date of sample receipt: 11 /10/21
Test completion Date: 22/10/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water**				**Source: Lonku Nala**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 10/10/2021**	**Time 11:10 A.M**	**Temperature 28°C**	**pH 6.4**	**Quantity Drawn:4Ltg**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
1	pH	---	6.83	APHA 23rd Edition,4500 H+,Page:4-95	6.5-8.5
2	Turbidity	NTU	4.9	APHA 23rd Edition,2130,Page:2-13	5
3	TDS	mg/L	114.5	APHA 23rd Edition,2540 C, Page :2-69	2000
4	TSS	mg/L	91.6	APHA 23rd Edition,2540,Page:2-70	....
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42	----
6	Dissolved Oxygen	mg/L	7.7	APHA 23rd Edition,4500-O C,Page:4-146	100
7	Total hardness	mg/L	82.5	APHA 23rd Edition,2340 B,Page:2-48	600
8	Calcium	mg/L	26.4	APHA 23rd Edition,3500-Ca B,Page:3-69	200
9	Magnesium	mg/L	17.6	APHA 23rd Edition,3500-Mg B,Page:3-86	100
10	Total Alkalinity	mg/L	117	APHA 23rd Edition,2320,Page:2-37	600
11	Chloride	mg/L	26.3	APHA 23rd Edition,4500-Cl B,Page:4-75	400
12	Sulphate	mg/L	12.8	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199	No relaxation
13	Nitrates	mg/L	7.3	APHA 23rd Edition,4500-NO_3 B,Page:4-127	No relaxation
14	Phosphate	mg/L	<.02	APHA 23rd Edition,4500-P,Page:4-163	No relaxation
15	conductivity	µS/cm	125	APHA 23rd Edition,2520B,Page:2-60	No relaxation

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Sample ID No: EETNE/Oct/04/21/D
Test Starting Date: 11/10/21

Date of sample receipt: 11/10/21
Test completion Date: 22/10/21

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500:2012 Permissible Limit
16	Arsenic	µg/L	BDL	APHA 23rd Edition,3114A,Page:3-36	No relaxation
17	Iron(as Fe)	mg/L	1.1	APHA 23rd Edition,3500-Fe B,Page:3-80	No relaxation
18	Salinity	%	0.3	APHA 23rd Edition,2520B,Page:2-60	Shall not be detectable in any 100 ml Sample
19	Total Coliform	MPN/100 mL	3	APHA 23rd Edition,9222B,Page:9-81	Shall not be detectable in any 100 ml Sample
20	Fecal Coliform	MPN/100 mL	Nil	APHA 23rd Edition,9222 D,Page:9-89	
21	BOD	mg/L	9.1	APHA 23rd Edition,5210B,Page:5-6	No relaxation
22	COD	mg/L	24	APHA 23rd Edition,5220 b,Page:5-18	No relaxation

NOTE: (BOD) Biochemical Oxygen Demand, (COD) Chemical Oxygen Demand,(TSS) Total Suspended solids (TDS) Total Dissolved Solids.

For Envision Enviro Technologies North East, Guwahati

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: i) The results relate only to the parameters tested.
ii) The test report shall not be reproduced except in full, without written approval of laboratory
iv) Parameter no.11 to 22 are analyzed by Department of Chemistry,B.Borooah College as per our MOU.

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TEST REPORT:
Report No: 211229_1503163_0
ULR No:TC766921000000176P
Sample ID No: EETNE/Dec/05/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt:20/12/21
Test completion Date: 29/12/21

Name & Address of Client	M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.					
Sample Description	Type: Surface Water (1 km D/S of dam site)				Source: Kopili River	
Sample collected by	M/s. En-vision Enviro Technologies North East					
Sample Collection Particulars	Date 17/12/2021	Time 11:35 A.M	Temperature 19°C	pH 5.6	Quantity Drawn:4Lt	Sampling Method: EETNE/SOP/02

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	4.38	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	1.45	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	36.7	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	81.2	APHA 23rd Edition,2540,Page:2-70
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	7.6	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	69.3	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	32.9	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	16.7	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	34.5	APHA 23rd Edition,2320,Page:2-37
11	Chloride	mg/L	12.3	APHA 23rd Edition,4500-Cl B,Page:4-75
12	Sulphate	mg/L	15.2	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199
13	Nitrates	mg/L	3.4	APHA 23rd Edition,4500-NO_3^- B,Page:4-127
14	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163
15	Salinity	%	0.3	APHA 23rd Edition,2520B,Page:2-60
16	conductivity	µS/cm	84.7	APHA 23rd Edition,2520B,Page:2-60

Page 1 of 2

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Sample ID No: EETNE/Dec/05/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
17	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	0.63	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Total Coliform	MPN/100	3	APHA 23rd Edition,9222B,Page:9-81
20	Fecal Coliform	MPN/100	Nil	APHA 23rd Edition,9222 D,Page:9-89
21	BOD	mg/L	3.6	APHA 23rd Edition,5210B,Page:5-6
22	COD	mg/L	52	APHA 23rd Edition,5220 b,Page:5-18

For Envision Enviro Technologies North East, Guwahati

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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Environmental Monitoring Report

Project No. 47101-004
Semi-Annual
January 2022

India: Assam Power Sector Investment Program - Tranche 3

PART C

Prepared by the Assam Power Generation Corporation Limited (APGCL) for the Asian Development Bank.

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TEST REPORT:
Report No: 211229_1503163_0
ULR No:TC766921000000174P
Sample ID No: EETNE/Dec/03/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.					
Sample Description	Type: Surface Water(1 km U/S of dam site)				Source: Kopili River	
Sample collected by	M/s. En-vision Enviro Technologies North East					
Sample Collection Particulars	Date 17/12/2021	Time 10:10 A.M	Temperature 19°C	pH 5.6	Quantity Drawn:4L	Sampling Method: EETNE/SOP/02

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	4.54	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	2.11	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	38.6	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	92.5	APHA 23rd Edition,2540,Page:2-70
5	Oil and GREASE	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	6.1	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	72.6	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	35.3	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	18.1	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	28.6	APHA 23rd Edition,2320,Page:2-37
11	Chloride	mg/L	18.5	APHA 23rd Edition,4500-Cl B,Page:4-75
12	Sulphate	mg/L	9.2	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199
13	Nitrates	mg/L	3.3	APHA 23rd Edition,4500-NO_3^- B,Page:4-127
14	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163
15	Salinity	%	0.5	APHA 23rd Edition,2520B,Page:2-60
16	conductivity	µS/cm	70.5	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/03/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
17	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	0.93	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Total Coliform	MPN/100ml	3	APHA 23rd Edition,9222B,Page:9-81
20	Fecal Coliform	MPN/100ml	Nil	APHA 23rd Edition,9222 D,Page:9-89
21	BOD	mg/L	6.1	APHA 23rd Edition,5210B,Page:5-6
22	COD	mg/L	54	APHA 23rd Edition,5220 b,Page:5-18

For Envision Enviro Technologies North East, Guwahati

Rimpi sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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TEST REPORT:
Report No: 211229_1503163_0
ULR No: TC766921000000177P
Sample ID No: EETNE/Dec/06/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water (3 km D/S of dam site)**				**Source: Kopili River**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 17/12/2021**	**Time 11:55 A.M**	**Temperature 20°C**	**pH 5.5**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	4.19	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	2.13	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	22.6	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	79.4	APHA 23rd Edition,2540,Page:2-70
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	7.1	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	63.5	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	30.7	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	15.8	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	31.5	APHA 23rd Edition,2320,Page:2-37
11	Sulphate	mg/L	14.3	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199
12	Nitrates	mg/L	10.9	APHA 23rd Edition,4500-NO_3^-B,Page:4-127
13	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163
14	Salinity	%	0.4	APHA 23rd Edition,2520B,Page:2-60
15	Conductivity	µS/cm	85.2	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/06/21/D | **Date of sample receipt: 20/12/21**
Test Starting Date: 20/12/21 | **Test completion Date: 29/12/21**

Sl No.	Parameters	Unit	Result	Reference Method
16	Chloride	mg/L	15.2	APHA 23rd Edition,4500-Cl B,Page:4-75
17	Arsenic	mg/L	BDL	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	0.88	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Total Coliform	MPN/100	3	APHA 23rd Edition,9222B,Page:9-81
20	Fecal Coliform	MPN/100	Nil	APHA 23rd Edition,9222 D,Page:9-89
21	BOD	mg/L	5.5	APHA 23rd Edition,5210B,Page:5-6
22	COD	mg/L	60	APHA 23rd Edition,5220 b,Page:5-18

For Envision Enviro Technologies North East, Guwahati

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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TEST REPORT:
Report No: 221229_1503163_0
ULR No:TC766921000000178P
Sample ID No: EETNE/Dec/07/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/22
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water (8 km D/S of dam site)**				**Source: Kopili River**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 17/12/2021**	**Time 12:25 P.M**	**Temperature 21°C**	**pH 5.5**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	4.09	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	3.61	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	41.5	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	56.7	APHA 23rd Edition,2540,Page:2-70
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	5.9	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	88.6	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	43.9	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	20.2	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	125	APHA 23rd Edition,2320,Page:2-37
11	Sulphate	mg/L	14.3	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199
12	Nitrates	mg/L	6.6	APHA 23rd Edition,4500-NO_3^-B,Page:4-127
13	Phosphate	mg/L	BDL	APHA 23rd Edition,4500-P,Page:4-163
14	Salinity	%	0.4	APHA 23rd Edition,2520B,Page:2-60
15	Conductivity	µS/cm	116	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/07/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
16	Chloride	mg/L	12.9	APHA 23rd Edition,4500-Cl B,Page:4-75
17	Arsenic	mg/L	<0.001	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	1.3	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Total Coliform	MPN/100	2	APHA 23rd Edition,9222B,Page:9-81
20	Fecal Coliform	MPN/100	Nil	APHA 23rd Edition,9222 D,Page:9-89
21	BOD	mg/L	3.2	APHA 23rd Edition,5210B,Page:5-6
22	COD	mg/L	104	APHA 23rd Edition,5220 b,Page:5-18

For Envision Enviro Technologies North East, Guwahati

Rimpi Sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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ii) The test report shall not be reproduced except in full, without written approval of laboratory

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Certificate No. TC-7669

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TEST REPORT:
Report No: 211229_1503163_0
ULR No:TC766921000000182P
Sample ID No: EETNE/Dec/11/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water**				**Source: Adit to HRT**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 18/12/2021**	**Time 11:30A.M**	**Temperature 20°C**	**p^H 9.3**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	p^H	---	11.32	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	3.21	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	55.7	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	82.9	APHA 23rd Edition,2540,Page:2-70
5	Oil and GREASE	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	6.4	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	59.4	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	29.7	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	14.8	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	121.6	APHA 23rd Edition,2320,Page:2-37
11	Sulphate	mg/L	11.3	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199
12	Nitrates	mg/L	3.8	APHA 23rd Edition,4500-NO_3^-B,Page:4-127
13	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163
14	Salinity	%	0.3	APHA 23rd Edition,2520B,Page:2-60
15	conductivity	µS/cm	69.7	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/11/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
16	Chloride	mg/L	10.6	APHA 23rd Edition,4500-Cl B,Page:4-75
17	Arsenic	mg/L	<0.001	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	1.2	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Total Coliform	MPN/100ml	3	APHA 23rd Edition,9222B,Page:9-81
20	Fecal Coliform	MPN/100ml	Nil	APHA 23rd Edition,9222 D,Page:9-89
21	BOD	mg/L	3.7	APHA 23rd Edition,5210B,Page:5-6
22	COD	mg/L	12	APHA 23rd Edition,5220 b,Page:5-18

For Envision Enviro Technologies North East, Guwahati

Rimpi sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

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TEST REPORT:
Report No: 211229_1503163_0
ULR No:TC766921000000175P
Sample ID No: EETNE/Dec/04/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water**				**Source: Submergence area Dam Site**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 17/12/2021**	**Time 10:30 A.M**	**Temperature 18°C**	**pH 5.7**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	6.13	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	2.13	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	55.9	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	74.3	APHA 23rd Edition,2540,Page:2-70
5	Oil and GREASE	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	7.1	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	66.9	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	32.4	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	16.7	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	94.2	APHA 23rd Edition,2320,Page:2-37
11	Sulphate	mg/L	11.5	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199
12	Nitrates	mg/L	6.3	APHA 23rd Edition,4500-NO_3 B,Page:4-127
13	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163
14	Salinity	‰	0.4	APHA 23rd Edition,2520B,Page:2-60
15	conductivity	µS/cm	102	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/04/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
16	Chloride	mg/L	15.8	APHA 23rd Edition,4500-Cl B,Page:4-75
17	Arsenic	mg/L	<0.001	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	0.71	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Total Coliform	MPN/100ml	3	APHA 23rd Edition,9222B,Page:9-81
20	Fecal Coliform	MPN/100ml	Nil	APHA 23rd Edition,9222 D,Page:9-89
21	BOD	mg/L	2.2	APHA 23rd Edition,5210B,Page:5-6
22	COD	mg/L	6.7	APHA 23rd Edition,5220 b,Page:5-18

For Envision Enviro Technologies North East, Guwahati

Rimpi sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: i) The results relate only to the parameters tested.
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TEST REPORT:
Report No: 211229_1503163_0
ULR No:TC766921000000186P
Sample ID No: EETNE/Dec/15/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water**				**Source: Dam site Outlet**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 18/12/2021**	**Time 4:15 P.M**	**Temperature 20°C**	**pH 7.9**	**Quantity Drawn:4L**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	7.22	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	2.05	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	35.6	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	68.4	APHA 23rd Edition,2540,Page:2-70
5	Oil and GREASE	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	7.3	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	62.7	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	36.5	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	25.6	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	23.2	APHA 23rd Edition,2320,Page:2-37
11	Sulphate	mg/L	8.7	APHA 23rd Edition,4500-SO_4^{2-} E,Page:4-199
12	Nitrates	mg/L	6.9	APHA 23rd Edition,4500-NO_3 B,Page:4-127
13	Phosphate	mg/L	<0.02	APHA 23rd Edition,4500-P,Page:4-163
14	Salinity	%	0.4	APHA 23rd Edition,2520B,Page:2-60
15	conductivity	µS/cm	95.6	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/15/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
16	Chloride	mg/L	16.7	APHA 23rd Edition,4500-Cl⁻ B,Page:4-75
17	Arsenic	mg/L	<0.001	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	0.37	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Total Coliform	MPN/100ml	Nil	APHA 23rd Edition,9222B,Page:9-81
20	Fecal Coliform	MPN/100ml	Nil	APHA 23rd Edition,9222 D,Page:9-89
21	BOD	mg/L	4.6	APHA 23rd Edition,5210B,Page:5-6
22	COD	mg/L	15	APHA 23rd Edition,5220 b,Page:5-18

For Envision Enviro Technologies North East, Guwahati

Rimpi sarma
Environmental Chemist
Test Done By

Dr. Pranita Chakraborty
Quality Manager
Authorized Signatory

Note: i) The results relate only to the parameters tested.
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TEST REPORT:
Report No: 211229_1503163_0
ULR No:TC766921000000179P
Sample ID No: EETNE/Dec/08/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt:20/12/21
Test completion Date: 29/12/21

Name & Address of Client	M/s. Lower Kopili Project, Near Lanka, Dist: Dima Hasao.					
Sample Description	Type: Surface Water				Source: Kala Nala	
Sample collected by	M/s. En-vision Enviro Technologies North East					
Sample Collection Particulars	Date 17/12/202	Time 01:15 P.M	Temperature 20°C	pH 7.5	Quantity Drawn:4Ltg	Sampling Method: EETNE/SOP/02

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	6.77	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	29.6	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	154.8	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	32.5	APHA 23rd Edition,2540,Page:2-70
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	6.9	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	66.2	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	33.5	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	15.2	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	120.6	APHA 23rd Edition,2320,Page:2-37
11	Chlorids	mg/L	15.3	APHA 23rd Edition,4500-Cl B,Page:4-75
12	Sulphate	mg/L	17.7	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199
13	Nitrates	mg/L	4.6	APHA 23rd Edition,4500-NO_3 B,Page:4-127
14	Phosphate	mg/L	<0.01	APHA 23rd Edition,4500-P,Page:4-163
15	conductivity	µS/cm	160	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/08/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
16	Chloride	mg/L	17.5	APHA 23rd Edition,4500-Cl B,Page:4-75
17	Arsenic	µg/L	BDL	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	1.6	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Salinity	%	0.11	APHA 23rd Edition,2520B,Page:2-60
20	Total Coliform	MPN/100mL	2	APHA 23rd Edition,9222B,Page:9-81
21	Fecal Coliform	MPN/100mL	Nil	APHA 23rd Edition,9222 D,Page:9-89
22	BOD	mg/L	9.2	APHA 23rd Edition,5210B,Page:5-6
23	COD	mg/L	56.8	APHA 23rd Edition,5220 b,Page:5-18

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Rimpi Sarma
Environmental Chemist
Test Done By

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TEST REPORT:
Report No: 211229_1503163_0
ULR No:TC766921000000180P
Sample ID No: EETNE/Dec/09/21/D
Test Starting Date: 20/12/21

Date of Report: 29/12/21
Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Name & Address of Client	**M/s. Lower Kopili Project. Near Lanka, Dist: Dima Hasao.**					
Sample Description	**Type: Surface Water**				**Source: Lonku Nala**	
Sample collected by	**M/s. En-vision Enviro Technologies North East**					
Sample Collection Particulars	**Date 17/12/2021**	**Time 01:40 P.M**	**Temperature 20°C**	**pH 7.1**	**Quantity Drawn:4Ltg**	**Sampling Method: EETNE/SOP/02**

Sl No.	Parameters	Unit	Result	Reference Method
1	pH	---	6.95	APHA 23rd Edition,4500 H+,Page:4-95
2	Turbidity	NTU	2.6	APHA 23rd Edition,2130,Page:2-13
3	TDS	mg/L	131.3	APHA 23rd Edition,2540 C, Page :2-69
4	TSS	mg/L	97.4	APHA 23rd Edition,2540,Page:2-70
5	Oil and Grease	mg/L	<5	APHA 23rd Edition,5520 B,Page:5-42
6	Dissolved Oxygen	mg/L	6.5	APHA 23rd Edition,4500-O C,Page:4-146
7	Total hardness	mg/L	75.2	APHA 23rd Edition,2340 B,Page:2-48
8	Calcium	mg/L	29.6	APHA 23rd Edition,3500-Ca B,Page:3-69
9	Magnesium	mg/L	18.5	APHA 23rd Edition,3500-Mg B,Page:3-86
10	Total Alkalinity	mg/L	128	APHA 23rd Edition,2320,Page:2-37
11	Chloride	mg/L	21.1	APHA 23rd Edition,4500-Cl B,Page:4-75
12	Sulphate	mg/L	13.7	APHA 23rd Edition,4500-SO_4^{2-}E,Page:4-199
13	Nitrates	mg/L	4.5	APHA 23rd Edition,4500-NO_3 B,Page:4-127
14	Phosphate	mg/L	<.02	APHA 23rd Edition,4500-P,Page:4-163
15	conductivity	µS/cm	119	APHA 23rd Edition,2520B,Page:2-60

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Sample ID No: EETNE/Dec/09/21/D
Test Starting Date: 20/12/21

Date of sample receipt: 20/12/21
Test completion Date: 29/12/21

Sl No.	Parameters	Unit	Result	Reference Method
16	Chloride	mg/L	16.2	APHA 23rd Edition,4500-Cl B,Page:4-75
17	Arsenic	µg/L	BDL	APHA 23rd Edition,3114A,Page:3-36
18	Iron(as Fe)	mg/L	1.5	APHA 23rd Edition,3500-Fe B,Page:3-80
19	Salinity	%	0.4	APHA 23rd Edition,2520B,Page:2-60
20	Total Coliform	MPN/100 mL	4	APHA 23rd Edition,9222B,Page:9-81
21	Fecal Coliform	MPN/100 mL	Nil	APHA 23rd Edition,9222 D,Page:9-89
22	BOD	mg/L	11	APHA 23rd Edition,5210B,Page:5-6
23	COD	mg/L	23	APHA 23rd Edition,5220 b,Page:5-18

For Envision Enviro Technologies North East, Guwahati

Rimpi Sarma
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Annexure 11 : Record of Kopili River Flow data

RECORDS OF HYDRO-METEOROLOGICAL DATA

Name of Project: Lower Kopili Hydro Electric Project (120 MW)

Name of Office : Lower Kopili Hydro Electric Project, APGCL, LONGKU, DIMA HASAO

DISCHARGE RECORDS OF KOPILI RIVER AT DISCHARGE SITE AT LONGKU, DIMA HASAO

For The Month of :::::::::: NOVEMBER 2021

Date	Time	Gauge reading (m)	Mean Velocity (m/s)	Area (Sq.m.)	Discharge (Cumec.)	Rainfall (mm.)	Remarks
1-Nov-21	8.00 AM	188.03	0.2558	255.370	65.320		R.L of gauge 189.75 m
	12:noon	188.02	0.2550	254.800	64.980		
	4.00 PM	188.02	0.2552	254.800	65.030		
2-Nov-21	8.00 AM	188.00	0.2582	253.660	65.500		
	12:noon	188.00	0.2567	253.660	65.110		
	4.00 PM	188.01	0.2556	254.230	64.970		
3-Nov-21	8.00 AM	188.00	0.2541	253.660	64.440		
	12:noon	188.00	0.2526	253.660	64.060		
	4.00 PM	188.01	0.2523	254.230	64.140		
4-Nov-21	8.00 AM	188.04	0.2517	255.940	64.420		
	12:noon	188.04	0.2502	255.940	64.040		
	4.00 PM	188.03	0.2516	255.370	64.250		
5-Nov-21	8.00 AM	188.02	0.2508	254.800	63.900		
	12:noon	188.00	0.2515	253.660	63.810		
	4.00 PM	188.00	0.2500	253.660	63.420		
6-Nov-21	8.00 AM	188.01	0.2506	254.230	63.720		
	12:noon	188.00	0.2474	253.660	62.770		
	4.00 PM	188.00	0.2482	253.660	62.950		
7-Nov-21	8.00 AM	187.98	0.2473	252.520	62.450		
	12:noon	188.01	0.2501	254.230	63.590		
	4.00 PM	188.00	0.2476	253.660	62.800		
8-Nov-21	8.00 AM	188.00	0.2407	253.660	61.060		
	12:noon	187.99	0.2443	253.090	61.840		
	4.00 PM	187.99	0.2424	253.090	61.360		
9-Nov-21	8.00 AM	187.98	0.2420	252.520	61.110		
	12:noon	187.98	0.2488	252.520	62.830		
	4.00 PM	187.96	0.2481	251.380	62.370		
10-Nov-21	8.00 AM	187.97	0.2467	251.950	62.160		
	12:noon	187.96	0.2442	251.380	61.380		
	4.00 PM	187.96	0.2448	251.380	61.530		
11-Nov-21	8.00 AM	187.97	0.2463	251.950	62.050		
	12:noon	187.96	0.2433	251.380	61.150		
	4.00 PM	187.97	0.2391	251.950	60.240		
12-Nov-21	8.00 AM	187.96	0.2450	251.380	61.590		
	12:noon	187.94	0.2428	250.240	60.760		
	4.00 PM	187.94	0.2428	250.240	60.750		
13-Nov-21	8.00 AM	187.94	0.2432	250.240	60.860		
	12:noon	187.93	0.2436	249.670	60.810		
	4.00 PM	187.93	0.2430	249.670	60.680		

14-Nov-21	8.00 AM	187.93	0.2456	249.670	61.320		
	12:noon	187.92	0.2458	249.110	61.230		
	4.00 PM	187.92	0.2460	249.110	61.290		
15-Nov-21	8.00 AM	187.89	0.2481	247.410	61.380		
	12:noon	187.89	0.2483	247.410	61.420		
	4.00 PM	187.88	0.2489	246.840	61.430		
16-Nov-21	8.00 AM	187.86	0.2471	245.710	60.710		
	12:noon	187.85	0.2483	245.140	60.860		
	4.00 PM	187.85	0.2468	245.140	60.490		
17-Nov-21	8.00 AM	187.84	0.2467	244.580	60.350		
	12:noon	187.82	0.2463	243.450	59.960		
	4.00 PM	187.82	0.2475	243.450	60.260		
18-Nov-21	8.00 AM	187.80	0.2523	242.320	61.150		
	12:noon	187.79	0.2508	241.760	60.640		
	4.00 PM	187.79	0.2495	241.760	60.310		
19-Nov-21	8.00 AM	187.78	0.2492	241.200	60.110		
	12:noon	187.78	0.2509	241.200	60.510		
	4.00 PM	187.78	0.2488	241.200	60.020		
20-Nov-21	8.00 AM	187.75	0.2517	239.510	60.290		
	12:noon	187.74	0.2522	238.950	60.270		
	4.00 PM	187.73	0.2528	238.390	60.260		
21-Nov-21	8.00 AM	187.71	0.2517	237.270	59.730		
	12:noon	187.71	0.2471	237.270	58.640		
	4.00 PM	187.70	0.2466	236.710	58.380		
22-Nov-21	8.00 AM	187.69	0.2470	236.150	58.320		
	12:noon	187.68	0.2470	235.590	58.200		
	4.00 PM	187.67	0.2468	235.030	58.010		
23-Nov-21	8.00 AM	187.64	0.2460	233.360	57.410		
	12:noon	187.62	0.2449	232.250	56.880		
	4.00 PM	187.60	0.2434	231.130	56.250		
24-Nov-21	8.00 AM	187.58	0.2429	230.020	55.880		
	12:noon	187.57	0.2432	229.470	55.810		
	4.00 PM	187.55	0.2423	228.360	55.340		
25-Nov-21	8.00 AM	187.55	0.2438	228.360	55.670		
	12:noon	187.55	0.2437	228.360	55.660		
	4.00 PM	187.55	0.2424	228.360	55.350		
26-Nov-21	8.00 AM	187.54	0.2421	227.810	55.160		
	12:noon	187.54	0.2398	227.810	54.640		
	4.00 PM	187.54	0.2395	227.810	54.570		
27-Nov-21	8.00 AM	187.52	0.2401	226.700	54.420		
	12:noon	187.52	0.2403	226.700	54.480		
	4.00 PM	187.52	0.2403	226.700	54.480		

28-Nov-21	8.00 AM	187.51	0.2395	226.150	54.170		
	12:noon	187.51	0.2384	226.150	53.920		
	4.00 PM	187.51	0.2372	226.150	53.640		
29-Nov-21	8.00 AM	187.49	0.2364	225.040	53.210		
	12:noon	187.49	0.2379	225.040	53.530		
	4.00 PM	187.49	0.2356	225.040	53.030		
30-Nov-21	8.00 AM	187.51	0.2356	226.150	53.280		
	12:noon	187.51	0.2350	226.150	53.140		
	4.00 PM	187.50	0.2351	225.590	53.030		

Dy General Manager(C)
L.K.H.E.P., APGCL, Longku
Dima Hasao

A.M.C)
LKHEP

RECORDS OF HYDRO-METEOROLOGICAL DATA

Name of Project: Lower Kopili Hydro Electric Project (120 MW)

Name of Office : Lower Kopili Hydro Electric Project, Longku, Dima Hasao, APGCL

DISCHARGE RECORDS OF KOPILI RIVER AT DISCHARGE SITE AT LONGKU, DIMA HASAO

For The Month of :::::::::: DECEMBER ' 2021

Date	Time	Gauge reading (m)	Mean Velocity (m/s)	Area (Sq.m.)	Discharge (Cumec.)	Rainfall (mm.)	Remarks
1-Dec-21	8.00 AM	187.46	0.2310	223.39	51.60		R.L of gauge = 189.75 m
	12:noon	187.46	0.2292	223.39	51.21		
	4.00 PM	187.47	0.2269	223.94	50.82		
2-Dec-21	8.00 AM	187.47	0.2275	223.94	50.95		
	12:noon	187.48	0.2260	224.49	50.73		
	4.00 PM	187.48	0.2263	224.49	50.81		
3-Dec-21	8.00 AM	187.47	0.2259	223.94	50.58		
	12:noon	187.46	0.2271	223.39	50.73		
	4.00 PM	187.45	0.2230	222.84	49.69		
4-Dec-21	8.00 AM	187.45	0.2207	222.84	49.18		
	12:noon	187.46	0.2200	223.39	49.15		
	4.00 PM	187.45	0.2178	222.84	48.54		
5-Dec-21	8.00 AM	187.44	0.2166	222.29	48.15		
	12:noon	187.44	0.2134	222.29	47.45		
	4.00 PM	187.45	0.2127	222.84	47.40		
6-Dec-21	8.00 AM	187.42	0.2191	221.19	48.46		
	12:noon	187.43	0.2188	221.74	48.51		
	4.00 PM	187.42	0.2164	221.19	47.87		
7-Dec-21	8.00 AM	187.43	0.2162	221.74	47.93		
	12:noon	187.42	0.2114	221.19	46.76		
	4.00 PM	187.41	0.2338	220.64	51.60		
8-Dec-21	8.00 AM	187.42	0.2104	221.19	46.55		
	12:noon	187.41	0.2021	220.64	44.59		
	4.00 PM	187.41	0.2110	220.64	46.55		
9-Dec-21	8.00 AM	187.40	0.1588	220.09	34.95		
	12:noon	187.41	0.1580	220.64	34.86		
	4.00 PM	187.40	0.1584	220.09	34.86		
10-Dec-21	8.00 AM	187.42	0.1584	221.19	35.03		
	12:noon	187.42	0.1575	221.19	34.84		
	4.00 PM	187.41	0.1567	220.64	34.57		
11-Dec-21	8.00 AM	187.40	0.1550	220.09	34.11		
	12:noon	187.40	0.1551	220.09	34.14		
	4.00 PM	187.39	0.1549	219.54	34.01		
12-Dec-21	8.00 AM	187.40	0.1958	220.09	43.10		
	12:noon	187.40	0.2001	220.09	44.04		
	4.00 PM	187.38	0.1982	218.99	43.40		
13-Dec-21	8.00 AM	187.37	0.1977	218.44	43.18		
	12:noon	187.36	0.2008	217.90	43.76		
	4.00 PM	187.35	0.2015	217.35	43.79		

14-Dec-21	8.00 AM	187.33	0.1968	216.26	42.56		
	12:noon	187.33	0.1980	216.26	42.82		
	4.00 PM	187.33	0.1987	216.26	42.98		
15-Dec-21	8.00 AM	187.34	0.1963	216.80	42.56		
	12:noon	187.33	0.1985	216.26	42.92		
	4.00 PM	187.33	0.1975	216.26	42.71		
16-Dec-21	8.00 AM	187.33	0.1970	216.26	42.60		
	12:noon	187.32	0.1937	215.71	41.77		
	4.00 PM	187.33	0.1906	216.26	41.23		
17-Dec-21	8.00 AM	187.34	0.1822	216.80	39.50		
	12:noon	187.33	0.1804	216.26	39.02		
	4.00 PM	187.33	0.1810	216.26	39.15		
18-Dec-21	8.00 AM	187.32	0.1809	215.71	39.01		
	12:noon	187.30	0.1787	214.62	38.36		
	4.00 PM	187.30	0.1776	214.62	38.12		
19-Dec-21	8.00 AM	187.28	0.1774	213.53	37.87		
	12:noon	187.27	0.1738	212.99	37.02		
	4.00 PM	187.29	0.1727	214.08	36.96		
20-Dec-21	8.00 AM	187.29	0.1720	214.08	36.83		
	12:noon	187.30	0.1707	214.62	36.63		
	4.00 PM	187.29	0.1702	214.08	36.43		
21-Dec-21	8.00 AM	187.30	0.1711	214.62	36.72		
	12:noon	187.30	0.1679	214.62	36.04		
	4.00 PM	187.29	0.1692	214.08	36.22		
22-Dec-21	8.00 AM	187.28	0.1672	213.53	35.71		
	12:noon	187.28	0.1672	213.53	35.71		
	4.00 PM	187.29	0.1647	214.08	35.26		
23-Dec-21	8.00 AM	187.29	0.1689	214.08	36.16		
	12:noon	187.27	0.1652	212.99	35.18		
	4.00 PM	187.28	0.1665	213.53	35.55		
24-Dec-21	8.00 AM	187.29	0.1665	214.08	35.65		
	12:noon	187.29	0.1685	214.08	36.07		
	4.00 PM	187.29	0.1652	214.08	35.36		
25-Dec-21	8.00 AM	187.28	0.1655	213.53	35.34		
	12:noon	187.28	0.1645	213.53	35.12		
	4.00 PM	187.28	0.1634	213.53	34.89		
26-Dec-21	8.00 AM	187.27	0.1632	212.99	34.76		
	12:noon	187.27	0.1610	212.99	34.29		
	4.00 PM	187.26	0.1599	212.44	33.97		
27-Dec-21	8.00 AM	187.25	0.1593	211.90	33.76		
	12:noon	187.24	0.1580	211.36	33.39		
	4.00 PM	187.25	0.1575	211.90	33.38		
28-Dec-21	8.00 AM	187.23	0.1584	210.81	33.38		
	12:noon	187.22	0.1552	210.27	32.64		
	4.00 PM	187.23	0.1565	210.81	33.00		
29-Dec-21	8.00 AM	187.21	0.1546	209.73	32.42		
	12:noon	187.22	0.1546	210.27	32.51		
	4.00 PM	187.21	0.1521	209.73	31.91		

30-Dec-21	8.00 AM	187.21	0.1557	209.73	32.66		
	12:noon	187.20	0.1553	209.19	32.49		
	4.00 PM	187.19	0.1544	208.65	32.22		
31-Dec-21	8.00 AM	187.19	0.1540	208.65	32.13		
	12:noon	187.18	0.1543	208.11	32.10		
	4.00 PM	187.18	0.1528	208.11	31.80		

Dy General Manager(C)
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Dima Hasao

Asstt.Gen Manager (C)
Dam & QC Division
LKHEP, APGCL

AM(C), LKHEP

Annexure 12 :Package 2 EMP of the tender document.

Table 2: Environmental Management Plan

PD Office: LKHEP = Project Director Office, Lower Kopili Hydro Electric Project, Assam Power Generation Corporation Ltd., CSC = Construction Supervision Consultant

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
	PRE-CONSTRUCTION PHASE							
1.	Impact on air, water, noise, soil	Location and design of power house, office, substation and colony	• Setting of colony away from construction areas including plantation all around colony • Drainage system with de-silting chamber, will be provided all around power house, office, substation and colony • Solid waste storage bin system will be provided at required location • All buildings are designed and will be constructed as per seismic zone provision. • The site-specific earthquake study has been completed by Department of Earthquake Engineering, IIT Roorkee. The site-specific design parameters recommended by IIT for MCE and DBE conditions are recommended as 0.36g and 0.18g for horizontal and 0.24g and 0.12g for vertical ground motion, respectively have been considered. The design has been reviewed by independent experienced dam expert appointed by ADB and found to be adequate. • Dam safety surveillance and monitoring aspects are included. Personnel Safety equipment will be provided at required location	Design Check	Document Review	Sites/ locations of all the infrastructures to be constructed are finalized. Other activities part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP
	Exposure to safety related risks			Design Check	Document Review	Safety measures part of Contractor's Construction Cost.	Contractor	CSC,PD Office, LKHEP

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Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
2.	Release of chemicals/ ashes in receptors (air, water, land)	Equipment specifications and design parameters	• CFC not used in substation transformers or other project facilities or equipment by concerned agencies • Processes, equipment, and systems will not to use chlorofluorocarbons (CFCs), including halon, and their use	Technical specifications	Document Review	Part of Contractor's Construction Cost.	Contractor	CSC,PD Office, LKHEP
3.	Exposure to noise	Power Plant /Substation location	• Design of plant enclosures to comply with IFC EHS noise regulations (85 dB(A) at work sites for heavy industry.	Design Check	Document Review	Part of Contractor's Construction Cost	Consultant	CSC,PD Office, LKHEP
4.	Acquisition of private land	Location of powerhouse, head works	• Acquisition of agricultural and cultivable land minimized.	Land area requirements	Document Review	Land acquisition will be taken care of by APGCL.	CSC,PD Office, LKHEP	CSC,PD Office, LKHEP
5.	Social inequities	Involuntary resettlement or land acquisition	• Compensation will be paid for temporary / permanent loss of productive land as per Govt. rules and regulation. • A list of all the affected persons by type of losses and extent of damages has been prepared through and the same will be compensated as per Combined Resettlement and Tribal Development Plan prepared as per GoI and ADB SPS 2009requirements.	No. of affected people and entitlement provisions	Document Review, Compensation process	Will be taken care of by APGCL.	PD Office, LKHEP	Revenue Department
6.	Loss of precious Ecological values/impacts on precious species due to acquisition of 523 ha of forest land	Encroachment into precious ecological areas	• Minimize acquisition of forest areas. • Avoid encroachment by careful site and alignment selection of access roads. • Afforestation of 1,046 ha (1:2 tree planting ratio) of degraded forestland • A compensatory afforestation and biodiversity conservation and management plan has been prepared (cost not to be considered) • Cut only trees marked by the Forest	Compensatory afforestation process, land take, no. of trees to be cut	Document Review. Clearance papers	Tree cutting & Plantation will be done through Forest Department. APGCL will bear the cost.	Forest Department	CSC,PD Office, LKHEP, Forest Department

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Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			Department • Ensure that the area is cleared as per directives/delineation of Forestry staff					
7.	Nuisance to neighboring properties	Noise related	• Substations, powerhouse, head works designed to ensure noise will not be a nuisance. Noise will be controlled within IFC EHS noise standards. In any case, there is no proximity of residences to these features.	Technical specifications	Document Review	Part of Contractor's Construction Cost	Contractor	CSC, PD Office, LKHEP
8.	Flooding hazards/ loss of agricultural production	Interference with drainage patterns/ irrigation channels	• The alignment of river course and setting of project facilities are done to avoid any flooding hazard. Detailed hydrological assessments have been carried out as part of detailed design. Additional IWRM management plan has been prepared.	Design Check	Document Review	Cost not to be considered.	CSC	PD Office, LKHEP
			• Dam Break Analysis and disastermanagement plan has been prepared. (Annex-22)			Disaster management is the part of Contractor's Construction Cost.	Contractor	CSC,PD Office, LKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
9.	Environmental pollution	Escape of polluting materials	• Transformers for construction power designed with oil spill containment systems, and purpose-built oil, lubricant and fuel storage system, complete with spill clean up equipment • Construct 110% fenced and bermed area with impermeable concrete floor • Powerhouses/substations to include drainage and sewage disposal systems (septic tanks. Solid waste Management) to avoid offsite land and water pollution	Design Check, technical specifications	Document Review	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP
10.	Contamination of receptors (land, water)	Equipment submerged under flood	• Powerhouses/substations protection from flooding	Design Check	Document Review	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP
11.	Natural disaster frequently observed	Ground subsidence/ landslide	• Civil design and siting of project facilities has been done with due considerations to earthquake and landslide so as to avoid any hazard	Design Check	Document Review	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP
12.	Fire hazards	Explosions/fire	• Design of Powerhouses/substations has included modern fire control systems/firewalls in accordance with the norms of National Fire Protection Association (NFPA) and Tariff Advisory Committee(TAC) • Provision of fire fighting equipment to be located within 20 m of transformers, power generationequipment • Fire protection and Safety practice have been prepared (Annex 20, 21)	Design Check	Document Review	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
13	Tree cutting	Cutting of trees during site clearance	• Restricting tree cutting within construction limit • Avoiding tree cutting at ancillary sites • Providing and maintaining compensatory tree plantation i.e. three times of cutting • Compensatory afforestation plan prepared	No. of trees to be cut	Observations	Tree cutting & Plantation will be done through Forest Department.	Forest Dept	CSC, PD Office, LKHEP
14	Removal of vegetative covers (dust, pollution)	Work site clearance	• Use of controlled clearing activities • Use of dust controlled measures • Collection and disposal of debris and muck.	Vegetation to be cleared	Observations	Part of Contractor's Construction Cost	Contractor	Forest Dept. / CSC / PD Office, LKHEP
15	Religious places	Work site	• Suitable mitigation measures have been incorporated in social impact assessment report	CRTDP	Observations	Cost to be covered under implementation of CRDTP	PD Office, LKHEP	CSC PD Office, LKHEP
16	Camp site and contractor facilities	Establishment of contractors facilities	• Obtain permits and NOCs from ASPC and other statutory agencies. • Contractor to submit a camp and site office plan defining all facilities to be created (Annex-10). These include human waste disposal facilities and solid waste management facilities. The basic plans to be prepared and finalized by contractor	NOCs and permits	Document check	Part of Contractor's Construction Cost	Contractor	CSC PD Office, LKHEP
17	Project facilities and commencement of construction	Clearances and permits	• Obtain environmental clearance from MoEF&CC • Obtain forest clearance from forest departments • Include EMP in the contract documents	Clearance letters	Document check	Cost not to be considered.	CSC PD Office, LKHEP	MoEF&CC, Forest Dept., CSC PD Office, LKHEP
18	Alignment	Pavement damage and inadequate drainage provisions in habitat areas	Construction of concrete pavement in habitant areas considering alignment level and drainage. Raise road level above the nearby areas with provision of adequate side drains to evacuate the rain water and domestic	Proper drainage system	Review of detail Design documents & drawings	Part of Contractor's Construction Cost	Contractor	APGCL/ (CSC)

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			discharges (drained by habitats occasionally) to prevent damage to road and rain water entry to habitats houses. Provision of adequate no. of cross drainage structures based on drainage pattern around the alignment					
19	Protection of sensitive receptors	Location of sensitive receptors (Schools, temples, church, hospitals, forest areas)	Careful selection of alignment to the sensitive receptor Timely scheduling of construction activity Provision of noise suitable barriers	Design and alignment plan	Review of design	Part of Contractor's Construction Cost	Contractor	APGCL/ (CSC)
20	Safety along the proposed alignment	Places where height of embankment is more than 3.0 m	Make provisions of crash barriers at accident prone areas as identified in the road safety audits. Provision of rumble strips in habitat areas to regulate speed. Provision of retro-reflective warning sign boards nears school, hospital, religious places and forests areas. Provision of proper sidewalks/pedestrian zone along the road near habitat areas, school, hospital, religious places and forests. Compliance with norms specified in IRC codes for state highway for curvature and grading. Provision of safety kerb at all bridges. The design should attempt to equalize cut and fill. Minimize the cutting in hill areas. Incorporate slope stabilization measures to prevent any land slide situation. Incorporate Slope stabilization measures to prevent any land slide situation.	No. of accident Vehicle collision	Field observation, interview of locals	Part of Contractor's Construction Cost	Design Consultant	APGCL/ (CSC)
21	Protection of road embankment in Flood prone Areas	Existing road	Raise embankment height above the HFL levels in the flood prone areas Provision of adequate drainage for protection from flood.	Proper drainage system provision to protect the		Part of Contractor's Construction Cost	Contractor	APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
				natural environment				
22	Disruption of utility services to local community	Throughout the corridor	All telephone and electrical poles/wires and underground cables should be shifted before start of construction. Necessary permission and payments should be made to relevant utility service agencies to allow quick shifting and restoration of utility services. Local people must be informed through appropriate means about the time of shifting of utility structures and potential disruption of services if any.	Utility shifting plan. Complaints from local people Status of local utility services	Interaction with concerned utility authorities and local public	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
	CONSTRUCTION PHASE							
1	Impact and air, water, noise, soil	Civil construction work for power house, tunnel, office, substation, access roads, colony etc.	**Air Pollution** • All the vehicles must have valid PUC certificates at all the time during construction phase of the project. • Water sprinkling shall be done to suppress the dust emissions from the site (Annex- III). • All the DG sets used for construction shall have valid consents from Assam State Pollution Control Board and shall have built-in stacks to reduce the air emission impacts.	PM10, PM 2.5 Dust pollution. Complaints from local residents Equipment/ vehicle maintenance record	Measurement. Observations, public discussions	Part of Contractor's Construction Cost. Testing of Air, water, Noise - - Contractor to consider the Cost.	Contractor	CSC,PD Office, LKHEP
	Emission of air pollutants (HC, SO2, NOX, CO etc.) from vehicles due to traffic congestion and use of equipment and machinery	Hot Mix plants, Batching Plant, crushers, DG sets locations	Regular maintenance of machinery and equipment. Batching, asphalt mixing plants and crushers at downwind (Nos) direction from the nearest settlement. Only crushers licensed by the PCB shall be used. DG sets with stacks of adequate height and use of low sulphur diesel as fuel. Ambient air quality monitoring. Follow traffic management plan.	Monitoring of ambient air quality & checking PUC certificates	Standards CPCB methods	Part of Contractor's Construction Cost. Testing of Air quality - Contractor to consider the Cost.	Contractor	APGCL / CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
	Noise from Construction vehicle, equipment and machinery	Throughout section especially at construction sites, residential and identified sensitive locations. 3 locations as suggested by the engineer. At least 2 times during construction period	Noise Pollution • Construction materials shall be properly maintained and noise barriers, if needed, shall be provided around worksites, to reduce the noise levels. Design of such barriers will be finalized by PMSC environment specialist. • All the workers will be provided with personal protective equipment including ear plugs and other necessary provisions by the contractor (Annex- 17)	Noise level, complaints from local residents, vehicle maintenance record, awareness programs implemented	Noise level measurement, field observations, discussions with local residents		Contractor	CSC,PD Office, LKHEP
			• All equipment to be timely serviced and properly maintained. • Bottlenecks to be removed. • Construction equipment and machinery to be fitted with silencers and maintained properly. • Only IS approved equipment shall be used for construction activities. • The regulation near residential, built up and forest area construction shall be restricted to daylight hours. • Timing of noisy construction activities shall be done during night time and weekends near schools and selected suitable times near temples when there are no visitors. concurrent noisy operations may be separated to reduce the total noise generated, and if possible re-route traffic during construction to avoid the accumulation of noise beyond standards. Else provision of temporary noise barrier at sensitive locations or near sources.	Noise levels Measurements Complaints from local people	As per Noise rule, 2000 Consultation with local people	Part of Contractor's Construction Cost. Plantation cost is separate and will be done by the Forest Department.	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			Water Quality: • Quality of water (river and wastewater discharged from the construction site) shall be analyzed monthly during construction for its compliance to the disposal standards of pollution control authority. (Annex-18)	Drainage systems. Total solids and turbidity level, pH, BOD, COD, TDS, TSS, DO, Total coliform, conductivity, oil and grease	Review records, site visit and observations, turbidity level and other water quality parameters to be checked		Contractor	CSC,PD Office, LKHEP
			Others • Proper plantation all around colony Green Belt Development Plan(Annex-13) • Drainage with De silting chamber will be provide all around power house, office, substation and colony • Solid waste storage bean system will be provided at required location. Solid Waste Management to be practiced.(Annex-14) • All CD structures designed constructed as per seismic zone provision • Safety system will be provided at required location to follow Occupational, Health and Safety Plans.(Annex-20,21)					
	Exposure to safety related risks			Planning for waste management	Review of planning and practices for waste management, site visit, observations	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
10.	Increased land requirement for temporary accessibility	Construction of access roads	• New access ways restricted to a single /intermediate carriageway width	Planning for access roads	Observations	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP
11.	Temporary blockage of utilities	Construction work	• Temporary placement of fill in drains/canals not permitted	Water blockage	Observations	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP
12.	Loss of vegetative cover	Site clearance	• Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance	No. of trees to be cut	Review clearance papers, field observations	APGCL to bear the cost	Forest Dept.	CSC,PD Office, LKHEP
13.	Fire hazards	Trimming/cutting of trees	• Trees allowed growing up to a specified height within the work areas by maintaining adequate clearance between the top of tree and the conductor as per the regulations	No. of trees to be trimmed	Observations	Part of Contractor's Construction Cost	Contractor with Forest department	CSC,PD Office, LKHEP
14.	Loss of vegetation and deforestation		• Trees that can survive pruning to comply should be pruned instead of cleared • Felled trees and other cleared or pruned vegetation to be disposed of as authorized by the statutory bodies	No. of trees to be trimmed	Review clearance papers, field observations	Part of Contractor's Construction Cost	Contractor, with Forest department	CSC,PD Office, LKHEP
	Loss of vegetation and deforestation	Reservoir clearing	• Removal of maximum commercially viable timber • All remaining timber, after commercial and salvage logging operations have been completed, will be cut as necessary and burnt • Avoid removing stumps, as disturbed soil may release far more nutrients in water	Area to be cleared	Review clearance papers, field observations	Removal by Forest Department. Contractor to consider Residual burning cost.	Forest Department and Contractor	CSC,PD Office, LKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
15	Loss of vegetation and deforestation	Woodlveg etation harvesting	• Construction workers prohibited from harvesting wood in the project area during their employment. (apart from locally employed staff continuing current legal activities) • Contractor should arrange LPG gas for cooking of food for their workers • Refer to Annex 10: Plan for Construction Camp Management	Fuel supply to workers	Review clearance papers, field observations	Part of Contractor's Construction Cost	Contractor	CSC /PD Office, LKHEP
16	Loss of Biodiversity. Disturbance / accidents/ injury to wildlife and avian fauna	Construction and clearing of forest areas	• Implementation of Compensatory afforestation plan • Creation of a greenbelt around the perimeter of various project appurtenances, selected stretches along reservoir periphery, access roads to compensate for the loss of habitat • Provisions of adequate signage's and speed limit on road sections within forest areas to avoid accidental road kills • Poaching activities should be monitored in workers areas and well as community areas (as per Annex 3) • Implementation of Biodiversity Conservation and Management Plan (Annex3) • Compliance with guidelines issued by the National Wildlife Board of India for linear intrusion in natural areas pertaining to roads and power lines • Compliance with guidelines issued by the Central Electricity Authority (CEA) for laying transmission lines in areas critical from the point of view of saving wildlife • Provision of wild fruit plantation for wildlife	Incidences of wildlife loss	Review clearance papers, field observations	Compensatory afforestation plan and Biodiversity Management Plan implementation will be born by APGCL. Contractor to consider the biodiversity monitoring cost and road signage's	Contractor	CSC /PD Office, LKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			• Annual bird count of migratory birds by involving locals and bird experts • Rehabilitation with local fruit bearing species in gaps • Anti-grazing drive in drawdown area to protect the bird breeding areas in proximity to reservoir					

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			during breeding season only in winter season. Grazing by local people will be allowed during dry season • Construction of check posts / watch towers in key locations • Conservation actions as proposed by IUCN (during construction and during the initial project operation) such as conducting a comprehensive survey and monitoring in and around the project area to establish range, distribution and population status of vulnerable and critical habitats in the project area for assessing its habitat requirements and identifying threats are proposed • Establishment of biodiversity conservation committee • Refer to Annex 3 : Biodiversity Conservation and management Plan • Refer to Annex 13 : Green Belt Development Plan			Contractor to consider the Green belt development around construction camp, project residential& other buildings as per the plan		
17.	Runoff to cause water pollution solid waste disposal	Surplus earth works oil	• Excess fill from excavations disposed of neat to roads or on barren land or personal in agreement with the local community or land owner • Soil excavated from power houses will be disposed in safe & scientific manner by placement on barren land or along back fill trench weir etc	Vehicle maintenance record, review plans for waste management and oil handling practices	Review of planning and practices for seepage and spoil disposal, control, site visits	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
18.	Loss of soil and water pollution	Substation construction	• Fill for the substation foundation obtained by creating or improving local water supply ponds or dhanis with the agreement of local communities • Construction activities involving significant ground disturbance (i.e. substation land forming) not undertaken during the monsoon season.	Planning for soil conservation	Record check, observations	Part of Contractor's Construction Cost	Contractor	CSC,PD Office, LKHEP
19.	Contamination of receptors (land, water, air)	Storage of chemicals and materials	• Fuel and other hazardous materials securely stored above high flood level with safety measures • Refer to Annex 11 :Project Personnel Health Plan	Vehicle maintenance record, review plans for waste management and oil handling practices	Record check, observations	Part of Contractor's Construction Cost. Contractor to consider Project Personnel Health Plan	Contractor	CSC ,PD Office, LKHEP
20.	Noise nuisance	Construction schedules	• During work near settlements construction activities only undertaken during the day and local communities will be informed of the construction schedule	Noise level monitoring	Record check, observations	Part of Contractor's Construction Cost	Contractor	CSC ,PD Office, LKHEP
21.	Contamination of receptors (land, water, air)	Provision of facilities for construction workers	• Construction workforce will be provided for certain facilities it includes proper sanitation, water supply and waste disposal facilities. • Refer to Annex 10 :Construction Camp Management Plan	Planning for health and safety	Review of planning and practices for seepage and spoil disposal, control, site visits	Part of Contractor's Construction Cost	Contractor	CSC ,PD Office, LKHEP
22.	Loss of agricultural productivity	Encroachment into agricultural land	• Use of existing roads wherever possible • Ensure existing irrigation facilities are maintained in working condition • Protect/Preserve topsoil and reinstate after construction completed	loss of agricultural products	Record check, observations	Part of Contractor's Construction Cost	Contractor	CSC ,PD Office, LKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			• Reprofile/reinstate damaged bunds etc. after construction completed					
23.	Social inequities	Encroachment into agricultural land	• Compensation for temporary loss in agricultural production as per provisions of Combined Resettlement and Tribal Development Plan	RTDP	Record check observations	Cost will be under CRDTP	Contractor	CSC, PD Office, UKHEP
24.	Soil loss, downstream siltation, etc.	Uncontrolled erosion/silt runoff	• Need for access tracks minimized: use of existing roads • Limit site clearing to work areas; regeneration of vegetation to stabilize works areas on completion (where applicable). • Avoidance of unsafe excavation in wet seasons. • Water courses protected from siltation through use of bunds and sediment ponds. • Refer to Annex 19: Water Pollution Control Measures	Soil erosion planning and cases	Record check, observations	Part of Contractor's Construction Cost	Contractor	CSC, PD Office, UKHEP
25.	Losses to neighbouring land uses/values	Nuisance to nearby properties	• Contract clauses specifying careful construction practices on every stage • Maximum existing access ways will be used. • Productive land will be reinstated following completion of construction	Construction planning	Record check, observations	Part of Contractor's Construction Cost	Contractor	CSC, PD Office, UKHEP
26.	Social inequities	Nuisance to nearby properties	• Compensation will be paid for loss of production, if any as per provisions of Combined Resettlement and Tribal Development Plan	CRTDP	Record check, complaints, observations	Cost will be under CRDTP	Contractor	CSC,PD Office, UKHEP
27.	Flooding and loss of soils, contamination of receptors (land, water)	Flooding hazards due to construction impediments of natural	• Avoid natural drainage pattern/ facilities being disturbed/ blocked/ diverted by ongoing construction activities • Refer to Annex 22: Dam Break Analysis And Disaster Management	Construction planning	Record check, observations	Part of Contractor's Construction Cost Contractor to consider Disaster Management cost as per the plan	Contractor	CSC,PD Office, UKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
		drainage	Plan					
28.	Contamination of receptors (land, water)	Equipment submerged under flood	• Equipment stored at secure place above the high flood level (HFL)	Construction planning	Record check observations	Part of Contractor's Construction Cost	Contractor	PMSC,PD Office, UKHEP
29.	Loss of land values	Inadequate siting of borrow areas	• Existing sites (if available) will be used, therefore no need to develop new sources of aggregates	Construction planning	Record check observations	Part of Contractor's Construction Cost	Contractor	PMSC,PD Office, UKHEP
30.	Injury and sickness of workers and members of the public	Environment, Health and safety	• Arrangement of Environment awareness programme • Contract provisions specifying minimum requirements for construction camps • Preparation and implementation of health and safety plan • Arrangement of primary health center with medicine and instrument with a knowledge able health staff. • Arrangement for health and safety training sessions. • Refer to Annex 5: Public Health Delivery System • Annex 9: Plan for Environmental Training of Workers • Refer to Annex 10: Plan for Construction Camp Management • Refer to Annex 11: Project Personnel Health Program • Refer to Annex 14: Solid Waste Management Plan • Refer to Annex 15: Emergency Plans for Hazardous Materials • Refer to Annex 16: Measures to	Training and awareness programs, Health and safety plans	Review of planning and practices for seepage and spoil disposal, control, site visits	Part of Contractor's Construction Cost Contractor to consider Cost for Public Health Delivery system, Environment Training, Solid waste management, Disaster Management, as per points annexed	Contractor	CSC, PD Office, UKHEP

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			Control Air Pollution • Refer to Annex 17: Measures to Control Noise Pollution • Refer to Annex 18: Measures to Control Water Pollution • Refer to Annex 19: Energy Conservation Measures • Refer to Annex 20: Fire Protection In Labor Camp And Staff Colonies • Refer to Annex 21: Safety Practices During Construction Phase • Refer to Annex 22: Dam Break Analysis and Disaster Management Plan					
31	Likely to maximize damages	Inadequate construction stages monitoring	• Training to personal of implementing agency for environmental monitoring work. • Implementation of effective environmental monitoring and reporting system using checklist of all contractual environmental requirement. • Appropriate contract clauses to ensure satisfactory • Implementation of contractual environmental mitigation measures.	Training and awareness programs. Environment monitoring plans	Record check, observations	Part of Contractor's Construction Cost Contractor to consider the training costs.	Contractor	CSC,PD Office, LIDHEP
32	Land use Change and Loss of productive/top oil	Throughout the section and borrow areas	Non-agricultural areas to be used as borrow areas to the extent possible. If using agricultural land, top soil to be preserved and laid over either on the embankment slope for growing vegetation to protect soil erosion	Borrow pit Locations Top soil storage area	Review borrow area plan, site visits	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
33	Slope failure and Soil erosion due to Construction activities, earthwork, and cut and fill, stockpiles etc.	Throughout the entire road especially along hilly areas	Bio-turfing of embankments to protect slopes. Slope protection by providing frames, dry stone pitching, masonry retaining walls, planting of grass and trees. The side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub as per design specifications. Care should be taken that the slope gradient shall not be greater than 2:1. The earth stockpiles to be provided with gentle slopes to prevent soil erosion. Rain cut drains during construction works prevented in consultation with the engineer. **In the internal road** - maintenance of slope, compaction of Dumping yard, protection of dumping areas through construction of gabion wall, toe wall, etc. - embankment, - protection of existing Water canners / drains.	Occurrence of slope failure, landslides or erosion issues	Review of design documents and site observation	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
34	Borrow area management	Borrow sites location	Non-productive, barren lands, upland shall be used for borrowing earth with the necessary permissions/consents. Depths of borrow pits to be regulated and sides not steeper than 25% and shall be as per Assam Minor Minerals and Mining Rules, 2013 and subsequent amendments. Topsoil to be stockpiled and protected for its use at the rehabilitation stage for landscaping purpose. Transportation of earth materials through covered vehicles. IRC recommended practice for borrow pits (IRC 10: 1961). Borrow areas not to be dug continuously as per rules. To the extent borrow areas shall be sited away from habitated areas. Borrow areas shall be leveled with salvaged material or other filling materials which do not pose contamination of soil. Else, it shall be	Existence of borrow areas in inappropriate/ unauthorized locations/ Poor borrow area Management practices. Incidents of accidents. Complaints from local people.	Review of design documents and site observation	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			converted into fishpond in consultation with fishery department and land owner/community. Rehabilitation of the borrow areas as per Guidelines for redevelopment of Borrow Areas.					
35	Quarry Operations	Quarry area locations	Aggregates will be sourced from existing licensed quarries. Copies of consent/ approval / rehabilitation plan for a new quarry or use of existing source will be submitted to EA, APGCL. The contractor will develop a Quarry Redevelopment plan as per the Mining Rules of the state and submit a copy of approval to EA.	Existence of licenses for all quarry areas from which materials are being sourced Existence of a Quarry redevelopment Plan	Review of design documents, contractor documents and site observation	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
36	Compaction of soil and impact on quarry haul roads due to movement of vehicles and equipment	Parking areas, haulage roads and construction yards.	Construction vehicles, machinery, and equipment to be stationed in the designated ROW to avoid compaction. Approach roads/haulage roads shall be designed along the barren and hard soil areas to reduce the compaction. Transportation of quarry material to the dumping site through heavy vehicles shall be done through existing major roads to the extent possible to restrict wear and tear to the village/minor roads. Load of haulage trucks will be monitored to ensure they do not exceed the standard limits to avoid safety issues and excessive damage on the roads. Land taken for construction camp and other temporary facility shall be restored to its original conditions.	Location of approach and haulage roads. Presence of destroyed/compacted agricultural land or land which has not been restored to its original condition	Site observation.	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC

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Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
37	Contamination of soil due to leakage/ spillage of oil, bituminous and bituminous debris generated from demolition and road construction	Fueling station, Construction sites, and construction camps and disposal location	Construction vehicles and equipment will be maintained and refueled in such a fashion that oil/diesel spillage does not contaminate the soil. Fuel storage and refueling sites to be kept away from drainage channels. Unusable debris shall be dumped in ditches and low lying areas. To avoid soil contamination Oil interceptors shall be provided at wash down and refueling areas. Waste oil and oil soaked cotton/ cloth shall be stored in containers labeled 'Waste Oil' and 'Hazardous' sold off to MoEF & CC/SPCB authorized vendors. Bituminous wastes to be dumped in approved borrow pits with the concurrence of landowner and covered with a layer of topsoil conserved from opening the pit. Bituminous wastes will be disposed off in an identified dumping site approved/ appropriately designed, compliant waste management facilities (landfills). Storage shall be as per Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and amended in 2008.	Quality of soil near storage areas. Presence of spilled oil or bitumen in areas	Site observation	Part of Contractor's Construction Cost.	Contractor	APGCL/ CSC
38	Sourcing of water during Construction	Throughout the section	Requisite permission shall be obtained for abstraction of groundwater from Central Groundwater Authority. Arrangements shall be made by contractor that the water availability and supply to nearby communities remain unaffected. Contractor may use other natural sources of surface water with permission from local authorities. Contractor is encouraged to harvest rain water at his own cost for utilization in Construction. Contractor shall explore community land for such option.	Approval from competent authority. Complaints from local people on water availability	Checking of documentation. Talk to local people	Part of Contractor's Construction Cost.	Contractor	APGCL/ CSC

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Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
39	Disposal of water during construction	Throughout the section	Provisions shall be made to connect road side drains with exiting nearby conduits otherwise make provision of water harvesting pits intermittently	Design of roadside drains Evidence of Proper drainage system for disposal of waste water	Standards methods Site observation and review of documents	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
40	Alteration in surface water hydrology due to embankment	Near all drainage channels, river crossings etc	Existing drainage system to be maintained and further enhanced. Provision shall be made for adequate size and number of cross drainage structures esp. in the areas where land is sloping towards road alignment. Road level shall be raised above HFL level wherever road level is lesser than HFL	Design of road side drains	Review of design documents Site observation	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
41	Siltation in water bodies due to construction activities/ earthwork	Near all water bodies, river embankment slopes	Embankment slopes to be modified suitably to restrict the soil debris entering water bodies. Provision of Silt fencing shall be made at water bodies. Silt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be re-vegetated. Earthworks and stone works to be prevented from impeding natural flow of rivers, streams and water canals or existing drainage system	Siltation of rivers, streams, ponds and other water bodies in area	Field observation	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC

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Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
42	Deterioration in Surface water quality due to leakage from vehicles and equipment's and waste from construction camps.	Water bodies, refueling stations, construction camps	No vehicles or equipment should be parked or refueled near water bodies, so as to avoid contamination from fuel and lubricants. Oil and grease traps and fueling platforms to be provided at re-fueling locations All chemicals and oil shall be stored away from water and concreted platform with catchment pit for spills collection All equipment operators, drivers, and warehouse personnel will be trained in immediate response for spill containment and eventual clean-up. Readily available, simple to understand and preferably written in the local language emergency response procedure, including reporting will be provided by the contractors Construction camp to be sited away from water bodies. Solid Wastes shall be collected, stored and taken to the approved, appropriately designed, compliant waste management facility (landfills) only Water quality shall be monitored periodically All equipment's operators, divers, and ware house personal will be trained in immediate response for spill containment and eventual cleanup Readily available, simple to understand and preferably retain in the local language emergency response procedure, including reporting, will be provided by the contractor.	Water quality of ponds, streams, rivers and other water bodies in project area Presence of oil floating in water bodies in area	Conduction of water quality tests as per the monitoring plan Field observation	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
43	Vegetation loss due to site preparation and construction activities	Throughout Road corridor	Minimize tree cutting to the extent possible. Roadside 611 trees to be removed with prior approval of competent authority. Compensatory plantation at 1:3 basis and additional plantation as per the IRC guidelines in consultation with Forest Department. Regular maintenance of all trees planted. Provision of LPG in construction camp as	ROW width 611 no. trees for felling Compensatory plantation plan 1833 no. trees replanted	Review of relevant documents - tree cutting permit, compensatory plantation Plan Field observations	Road side Plantation will be done by the Forest Department Provision of LPG connections in the construction camps- Part of Contractor's	Cutting of trees by the Forest Department Relevant agency specialized in afforestation	APGCL / CSC

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Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			fuel source to avoid tree cutting wherever possible. Plantation of trees on both sides of the road. Integrate vegetation management (IVM) with the carriage way completely clear of vegetation. From the edge of the road to the boundary of ROW, vegetation structured with smaller plants near the line and larger trees further away to avoid costly and provide habitats for a wide variety of plants and animals. Additional plantation near river banks to check erosion as part of compensatory plantation. In the event of design changes during the construction stages additional assessments including the possibility to save trees shall be made by the EA. Road side Plantation Strategy as per IRC specifications including manuring.			Construction Cost		
44	Wildlife/animal disturbance due to site preparation and construction activities	In Mandap Reserve Forest along the road. Elephant crossings are reported by locals once in year during November-December months)	Identify the locations for animal corridor crossing the alignment and provide proposed passage as per site condition/geography	Barricading the corridor for alignment crossing to guide elephant passers at one location. If required assistance to be obtained from the local Forest Officials.	Physical check on conditions	Contractor to Consider the Cost.	Contractor	APGCL/ CSC
45	Impact associated with location	All construction camps	All camps should maintain minimum distance from following: 500 m from habitation 500 m from forest areas where possible 500 m from water bodies where possible 500 m from through traffic route where possible	Location of Campsites and distance from habitation, forest areas, water bodies, through traffic route and other construction	On site Observation. Interaction with workers and local community	Part of Contractor's Construction Cost.	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
				camps				
46	Worker's construction camp	All construction camps	The location layout and basic facility provision of each labor camp will be submitted to SQC prior to their construction. The construction shall commence only after approval of SQC. The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner as approved by the EA. Adequate water and sanitary latrines with septic tanks attached to soak pits shall be provided. Preventive medical care to be provided to workers including a First-Aid kit that must be available in the camp. Waste disposal facilities such as dust bins must be provided in the camps and regular disposal of waste must be carried out. Dry and wet waste to be disposed separately. The Contractor will take all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides which should comply with local regulations. No alcoholic liquor or prohibited drugs will be imported to, sell, give, and barter to the workers of host community. Use of environmental friendly paints. All reasonable precaution will be taken by the Contractor to prevent danger of the workers and the public	Camp health Records. Existence of proper first aid kit in camp site. Complaints from local people	Camp Records. Site Observation. Consultation with local people living nearby.	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			from fire.					
47	Drinking water	Camp site. Once in a year	Drinking water facility in each of the camps and work site to be provided by the contractor.	Turbidity, TH, Total Alkalinity, Cl, Residual Chloride, Fe, Fluoride, Bacteriological test.	IS:10500: 2012	Providing safe drinking water to all workers - Part of Contractor's Construction Cost Testing of water quality :- Contractor to consider the Cost.	Contractor	CSC, APGCL
48	AIDS awareness camps		Awareness raising to immigrant workers/local community on communicable and sexually transmitted diseases	Once every six months		Contractor to consider the Cost	Contractor	CSC, APGCL
49	Health checkup camps		Health checkup for the workers	Once every month		Contractor to consider the Cost	Contractor	CSC, APGCL
50	Contamination of soil, water bodies by Fuel and Lubricants	All along the project corridor, fuel refilling station, Vehicle and Workshop maintenance area, vehicle washing bay	Vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. Oil refilling station shall be constructed on impervious surface. Vehicle and equipment maintenance workshop shall also be constructed on the impervious surface and under a shed. Oil and grease interceptor shall be installed by the Contractor to remove oil and grease from the wash out water from the workshop area, fuel refilling station and vehicle washing bay.			Part of Contractor cost	Contractor	CSC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			The oil and grease skimmed from the interceptor shall be stored and dumped into secured landfill site.					
51	Selection of Dumping Sites	All all Dumping Sites	Unproductive/wastelands shall be selected for dumping sites. Away from residential areas and water bodies. Dumping sites have adequate capacity equal to the amount of debris generated. Public perception and consent from the village Panchayats has to be obtained before finalizing the location if in village land. Unutilized debris material shall be suitably disposed off by the Contractor at approved dumping sites. Completion of the dumping sites is required. Contractor will ensure that appropriate erosion control measures are implemented before handing over the dumping site to the community/ individual concerned. Protection from spillage in dumping areas near water bodies, forest, flora and movement route of fauna are to be carried out.	Location of dumping sites. Public complaints	Field survey and interaction with local people	Dumping areas already available in the project construction area. Development & spillage protection will be part of Contractor's Construction Cost.	Contractor	APGCL/ CSC
52	Reuse and disposal of construction and dismantled waste	Throughout the corridor	The existing bitumen surface shall be utilized for paving of cross roads, access roads and paving works in construction sites and camps, temporary traffic diversions, and haulage roads. Unusable and bituminous debris materials should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. For removal of debris, wastes and its disposal MOSRTH guidelines and IFC EHS guidelines should be followed. Unusable and surplus materials, as determined by the Engineer will be removed and disposed off-site.	Percentage of reuse of existing surface material. Method and location of disposal site of construction debris	Contractor Records. Field Observation. Interaction with local people	Part of Contractor's Construction Cost.	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
			All excavated materials from roadway shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping.					
53	Management of existing traffic and safety	Throughout the corridor especially at intersections	Temporary traffic diversion shall be planned by the contractor and approved by the 'Engineer' The traffic control plans shall contain details of diversions, traffic safety arrangements during construction, safety measures for night time traffic and precautions for transportation of hazardous materials. Traffic control plans shall be prepared in line with requirements of IRC's SP 55 document The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. On stretches where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will be constructed. Restriction of construction activity to only one side of the existing road. The contractor shall inform local community of changes to traffic routes, and pedestrian access arrangements with assistance from 'Engineer'	Traffic management plan, Safety signs on Site, Number of traffic accidents	Review traffic management plan, Field observation of traffic management and safety system Interaction with people in vehicles using the road	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
56	Accident risk to local community	Construction sites	Restrict access to construction sites, to authorized personnel Physical separation must be provided for movement of vehicular and human traffic. Adequate signage must be provided for safe traffic movement	Safety signs and their location Incidents of Accidents Complaints from local people	Site Inspection, Consultation with local people	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
57	Clean-up Operations, Restoration and Rehabilitation	Throughout the corridor, construction camp sites and borrow areas	Contractor will prepare site restoration plans which will be approved by the 'Engineer' The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. All construction zones including river beds, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the work must be left clean and tidy, at the contractor's expense, to the satisfaction of the Environmental officer. All the opened borrow areas will be rehabilitated and 'Engineer will certify in this regard.	Clean and restored camp sites Presence/absence of construction material/debris after completion of construction works on construction site	Site Observation, Interaction with locals, Issue completion certificate after restoration of all sites are found satisfactory	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
58	Disposal of bitumen waste	Locations where existing road will be widened	If generated- The disposal of residual bituminous wastes will be done by the Contractor at secure landfill sites, with the requisite approvals for the same from the concerned government agencies/ SPCB			Part of Contractor's Construction Cost	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
56	Accident risk to local community	Construction sites	Restrict access to construction sites to authorized personnel Physical separation must be provided for movement of vehicular and human traffic. Adequate signage must be provided for safe traffic movement	Safety signs and their location Incidents of Accidents Complaints from local people	Site Inspection, Consultation with local people	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
57	Clean-up Operations, Restoration and Rehabilitation	Throughout the corridor, construction camp sites and borrow areas	Contractor will prepare site restoration plans which will be approved by the Engineer. The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. All construction zones including river beds, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the work must be left clean and tidy, at the contractor's expense, to the satisfaction of the Environmental officer. All the opened borrow areas will be rehabilitated and Engineer will certify in this regard.	Clean and restored camp sites. Presence/absence of construction material/debris after completion of construction works on construction site	Site Observation, Interaction with locals, Issue completion certificate after restoration of all sites are found satisfactory	Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
58	Disposal of bitumen waste	Locations where existing road will be widened	If generated- The disposal of residual bituminous wastes will be done by the Contractor at secure landfill sites, with the requisite approvals for the same from the concerned government agencies/ SPCB			Part of Contractor's Construction Cost	Contractor	APGCL/ CSC

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Mitigation Cost	Implementing Agency	Supervising & Monitoring Agency
59	Disposal of plastic waste		To manage the plastic waste generated			Part of Contractor's Construction Cost	Contractor	APGCL/ CSC
	During Defect Liability period as per terms of the contract							
1.	During Defect Liability period as per terms of the contract	All environmental aspects	• APGCL shall monitor the operational performance of the various mitigation measures implemented in the project.	Environmental and ecological parameters	Record, complaints, observations	Part of Contractor's defect liability period as per term of the contract	PD Office, LKHEP	PD Office, LKHEP

Table 3: Environmental Monitoring Plan

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
Soil and Sediments							
Pre-construction Stage	pH, Electrical Conductivity, Nitrogen, Phosphates, Potassium, Organic matter, water content, silt content, average grain size, heavy metals, Al, Fe, Cu, Mn, As, Zn, Ni, Pb, Cr, C, Cd (Standards by CPCB as given in Annex 2)	At identified locations: - 1 km upstream of submergence site - Submergence area - 1 and 3 km downstream of dam site	Once prior to start of construction	-	Contamination of sediments	CSC/ External monitor	CSC, PD Office, LKHEP
Air Quality and Noise Levels							
Pre-construction Stage	• PM_{10}, $PM_{2.5}$, SO_2, NOx, CO, HC (Standards given in Annex 2) • Leq - Noise levels day time and noise time on dB (A) scale (Gol	• Wherever the contractor decides to locate the Hot mix plant • At major construction	Once prior to start of construction	Continuous 24 hours/ or for 1 full working day	Review adequacy of measures proposed in	CSC/ External monitor	CSC, PD Office, LKHEP

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
	and IFC Standards given in Annex 2)	sites as suggested by CSC for regular monitoring • At hot mix plant and equipment yards • At sensitive receptor locations		- twice in a week	EMP		
Construction Stage	• $PM_{2.5}$, PM_{10}, SO_2, NOx, CO, HC(Standards given in Annex2) • Leq - Noise levels on dB (A) scale (Std and IFC Standards given in Annex2)	• Wherever the contractor decides to locate the Hot mix plant • At major construction sites as suggested by CSC for regular monitoring • At hot mix plant and equipment's yards • At sensitive receptor locations (along the highway)	Once in a season excluding monsoon for entire duration of construction	Continuous 24 hours/ or for 1 full working day - twice in a week	Check and modify control devices like bag filter/cyclones of hot mix plant Provide additional noise barriers	Contractor through approved monitoring agency	CSC, PD Office, LKHEP
Water Quality							
Pre-construction Stage	pH, Temperature, DO, Oil & Grease, Conductivity, TSS, TDS, Alkalinity, Total Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, heavy metals, COD, BOD, Iron, Total Coliform, Faecal Coliform, Salinity (Surface Quality Standards by CPCB as given in Annex 2)	At identified water bodies locations • 1 km upstream of submergence site • Submergence area • 1, 3 and 8 km downstream of dam site • At identified water bodies locations (wells and other ground water sources in project area)	Once prior to start of construction	-	Check and modify petrol interceptors, Silt fencing devices	CSC/ External monitor	CSC, PD Office, LKHEP

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
Construction Stage	pH, Temperature, DO, Oil & Grease, Conductivity, TSS, TDS, Alkalinity, Total Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, heavy metals, COD, BOD, Iron, Total Coliform, Faecal Coliform, Salinity (Surface Quality Standards by CPCB as given in Annex 2) **pH of river water as per EC conditions**	At identified water bodies locations • 1 km upstream of submergence site • Submergence area • 1, 3 and 8 km downstream of dam site	Once in a season Excluding monsoon for 2 years	-	Check and modify petrol interceptors, Silt fencing devices	Contractor Through approved monitoring agency	CSC, PD Office, LKHEP
	Ground water- pH, Temperature, Conductivity, TSS, TDS, Alkalinity, Total Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, Iron, heavy metals, (Ground Quality Standards by CPSB as given in Annex 2) Drinking water- pH, Turbidity, TH, Total Alkalinity, Cl, Residual Chlorine, Fe, Fluoride, Bacteriological test	• At identified water bodies locations (wells and other ground water sources in project area)	Once in a season Excluding monsoon for 2 years	-	Check and modify petrol interceptors, Silt fencing devices	Contractor Through approved monitoring agency	CSC, PD Office, LKHEP
Water-related diseases							
Construction	Identification of water related diseases, adequacy of local vector control and curative measure, etc.	Labor camps and colonies	Three times a year	-	Check hygiene conditions in camp and colonies	Contractor through approved monitoring agency	CSC, PD Office, LKHEP
Terrestrial Ecology							

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
Pre-construction	Terrestrial Flora and fauna (using camera traps, incidental observations)	At selected locations in the project area, near proposed worksites, along the transmission line route, along access roads, and in the forest south of the project area, for determination of baseline	Once prior to start of construction	-	Check baseline record Check status of flora and fauna and provide additional monitoring, if required	CSC/ External monitor	CSC, PD Office, LKHEP
Construction	Status of afforestation programme of green belt development, Terrestrial Flora and fauna (using camera traps, incidental observations)	At selected locations in the project area, near worksites, along the transmission line route, along access roads, and in the forest south of the project area	Once every season	-	Check baseline record Check status of flora and fauna and provide additional protective measures, if required	Contractor Through external agency	CSC, PD Office, LKHEP, Forest Department
	Road side plantation	Road side tree cutting		Throughout the construction stage		Contractor	Forest Department, & CSC
Aquatic Ecology							
Pre-construction	Phytoplankton, zooplankton, benthic animals, fish composition	• 1 km upstream of reservoir site • downstream of dam site	Once prior to start of construction	-	Check baseline record	CSC/ External monitor	CSC, PD Office, LKHEP
Construction	Phytoplankton, zooplankton, benthic animals, fish composition	• 1 km upstream of reservoir site • downstream of dam site	Once every season	-	Check baseline record, determine change-cause factors and adjust	PD Office, LKHEP through approved monitoring agency	CSC, PD Office, LKHEP

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
Hydrology							
Construction	Discharge (m³/s)	• Above dam, below dam, at TRT and confluence point of Myrrang with Kopili river	Monthly	-	Check baseline record	PD Office, LKHEP through approved monitoring agency	CSC, PD Office, LKHEP
	e-flow	• E-flow at the dam will be monitored constantly (in situ gauge) as per the e-flow management plan	Constantly	-	Check baseline record with designed minimum e-flow figures	PD Office, LKHEP	PD Office, LKHEP
Health and Safety							
Construction	Monitor and report health and safety incidents	All construction sites	Continuous	-	Follow EMP provisions and take actions as per IFC EHS Guidelines	Contractor	CSC,PD Office, LKHEP
Meteorology Parameters							
Construction	Wind direction & velocity temperature humidity, rain	At one of the ambient air quality sampling sites	Continuous	-	Data check	PD Office, LKHEP through external agency	PD Office, LKHEP

PD Office, LKHEP = Project Director Office, Lower Kopili Hydro Electric Project, Assam Power Generation Corporation Ltd., CSC = Construction Supervision Consultant

Annexure 13 :Package 3 EMP of the tender document.

Section 8 - Special Conditions of Contract

46.4 The Contractor shall comply with all applicable national, provincial, and local environmental laws and regulations.

The Contractor shall comply with (i) the measures and requirements set forth in the Initial Environmental Examination and the Environmental Management Plan and (ii) any corrective or preventative actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the Initial Environmental Examination and the Environmental Management Plan.

The Contractor shall allocate a budget for compliance with these measures, requirements and actions.

Table 1: Environmental Management Plan
(LKHEP, Package -3 : Electro Mechanical)

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
DESIGN AND PRE-CONSTRUCTION PHASE							
1.	Impact on air, water, noise, soil	Location and design of power house, office, substation and colony	• Siting of colony away from construction areas including plantation all around colony. • Drainage system with de-silting chamber, will be provided all around power house, office, substation and colony. • Solid waste storage bin system will be provided at required location. • All buildings are designed and will be constructed as per seismic zone provision. • The site-specific earthquake study has been completed by Department of Earthquake Engineering, IIT Roorkee. The site-specific design parameters recommended by IIT for MCE and DBE conditions are recommended as 0.36g and 0.18g for horizontal and 0.24g and 0.12g for vertical ground motion, respectively have been considered. The design has been reviewed by independent experienced dam expert appointed by ADB and found to be adequate. • Dam safety surveillance and monitoring aspects are included. Personnel Safety equipments will be provided at required location.	Design Check	Document Review	Contractor	PMC, APGCL
	Exposure to safety related risks			Design Check	Document Review	Contractor	PMC, APGCL
2.	Release of chemicals ashes in receptors (air, water, land)	Equipment specifications and design parameters.	• CFC not used in substation transformers or other project facilities or equipment by concerned agencies. • Processes, equipment, and systems will not to use chlorofluorocarbons (CFCs), including halon; and their use.	Technical specifications	Document Review	Contractor	PMC, APGCL
3.	Exposure to noise	Power Plant /Substation location	• Design of plant enclosures to comply with IFC EHS noise regulations (85 dB(A) at work sites for heavy industry.	Design Check	Document Review	Contractor	PMC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
4.	Acquisition of private land	Location of powerhouse, head works.	• Acquisition of agricultural and cultivable land minimized.	Land area requirements	Document Review	APGCL	APGCL, Revenue Department
5.	Social inequities	Involuntary resettlement or land acquisition.	• Compensation will be paid for temporary / permanent loss of productive land as per Govt. rules and regulation. • A list of all the affected persons by type of losses and extent of damages has been prepared through and the same will be compensated as per Resettlement and Tribal Development Plan prepared as per GoI and ADB SPS 2009 requirements.	No. of affected people and entitlement provisions	Document Review, Compensation process	APGCL	APGCL, Revenue Department
6.	Loss of precious Ecological values/impacts on precious species due to acquisition of 523 ha of forest land	Encroachment into precious ecological areas.	• Minimize acquisition of forest areas. • Avoid encroachment by careful site and alignment selection of access roads. • Afforestation of 1,046 ha (1:2 tree planting ratio) of degraded forest land • A compensatory afforestation and biodiversity conservation and management plan has been prepared (Annex 9). • Cut only trees marked by the Forest Department • Ensure that the area is cleared as per directives/delineation of Forestry staff	Compensatory afforestation process, land take, no. of trees to be cut	Document Review, Clearance papers	APGCL, Forest Department	APGCL, Forest Department
7.	Nuisance to neighbouring properties	Noise related	• Substations, powerhouse, head works designed to ensure noise will not be a nuisance. Noise will be controlled within IFC EHS noise standards. In any case, there is no proximity of residences to these features.	Technical specifications	Document Review	Contractor, PMC	APGCL
8.	Flooding hazards/ loss of agricultural production	Interference with drainage patterns/ Irrigation channels	• The alignment of river channel and siting of project facilities are done to avoid any flooding hazard. Detailed hydrological assessments have been carried out as part of detailed design. Additional IWRM management plan has been prepared.	Design Check	Document Review	DPR Consultant, PMC	APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
			• Dam Break Analysis and disaster management plan has been prepared (Annex 30).				
9.	Environmental pollution	Escape of polluting materials	• Transformers designed with oil spill containment systems, and purpose-built oil, lubricant and fuel storage system, complete with spill cleanup equipment • Construct 100% fenced and bermed area with impermeable concrete floor. • Powerhouses/substations to include drainage and sewage disposal systems (septic tanks, sewage treatment plant) to avoid offsite land and water pollution.	Design Check, technical specifications	Document Review	Contractor	PMC, APGCL
10.	Contamination of receptors (land, water)	Equipment submerged under flood	• Powerhouses/substations constructed above the high flood level (HFL) i.e. 185.34 m, by raising the foundation pad. This level also includes any possible effects from future climate change.	Design Check	Document Review	Contractor	PMC, APGCL
11.	Natural disaster frequently observed	Ground subsidence/ landslide	• Civil design and sitting of project facilities has been done with due considerations to earthquake and landslide so as to avoid any hazard.	Design Check	Document Review	Contractor	PMC, APGCL
12.	Fire hazards	Explosions/fire	• Design of Powerhouses/substations has included modern fire control systems/firewalls in accordance with the norms of National Fire Protection Association (NFPA) and Tariff Advisory Committee (TAC). • Provision of fire fighting equipment to be located within 20 m of transformers, power generation equipment. • Fire protection and Safety practice have been prepared (Annex 28, 29).	Design Check	Document Review	Contractor	PMC, APGCL
13.	Tree cutting	Cutting of trees during site clearance	• Restricting tree cutting within construction limit. • Avoiding tree cutting at ancillary sites. • Providing and maintaining compensatory tree plantation i.e. three times of cutting. • Compensatory afforestation plan prepared.	No. of trees to be cut	Observations	Contractor, Forest Dept.	APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
14.	Removal of vegetative covers (dust, pollution)	Work site clearance	• Use of controlled clearing activities • Use of dust controlled measures • Collection and disposal of debris and muck.	Vegetation to be cleared	Observations	Contractor	Forest Dept. / APGCL
15.	Removal of utilities	Work site clearance	• Necessary planning and coordination with concerned authority and local body. • Prior notice to and consultation with concerned authority, local body and public to be affected so as to ensure that work does not get affected and impact on public is minimum.	Utility shifting plan	Observations	Concerned utility agencies / Contractor	PMC, APGCL
16.	Religious places	Work site	• Suitable mitigation measures have been incorporated in social impact assessment report.	RTDP	Observations	APGCL	PMC, APGCL
17.	Camp site and contractor facilities	Establishment of contractors' facilities	• Obtain permits and CTE, CTO, NOCs from ASPBC and other statutory agencies. • Contractor to submit a camp and site office plan defining all facilities to be created. These include human waste disposal facilities and solid waste management facilities. The basic plans provided in Annex 17) to be updated and finalized by contractor.	NOCs and permits	Document check.	Contractor	ASPCB, APGCL, PMC
18.	Project facilities and commencement of construction	Clearances and permits	• Obtain environmental clearance from MoEF&CC • Obtain forest clearance from forest departments • Include EMP in the contract documents.	Clearance letters	Document check.	APGCL. Contractor (for minor mineral)	MoEF&CC, Forest Dept., APGCL, PMC
CONSTRUCTION PHASE							
1.	Impact and air, water, noise, soil	Civil construction work for power house, tunnel, office, substation, access roads, colony etc.	**Air Pollution**: • All the vehicles must have valid PUC certificates at all the time during construction phase of the project. • Water sprinkling shall be done to suppress the dust emissions from the site. • All the DG sets used for construction shall have valid consents from Assam State Pollution Control Board and shall have built-in stacks to reduce the air emission impacts.	PM10, Dust pollution, Complaints from local residents Equipment/ vehicle maintenance record	Measurement Observations, public discussions	Contractor	PMC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
			• Refer to Annex 24: Measures for Air Pollution Control **Noise Pollution**: • Construction materials shall be properly maintained and noise barriers, if needed, shall be provided around worksites, to reduce the noise levels. Design of such barriers will be finalized by CSC environment specialist. • All the workers will be provided with personal protective equipment including ear plugs and other necessary provisions by the contractor. • Refer to Annex 25: Measures for Noise Pollution Control	Noise level, complaints from local residents, vehicle maintenance record, awareness programs implemented	Noise level measurement, field observations, discuss with local residents	Contractor	PMC, APGCL
			Water Quality: • Quality of water (river and wastewater discharged from the construction site) shall be analyzed monthly during construction, for its compliance to the disposal standards of pollution control authority. • Refer to Annex 26: Measures for Water Pollution Control	Drainage systems, Total solids and turbidity level	Review records, site visit and observations, turbidity level and other water quality parameters to be checked	Contractor	PMC, APGCL
	Exposure to safety related risks		**Others**: • Proper plantation all around colony. Refer to Annex 21: Green Belt Development Plan • Drainage with De silting chamber, will be provide all around power house, office, substation and colony. • Solid waste storage bean system will be provided at required location. Refer to Annex 22: Solid Waste Management Plan • All buildings designed constructed as per seismic zone provision. • Safety system will be provided at required location. Refer to Annex 18, Annex 28, Annex 29 for Occupational, Health and Safety Plans.	Planning for waste management	Review of planning and practices for waste management, site visit, observations	Contractor	PMC, APGCL
2.	Infrastructure provisions at	Health and hygiene at workers camps	• Contractor during the progress of work will provide, erect and maintain necessary living	Planning for health and	Review of planning and	Contractor	PMC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
	labor camps		accommodation and ancillary facilities for labor as per the requirements of applicable labor regulations of Government of India. • All the work sites and camp sites shall also be provided with basic sanitation and infrastructure as per the requirements of Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996. • Kitchen waste and wastewater to be treated before discharge. • Refer to Annex 12: Public Health Delivery System • Refer to Annex 18: Project Personnel Health Plan • Refer to Annex 28: Fire Protection in Labor Camps and Staff Colonies • Refer to Annex 29: Safety Practices during Construction	safety, practices being implemented	practices for seepage and spoil disposal, control, site visits		
		Fire Protection in Labor Camp and Staff Colonies	• Safety Practices During Construction Phase • Refer to Annex 28: Fire Protection in Labor Camps and Staff Colonies	Planning for health and safety	Check record, observations, discussion with workers	Contractor	PMC, APGCL
3.	Solid Waste Management	Construction camps	• Collection and disposal of human waste as per waste management plan. • Refer to Annex 22: Solid Waste Management Plan	Quantity of SW collected and disposed	Record check, observations	Contractor	PMC, APGCL
4.	Muck disposal	Tunneling and excavation activities	• Muck generated from various tunnelling and excavation activities would be dumped suitably to designated sites • Refer to Annex 13: Muck Disposal Plan	Quantity of muck generated and disposed	Record check, observations	Contractor	PMC, APGCL
5.	Construction sites	Restoration of sites	• Restoration of construction sites. • Refer Annex 19: Construction Site Restoration Plan.	Physical inspection of sites	Record check, observations	Contractor	PMC, APGCL
6.	Noise and vibrations	Equipment layout and installation	• Construction techniques and machinery selection seeking to minimize ground disturbance. • Refer to Annex 25: Measures for Noise Pollution Control	Noise and vibration levels	Noise and vibration monitoring record	Contractor	PMC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
7.	Disturbed farming activity	Physical construction	• Construction activities on cropping land time to avoid disturbance of field crops (within 1 month of harvest wherever possible).	Crops damaged	Observations	Contractor	PMC, APGCL
8.	Noise vibration and operator safety, efficient operation, equipment wear and tear	Mechanized construction	• Construction Mechanized maintenance and turning of plant. • Proper maintenance and turning of plant • Implement environmental mitigation and good-construction as integral component of each civil activity and as day-to-day activity	Planning for health and safety	Record check, observations	Contractor	PMC, APGCL
9.	Increase in airborne dust particles	Construction of access roads	• Existing roads and tracks used for construction and maintenance access to the site wherever possible. • Refer to Annex 24: Measures for Air Pollution Control	Dust levels	Record check, observations	Contractor	PMC, APGCL
10.	Increased land requirement for temporary accessibility	Construction of access roads	• New access ways restricted to a single /intermediate carriageway width. • Refer to Annex 20: Road Construction Management Plan	Planning for access roads	Observations	Contractor	PMC, APGCL
11.	Temporary blockage of utilities	Construction work	• Temporary placement of fill in drains/canals not permitted	Water blockage	Observations	Contractor	PMC, APGCL
12.	Loss of vegetative cover	Site clearance	• Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	No. of trees to be cut	Review clearance papers, field observations	Contractor/ Forest Dept.	PMC, APGCL
13.	Fire hazards	Trimming/cutting of trees	• Trees allowed growing up to a specified height within the work areas by maintaining adequate clearance between the top of tree and the conductor as per the regulations.	No. of trees to be cut	Observations	Contractor	PMC, APGCL
14.	Loss of vegetation and deforestation		• Trees that can survive pruning to comply should be pruned instead of cleared. • Felled trees and other cleared or pruned vegetation to be disposed of as authorized by the statutory bodies.	No. of trees to be cut	Review clearance papers, field observations	Contractor	PMC, APGCL

15.	Loss of vegetation and deforestation	Wood/vegetation harvesting	• Construction workers prohibited from harvesting wood in the project area during their employment, (apart from locally employed staff continuing current legal activities). • Contractor should arrange LPG gas for cooking of food for their workers. • Refer to Annex 17: Plan for Construction Camp Management	Fuel supply to workers	Review clearance papers, field observations	Contractor	PMC, APGCL
16	Loss of Biodiversity, Disturbance / accidents/ injury, to wildlife and avian fauna	Construction and clearing of forest areas	• Implementation of Compensatory afforestation plan. • Creation of a greenbelt around the perimeter of various project appurtenances, selected stretches along reservoir periphery, access roads to compensate for the loss of habitat • Provisions of adequate signages and speed limit on road sections within forest areas to avoid accidental roadkills . • Poaching activities should be monitored in workers areas and well as community areas (as per Annex 9). • Implementation of Biodiversity Conservation and Management Plan (Annex 9) • Compliance with guidelines issued by the National Wildlife Board of India for linear intrusion in natural area pertaining to roads and power lines. • Provision of wild fruit plantation for wildlife • Annual bird count of migratory birds by involving locals and bird experts • Rehabilitation with local fruit bearing species in gaps Anti-grazing drive in drawdown area to protect the bird breeding areas in proximity to reservoir during breeding season – only in winter season. Grazing by local people will be allowed during dry season. • Construction of check posts / watch towers in key locations • Conservation actions as proposed by IUCN (during construction and during the initial project operation) such as conducting a comprehensive survey and monitoring in and around the project area to establish range, distribution and population status of vulnerable and critical habitats in the project area for assessing its habitat requirements and	Incidences of wildlife loss	Review clearance papers, field observations	Contractor	PMC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
			identifying threats are proposed. • Establishment of biodiversity conservation committee. • Refer to Annex 9: Biodiversity Conservation and management Plan • Refer to Annex 21: Green Belt Development Plan				
17.	Runoff to cause water pollution, solid waste disposal	Surplus earth work/soil	• Excess fill from excavations disposed of next to roads or on barren land or personal in agreement with the local community or land owner. • Soil excavated from power houses will be disposed as safe & scientific manner by placement on barren land or along back fill trench weir etc.	Vehicle maintenance record, review plans for waste management and oil handling practices	Review of planning and practices for seepage and spoil disposal, control, site visits	Contractor	PMC, APGCL
18.	Loss of soil and water pollution	Substation construction	• Fill for the substation foundation obtained by creating or improving local water supply ponds or drains, with the agreement of local communities. • Construction activities involving significant ground disturbance (i.e., substation land forming) not undertaken during the monsoon season.	Planning for soil conservation	Record check, observations	Contractor	PMC, APGCL
19.	Contamination of receptors (land, water, air)	Storage of chemicals and materials	• Fuel and other hazardous materials securely stored above high flood level with safety measures. • Hazardous gas or chemicals to be stored in designated storage facility complying the hazardous chemicals and storage rules. • Plastic shall be disposed as per rule. • Refer to Annex 18: Project Personnel Health Plan	Vehicle maintenance record, review plans for waste management and oil handling practices	Record check, observations	Contractor	PMC, APGCL
20.	Noise nuisance	Constructio n schedules	• During work near settlements construction activities only undertaken during the day and local communities will be informed of the construction schedule	Noise level monitoring	Record check, observations	Contractor	PMC, APGCL
21.	Contamination of receptors (land, water, air)	Provision of facilities for construction workers	• Construction workforce will be provided for certain facilities it includes proper sanitation, water supply and waste disposal facilities.	Planning for health and safety	Review of planning and practices for seepage	Contractor	PMC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
			• Construction worker camp to be established in Revenue land. • Refer to Annex 17: Construction Camp Management Plan		and spoil disposal, control, site visits		
22.	Loss of agricultural productivity	Encroachment into agricultural land	• Use of existing roads wherever possible. • Ensure existing irrigation facilities are maintained in working condition. • Protect/Preserve topsoil and reinstate after construction completed. • Repair/reinstate damaged bunds, etc. after construction completed	loss of agricultural products	Record check, observations	Contractor	PMC, APGCL
23.	Social inequities	Encroachment into agricultural land	• Compensation for temporary loss in agricultural production as per provisions of Resettlement and Tribal Development Plan	RTDP	Record check, observations	Contractor	PMC, APGCL
24.	Soil loss, downstream siltation; etc.	Uncontrolled erosion/silt runoff	• Need for access tracks minimised, use of existing roads. • Limit site clearing to work areas regeneration of vegetation to stabilize works areas on completion (where applicable). • Avoidance of excavation in wet seasons. • Water courses protected from siltation through use of bunds and sediment ponds. • Refer to Annex 26: Water Pollution Control Measures	Soil erosion planning and cases	Record check, observations	Contractor	PMC, APGCL
25.	Losses to neighbouring land uses/values	Nuisance to nearby properties.	• Contract clauses specifying careful construction practices on every stage. • Maximum existing access ways will be used. • Productive land will be reinstated following completion of construction.	Construction planning	Record check, observations	Contractor	PMC, APGCL
26.	Social inequities	Nuisance to nearby properties.	• Compensation will be paid for loss of production, if any as per provisions of Resettlement and Tribal Development Plan	RTDP	Record check, complaints, observations	Contractor	PMC, APGCL
27.	Flooding and loss of soils, contaminati on of receptors (land, water)	Flooding hazards due to construction impediments of natural drainage.	• Avoid natural drainage pattern/ facilities being disturbed/ blocked/ diverted by ongoing construction activities. • Refer to Annex 30: Dam Break Analysis And Disaster Management Plan	Construction planning	Record check, observations	Contractor	PMC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
28.	Contamination of receptors (land, water)	Equipment submerged under flood	• Equipment stored at secure place above the high flood level (HFL) i.e. 185.34 m.	Construction planning	Record check, observations	Contractor	PMC, APGCL
29.	Loss of land values	Inadequate siting of borrow areas	• Existing sites (if available) will be used, therefore, no need to develop new sources of aggregates.	Construction planning	Record check, observations	Contractor	PMC, APGCL
30.	Injury and sickness of workers and members of the public.	Environment, Health and safety	• Arrangement of Environment awareness programme. • Contract provisions specifying minimum requirements for construction camps. • Preparation and implementation of health and safety plan. • Arrangement of primary health centre with medicine and instrument with a knowledgeable health staff. • Arrangement for health and safety training sessions. • First aid facility in workplace and in the camps • COVID 19 SOP to be prepared and approved by APGCL. • COVID appropriate behavior to be followed. • Refer to Annex 12: Public Health Delivery System • Annex 16: Plan for Environmental Training of Workers • Refer to Annex 17: Plan for Construction Camp Management • Refer to Annex 18: Project Personnel Health Program • Refer to Annex 22: Solid Waste Management Plan • Refer to Annex 23: Emergency Plans for Hazardous Materials • Refer to Annex 24: Measures to Control Air Pollution • Refer to Annex 25: Measures to Control Noise Pollution	Training and awareness programs, Health and safety plans	Review of planning and practices for seepage and spoil disposal, control, site visits	Contractor	PMC, APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
			• Refer to Annex 26: Measures to Control Water Pollution • Refer to Annex 27: Energy Conservation Measures • Refer to Annex 28: Fire Protection In Labor Camp And Staff Colonies • Refer to Annex 29: Safety Practices During Construction Phase • Refer to Annex 30: Dam Break Analysis and Disaster Management Plan				
31.	Likely to maximize damages	Inadequate construction stages monitoring	• Training to personal of implementing agency for environmental monitoring work. • Implementation of effective environmental monitoring and reporting system using checklist of all contractual environmental requirement. • Appropriate contact clauses to ensure satisfactory • implementation of contractual environmental mitigation measures.	Training and awareness programs, Environment monitoring plans	Record check, observations	Contractor	PMC, APGCL
OPERATION PHASE							
1.	Loss of vegetation and deforestation	Wood/vegetation harvesting	• Staff working at site prohibited from harvesting wood in the project area during their employment, (apart from locally employed staff continuing current legal activities). APGCL / Contractor should arrange LPG gas for cooking of food for their workers.	Loss of forests	Record, observations	Forest Dept. / APGCL	APGCL
2.	Tree plantation	-	• Compensatory afforestation plan.	Survival rate of trees (70% minimum)	Field observations	Forest Dept. / APGCL	APGCL
3.	Wildlife and Biodiversity	Loss of wildlife / biodiversity	• Implementation and monitoring of biodiversity conservation plan activities.	Change in habitats	Field observations	Forest Dept. / APGCL	APGCL
4.	Contamination of receptors (land, water)	Equipment may submerged under flood	• Equipment will be installed above the high flood level (i.e. 185.34 m) by raising the foundation pad. This level also includes climate change factors.	Pollution levels	Record, observations	APGCL	APGCL

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
5.	Soil Erosion	-	• Implementation and monitoring of Catchment Area Treatment Plan (Annex 10) prepared.	Catchment Area Treatment	Record, observations	APGCL	APGCL
6.	Dam Break and Disaster management	Dam Break and Disaster management	• Installation of alert system in control room • Setting up of communication system in various villages • Flood Forecasting Arrangements • Follow Disaster Management Plan (Refer to Annex 30)	Disaster Management Plan	Record, observations	APGCL	APGCL
7.	Water Quality	Water quality change	• Monitoring once in every season at various locations • Monitoring of water quality restoration plan	Water quality parameters	Record, observations	APGCL	APGCL
8.	Ecology	-	• Monitoring of Ecology of the project area shall be done once in each season	Biodiversity Conservation Plan	Record, observations	APGCL	APGCL
9.	Land use Pattern	-	• Monitoring of Land use pattern once in a year	Land use pattern	Record, observations	APGCL	APGCL
10.	Injury and sickness of staff/workers	Inadequate provision of staff/workers health and safety during operations	• Careful design using appropriate technologies to minimize hazards. • Safety awareness raising for staff. • Preparation of emergency plan and training given to staff, for their implementation. • Adequate sanitation and water supply facilities will be provided.	Training and awareness plan, safety plans	Record, observations	APGCL	APGCL
11.	Injury/mortality to staff and public	Electric shock Hazards	• Careful design using appropriate technologies to minimize hazards. • Security fences around substations/ powerhouse/ head works. • Barriers to prevent climbing on/dismantling of transmission towers. • Appropriate warning sign on facilities. • Electric safety awareness rising in project areas. • Fire hydrant point and fire extinguisher may be placed at appropriate places.	No. of incidences	Record, observations	Contractor, APGCL	APGCL
12.	Unnecessary environmental losses of various types	Operation and maintenance staff skills less than acceptable	• Adequate training in O&M to all relevant staff of substations and transmission line maintenance crews. • Preparation and training in the use of O&M manuals and standard operating practices.	Training plans	Record, observations	Contractor, APGCL	APGCL
13.	Diminished ecological and social values.	Inadequate periodic environmental monitoring.	• Proper environmental monitoring of project operations and maintenance activities.	Environment parameters	Monitoring Records, observations	Contractor, APGCL	APGCL
14.	Release of chemicals and gases in receptors (air, water, land)	Equipment periodic environmental monitoring	• Processes, equipment and systems using chlorofluorocarbons (CFCs), including halon, should not be used in any stage of equipment.	Environment parameters	Record, complaints, observations	APGCL	APGCL
15.	Nuisance to neighbouring properties.	Noise related	• Powerhouses/substations sited and designed to ensure noise will not be a nuisance	Equipment's performance	Record, complaints	APGCL	APGCL
16.	Operational performance	All environmental aspects	• APGCL shall monitor the operational performance of the various mitigation measures implemented in the project. Contractor shall carry out Environment monitoring during DLP .	Environment and ecological parameters	Record, complaints, observations	Contractor, APGCL	APGCL

APGCL = Assam Power Generation Corporation Ltd., PMC = Project Management Consultant

Table 2: Environmental Monitoring Plan

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
Soil and Sediments							
Pre-construction Stage	pH, Electrical Conductivity, Nitrogen, Phosphates, Potassium, Organic matter, water content, silt content, average grain size, heavy metals, Al, Fe, Cu, Mn, As, Zn, Ni, Pb, Cr, C, Cd (Standards by CPCB as given in Annex 2)	At identified locations 1 km upstream of submergence site Submergence area 1 and 3 km downstream of dam site	Once prior to start of construction	-	Contamination of sediments	Contractor / External monitor	PMC, APGCL
Air Quality and Noise Levels							
Pre-construction Stage	• $PM_{2.5}$, PM_{10}, SO_2, NOx, CO, HC (Standards given in Annex 2) • Leq - Noise levels day time and noise time on dB (A) scale (GoI and IFC Standards given in Annex 2)	• Wherever the contractor decides to locate the Hot mix plant • At major construction sites as suggested by CSC for regular monitoring • At hot mix plant and equipments yards • At sensitive receptor locations	Once prior to start of construction	Continuous 24 hours/ or for 1 full working day – twice in a week.	Review adequacy of measures proposed in EMP.	Contractor/ External monitor	PMC, APGCL
Construction Stage	• $PM_{2.5}$, PM_{10}, SO_2, NOx, CO, HC (Standards given in Annex 2) • Leq - Noise levels on dB (A) scale (GoI and IFC Standards given in Annex 2)	• Wherever the contractor decides to locate the Hot mix plant • At major construction sites as suggested by CSC for regular monitoring • At hot mix plant and equipments yards • At sensitive receptor locations (along the highway)	Once in a season excluding monsoon for entire duration of construction	Continuous 24 hours/ or for 1 full working day – twice in a week.	Check and modify control devices like bag filter/cyclones of hot mix plant Provide additional noise barriers	Contractor Through approved monitoring agency	PMC, APGCL

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
Operations Stage	• $PM_{2.5}$, PM_{10}, SO_2, NOx, CO, HC (Standards given in Annex 2) • Leq - Noise levels on dB (A) scale (GoI and IFC Standards given in Annex 2)	• At selected locations in the project site (dam site, powerhouse, permanent colony) • At sensitive receptor locations (along the highway)	Quarterly for 2 years	Continuous 24 hours/ or for 1 full working day - Once in a week	Check and provide suitable measures	Contractor, APGCL Through approved monitoring agency	APGCL
Water Quality							
Pre-construction Stage	pH, Temperature, DO, Oil & Grease, Conductivity, TSS, TDS, Alkalinity, Total Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, heavy metals, COD, BOD, Iron, Total Coliform, Faecal Coliform, Salinity (Surface Quality Standards by CPCB as given in Annex 2)	At identified water bodies locations • 1 km upstream of submergence site • Submergence area • 1, 3 and 8 km downstream of dam site • At identified water bodies locations (wells and other ground water sources in project area)	Once prior to start of construction	-	Check and modify petrol interceptors, Silt fencing devices.	Contractor / External monitor	PMC, APGCL
Construction Stage	pH, Temperature, DO, Oil & Grease, Conductivity, TSS, TDS, Alkalinity, Total Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, heavy metals, COD, BOD, Iron, Total Coliform, Faecal Coliform, Salinity (Surface Quality Standards by CPCB as given in Annex 2)	At identified water bodies locations • 1 km upstream of submergence site • Submergence area • 1, 3 and 8 km downstream of dam site	Once in a season Excluding monsoon for 2 years	-	Check and modify petrol interceptors, Silt fencing devices.	Contractor Through approved monitoring agency	PMC, APGCL
	pH, Temperature, Conductivity, TSS, TDS, Alkalinity, Total, Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, Iron, heavy metals, (Ground Quality Standards by CPSB as given in Annex 2)	• At identified water bodies locations (wells and other ground water sources in project area)	Once in a season Excluding monsoon for 2 years	-	Check and modify petrol interceptors, Silt fencing devices.	Contractor Through approved monitoring agency	PMC, APGCL

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
	pH, BOD, COD, TSS, TDS (Effluent Quality Standards by CPSB as given in Annex 2)	AT STP locations (Before and after treatment from each STP)	Monthly		Check and modify petrol interceptors, Silt fencing devices; adjust STP mechanisms.	Contractor Through approved monitoring agency	PMC, APGCL
Operation Stage	pH, Temperature, DO, Oil & Grease, Conductivity, TSS, TDS, Alkalinity, Total Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, COD, BOD, Iron, Total Coliform, Faecal Coliform, Salinity (Surface Quality Standards by CPSB as given in Annex 2)	• 1 km upstream of submergence site • Submergence area • 1, 3 and 8 km downstream of dam site	Once in a season Excluding monsoon for 2 years	-	Check and modify petrol interceptors, Silt fencing devices. Check and repair STW if required.	Contractor, APGCL Through approved monitoring agency	APGCL
	pH, Temperature, Conductivity, TSS, TDS, Alkalinity, Total, Hardness, Calcium, Magnesium Chloride, Phosphate, Sulphate, Nitrate, Iron. (Ground Quality Standards by CPSB as given in Annex 2)	• At identified locations(wells and other ground water sources in project area, staff colonies)	Once in a season Excluding monsoon for 2 years	-	Check and modify petrol interceptors, Silt fencing devices.	Contractor, APGCL Through approved monitoring agency	APGCL
	pH, BOD, COD, TSS, TDS (Effluent Quality Standards by CPSB as given in Annex 2)	AT STP locations (Before and after treatment from each STP)	weekly	-	Check and modify petrol interceptors, Silt fencing devices; adjust STP mechanisms.	Contractor, APGCL Through approved monitoring agency	APGCL
Water-related diseases							
Construction	Identification of water related diseases, adequacy of local vector control and curative measure, etc.	Labor camps and colonies	Three times a year	-	Check hygiene conditions in camp and colonies	Contractor through approved monitoring agency	PMC, APGCL
Operation	Identification of water related diseases, adequacy of local vector control and curative measure, etc.	Villages adjacent to project sites	Once in a year	-	Check hygiene conditions in worker colonies	Contractor, APGCL through approved agency	APGCL
Terrestrial Ecology							

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
Pre-construction	Terrestrial Flora and fauna (using camera traps, incidental observations)	At selected locations in the project area, near proposed worksites, along the transmission line route, along access roads, and in the forest south of the project area, for determination of baseline	Once prior to start of construction	-	Check baseline record Check status of flora and fauna and provide additional monitoring, if required.	PMC/ External monitor	PMC, APGCL
Construction	Status of afforestation programme of green belt development, Terrestrial Flora and fauna (using camera traps, incidental observations)	At selected locations in the project area, near worksites, along the transmission line route, along access roads, and in the forest south of the project area	Once every season	-	Check baseline record Check status of flora and fauna and provide additional protective measures, if required.	Contractor Through external agency	PMC, APGCL, Forest Department
Operation	Status of afforestation programmes of green belt development, Terrestrial Flora and fauna (using camera traps, incidental observations, and satellite image analysis)	At selected locations in the project area, near the dam and powerhouse, along the transmission line route, along access roads, and in the forest south of the project area	Once every season	-	Check baseline record Check status of flora and fauna and provide additional protective measures, if required. Survival rate of trees (70% min.)	APGCL	APGCL, Forest Department
Aquatic Ecology							
Pre-construction	Phytoplankton, zooplankton, benthic animals, fish composition	• 1 km upstream of reservoir site • downstream of dam site	Once prior to start of construction	-	Check baseline record	PMC/ External monitor	PMC, APGCL
Construction	Phytoplankton, zooplankton, benthic animals, fish composition	• 1 km upstream of reservoir site • downstream of dam site	Once every season	-	Check baseline record, determine change-cause	APGCL Through approved monitoring agency	PMC, APGCL

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
					factors and adjust		
Operation	Phytoplankton, zooplankton, benthic animals, fish composition, river discharge (e-flow and tributaries)	• 1 km upstream of reservoir site • Submergence area • 1, 3 and 8 km downstream of dam site	Once every season	-	Check baseline record, determine change-cause factors and adjust	APGCL	APGCL
Hydrology							
Construction	Discharge (m^3/s)	• Above dam, below dam, at TRT and confluence point of Mynriang with Kopili river.	Monthly	-	Check baseline record	APGCL Through approved monitoring agency	PMC, APGCL
	e-flow	• E-flow at the dam will be monitored constantly (in situ gauge) as per the e-flow management plan	Constantly	-	Check baseline record with designed minimum e-flow figures	APGCL	APGCL
Operation	Discharge (m^3/s)	• Above dam, below dam, at TRT and confluence point of Mynriang with Kopili river.	Monthly for first 2 years	-	Check baseline record	APGCL Through approved monitoring agency	PMC, APGCL
	e-flow	• E-flow at the dam will be monitored constantly (in situ gauge) as e-flow management plan	Constantly	-	Check baseline record with designed minimum e-flow figures	APGCL	APGCL
Land use							
Operation	Land use pattern using satellite data	Project area	Once in a year	-	Check status with satellite images (passive monitoring; only intervene if there is illegal forest clearing)	Contractor, APGCL Through external agency	APGCL
Health and Safety							

Environmental Features / Stage	Parameters and Standards	Location	Frequency	Duration	Action Plan in case criteria exceeds the standards	Responsible party	
						Implementation	Supervision
Construction	Monitor and report health and safety incidents	All construction sites	Continuous	-	Follow EMP provisions and take actions as per IFC EHS Guidelines	Contractor	PMC, APGCL
Operation	Monitor and report health and safety incidents	All project facilities	Continuous	-	Follow and take actions as per IFC EHS Guidelines.	APGCL	APGCL
Meteorology Parameters							
Operation	Wind direction & velocity temperature humidity, rain	At one of the ambient air quality sampling sites	Continuous	-	Data check	Contractor, APGCL Through external agency	APGCL

APGCL= Assam Power Generation Corporation Limited. PMC = Project Management Consultant.

Note :

1. Contractor has to submit the CEMP within one month of the contract award.
2. Monthly Environment Report to be submitted by Environment Officer / Environment Engineer of Contractor.
3. Monthly Safety Report to be submitted by EHS manager of Contractor.
4. Except EC and FC for the project all necessary statutory permits, CTE, CTO, other Clearances, NOCs for the project work to be procured by the Contractor.

Annexure 14 : Compliances of the conditions of the permits and clearances

Compliance of CTE / CTO from PCBA

	Compliance of CTE of Crusher Plant	
	No. WB/SLC/T-1184/21-22/06/1165 dated 22/10/21	Remarks
1	Gaseous pollution due to burning of fuel to run engine, boiler, etc should be controlled by adopting preventive measures adequately.	Electrically operated engine is used.
2	Solid waste that arises during the operation should be properly segregated and disposed of scientifically without causing nuisance.	Complied
3	Fire warning (Alarm, Siren) is to be installed by the unit to guard against accidental pollution / mishap together with fire fighting devises.	Complied
4	All pipe connections joints, fittings etc in the factory and plant are to be frequently checked and shall be leak proof all the time.	Complied
5	All unwanted Toxic Chemical/ Fluid / Gases are to be neutralized before releasing to the ambient air / flaring up as required.	Complied
6	Production process is to be monitored and in the event of danger immediate shut down is to be ensured by the industry.	Complied
7	Healthy working environment for the worker must be maintained and there should not be health Hazard to the workers for inadequate arrangement for ventilation, dust removal to arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.	Complied
8	The CTE does not authorize or approve the construction of any physical structures or facilities or the undertaking of any work in any natural watercourse except of the works specially instructed herein.	Complied
9	All steps are to taken by the industry to control the dust so that the dust so that it does not go outside the factory.	Being Complied
10	The industry is to fully enclose the screening machine dust extraction from close to unit.	Being Complied
11	The industry is to provide dust extraction arrangement at all transfer points.	Complied
12	The industry is to make water spraying arrangement for the finer product.	Complied
13	The industry will always keep it wet the finer product.	Complied
14	Necessary steps are to be made to minimize noise.	Complied
15	The screening unit should strictly follow the following standards for suspended particulates matter.	Complied

	The following pollution control measures are to be implemented. a. Dust containment cum suppression system for the equipment's. b. Construction of wind breaking walls. c. Construction of metalled roads within the premises. d. Regular cleaning and wetting of ground within the premises. e. Growing of green belt along the periphery.	
	Compliance of CTO of Crusher Plant	
	No. WB/SLC/T-1184/21-22/09/1152 dated 7/12/21	
1	.. The CTO will automatically become invalid if there is any changes, modifications, alteration, expansion or deviation is made in actual practice.	Agreed
2	The CTO is Valid for a period up to 31.03.2025 unless otherwise suspended or revoked.	Agreed
3	The CTO may be modified, suspended or revoked by the Borad in whole or in part during its term for cause including, but not limited to the following :- a) Violation of the Terms and Conditions of this CTO; b) Obtaining the CTO by misinterpretation or failure to disclose fully all relevant facts; c) A change in any condition that require temporary or permanent reduction or elimination of the authorised discharge / emission.	Agreed
4	The CTO does not authorize any addition, alteration, modification, modernization of processor products without prior permission of the Board.	Agreed
5	Proper housekeeping shall be maintained within unit premises.	Complied
6	The project proponent must develop a green belt / plantation area with native trees covering atleast 33% of the total plot area to develop Green Belt and Carbon sink.	Complied (Existing area of 33% Green cover around the Plat is maintained)
7	The project authority should install a Display Board as per the Boards notification no PCBA/LGL-95/2021/Notification/01 dated 11.11.2021. (Copy enclosed as Appendix -A).	Complied
8	As per the provisions of the Water (Prevention and Control of Pollution) Act, 1974 as amended and Air Prevention and Control of Pollution) Act, 1981 as amended that any Officer empowered by the Board on its behalf shall have without interruption, the right and any time to enter the unit premises for inspection, collection of sample for analysis and may call for any information as deemed necessary.	Agreed

<table>
<tr><td></td><td>Denial of this right will cause withdrawal if the Consent order.</td><td></td></tr>
<tr><td>9</td><td>The unit shall apply for renewal atleast ninety (90) Days before expiry of this CTO.</td><td>Agreed</td></tr>
<tr><td></td><td>Specific Conditions :</td><td></td></tr>
<tr><td>10</td><td>DG sets
The unit shall comply with the standards and guidelines for control of noise pollution from stationary Diesel Generator (DG) set as attached in Appendix-B.</td><td>Complied</td></tr>
<tr><td>11</td><td>The industry shall take adequate measures for control of noise from its own source so as to comply with the Standards below :

<table><tr><td rowspan="2">Category of Area</td><td colspan="2">Limit in dB(A) Leq.</td></tr><tr><td>Day time (6:00 AM to 9:00 PM)</td><td>Night Time (9:00 PM to 6:00 AM)</td></tr><tr><td>Industrial area</td><td>75</td><td>70</td></tr></table></td><td>Complied</td></tr>
<tr><td>12</td><td>The Industry must comply with the National Ambient Air Quality Standards as prescribed vide Notification No. B-29016/20/90/PCI-I dtd. 18.11.2009 especially with reference to $PM_{2.5}$ & PM_{10} as follows :<table><tr><td rowspan="2">Sl. No.</td><td rowspan="2">Pollutant</td><td rowspan="2">Time Weighted Average</td><td colspan="2">Concentration in Ambient Air</td></tr><tr><td>Industrial, Residential, Rural and Other area</td><td>Ecologically sensitive area (Notified by Central Government)</td></tr><tr><td>1</td><td>Particulate matter (size less than 10 µg) or $PM_{10}\mu g/m^3$</td><td>Annual</td><td>60</td><td>60</td></tr><tr><td></td><td></td><td>24 hours</td><td>100</td><td>100</td></tr><tr><td>2</td><td>Particulate matter (size less than 2.5 µg) or $PM_{2.5}\mu g/m^3$</td><td>Annual</td><td>40</td><td>40</td></tr><tr><td></td><td></td><td>24 hours</td><td>60</td><td>60</td></tr></table></td><td>Complied</td></tr>
<tr><td>13</td><td>The unit shall comply with the air quality standard of Stone crusher as follows :<table><tr><td>SL No</td><td>Pollutant</td><td>Standards</td></tr><tr><td>1</td><td>Suspended Particulate Matter</td><td>The suspended particulate matter measured between 3 meters and 10 meters from any process equipment</td></tr></table></td><td>Complied</td></tr>
</table>

			of a stone crushing unit shall not exceed 600 micrograms per cubic meter.	
	Hazardous waste aspect			
1	The unit shall apply for authorization under the Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016.			Agreed and complied
2	Appropriate facility should be created for handling, storage, treatment & disposal of Hazardous waste generated form the industry such as spent oil, waste oil etc. in accordance with the provisions of the Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 including Notifications, Guidelines issued there under;			Complied
3	The unit should submit the annual return under the Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 in the Form IV within 30th June every year., E Waste Management Rules, 2016 in the Form - III within 30th June every year and Plastic Waste Management Rules, 2016 within 30th June every year.			Agreed
	The unit shall submit compliance report of the mandated conditions by April 15 of every year to Member Secretary, PCBA as well as to concerned Regional Office of the Board. The Board will have the liberty to withdraw the CTO if adequate pollution control and safety measures are not taken.			Agreed

Annexure 15 :Copies of CTE and CTO
15.1 Crusher Plant and DG sets -CTE

Pollution Control Board:: Assam
Bamunimaidam; Guwahati-21
(Department of Environment & Forests :: Government of Assam)
Phone: 0361-2652774 & 2550258; Fax: 0361-2550259
Website: www.pcbassam.org

No. WB/SLC/T-1184/21-22/06 1065 Dated Guwahati the. 22/10/2021

"CONSENT TO ESTABLISH"

"CONSENT TO ESTABLISH" is hereby granted to **M/S LARSEN & TOUBRO LTD.** for setting up a **Stone Crusher unit** with production capacity of Stone Aggregate – 33378 MT/Month; By Product : Quarry Wastage – 5006 MT/Month & Micro Fines – 3337 MT/Month alongwith 4 Nos. of DG Set of capacity – 125KVA, 250KVA, 180KVA & 40KVA to be located at Vill.: Longku, P.O.: Umrangso, Dist.: Dima Hasao, Pin-788931, (Assam) under Section 21 of Air (Prevention & Control of Pollution) Act, 1981 as amended under the following terms & conditions:

1. No Air, Water, Soil pollution shall be created by the industry beyond the permissible limits prescribed by the Board. The industry would incorporate adequate pollution control measures before they put the plant into operation.
2. To maintain the environment and ecology in the area provisions for planting selected species of tree within the compound and approaches along with provisions for park, garden and Fountain shall have to be made. Massive aforestation will have to be made by the industry in the factory and township if any.
3. As per provisions of water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 any officer, employed by this Board in its behalf shall have without any interruption, the right at any time to enter the industry for inspection, to take samples for analysis and may call for any information etc. Violation of this right will lead to withdrawal of this permission.
4. As per provisions of the Act, regular quarterly monitoring are to be done by the industry from the location/points fixed by the Board and the report to be submitted to the board quarterly.
5. To regularize the subsequent process, the legal provisions of "Consent to Operate" as per Act shall have to timely adhered to.
6. Gaseous pollution due to the burning of fuel to run engine, boiler, etc. should be controlled by adopting preventive measures adequately.
7. Solid waste that arises during the operation should be properly segregated and disposed of scientifically without causing nuisances.
8. Fire warning (Alarm, Siren) is to be installed by the unit to guard against accidental pollution/ mishap together with fire fighting devices.
9. All pipe connection, Joints, fittings etc. in the factory and plant are to be frequently checked and shall be leak proof all the time
10. Proper housekeeping and adequate maintenance has to be ensured/ enforced as per provisions of Acts.

Contd.....p/2

22/10

11. All unwanted Toxic Chemical/Fluid/Gases are to be neutralized before releasing to the ambient air / flaring up as required.

12. Production process is to be monitored and in the event of danger immediate shut down is to be ensured by the industry.

13. **"CONSENT TO ESTABLISH"** has been issued basing on the particulars furnished by the applicant and subject to imposition to further/more conditions if warranted by the subsequent development.

14. Healthy working environment for the worker must be maintained and there should not be health Hazard to the workers for inadequate arrangement for ventilation, dust removal to arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.

15. The unit must submit compliance report of action taken on the conditions given by the Board before commissioning of the plant.

16. **"CONSENT TO ESTABLISH" will be valid till the date of commissioning of the unit or 7 (seven) years whichever is earlier.**

17. This issuance of the **"CONSENT TO ESTABLISH"** does not convey any property right in their real or personal property or any exclusive privileges nor does it authorize any injury to private property nor any invasion right any infringement of Central, State or Local Laws or Regulations.

18. The **"CONSENT TO ESTABLISH"** does not authorize or approve the construction of any physical structures or facilities or the undertaking of any work in any natural watercourse except of the works specially instructed herein.

19. All steps are to be taken by the industry to control the dust so that it does not go outside the factory.

20. The industry is to fully enclose the screening machine with dust extraction from close to unit.

21. The industry is to provide dust extraction arrangement at all transfer points.

22. The industry is to make water-spraying arrangement for the finer product.

23. The industry will always keep it wet the finer product.

24. Necessary steps are to be made to minimize noise.

25. The industry must comply to the National Ambient Air Quality Standards as per Schedule – VII under Rule, 3 (3B) of the Environment (Protection) Rules, 1986.

Contd.....p/3

26. Necessary steps are to be taken to maintain Ambient Air Quality standards in respect of Noise as per the Noise Pollution (Regulation and Control) Rules, 2000 as amended till date.

27. The screening unit should strictly follow the following standards for suspended particulates matter.

    The following pollution control measures are to be implemented:

    a. Dust containment cum suppression system for the equipment.
    b. Construction of wind breaking walls.
    c. Construction of the metalled roads within the premises.
    d. Regular cleaning and wetting of the ground within the premises.
    e. Growing of a green belt along the periphery.

28. The unit should follow the guidelines as per **Appendix-'A'**.

29. The unit shall submit compliance report of the mandated conditions by April, 15, every year to Member Secretary, PCBA as well as to Regional Office, Silchar, PCBA.

30. The Board will have the liberty to withdraw the **"CONSENT TO ESTABLISH"** if adequate pollution control and safety measures are not taken.

(Dr. Shantanu Kr. Dutta)
Member Secretary

Memo No. WB/SLC/T-1184/21-22/06-A/1065 Dated Guwahati the, 22.10.2021

Copy to:

1. M/s. Larsen & Toubro Ltd., Vill.: Longku, P.O.: Umrangso, Dist.: Dima Hasao, Pin-788931, (Assam) for information & necessary action. This has reference to online application vide **No. 581837**
2. The Commissioner of Industries & Commerce, Assam, Udyog Bhawan, Bamunimaidam, Guwahati-781021 for kind information.
3. The Regional Executive Engineer, Regional Laboratory cum Office, Silchar, Pollution Control Board, Assam for information & necessary action.

(Dr. Shantanu Kr. Dutta)
Member Secretary

APPENDIX – A

1.66.0 STANDARDS AND GUIDELINES FOR CONTROL OF NOISE POLLUTION FROM STATIONARY DIESEL GENERATOR (DG) SETS.

(A) Notes standards for DG sets (15-500KVA)

The total sound power level LW of DG set should loss than 94 + 10 log 10KVA, dB (A), at the manufacturing stage, whether; KVA is the nominal power rating of a DG set.

This level should fall by 5dB (A) every five years, till 2007, i.e. in 2002 and then in 2007.

(B) Mandatory Acoustic enclosure/Acoustic treatment of room for stationary DG sets (5KVA and above):

Noise from the DG set should be controlled by providing an acoustic enclosure on by treating the room acoustically.

The acoustic enclosure/acoustic treatment of the room should be designed for minimum 25 dB (A) insertion Loss or for meeting the ambient noise standards, which ever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under circumstances the performance may be checked for noise reduction up to actual ambient noise level, preferably, in the night time). The measurement for insertion Loss may be done at different points at 0.5 from the acoustic enclosure/room, and then averaged. (See the Schematic Diagram).

The DG set should also be provided with proper exhaust muffler with Insertion Loss of minimum 25 dB (A).

Guidelines for the manufacturers Users of DG sets 5KVA and above:

- The manufacture should offer to the user a standard acoustic enclosure of 25dB(A), Insertion Loss and also a suitable exhaust muffler with Insertion Loss of 25dB(A).
- The user should make efforts to bring down the noise levels due to the DG set, outside his premises, within the ambient noise requirements by proper sitting and control measures.
- The manufacturer should furnish noise power levels of the unsalaried DG sets as per standards prescribed under (A).
- The total sound power level of a DG set, at the user's and, shall be within 2dB(A) of the total sound power level of the DG set, at the manufacturing stage, as prescribed under (A).
- Installation of DG set must be strictly in compliance with the recommendation of the DG set manufacture.
- A proper routines and preventive maintenance procedure for the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

2.44.0 NOISE (AMBIENT STANDARDS)

Area Code	Category of Area	Limit in dB(A) Leq.	
		Day time	Night time
A.	Industrial area	75	70
B.	Commercial area	65	55
C.	Residential area	55	45
D.	Silence Zone	50	40

Note – 1 : Day time is reckoned in between 6.00 A.M. and 9.00 P.M.

Note – 2 : Night time is reckoned in between 9.00P.M. and 6.00 A.M.

Note – 3 : Silence zone is defined as areas up to 100 meters around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent Authority.

Note – 4 : Mixed categories of areas should be declared as one of the four above mentioned categories by the competent Authority and the corresponding standard shall apply.

Source: EPA, 1986
[GSR 7, dated Dec.22, 1998]

Source : EPA, Notification
[GSR 1063 (E), dated Dec., 26, 1998]

3.22.0 DIESEL GENERATOR SETS : STACK HEIGHT

1. The minimum stack height to be provided with each generator set shall be worked out as per the following formula:- H = h + 0.2 √KVA, where H = Total height of stack in meter.

h = Height of the building in meters where generator set is installed.

KVA = Total generator capacity.

Adequate fire fighting measures have to be provided by the occupier of the premises. Based on the above formula the minimum stack height to be provided with different range of generator sets may be categories as follows:

Range of Generator sets	Minimum Stack Height
50 KVA	Ht. of the building + 1.5 metre.
50 – 100 KVA	Ht. of the building + 2.0 metre.
100 -150 KVA	Ht. of the building + 2.5 metre.
150 - 200 KVA	Ht. of the building + 3.0 metre.
200 - 250 KVA	Ht. of the building + 3.5 metre.
250 - 300 KVA	Ht. of the building + 3.5 metre.

Similarly for higher KVA rating a stack height can be worked out using the above formula.

Source : Evolved by CPCB
[Emission Regulations Part-IV: COINDS/26 1986-87]

4. A .32.0 Part – C

Sl. No. 1 Stack Gas : PM – 150 µg/Nm^3

B. Ambient Air Standards:

Residential Area	Industrial Area	Sensitive Area
SO_2 : 80* µg/m^3	120* : µg/m^3	30* : µg/m^3
NO_2 : 80* µg/m^3	120* : µg/m^3	30* : µg/m^3
CO : 2.0** µg/m^3	5.0** : µg/m^3	1.0** : µg/m^3
*24 hourly; ** 8 hourly		

5. SCHEMATIC DIAGRAM OF D.G. SET IN AN ACOUSTIC ENCLOSURE No. Process/71/1998-99.

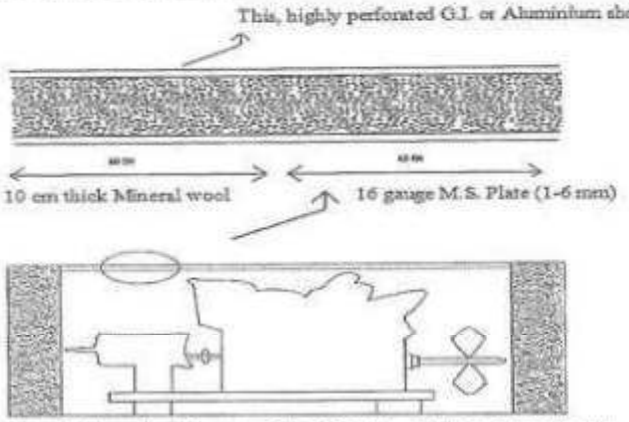


Fig. 4 Schematic Diagram of the DG set in an Acoustic Enclosure

Air required for the ventilation and breathing of the engine will have to be provided by means of intake louvers and exhaust louvers (called parallel baffle mufflers) projecting out of the enclosure.

(Dr. Shantanu Kr. Dutta)
Member Secretary
Pollution Control Board, Assam

15.2. Batching Plant and DG sets – CTE

Pollution Control Board:: Assam
Bamunimaidam; Guwahati-21
(Department of Environment & Forests :: Government of Assam)
Phone: 0361-2652774 & 2550258; Fax: 0361-2550259
Website: www.pcbassam.org

No. WB/SLC/T-1191/21-22/7 Dated Guwahati, the 11/7/2021
Online application No. 590529

"CONSENT TO ESTABLISH"

"CONSENT TO ESTABLISH" is hereby granted under Section 25 of Water (Prevention & Control of Pollution) Act, 1974 and Section 21 of Air (Prevention & Control of Pollution) Act, 1981 as amended and Rules Framed thereunder to

i) Name of Industry- M/S. Larsen & Toubro Ltd. batching Plant.
ii) Name of the Occupier / Applicant and Designation- Mr. Santanu Majumder (Project Manager).
iii) Address- Lower Kopili Hydro Electric project, Vill; Longku, P.O. Umrangso, Dist Dima Hasao (Assam)
iv) Validity of CTE- till the date of commissioning of the unit or 7 (seven) years whichever is earlier
v) Details of Products to be Manufactured. Batching Plant Unit of capacity 5200 MT/Month.

This CTE is valid as per specific information and documents provided by the occupier as well as site inspection and preliminary assessment by the Board and same is granted subject to the General and specific conditions stipulated below:-

1. No Air, Water, Soil pollution shall be created by the industry beyond the permissible limits prescribed by the Board. The industry would incorporate adequate pollution control measures before they put the plant into operation.
2. To regularize the subsequent process, the legal provisions of 'Consent to Operate' as per Act shall have to be timely adhered to.
3. The solid waste generated from the unit shall be disposed in a scientific way as per Solid Waste Management Rules, 2016.
4. Environmental Statement in prescribed form V should be submitted on or before the 30th September every year.
5. Fire warning (Alarm, Siren) is to be installed by the unit to guard against accidental pollution/ mishap together with fire fighting devices.
6. Proper housekeeping and adequate maintenance has to be ensured/ enforced as per provisions of Acts.
7. Healthy working environment for the worker must be maintained and there should not be health Hazard to the workers for inadequate arrangement for ventilation, dust removal to arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.
8. The Plastic waste generated from the unit shall be disposed in a scientific way as per Plastic Waste Management Rules, 2016.
9. Healthy working environment for the worker must be maintained and there should not be health Hazard to the workers for inadequate arrangement for ventilation, dust removal to arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.
10. The project proponent shall develop a greenbelt / Plantation area with native trees only at at-least 33% of total plot area.
11. The industry is to provide dust extraction arrangement at all transfer points.

12. The industry should install water sprinkler system to suppress the dust which may arise due to plying of vehicles etc.

13. Necessary steps are to be made to bring the noise within the prescribed limit as stipulated below, as per GSR 7, dated Dec 22, 1998.

Limit in dB(A) Leq.	
Day time	Night time
75	70

14. The unit shall apply for Authorization under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 within 30 days from the date of issue of this order.

15. The industry must comply to the National Ambient Air Quality Standards as per Schedule – VII under Rule, 3 (3B) of the Environment (Protection) Rules, 1986, especially with respect to $PM_{2.5}$, PM_{10} SO_2 & NO_2 as follows.

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air	
			Industrial, Residential, Rural & Other Area	Ecologically Sensitive Area (notified by Central Government)
1.	Particulate Matter (size less than 10µg) or PM10 µg/m3	Annual* 24 hours**	60 100	60 100
2.	Particulate Matter (size less than 2.5µg) or PM2.5 µg/m3	Annual* 24 hours**	40 60	40 60
3.	Sulphur Dioxide (SO2), µg/m3	Annual* 24 hours**	50 80	20 80
4.	Nitrogen Dioxide (NO2), µg/m3	Annual* 24 hours**	40 80	30 80

16. The unit shall submit compliance report of the mandated conditions by April, 15, every year to Member Secretary, PCBA as well as to concerned Regional Office, PCBA.

17. This "CONSENT TO ESTABLISH" is subject to imposition of any other condition, if warranted by the subsequent development. This issuance of the CTE does not i) convey any property right in their real or personal property or any exclusive privileges, ii) nor does it authorize any injury to private property nor any invasion right/ any infringement of Central, State or Local Laws or Regulations. iii)The CTE does not authorize or approve the construction of any physical structures or facilities or the undertaking of any work in any natural watercourse except of the works specially instructed herein.

The Board will be at liberty to withdraw the CTE at any time without notice, if necessary steps for prevention & control of pollution and prevention of environment is not taken by the industry as per mentioned conditions.

(Dr. Shantanu Kr. Dutta)
Member Secretary

Memo No. WB/SLC/T-1191/21-22/7-A. Dated Guwahati, the 11/11/2021

Copy to:

1. M/s. Larsen & Toubro Ltd, batching Plant, Lower Kopili Hydro Electric project, Vill: Longku, P.O. Umrangso, Dist Dima Hasao (Assam) for information & necessary action.
2. The Regional Executive Engineer, RLO, Silcahr, Pollution Control Board, Assam for information & necessary action.

(Dr. Shantanu Kr. Dutta)
Member Secretary

15.3. Crusher plant and DG sets – CTO

Pollution Control Board:: Assam
Bamunimaidam; Guwahati-21
(Department of Environment & Forests :: Government of Assam)
Phone: 0361-2652774 & 2550258; Fax: 0361-2550259
Website: www.pcbassam.org

No. WB/SLC/T-1184/21-22/09 1152 Dated Guwahati, the 07/12/2021

"CONSENT TO OPERATE"

"CONSENT TO OPERATE" (CTO) under Section 21 of Air (Prevention and Control of Pollution) Act, 1981 as amended is granted to:-

i)	Name of Industry	**M/s Larsen & Toubro Ltd**
ii)	Name of the Occupier Applicant and Designation	:Shri SANTANU MAJUMDAR, PROJECT MANAGER
iii)	Address of Industry	:Vill-Totelangso, P.O.: Umrangso,Dist: Dima Hasao, PIN: 788931, Assam
iv)	Project cost	47.0 (In Lakhs)
v)	Validity	**31-03-2025**

Sl No.	Number / Type of Crusher	Capacity
1	Jaw Crusher-Primary	200 TPH
2	Jaw Crusher-Secondary	200 TPH

Sl No.	Product	Quantity/ Capacity
1	Stone Aggregate	33378 MT/Month
2	By product: 1.Quarry Wastage 2. Micro Fines	 5006 MT/Month 3337 MT/Month.

vi) DG Set — 4 nos. of capacity – 40 KVA, 125 KVA, 180 KVA & 250 KVA

TERMS AND CONDITIONS:

1. This CTO has been accorded based on the particulars furnished by the applicant vide Application ID **810264** and subject to addition of further more conditions if so warranted by subsequent developments. The CTO will automatically become invalid if there is any changes, modification, alteration, expansion or deviation is made in actual practice.
2. The CTO is valid for a period up to **31.03.2025** unless otherwise suspended or revoked.
3. The CTO may be modified, suspended or revoked by the Board in whole or in part during its term for cause including, but not limited to the following:-
   a) Violation of any Terms and Conditions of this CTO;
   b) Obtaining the CTO by misrepresentation or failure to disclose fully all relevant facts;
   c) A change in any condition that require temporary or permanent reduction or elimination of the authorized discharge/emission;
4. The CTO does not authorize any addition, alteration, modification, modernization of processor products without prior permission of the Board.
5. Proper housekeeping shall be maintained within unit premises.
6. The project proponent must develop a greenbelt/plantation area with native trees covering atleast 33% of the total plot area to develop Green Belt and Carbon Sink.

Contd...p/2

7. The project authority should install a Display Board as per the Boards notification no. PCBA/LGL-95/2021/Notification/01 dtd.11.11.2021. (Copy enclosed as **Appendix-A**).
8. As per the provisions of the Water (Prevention and Control of Pollution) Act, 1974 as amended and Air Prevention and Control of Pollution) Act, 1981 as amended that any Officer empowered by the Board on its behalf shall have without interruption, the right at any time to enter the unit premises for inspection, collection of sample for analysis and may call for any information as deemed necessary. Denial of this right will cause withdrawal of the Consent Order.
9. The unit shall apply for renewal atleast ninety (90) before expiry of this CTO.

Specific Conditions:

10. **DG Set**

The unit shall comply with the **standards and guidelines for control of noise pollution from stationary Diesel Generator (DG) set** as attached in Appendix-B.

11. The industry shall take adequate measures for control of noise from its own source so as to comply with the Standards below:

Category of Area	Limit in dB(A) Leq.	
	Day Time (6:00am-9:00pm)	Night Time (9:00pm-6:00am)
Industrial area	75	70

12. The industry must comply with the National Ambient Air Quality Standards as prescribed vide Notification No. B-29016/20/90/PCI-I dtd. 18.11.2009 especially with reference to $PM_{2.5}$ & PM_{10} as follows:

Sl. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air	
			Industrial, Residential, Rural & Other Area	Ecologically Sensitive Area (notified by Central Government)
1.	Particulate Matter (size less than 10µg) or PM_{10} µg/m³	Annual*	60	60
		24 hours**	100	100
2.	Particulate Matter (size less than 2.5µg) or $PM_{2.5}$ µg/m³	Annual*	40	40
		24 hours**	60	60

13. The unit shall comply with the **air quality standard of Stone crusher** as follows:

Sl. No.	Pollutant	Standards
1.	Suspended particulate matter	The suspended particulate matter measured between 3 meters and 10 meters from any process equipment of a stone crushing unit shall not exceed 600 micrograms per cubic meter.

Hazardous Waste Aspect:

1. The unit shall apply for authorization under the Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016.
2. Appropriate facility should be created for handling, storage, treatment & disposal of Hazardous waste generated from the industry such as spent oil, waste oil etc. in accordance to the provisions of the Hazardous & Other Wastes (Management & Trans Boundary Movement) Rules, 2016 including Notification, Guidelines issued there under;
3. The unit should submit the annual return under the Hazardous & Other Wastes (Management & Trans Boundary Movement) Rules, 2016 in the Form-IV within 30th June every year, E-Waste Management Rules, 2016 in the Form-III within 30th June every year and Plastic Waste Management Rules, 2016 within 30th June every year.

Contd...p/3

The unit shall submit compliance report of the mandated conditions by April 15 of every year to Member Secretary, PCBA as well as to concerned Regional Office of the Board. The Board will have the liberty to withdraw the CTO if adequate pollution control and safety measures are not taken.

(Shantanu Kr. Dutta)
Member Secretary

Memo No. WB/SLC/T-1184/21-22/09-A, Dated Guwahati, the 07/12/ 2021

Copy to:

1. M/s Larsen & Toubro Ltd, Vill-Totelangso, P.O.: Umrangso,Dist: Dima Hasao, PIN: 788931, Assam for information & necessary action.
2. The General Manager, DI & CC, Dima Hasao District, Assam, for information.
3. The Executive Engineer, Regional Lab cum Office, Silchar, Pollution Control Board, Assam for information & necessary action.

(Shantanu Kr. Dutta)
Member Secretary

APPENDIX – I

1.66.0 Standards and Guidelines for Control of Noise Pollution from Stationary Diesel Generator (DG) Sets.

(A) Sound standards for DG sets (15-500KVA)

The total sound power level LW of DG set should loss than 94 + 10 log 10KVA, dB (A), at the manufacturing stage, whether; KVA is the nominal power rating of a DG set.

This level should fall by 5dB (A) every five years, till 2007, i.e. in 2002 and then in 2007.

(B) Mandatory Acoustic enclosure/Acoustic treatment of room for stationary DG sets (5KVA and above):

Noise from the DG set should be controlled by providing an acoustic enclosure on by treating the room acoustically.

The acoustic enclosure/acoustic treatment of the room should be designed for minimum 25 dB (A) insertion Loss or for meeting the ambient noise standards, which ever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under circumstances the performance may be checked for noise reduction up to actual ambient noise level, preferably, in the night time). The measurement for insertion Loss may be done at different points at 0.5 from the acoustic enclosure/room, and then averaged. (See the Schematic Diagram).

The DG set should also be provided with proper exhaust muffler with Insertion Loss of minimum 25 dB (A).

Guidelines for the manufacturers Users of DG sets 5KVA and above:

- The manufacture should offer to the user a standard acoustic enclosure of 25dB(A). Insertion Loss and also a suitable exhaust muffler with Insertion Loss of 25dB(A).
- The user should make efforts to bring down the noise levels due to the DG set, outside his premises, within the ambient noise requirements by proper sitting and control measures.
- The manufacturer should furnish noise power levels of the unsalaried DG sets as per standards prescribed under (A).
- The total sound power level of a DG set, at the user's and, shall be within 2dB(A) of the total sound power level of the DG set, at the manufacturing stage, as prescribed under (A).
- Installation of DG set must be strictly in compliance with the recommendation of the DG set manufacture.
- A proper routines and preventive maintenance procedure for the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

2.44.0 NOISE (AMBIENT STANDARDS)

Area Code	Category of Area	Limit in dB(A) Leq.	
		Day time	Night time
A.	Industrial area	75	70
B.	Commercial area	65	55
C.	Residential area	55	45
D.	Silence Zone	50	40

Note – 1 : Day time is reckoned in between 6.00 A.M. and 9.00 P.M.

Note – 2 : Night time is reckoned in between 9.00P.M. and 6.00 A.M.

Note – 3 : Silence zone is defined as areas up to 100 meters around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent Authority.

Note – 4 : Mixed categories of areas should be declared as one of the four above mentioned categories by the competent Authority and the corresponding standard shall apply.

Source: EPA, 1986
[GSR 7, dated Dec.22, 1998]

Source : EPA, Notification
[GSR 1063 (E), dated Dec., 26, 1998]

3.22.0 DIESEL GENERATOR SETS : STACK HEIGHT

1. The minimum stack height to be provided with each generator set shall be worked out as per the following formula:- H = h + 0.2 √KVA, where H = Total height of stack in meter.

h = Height of the building in meters where generator set is installed.

KVA = Total generator capacity.

Adequate fire fighting measures have to be provided by the occupier of the premises. Based on the above formula the minimum stack height to be provided with different range of generator sets may be categories as follows:

Range of Generator sets	Minimum Stack Height
50 KVA	Ht. of the building + 1.5 metre.
50 – 100 KVA	Ht. of the building + 2.0 metre.
100 -150 KVA	Ht. of the building + 2.5 metre.
150 - 200 KVA	Ht. of the building + 3.0 metre.
200 - 250 KVA	Ht. of the building + 3.5 metre.
250 - 300 KVA	Ht. of the building + 3.5 metre.

Similarly for higher KVA rating a stack height can be worked out using the above formula.

Source : Evolved by CPCB
[Emission Regulations Part-IV: COINDS/26 1986-87]

4. A .32.0 Part – C

Sl. No. 1 Stack Gas : PM – 150 µg/Nm^3

B. Ambient Air Standards:

Residential Area	Industrial Area	Sensitive Area
SO_2 : 80* µg/m^3	120* : µg/m^3	30* : µg/m^3
NO_2 : 80* µg/m^3	120* : µg/m^3	30* : µg/m^3
CO : 2.0** µg/m^3	5.0** : µg/m^3	1.0** : µg/m^3
*24 hourly; ** 8 hourly		

5. SCHEMATIC DIAGRAM OF D.G. SET IN AN ACOUSTIC ENCLOSURE No. Process/71/1998-99.

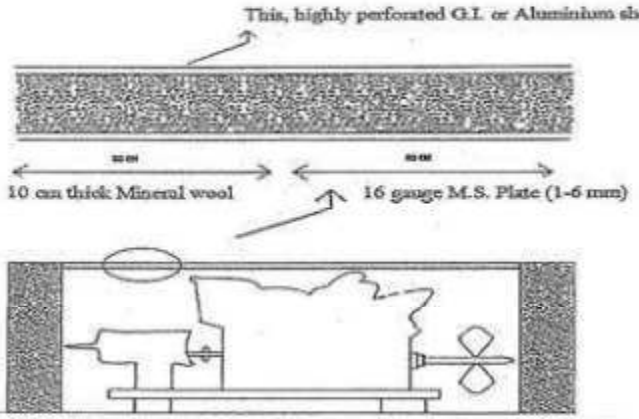


Fig. 4 Schematic Diagram of the DG set in an Acoustic Enclosure

Air required for the ventilation and breathing of the engine will have to be provided by means of intake louvers and exhaust louvers (called parallel baffle mufflers) projecting out of the enclosure.

(Dr. Shantanu Kr. Dutta)
Member Secretary
Pollution Control Board, Assam

15.4. Batching Plant and DG sets – CTO

Pollution Control Board:: Assam
Bamunimaidam; Guwahati-21
(Department of Environment & Forests :: Government of Assam)
Phone: 0361-2652774 & 2550258; Fax: 0361-2550259
Website: www.pcbassam.org

No. WB/SLC/T-1191/21-22/17 Dated Guwahati, the 27th December, 2021

"CONSENT TO OPERATE"

"CONSENT TO OPERATE" (CTO) under Section 25 of Water (Prevention and Control of Pollution) Act 1974 and Section 21 of Air (Prevention and Control of Pollution) Act, 1981 as amended is granted to-

i) Name of Industry : **M/s Larsen & Toubro Limited.**
ii) Name of the Occupier / Applicant and Designation : Sri Santanu Majumdar,Project Manager
iii) Address of Industry : Vill-Totelangso,P.O-Umrangso,Dist-Dima Hasao,Assam
iv) Project cost : Rs. 95.00 Lakhs
v) Details of Products :

Sl No.	Product	Quantity/ Capacity
1	Ready Mix Concrete	5200 M^3/Month

vi) DG Sets : 1x250 KVA, 1x180 KVA, 1x140 KVA & 1x125 KVA

TERMS AND CONDITIONS:

1. This **CTO** has been accorded based on the particulars furnished by the applicant vide Application ID **838921** and subject to addition of further more conditions if so warranted by subsequent developments. The CTO will automatically become invalid if there is any changes, modification, alteration, expansion or deviation is made in actual practice.
2. The CTO is valid for a period up to 31.03.2025 unless otherwise suspended or revoked.
3. The CTO may be modified, suspended or revoked by the Board in whole or in part during its term for cause including, but not limited to the following:-
   a) Violation of any Terms and Conditions of this CTO;
   b) Obtaining the CTO by misrepresentation or failure to disclose fully all relevant facts;
   c) A change in any condition that require temporary or permanent reduction or elimination of the authorized discharge/emission.
4. **The project proponent shall develop a greenbelt / Plantation area with native trees covering at-least 33% of total plot area for the development of greenbelt and carbon sink.**
5. As per provisions of water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 any officer, employed by this Board in its behalf shall have without any interruption, the right at any time to enter the industry for inspection, to take samples for analysis and may call for any information etc.
6. **The project authority should install a Display Board as per the Boards notification no.CBA/LGL-95/2021/Notification/01 dtd.11.11.2021.** (Copy enclosed as Appendix-A).
7. Permission shall be obtained from the Central Ground Water Authority (CGWA) for the extraction of ground water, if applicable.

Contd....P/2

6. Measures including water sprinkling shall be provided at all the material in the haul roads to control fugitive emission.

Air Aspects:

1. **The unit shall comply with the Particulate Matter (PM) emission level at 150 mg/Nm^3**
2. Dust suppression measures are to be taken by the industry to control the dust in the haul roads during movement of vehicles.
3. The unit shall comply with the **standards and guidelines for control of noise pollution from stationary Diesel Generator (DG) set as notified vide GSR 7, dtd.22.12.1998** as attached in **Appendix-B**.
4. Necessary steps are to be made to bring the noise within the prescribe limit as stipulated below:

Limit in dB(A) Leq.	
Day time	Night time
75	70

5. The industry must comply the National Ambient Air Quality Standards as per Schedule – VII under Rule, 3 (3B) of the Environment (Protection) Rules, 1986 as prescribed **vide CPCB Notification No. B-29016/20/90/PCI-I dtd. 18.11.2009** (copy enclosed as **Appendix -C**) especially for $PM_{2.5}$ & PM_{10}.

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air	
			Industrial, Residential, Rural & Other Area	Ecologically Sensitive Area (notified by Central Government)
1.	Particulate Matter (size less than 10µg) or PM10 µg/m3	Annual* 24 hours**	60 100	60 100
2.	Particulate Matter (size less than 2.5µg) or PM2.5 µg/m3	Annual* 24 hours**	40 60	40 60

Water Aspects:

1. **The unit must construct effluent treatment system for the treatment of waste water and the parameters should meet with general discharge parameters standard as per G.S.R. 422(E) dated 19.05.1993** (Copy enclosed as Appendix **-D**).
2. The unit shall reuse the treated water at their own processes.

Solid Waste Aspect-

1. Adequate facility should be created for collection, storage, transportation, treatment & disposal of solid waste generated from the Industry
2. Adequate system should be adopted on reduction of waste generation and enhancement of re-utilization & recycling of waste materials.
3. Solid waste generated in the unit shall be disposed of as per the provisions of the Solid Waste Management Rules 2016.

Contd....P/3

D. **Hazardous Waste Aspects-**

1. The unit shall apply for authorization under the Hazardous & Other waste (Management & Transboundary Movement) Rules, 2016 and submit the annual return under Hazardous & Other Waste (Management & Trans Boundary Movement) Rules 2016 in the Form-IV within 30th June every year.
2. Adequate facility shall be provided for collection and storage of spent oil and such hazardous waste generated in the unit shall be sent to registered recyclers for recycling.
3. The unit shall disposed hazardous waste generated in the unit in accordance to the provisions of the Hazardous & Other Waste (Management & Trans Boundary Movement) Rules 2016 including Notification, Guidelines issued there under.

The unit shall submit compliance report of the mandated conditions by April 15 of every year to Member Secretary, PCBA as well as to Regional Office, Silchar, PCBA. The Board will have the liberty to withdraw the CTO if adequate pollution control and safety measures are not taken.

(Shantanu Kr. Dutta)
Member Secretary

Memo No. WB/ SLC/T-1191/21-22/17-A 1947 Dated Guwahati, the 27th December, 2021

Copy to:

1. M/s Larsen & Toubro Limited, Vill- Totelangso, P.O-Umrangso, Dist- Dima Hasao, Assam A for information & necessary action.
2. The Executive Engineer, RLO, Silchar, Pollution Control Board, Assam for information & necessary action.

(Shantanu Kr. Dutta)
Member Secretary

Appendix-A

pcba

Pollution Control Board, Assam
Bamunimaidam, Guwahati-21

NOTIFICATION

No. PCBA/LGL-95/2021/Notification/01 Dated Guwahati, the 11th Nov, 2021

In exercise of the powers conferred under Section-5 of the Environment (Protection) Act, 1986 as amended till date and keeping in view the need of public interest towards dissemination of vital information regarding Consent/Authorization of this Board, all industries are hereby directed to install a Display Board of minimum size 5 x4 , near the main entrance gate.

The format of the display board is given below:

Name and Address of the Unit : M/s.

Description of Consent/Authorization	Details
Consent to Establish (CTE)	No.: Date of Issue:
Consent to Operate (CTO)	No.: Date of validity:
Authorization under Hazardous & Other waste (Management & Transboundary Movement) Rules, 2016 (if applicable)	No.: Date of Issue: Date of validity:

Member Secretary

Memo No. PCBA/LGL-95/2021/Notification/01-A/983 Dated Guwahati, the 11th Nov, 2021

Copy to:

1. The Commissioner & Secretary to the Govt. of Assam, Department of Environment & Forest, Dispur for kind information.
2. P.A. to the Chairman, PCBA for kind appraisal of the Hon'ble Chairman.
3. The AE Regional Heads, PCBA for information & necessary action.
4. M/S APS Advertising Pvt. Ltd, Guwahati-1. They are requested to publish the "NOTICE" in "the Assam Tribune" and "Dainandin Barta" on 12.11.2021.
5. Notice Board, Head Office / Website (www.pcbassam.org), PCBA.

Member Secretary

APPENDIX – B

1.66.0 Standards and Guidelines for Control of Noise Pollution from Stationary Diesel Generator (DG) Sets.

(A) Notes standards for DG sets (15-500KVA)

The total sound power level LW of DG set should less than 94 + 10 log 10KVA, dB (A), at the manufacturing stage, whether; KVA is the nominal power rating of a DG set.

This level should fall by 5dB (A) every five years, till 2007, i.e. in 2002 and then in 2007.

(B) Mandatory Acoustic enclosure/Acoustic treatment of room for stationary DG sets (5KVA and above):

Noise from the DG set should be controlled by providing an acoustic enclosure on by treating the room acoustically.

The acoustic enclosure/acoustic treatment of the room should be designed for minimum 25 dB (A) insertion Loss or for meeting the ambient noise standards, which ever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under circumstances the performance may be checked for noise reduction up to actual ambient noise level, preferably, in the night time). The measurement for insertion Loss may be done at different points at 0.5 from the acoustic enclosure/room, and then averaged. (See the Schematic Diagram).

The DG set should also be provided with proper exhaust muffler with Insertion Loss of minimum 25 dB (A).

Guidelines for the manufacturers Users of DG sets 5KVA and above:

- The manufacture should offer to the user a standard acoustic enclosure of 25dB (A). Insertion Loss and also a suitable exhaust muffler with Insertion Loss of 25dB (A).
- The user should make efforts to bring down the noise levels due to the DG set, outside his premises, within the ambient noise requirements by proper sitting and control measures.
- The manufacturer should furnish noise power levels of the unsalaried DG sets as per standards prescribed under (A).
- The total sound power level of a DG set, at the user's and, shall be within 2dB(A) of the total sound power level of the DG set, at the manufacturing stage, as prescribed under (A).
- Installation of DG set must be strictly in compliance with the recommendation of the DG set manufacture.
- A proper routines and preventive maintenance procedure for the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

2.44.0 NOISE (AMBIENT STANDARDS)

Area Code	Category of Area	Limit in dB (A) Leq.	
		Day time	Night time
A.	Industrial area	75	70
B.	Commercial area	65	55
C.	Residential area	55	45
D.	Silence Zone	50	40

Note – 1 : Day time is reckoned in between 6.00 A.M. and 9.00 P.M.

Note – 2 : Night time is reckoned in between 9.00P.M. and 6.00 A.M.

Note – 3 : Silence zone is defined as areas up to 100 meters around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent Authority.

Note – 4 : Mixed categories of areas should be declared as one of the four above mentioned categories by the competent Authority and the corresponding standard shall apply.

Source: EPA, 1986
[GSR 7, dated Dec.22, 1998]

Source: EPA, Notification
[GSR 1063 (E), dated Dec., 26, 1998]

3.22.0 DIESEL GENERATOR SETS : STACK HEIGHT

1. The minimum stack height to be provided with each generator set shall be worked out as per the following formula: - H = h + 0.2 √KVA, where H = Total height of stack in meter.

h = Height of the building in meters where generator set is installed.

KVA = Total generator capacity.

Adequate fire fighting measures have to be provided by the occupier of the premises. Based on the above formula the minimum stack height to be provided with different range of generator sets may be categories as follows:

Range of Generator sets	Minimum Stack Height
50 KVA	Ht. of the building + 1.5 metre.
50 – 100 KVA	Ht. of the building + 2.0 metre.
100 -150 KVA	Ht. of the building + 2.5 metre.
150 - 200 KVA	Ht. of the building + 3.0 metre.
200 - 250 KVA	Ht. of the building + 3.5 metre.
250 - 300 KVA	Ht. of the building + 3.5 metre.

Similarly for higher KVA rating a stack height can be worked out using the above formula.

Source : Evolved by CPCB
[Emission Regulations Part-IV: COINDS/26 1986-87]

4. A .32.0 Part – C

Sl. No. 1 Stack Gas : PM – 150 µg/Nm^3

B. Ambient Air Standards:

Residential Area	Industrial Area	Sensitive Area
SO_2 : 80* µg/m^3	120* : µg/m^3	30* : µg/m^3
NO_2 : 80* µg/m^3	120* : µg/m^3	30* : µg/m^3
CO : 2.0** µg/m^3	5.0** : µg/m^3	1.0** : µg/m^3
*24 hourly; ** 8 hourly		

5. SCHEMATIC DIAGRAM OF D.G. SET IN AN ACOUSTIC ENCLOSURE No. Process/71/1998-99.

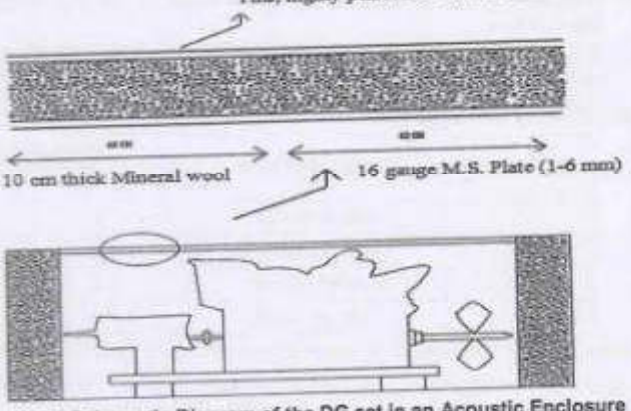


Fig. 4 Schematic Diagram of the DG set in an Acoustic Enclosure

Air required for the ventilation and breathing of the engine will have to be provided by means of intake louvers and exhaust louvers (called parallel baffle mufflers) projecting out of the enclosure.

(Dr. Shantanu Kr. Dutta)
Member Secretary
Pollution Control Board, Assam

APPENDIX-C

NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION
New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-L.—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), $\mu g/m^3$	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM_{10} $\mu g/m^3$	Annual*	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ $\mu g/m^3$	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) $\mu g/m^3$	8 hours**	100	100	- UV photometric - Chemiluminescence
		1 hour**	180	180	- Chemical Method
6	Lead (Pb) $\mu g/m^3$	Annual*	0.50	0.50	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100	-Chemiluminescence -Indophenol blue method
		24 hours**	400	400	

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m^3	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m^3	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Extv.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

Printed by the Manager, Government of India Press, Ring Road, Mayapuri, New Delhi-110064
and Published by the Controller of Publications, Delhi-110054.

APPENDIX-D

Pollution Control Board, Assam

[1][SCHEDULE – VI]

(See rule 3A)

GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A : EFFLUENTS

S. No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2	3			
		(a)	(b)	(c)	(d)
1.	Colour and odour	See 6 of Annexure-I	--	See 6 of Annexure -I	See 6 of Annexure-I
2.	Suspended solids mg/l, Max.	100	600	200	(a) For process waste water- 100 (b) For cooling water effluent 10 percent above total suspended matter of influent.
3.	Particulate size of suspended solids	Shall pass 850 micron IS Sieve	--	--	(a) Floatable solids, max. 3 mm. (b) Settleable solids, max. 850 microns.
[2]4.	***	*	--	***	--
5.	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
6.	Temperature	shall not exceed 5°C above the receiving water temperature	--	--	shall not exceed 5°C above the receiving water temperature

1 Schedule VI inserted by Rule 2(d) of the Environment (Protection) Second Amendment Rules, 1993 notified vide G.S.R. 422(E) dated 19.05.1993, published in the Gazette No. 174 dated 19.05.1993.

2 Omitted by Rule 2(d)(i) of the Environment (Protection) Third Amendment Rules, 1993 vide Notification No.G.S.R.801(E), dated 31.12.1993.

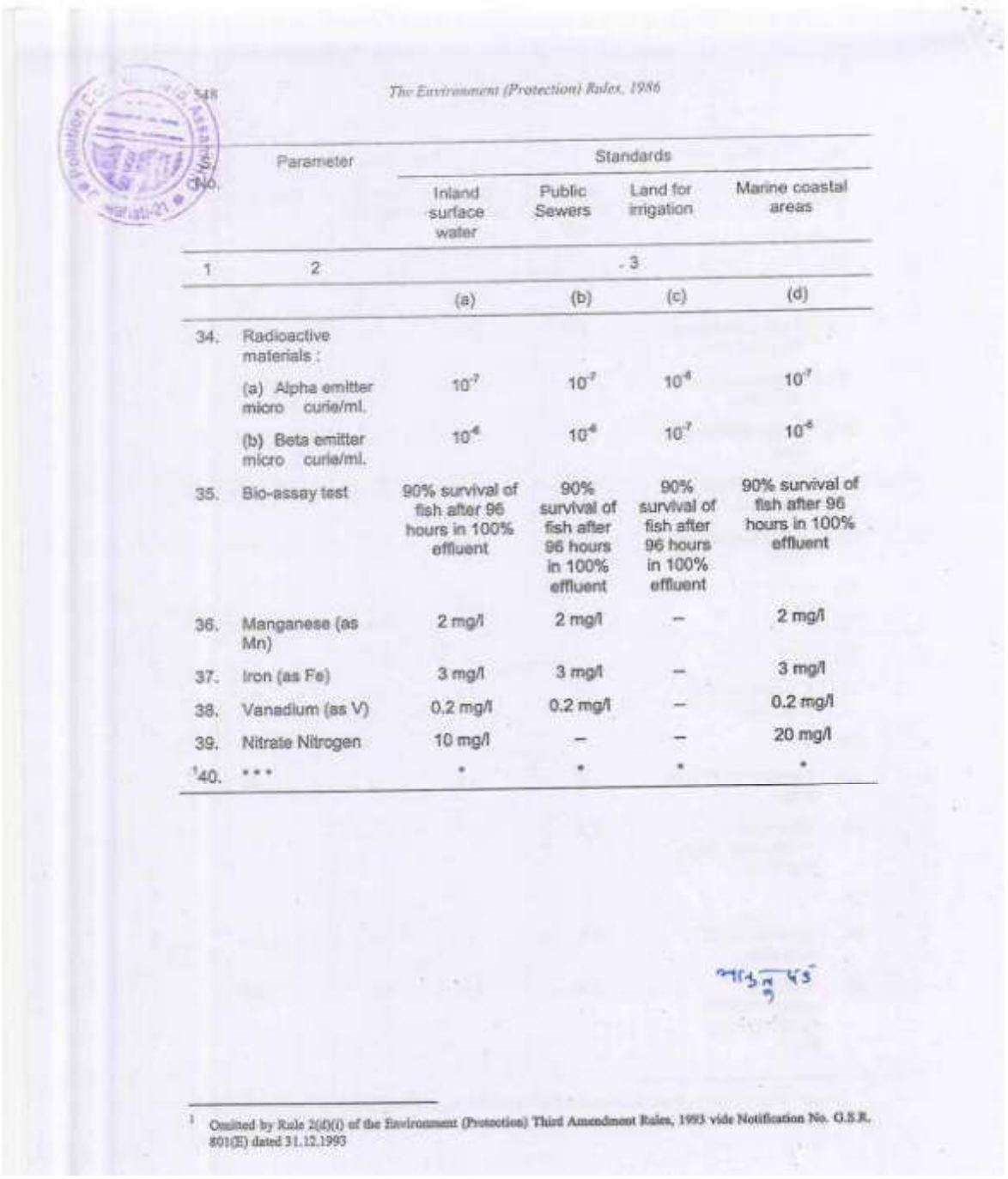
S. No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2	3			
		(a)	(b)	(c)	(d)
7.	Oil and grease mg/l Max.	10	20	10	20
8.	Total residual chlorin mg/l Max.	1.0	–	–	1.0
9.	Ammonical nitrogen (as N), mg/l Max.	50	50	–	50
10.	Total Kjeldahl Nitrogen (as NH_3) mg/l, Max.	100	–	–	100
11.	Free ammonia (as NH_3) mg/l, Max.	5.0	–	–	5.0
12.	Biochemical Oxygen demand [1][3 days at 27°C] mg/l max.	30	350	100	100
13.	Chemical Oxygen Demand, mg/l, max.	250	–	–	250
14.	Arsenic (as As), mg/l, max.	0.2	0.2	0.2	0.2
15.	Mercury (as Hg), mg/l, Max.	0.01	0.01	–	0.01
16.	Lead (as Pb) mg/l, Max.	0.1	1.0	–	2.0
17.	Cadmium (as Cd) mg/l, Max.	2.0	1.0	–	2.0
18.	Hexavalent Chromium (as Cr+6), mg/l max.	0.1	2.0	–	1.0

[1] Substituted by Rule2 of the Environment (Protection) Amendment Rules, 1996 notified by G.S.R.176, dated 2.4.1996 may be read as BOD (3 days at 27°C) wherever BOD 5 days 20°C occurred.

Pollution Control Board, Assam

S. No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2	3			
		(a)	(b)	(c)	(d)
19.	Total chromium (as Cr.) mg/l, Max.	2.0	2.0	--	2.0
20.	Copper (as Cu) mg/l, Max.	3.0	3.0	--	3.0
21.	Zinc (As Zn.) mg/l, Max.	5.0	15	--	15
22.	Selenium (as Se.) mg/l, Max.	0.05	0.05	--	0.05
23.	Nickel (as Ni) mg/l, Max.	3.0	3.0	--	5.0
[1]24.	* * *	*	*	*	*
[1]25.	* * *	*	*	*	*
[1]26.	* * *	*	*	*	*
27.	Cyanide (as CN) mg/l Max.	0.2	2.0	0.2	0.2
[1]28.	* * *	*	*	*	*
29.	Fluoride (as F) mg/l Max.	2.0	15	--	15
30.	Dissolved Phosphates (as P), mg/l Max.	5.0	--	--	--
[2]31.	* * *	*	*	*	*
32.	Sulphide (as S) mg/l Max.	2.0	--	--	5.0
33.	Phenolic compounds (as C_6H_5OH) mg/l, Max.	1.0	5.0	--	5.0

[1] Omitted by Rule 2(d)(i) of the Environment (Protection) Third Amendment Rules, 1993 vide Notification No.G.S.R.801(E), dated 31.12.1993.



548 *The Environment (Protection) Rules, 1986*

S. No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2	3			
		(a)	(b)	(c)	(d)
34.	Radioactive materials :				
	(a) Alpha emitter micro curie/ml.	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	(b) Beta emitter micro curie/ml.	10^{-6}	10^{-6}	10^{-7}	10^{-6}
35.	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
36.	Manganese (as Mn)	2 mg/l	2 mg/l	–	2 mg/l
37.	Iron (as Fe)	3 mg/l	3 mg/l	–	3 mg/l
38.	Vanadium (as V)	0.2 mg/l	0.2 mg/l	–	0.2 mg/l
39.	Nitrate Nitrogen	10 mg/l	–	–	20 mg/l
[1]40.	* * *	*	*	*	*

[1] Omitted by Rule 2(d)(i) of the Environment (Protection) Third Amendment Rules, 1993 vide Notification No. G.S.R. 801(E) dated 31.12.1993

Appendix 1 :CEMP of Package 2

Appendix 2 :Health and Safety Plan – Package 2



Wild Flowers - November 2021



APPENDIX -1 – CEMP of Package 2

L&T Construction
Heavy Civil Infrastructure

Environmental Management Plan (EMP)
120MW LOWER KOPILI HYDROELECTRIC PROJECT, (PACKAGE-2)

L&T LIFE Work Incident Free to Live Injury Free Each day

Reference: **IM 27 A**

Review & Approval:

	Name	Position	Date	Signature
Prepared by Project Environmental Engineer	Manoj Yadav	Assistant Manager	29-11-2021	
Approved by L&T Project Head	Santanu Majumdar	Project Manager	30-11-2021	
Approval by Client (if applicable)				

Revision History:

Issue	Revision	Date	Change Summary
1	R0	13.09.2020	Submitted along with EHS Plan
2	R0	03.04.2021	Updated as reviewed by client
3	R0	07.07.2021	Updated as reviewed by customer (Separate EMP Submission)
4	R1	30.11.2021	Updated EMP submitted

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FOREWORD

This plan has been prepared as per the established, implemented & certified Environmental Management System in line with the requirements of ISO 14001: 2015 of Contractor.

In this Environmental Management Plan, cross references have been furnished, where ever applicable, to various Integrated as well as Environmental Management System Procedures / Guidelines / Work Instructions prepared in line with the requirements of International Standard ISO 14001:2015 (Environmental Management System – Specification with guidance for use) and Conditions of Contract.

EXECUTIVE SUMMARY

Site may create a wide range of impacts on the environment due to various construction activities. The potential adverse effects of this project work encompass air pollution, noise and vibration, visual pollution, ground water pollution, contamination of bottom sediment, loss of bottom habitat, current pattern change, waste disposal, oil leakage and spillage, hazardous material emissions and other unhealthy socio-cultural impacts. To minimize these adverse effects this EMP will act as an apex-guiding manual at the project site level, which describes in detail how the significant aspects leading to adverse environmental impacts will be identified and mitigated. All the significant aspects of the project will be identified, so that the adverse aspects can be prevented, controlled or minimized by having suitable objectives and targets and or operational control procedures.

The mitigating measures adopted during construction operations will include the ambient air quality management; control of water pollution, waste water treatment and water conservation; spill prevention and control (oil and lubricant), noise quality management from plant, DG sets, machineries and vehicles; solid (Chemical hazardous and non-hazardous) waste management including proper sorting, segregation, storage, transport, much management, tree plantation, wildlife awareness at site level and community level, treatment and disposal.

With the mitigation measures discussed at various subsection of this plan will be implemented, the environmental conditions such as air, water, noise, soil and marine will be well maintained by regular monitoring and assessment and no unacceptable residual impacts are anticipated during the project construction.

DEFINITIONS AND ABBREVIATIONS

Environment

Surroundings in which an organization operates, including air, water, land, natural resources, flora fauna, humans and their interrelation.

Reclamation

Reclamation and also known is the process of creating new land from the soil dredged from the sea/river/lake bottom. Reclaimed land can be further used for construction purposes and general development of the area.

Revetment

Revetments are sloping structures placed on banks or cliffs in such a way as to absorb the energy of incoming water and protect the port facilities/land from the wave impact.

Quarrying

An open excavation or pit from which stone is obtained by digging, cutting, or blasting. Obtained rock can be further used for construction purposes.

Environmental Aspects

Element of an organization's activities, products or services that can interact with the environment.

NOTE: A significant environmental aspect is an environmental aspect that has or can have a significant environmental impact.

Environmental Impact

Any change to the environment, whether, adverse or beneficial wholly or partially resulting from an organization's activities, products or sources.

Corrective Action

Action taken to eliminate the cause of an existing non-conformity or other undesirable situation in order to prevent its recurrence.

Preventive action

Action taken to eliminate the cause of a potential non-conformity, defect or other potentially undesirable situation in order to prevent occurrence.

Environmental control measures / operational control measures

This is a documented procedure, which will be established and maintained to cover situations where their absence could lead to deviations from the existing environmental policy and their objectives and targets.

Grievance Redress Mechanism:

Contractor's/Construction Environmental Management Plan (CEMP):

This document acts as an apex level document at the project site. The relevant cross-reference to the various documents such as **EMS**, manuals, monitoring & measurement, procedures etc. are referred within the CEMP document. This is a live document, which undergoes a periodic revision as and when required.

Environmental management programme*:* This plan is a derived action plan for achieving the project related objectives and targets by explaining the responsibility and time frame required to achieve at each relevant function and level of the organization.

Environmental management system

That part of the overall management system which includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy.

Integrated management system

This is a combined management system developed to achieve quality, environment, occupational health and safety of the project. In this IMS system the developed and documented procedures are periodically reviewed as part of continual improvement. IMS is established under the guidance of ISO 14001 (Environment) and BS OHSAS 18001 (Occupational Health & Safety). IMS is periodically audited through Contractor internal audit team and external certifying agency. The integrated management system ensures that support for key aspects such as staff competence; training, procedures, incident and audit reporting are available. The integrated EHS approach is built on the "Plan, Do, Check, Act" model to ensure that all relevant environmental matters are systematically identified, controlled and monitored. Using this systematic approach helps to ensure that the goals for operational implementation in the first instance are achieved and, based on a continuous monitoring and evaluation, performance improves over time. The EHSS department will audit the management systems and issue updates and improvements on a continual basis.

ISO 14001*:* In simple terms, ISO 14001:2015 is an environmental management system standard against which certifiable audit is carried out. ISO 14001:2015 is applicable to any organization that wishes to;

- Implement, maintain and improve an environmental management system developed by the Deming's cycle concept "**Plan, Do, Check and Act**".
- Assure itself of its conformance with its stated environmental policy.
- Demonstrate such conformance to others.
- **Non-conformance*:*** This can be defined as a deviation of any size or magnitude from the PEMP/EMS requirements.

ABBREVIATIONS

ALARP	As Low as Reasonably Practicable
BIS	Bureau of Indian Standards
BOD	Biochemical Oxygen Demand
CPCB	Central Pollution Control Board
CM	Construction Manager
CO	Carbon Monoxide
dB	Decibels
DG	Diesel Generator
DO	Dissolved Oxygen
EAC	Environment Appraisal Committee
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
EM	Environmental Manager
FA	First Aider
Fe	Ferrous
ADB	Asian Development Bank (ADB)
IS	Indian Standards
ISI	Indian Statistical Institute
ISO	International Organization for Standardization
KMPH	Kilometre per hour
LPG	Liquefied Petroleum Gas
MoEF&CC	Ministry of Environment, Forest and Climatic Change
MOM	Minutes of Meeting
MSDS	Material Safety Data Sheet
NOX	Nitrous Oxide
OHSE	Occupational Health Safety and Environment

P&M	Plant & Machinery
pH	Hydrogen Ion Concentration
Pb	Lead
PD	Project Director
PM10	Particulate Matter <10 microns
PM2.5	Particulate Matter <2.5 microns
PPE	Personal Protective Equipment
PUC	Pollution under Control
PVC	Polyvinyl Chloride
SEAC	State Environment Appraisal Committee
SEIAA	State Environmental Impact Assessment Authority
SPCB	State Pollution Control Board
SO2	Sulphur Dioxide
SOP	Standard Operating Procedure
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TM	Transit Mixture
TSP	Total Suspended Particles
WHO	World Health Organization

1. Introduction

CEMP/EMP is a site-specific plan developed to ensure that appropriate environmental management practices are followed during the construction phase of a project.

Specifically, the EMP ensures that the environmental impacts identified during previously performed environmental studies will be properly managed and that activities will comply with all applicable environmental rules and regulations.

1.1. Scope of CEMP/EMP

This Environmental Management Plan (EMP) addresses the programme that shall be implemented during execution of the construction activities and shall be consistent with the environmental regulations ADB & Client's requirements to help eliminate or continuously reduce environmental impacts within the operational activity. Scope of this EMP includes the environmental management plan for all the construction activities planned under 120 MW- Lower Kopili Hydroelectric Project, which includes reclamation and landfill, ground improvement works, existing revetment removal and construction of new one, quarrying, construction of security gate complex, engineer's office, site office and related establishment.

1.2. Objective of CEMP/EMP

This EMP will form part of the larger management framework on the project and will integrate with other management processes used by L&T HCI IC.

This EMP provides a management system approach to ensure that L&T HCI IC establishes and maintains best control practices to manage potential environmental impacts during the entire project activities wherever practicable, realizes opportunities for enhanced environmental outcomes. L&T HCI IC is committed to providing the services it offers in a manner that confirms to the contractual requirements and to all relevant regulatory and legislative requirements. To achieve this, we will plan, implement and control an integrated management system that achieves the stated environmental outcomes.

Where adverse impacts have been identified, the EMP has examined the extent to which this impact would be mitigated through the adoption of good practices. The EMP describes both generic good practices and measures and the site-specific measures, the implementation of which is aimed at mitigating potential impacts associated with the construction of the project. The overall objective of this EMP is:

- To cover all aspects of Environmental Management on the Project site and the requirements of ISO 14001:2015,

- To cover contract provisions on environment management, contract EMP, contract EMOP and additional safeguard measure suggested in addendum to EIA,
- Make reference to statutory environmental requirements and obligations,
- Clarify the responsibilities of the various parties involved,
- Address all potential significant environmental impacts,
- Set out an approach to environmental management,
- Initiate and implement mitigation measures,
- Set out housekeeping measures,
- Set out emergency procedures,
- Identify all training needs and to provide awareness and other environmental skill development,
- Provides a monitoring, auditing and reporting mechanism,

2. Project Description

To meet the ever-increasing demand of reliable and sustainable power in Assam and North-Eastern (NE) region, the EA has proposed the LKHEP (project) which consists of building a dam across Kopili river at Longku. The proposed project is situated in the Karbi Anglong and Dima Hasao (also known as North Cachar Hills) Autonomous District Council (ADC) areas of Central Assam. The Kopili river has two hydroelectric power plants already operational, both upstream of the proposed project: Khandong HEP (75 MW, served from Khandong reservoir on Kopili river) and Kopili HEP (200 MW, served from Umrong reservoir on the Umrong river). Umrong river is tributary of Kopili river, and receives water from the Umrong river as well as the tail water from the Khandong power plant. Both the existing power plants upstream of the proposed project are owned and operated by North Eastern Electric Power Corporation Limited (NEEPCO).

Table 1: Project Details

Client	Assam Power Generation Corporation Limited (APGCL)
Employer's Representative	AF-Consult India Pvt Ltd
Contractor	L&T Construction
Contract Value	1163 Cr. (Including GST)
Project Duration	48 month
No. Of Stations & Location	Longku, Dima Hasao

2.1. Project Location

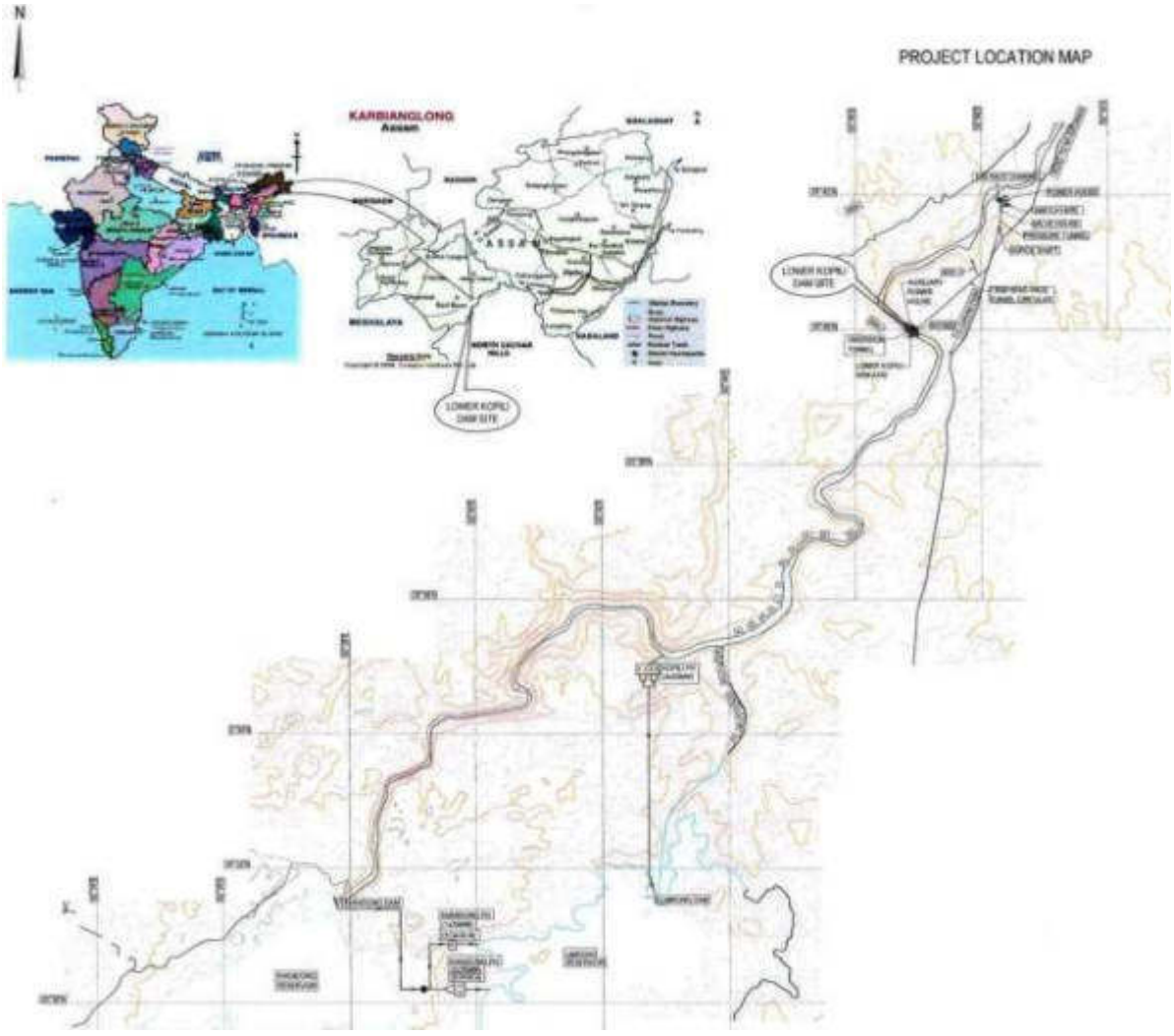


Figure 1: Project Location Map

3. Environmental Management

This Environmental Management Plan (EMP) addresses the programme that shall be implemented during execution of the construction work and shall be consistent with the environmental regulations and Client's requirements to help eliminate or continuously reduce environmental aspects and impacts within the construction activities. This will incorporate, implement and monitor all the requirements of Environmental Management System (ISO 14001:2015).

3.1. Environmental Management System

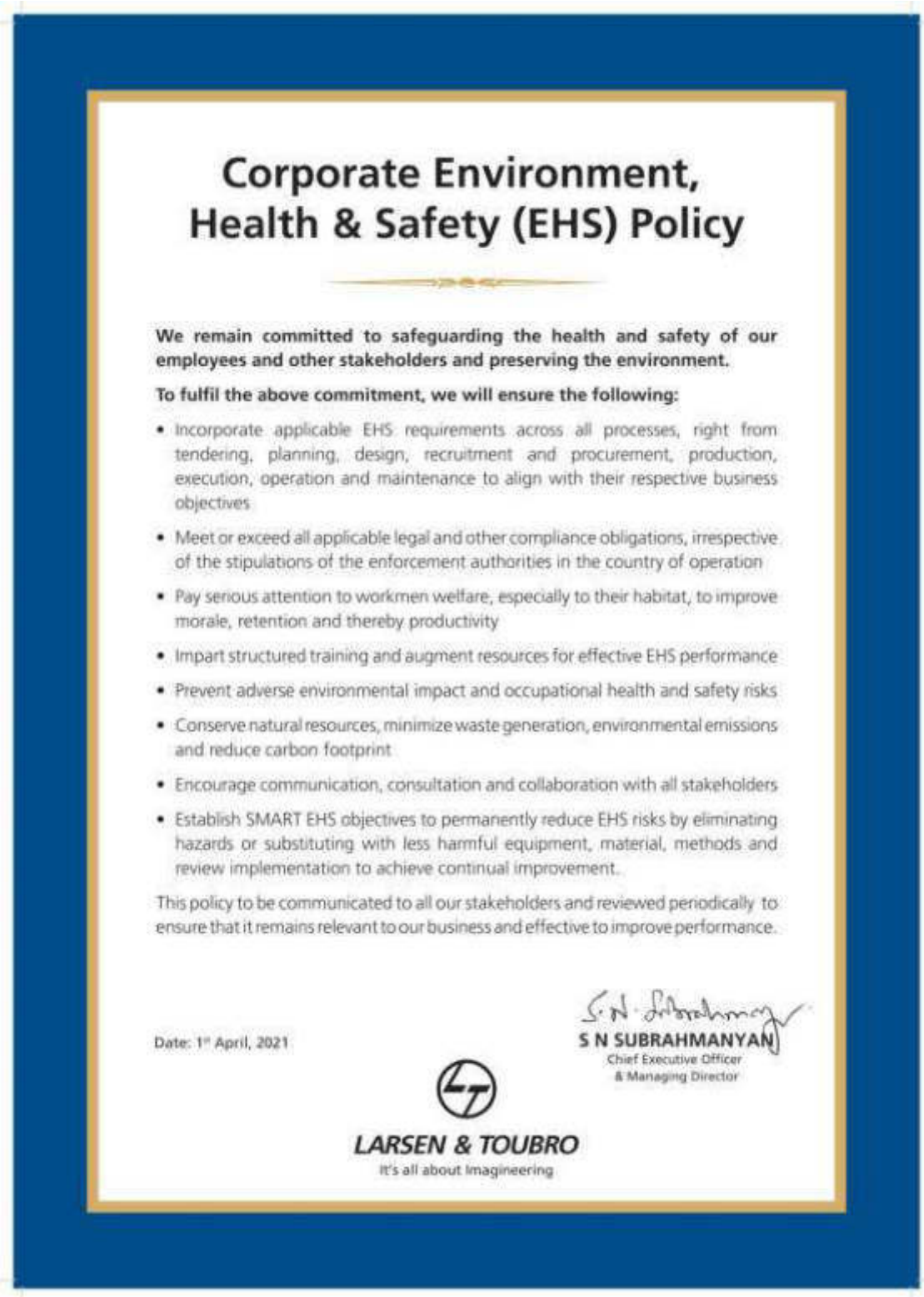
L&T has developed and implemented an integrated management system (IMS) in line with ISO 14001: 2015 and OHASAS 18001 and certified to both Environment and Health & Safety standard requirements.

L&T HCI IC has a "continual improvement" strategy towards managing its environmental management system. The aim is to implement and improve the existing procedures to embrace all the elements of ISO 14001. This CEMP covers all aspects of Environmental Management at the project site and the requirements of ISO 14001:2015.

3.2. EHS Policy Statement

L&T HCI IC EHS policy outlines management's commitment to prevent, mitigate and control pollution and damage to the environment. Compliance with this policy is achieved by developing and implementing a management system for this Project. This Construction Environmental Management Plan reflects our environmental commitment and forms a subsidiary document to the Project Management Plan.

Environmental policy, environmental objectives and targets shall be displayed on notice boards, meeting rooms and from reception areas to site offices. The objectives of the Policy shall be communicated to all L&T HCI IC employees and subcontractor employees throughout the course of the Project.



Corporate Environment, Health & Safety (EHS) Policy

We remain committed to safeguarding the health and safety of our employees and other stakeholders and preserving the environment.

To fulfil the above commitment, we will ensure the following:

- Incorporate applicable EHS requirements across all processes, right from tendering, planning, design, recruitment and procurement, production, execution, operation and maintenance to align with their respective business objectives
- Meet or exceed all applicable legal and other compliance obligations, irrespective of the stipulations of the enforcement authorities in the country of operation
- Pay serious attention to workmen welfare, especially to their habitat, to improve morale, retention and thereby productivity
- Impart structured training and augment resources for effective EHS performance
- Prevent adverse environmental impact and occupational health and safety risks
- Conserve natural resources, minimize waste generation, environmental emissions and reduce carbon footprint
- Encourage communication, consultation and collaboration with all stakeholders
- Establish SMART EHS objectives to permanently reduce EHS risks by eliminating hazards or substituting with less harmful equipment, material, methods and review implementation to achieve continual improvement.

This policy to be communicated to all our stakeholders and reviewed periodically to ensure that it remains relevant to our business and effective to improve performance.

Date: 1st April, 2021

S N SUBRAHMANYAN
Chief Executive Officer
& Managing Director

LARSEN & TOUBRO
It's all about Imagineering

Figure 1: Corporate EHS Policy Statement



Project Environment, Health & safety (EHS) Policy

Aligned with the Corporate EHS policy, we are committed to protect the Environment and Providing a safe and healthy workplace for our employees and stakeholders. With this propose was created an internal EHS Policy specific for 120MW Lower Kopili HEP to provide the guideline to all in achieving those objectives. By this reason and to get the objectives proposed is requested to all:

- Understand and transmit the Corporate EHS Policy to all involved in the Project.
- Ensure the application and compliance during the execution of the Project from all legal requirements, Internal and external standers, and the requirements from the Client.
- Identify and prevent incident for all Class 1 risk activities.
- Provide and deploy all available resources required in case of potential incident or emergency situation.
- Report and investigate all incidents that occur in our Project.
- Give EHS induction and training for all L&T employees, subcontractors, and visitors.
- Identify all potential occupational health & hygiene hazards at workplace and implement the required control measures by conducting regular EHS inspection and reports.
- Conduct all Project activities in an environmentally friendly manner, by adopting a multi-pronged strategy focusing on minimizing / recycling waste, disposing waste according the norms, conserving energy, optimising resource, and regular monitoring of environment.
- Provide good housekeeping in all Project.
- Follow up and respect all the internal procedures and collaboration with all the L&T employees, Subcontractors, and visitors.

01.10.2020

Santanu Majumdar
Project Manager

Finger 2A: Project EHS policy

3.3. Objectives and Targets

Project Manager will designate responsibility for achieving objectives and targets at the program or process level. Progress monitoring of environmental objectives and targets will be done on a quarterly basis. Objectives and targets will be communicated to individuals at each relevant function and level who are involved with any activity, product or service that has an associated significant environmental aspect. Objectives are specific and targets are measurable wherever practicable. Performance indicators are identified to track the accomplishment of targets.

When setting objectives and targets, the following is considered:

- Significant environmental aspects;
- Legal and other requirements;
- Technological options;
- Financial, operational and business requirements;
- Views of interested parties;
- Commitment to pollution prevention; and
- Environmental policy.

Objectives and targets will be modified when changes occur in the organization or to the product, activity, or service, or when environmental or business conditions warrant.

The environment management team reviews facility level environmental aspects, significant environmental aspects, and objectives and targets at least annually or when environmental or business conditions warrant.

Senior management reviews significant environmental aspects and objectives and targets during the annual management review meeting for continuing suitability, adequacy, and effectiveness. An up-do-date copy of the register and all associated reports shall be located in the main office.

Table 2: Project Specific Objective and Target

Sr. No	Objective	Targets	Key Performance Indicator (KPI)
1	Comprehensive environmental management throughout the project work	Full compliance of this EMP	Inspection Reports Audit Reports Monitoring Reports
2	Compliance with all applicable regulatory and other requirements	No non-conformance and violation notice from environmental authority	Violation/Non Conformance Notice Received
3	No major unforeseen impacts to the environment	Zero major environmental incidents	Incident Report
4	To raise the awareness level of all employees to understand their roles and responsibility and to involve proactively for the safeguard of the environment.	1. Familiarization of EMP to project team 2. Regular Awareness Training to train 100 % of the work force 3. Mandatory Environmental Induction for all employees 4. Regular Tool Box Talks (minimum once in a week)	Training Records and Attendance Sheet
5	Resource conservation through judicious use of material & products, energy, fuel and water	Development and Implementation of waste management by Reduce-Reuse-Recycle (R-R-R) approach	1. Recycling Record 2. Waste Generation Data

			3. Various Environmental Initiative & Conservation Strategies

3.4. Organization Structure

The Environmental Team on this Project is set-up as shown in Figure 3. Only key positions are indicated in the project environmental management organization structure. These positions may change throughout the life of the Project based on situation and work requirements as determined by the Project Director.

Such changes are reflected in a detailed organisation chart which is produced and updated in this plan when reissued. All changes to Environmental key personnel would be advised to the Employer. Appropriate approvals will be sought for all Key Personnel changes where required in the contract.

The EHS/Environmental organization structure specific to the project.

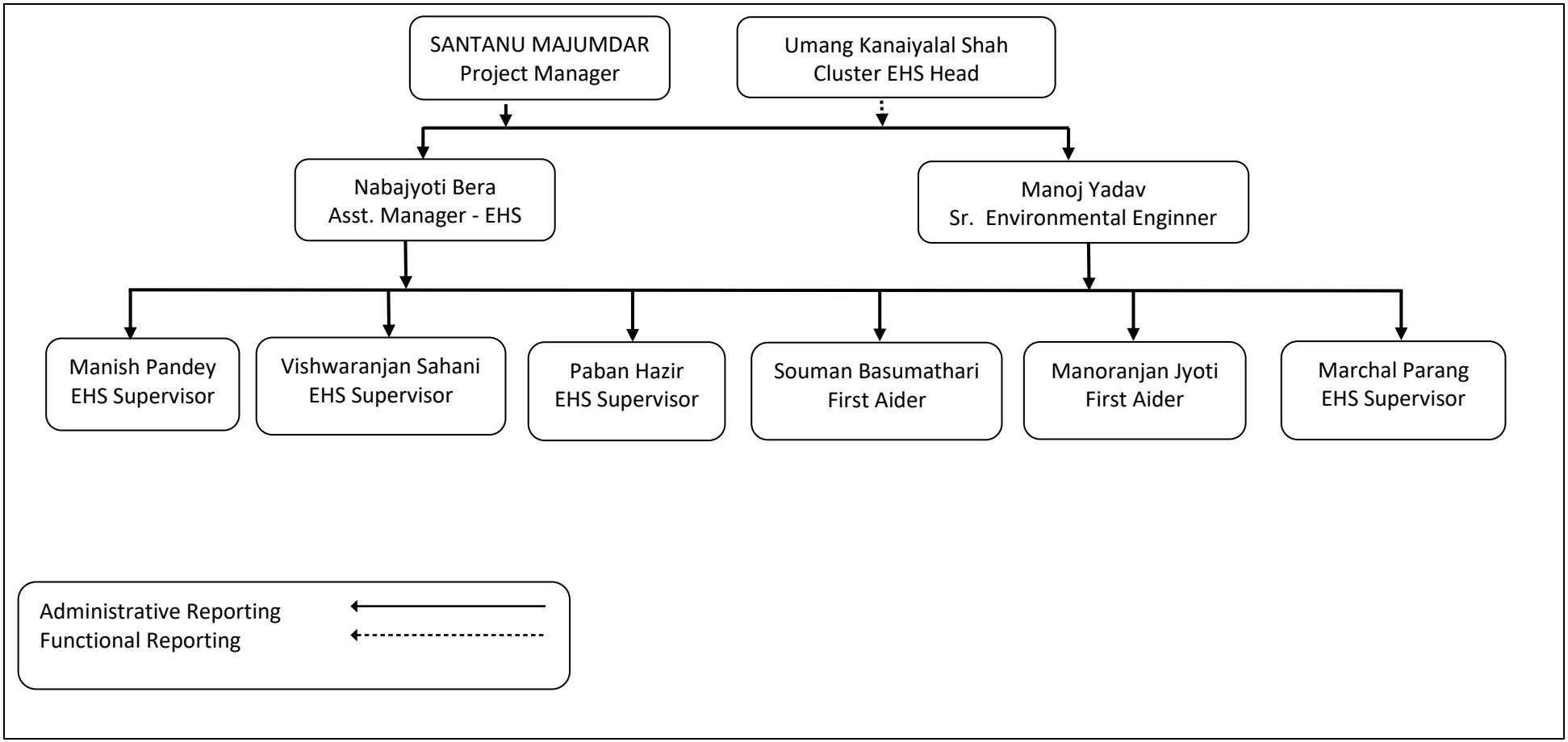


Figure 2: EHS Organization Structure

3.5. Roles and Responsibilities

All the site personnel have a responsibility for their own environmental performance and the impact they have on environmental performance. In particular all site personnel are required to:

- Undertake all activities in accordance with the agreed plans of management, procedures and work methods;
- Ensure that they are aware of the contact person regarding environmental matters;
- Report any activity that has resulted in, or has the potential to result in an environmental incident;
- Ensure that they attend the environmental training provided;

Please refer to **Table 3** which depicts the key roles for the project and their specific environmental management responsibilities.

Table 3: Roles and Responsibility

Role	Responsibilities
Project Manager	Project Manager has the overall responsibility to ensure the requirements of the environmental management plan (EMP) are fully implemented and in particular, that environmental requirements are not secondary to other construction requirements. • Endorse and support the implementation of the project environmental policy.

	• Provide adequate resources (personnel, financial and technological) to ensure effective development, implementation and maintenance of the EMP and to ensure that work is undertaken in line with legal and contractual requirements. • Participate and provide guidance in the regular review of the CEMP and associated documents. • Implement, review and ensure compliance with the EMP, associated management plans • Allocate resources to meet the requirements of the EMP, management plans • Ensure complaints are investigated and effective resolution achieved
EHS In-charge	• Ensure all personnel receive appropriate induction training, including details of the environmental and community requirements • Provide support to the Environment Officer in the implementation of the Management Plans, and any approval requirements • Participate and provide guidance in the regular review of the EMP and associated documents • Implement, review and ensure compliance with the EMP
Environmental Engineer/Officer/Manager	Environment officer will develop and revise this plan and steer the overall environmental management for the project. In addition to managing the environmental team unit, specific responsibilities include but not limited to: • Coordinate the preparation of the EMP and associated management plans • Develop strong working relationships with regulatory agencies and stakeholders • Together with senior project personnel and specialist assistance, ensure that the commitment to excellence in environmental management is communicated to and understood by all project members • Liaise with the project team in refining the EMP

	• Working with and through the Engineer, liaise with Respective State pollution control board, district collector and other agencies on all matter concerning pollution affecting naval establishments and units • Ensure that key environmental management deliverables are provided within required timeframes • Identify and propose solutions to significant environmental issues in consultation with key construction personnel • Ensure that environmental risks are appropriately identified, communicated and effectively managed • Coordinate investigation and response to environmental complaints and inquiries • Attend EHS committee meetings • Manage and deliver the environmental induction and training program • Establish the project environmental compliance reporting protocols and templates • Contribute to resolving environmental issues in conjunction with project team members • Identify all environmental approvals and permits required • Deliver the environmental component of toolbox sessions • Arrange and coordinate 3rd parties' lab test & monitoring activities required by this document • Ensure that instructions are issued and adequate information provided to field based employees which relate to environmental risks on site • Identify resources required for implementation of the EMP. • Coordinate action in emergency situations and allocating required resources.

Store In-charge	• Manage handling, storage, transport and record keeping considerations especially for hazardous waste and substances in line with procedure, legal and other requirements. • He will keep a copy of related authorization and comply the relevant conditions of the authorization and consent. • Maintain storage area as an oil spill free condition with proper housekeeping. • Compliance of at least the following rules: 1. Hazardous wastes (management, handling and Transboundary movement) rules. 2. Bio-medical waste (management & handling) rules 3. Batteries (management and handling) rules 4. Gas cylinder rules
Plant and Machinery In-charge	• Prevent and control dust pollution, water pollution, water losses, oil spillage, and noise pollution at site resulting from operation of plant and equipment • Provide and maintain waste water treatment unit for vehicle washing unit, etc. and air pollution control arrangement for traffic area, etc. • Maintain storage area as an oil spill free condition with proper housekeeping. • Noise level of vehicle and other equipment will be low as far as possible. • Maintain Pollution Under Control (PUC) record for vehicle and periodically checked

Construction Manager/Section In-charge	• He will keep a copy of related authorization and comply the relevant conditions of the authorization and consent • Implement control measures for control dust, air pollution, water pollution, water losses, oil spillage, and noise pollution at site within their area of responsibility • Provide and maintain waste water treatment unit for vehicle washing, concrete washing etc. as applicable to their work.

3.6. Regulatory and Other Requirements

L&T HCI IC operations are subject to the relevant local, regional, national, international and nautical regulations depending on the location as well as to the region where the project takes shape. These regulations contain a number of environmental obligations / requirements and are regulatory, technical, administrative and organisational.

This section presents a list of current environmental legislation and requirement, which relates to the assessment of potential environmental impacts for the proposed development.

To ensure compliance with all legal and contractual requirements the project shall identify and maintain a contractual compliance register.

Each element of the contractual /legal requirement is assessed, and applicable appropriate plans and actions are stated and recorded in order to allow a full compliance check.

3.6.1. Applicable Laws & Regulations

The following environmental laws, bylaws, regulations and international protocols that are applicable to this project:

3.6.1.1 NATIONAL ENVIRONMENTAL POLICY FRAMEWORK

Sl. No.	Name of Policy	Applicability	Brief Description
1	National Forest Policy 1988	Yes	The National Forest Policy 1988 emphasizes the role of forests in the national economy and in ecology. The basic objectives of National Forest Policy are given below: Maintenance of environmental stability through preservation and where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of the forests of the country; Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country; Checking soil erosion and denudation in the catchment areas of rivers, lakes, and reservoirs in the interest of soil and water conservation, for mitigating floods and droughts and for the retardation of siltation of reservoirs; Increasing the sustainability of the forest/tree cover in the country through massive afforestation and social forestry programmes especially on all denuded degraded and unproductive lands; Meeting the requirements of fuel wood, fodder, minor forest produce and small timber of the rural and tribal populations; Increasing the productivity of forests to meet essential national needs; Encouraging efficient utilization of forest produce and maximizing substitution of wood; and Creating a massive people's movement with the involvement of women for achieving these I objectives and to minimize pressure on existing forests.
2	Policy statement for Abatement of Pollution, 1992	Yes	The policy takes a comprehensive approach to integrate environmental and economic aspects in development planning; stress is laid on preventive aspects for pollution abatement and promotion of technological inputs to reduce industrial

3	National Conservation Strategy and Policy Statement on Environment 'and Development, 1992	Yes	pollutants; and through reliance upon public cooperation in securing a clean environment to respond to the coming challenges. The objective is to integrate environmental considerations into decision making at all levels. To achieve this, steps have to be taken to: · Prevent pollution at source; Encourage. develop and apply the best available practicable technical solutions; Ensure that the polluter pays for the pollution and control arrangements; Focus protection on heavily polluted areas and river stretches; and Involve the public in decision making. The policy lays emphasis on conservation of natural resources such as Land and Water, Atmosphere, Biodiversity and Biomass.
4	National Environmental Policy, 2006	Yes	The dominant theme of this policy is that while conservation of environmental resources is necessary to secure livelihoods and well-being of all. the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation than from degradation of the resource.
5	Water Policy of India, 2002	Yes	National Water Policy of India with respect to hydropower generation states that "water resource development projects should to the extent possible, be planned and developed as multipurpose projects. Provision of drinking water should be a primary consideration. The projects should provide for irrigation, flood mitigation, hydroelectric power generation, navigation, pisciculture and recreation wherever possible’
	National Policy on Hydropower Development 1998	Yes	The Hydropower Development Policy has an objective to prevent a decline in hydro share and to undertake measures for maximizing vast hydroelectric potential in India especially in the North and North eastern Regions including Assam. As per the India's 11th Plan, hydro stations account for only 25% of the total installed capacity as against the ideal hydro thermal mix of 40:60. The total hydro potential assessed by Central Electricity Authority (CEA) at 60% load factor is 84,044 MW. With the

			completion of the hydro projects under current construction the hydro potential utilized would increase to 22%. The objectives of the policy include the following: Ensuring targeted capacity addition during 9th Plan (and the subsequent plans - the 11th Plan targets total capacity addition of 15,627 MW in the hydropower sector); Exploitation of vast hydroelectric potential at a faster pace; Promoting small and mini hydro projects; Strengthening the role of Public Sector Undertaking (PSUs) /State Electricity Boards (SEBs) for taking up new hydro projects; Increasing private investment in development of hydropower; Supporting public sector by greater private investment through Independent Power Producers (IPPs) and joint ventures; and Consideration of private sector participation as vital for large scale development of hydropower.
Guidelines			
7	National Board for Wildlife (NBWL)	Yes	Provides guidelines for linear infrastructure intrusions in natural areas pertaining to roads and power lines; stipulates that 'to prevent electrocution deaths of Asian elephants, the height above the ground at the lowest point of the lowest conductor or grounding wires (at the maximum sag point) of power lines, whether insulted or bare, passing through all natural areas with known presence or movement of Asian elephants, shall be a minimum of 20 ft. (6.6 meters) above the ground on level terrain (less than 20 degrees) and a minimum of 30 feet (9.1 meters) above the ground on steeper terrain (slope of more than 20 degrees). These standards have been implemented while designing the 220 kV power transmission line from LKHEP to the Lanka substation.

8	Central Electricity Authority (CEA)	Yes	The Central Electricity Authority (CEA) is tasked with performing the duties related to monitoring of the Hydropower projects in pursuance of 73 (f) of Electricity Act, 2003. The progress of each project is monitored continuously through frequent site visits, interaction with the developers, and critical study of monthly progress reports. Chairperson, CEA holds review meeting with the developers and other stakeholders to sort out the critical issues. The CEA also provides guidelines for laying transmission and distribution lines in areas critical from the point of view of saving wildlife. The guidelines suggest provision of suitable spikes provided e.g. on 33 kV and 11 kV poles at the height of 1.21 meters (four feet) and 2.1 meters (seven feet) to ward off animals coming close to the poles and damaging them by rubbing their bodies against them, particularly elephants. These standards have been implemented while designing the 33kV construction power line from LKHEP to the Umrangso substation.

3.6.1.2 NATIONAL ENVIRONMENTAL STATUES AND LEGISLATION

S.No	Environmental Statutes and legislation	Applicability	Duration of Compliance	Brief Description
1	The Environmental Impact Assessment (EIA) Notification, 2006 and Amendments (up to 2012)	Yes	Pre- construction and Construction	The Notification imposes restrictions and prohibitions on new projects or activities and also on the expansion or modernization of existing projects or activities based on their potential environmental impacts. LKHEP: As per EIA Notification, 2006 of GoI hydroelectric power generation projects have been classified under Category A, item 1 (c) "River Valley projects" of the EIA Notification, 2006 and require preparation of an EIA Report and Environmental Clearance (EC). Whenever a project is accorded an EC, a set of recommendations and conditions are stipulated by the Appraisal Committee for

				compliance by the Project Proponent / investor while the project is under implementation and later under operation. Associated Facilities: As per EIA Notification, 2006 of GoI, power transmission and distribution projects are not listed as environmentally sensitive projects and hence, no Environmental Clearance (EC) is required from the MoEF&CC or from the State-level Environment Impact Assessment Authority. Clearance from the Assam Forest Department is required only in cases where a project is constructed on forestland or requires cutting of forest trees. An EMP for the 220kV transmission line has been prepared as part of the EIA as per SPS 2009 requirements.
2	The National Environmental Appellate Authority Act, 1997	Yes	Pre- construction and Construction	This Act was established to hear grievances arising out EC cases under the Environmental Protection Act (EPA), 1986 by the establishment of a National Environment Appellate Authority (NEAA). A person aggrieved by an order granting environmental clearance in a given area for establishing an industry may, within 30 days from the date of such an order, appeal to the NEAA. The appellant can be a person, who owns or controls the project, an association of persons, Central or State Government or any local authority. The Authority shall dispose of the appeal within 90 days from the date of filing the appeal.

3	National Environment Tribunal Act, 1995	Yes	Pre- construction, Construction and Operation	The National Environment Tribunal Act prescribes the procedure and substantive law relating to compensation for the death of, or injury to, a person and damage to property and environment, by any industry wherein a hazardous substance is used or is a by-product. It also provides for the establishment of a National Environment Tribunal for effective and expeditious disposal of such grievances. The tribunal would have jurisdiction over matters specified in the Public Liability Insurance Act, 1991. The tribunal would receive claims of compensation by the person who has sustained the injury or by his or her legal representative.
4	National Green Tribunal Act, 2010	Yes	Pre- construction, Construction and Operation	This Act provides for the establishment of National Green Tribunal for the effective and expeditious disposal of cases relating to environment protection, conservation of forests and other natural resources, and giving relief and compensation for damages to persons and property. The tribunal has jurisdiction over all civil cases relating to environment. It would deal with all environmental laws on air and water pollution, the Environmental Protection Act (EPA), the Forest Conservation Act (FCA), and the Biodiversity Act. Also the relief and compensation under this act is in
5	The Biodiversity Act, 2002 and Rules, 2004	Yes	Pre- construction, Construction and Operation	Umbrella legislation aimed at conservation of biological resources and associated knowledge as well as facilitating access to them in a sustainable manner and through a just process.

6	The Wildlife (Protection) Act, 1972 and Amendments (2006); The Wildlife Protection Rules 1995	No		All projects/activities being conceptualized, developed, implemented and/or funded within wildlife sanctuaries or national parks should take cognizance and comply with the provisions of these rules and obtain required clearances from the National Board for Wildlife /Chief Wildlife Warden. Note: LKHEP project and Associated Facilities will not affect any Wildlife Sanctuaries and/or National Parks.
7	The Indian Forest Act, 1927	Yes	Pre- construction	All projects/activities being conceptualized, developed, implemented and/or funded within forests should take cognizance and comply with the provisions of these rules and obtain required clearances from the MoEF&CC
8	Forest (Conservation) Act, 1980, and Amendments (1988) • Forest (Conservation) Rules, 1981, Amendments 1992 and 2003 • Guidelines for diversion of forest lands for non-forest purpose under the Forest (Conservation) Act, 1980	Yes	Pre- Construction, Construction and Operation	Forest Clearance: The MoEF&CC has gazetted a statutory notification called the Forest (Conservation) Act, 1980. According to this Act permission of MOEF&CC is required for use of any forest land. The application form for forest clearance includes: project description; detailed map; alternatives and reasons for rejection of alternatives; population benefited; employment granted; details of flora and fauna in the area; density and other specific details of vegetation; status as wildlife sanctuary, biosphere reserve, national park, nature reserve; rare or endangered species; habitat for migrating fauna; vulnerability to erosion; number of displaced families; scheduled caste/scheduled tribes involved in displacement; rehabilitation plan; and details of the compensatory afforestation (CA) scheme. The application includes a detailed route marked on Survey of India map. The Project Proponent submits forest clearance applications to the

				concerned Divisional Forest Officer (DFO). The locations of reserved forest (RF) and protected forest (PF) are checked and marked on a map, and the forest clearance application in the required format is prepared jointly by Project Proponent and the Forest Department. Forest Diversion: For diversion of forestland in Wildlife Sanctuaries / National Parks: in view of the orders of the Supreme Court of India, the State Governments have been advised not to submit any proposal for diversion of forestland under FCA, 1980 without seeking prior permission of the Supreme Court. For seeking permission of Supreme Court, the Project Proponent should submit the proposal to the Chief, Wild Life Warden (CWLW) in the prescribed Performa. For small development and public utility projects involving diversion of forest land up to 5 Hectares (ha), the State Government may authorize the Nodal Officer or any other officer to submit the proposals directly to the Regional Office of the MoEF&CC. All proposals relating to diversion of forest land up to 40 ha shall be sent directly to the concerned Regional office of the MoEF&CC by the State Government. All other proposals shall be sent by the State Government to the Secretary, MoEF&CC. Guidelines for ROW: The Act also offers guidelines on the right-of-way (RoW) and tree cutting. Where routing of transmission / distribution lines through the forest areas cannot be

				avoided, these should be aligned in such a way that it involves the least amount of tree cutting. Below each conductor, a width clearance of 3 meters (m) would be permitted for the movement of tension stringing equipment. The trees on such strips would have to be felled if necessary but after stringing work is completed, and the natural vegetation will be allowed to regenerate. Felling/pollarding/pruning of trees will be done with the permission of the local forest officer whenever necessary to maintain the electrical clearance. One outer strip shall be left clear to permit maintenance of the power line. Under the Act: • For transmission line voltage of 220 kV, the width of ROW is equal to 25 m • For transmission line voltage of 132kV, the width of ROW is equal to 18 m to 20 m • For distribution line voltage of 33 kV, the width of ROW is equal to 15 m and for distribution line voltage of 11 kV, the width of ROW is equal to 7 m Compensatory Afforestation (CA) • If non-forest land is not available, compensatory plantation is to be established on degraded forest lands, which must be twice the forest area affected or lost. If non-forest land is available, compensatory forest are to be raised over an area equivalent to the forest area affected or lost.

10	The Environment Protection Act, 1986; The Environment Protection Rules 1986 and Amendments (2009)	Yes	Pre- construction, Construction and Operation	The Environmental Protection Act (EPA) was introduced in 1986 as an umbrella legislation that provides a holistic framework for the protection and improvement to the environment, and the prevention of hazards to human beings, other living creatures, plants and property. In terms of responsibilities, the Act and the associated Rules requires for obtaining environmental clearances for specific types of new/expansion projects (addressed under EIA Notification, 2006) and for submission of an Environmental Statement to the State Pollution Control Board annually.[15] It empowers the Central Government to establish authorities charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. It also empowers Central government to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges; regulating the location of industries; management of hazardous wastes, and protection of public health and welfare.
11	The Air (Prevention and Control of Pollution) Act, 1981; The Air (Prevention and Control) Rules 1982 and Amendments (1988)	Yes	Construction and Operation	The Act prohibits the construction and operation of any industrial plant without the consent of State Pollution Control Boards (SPCBs). The Act assigns powers and functions to the Central Pollution Control Board (CPCB) and the SPCBs for prevention and control of air pollution and all other related matters. For the prevention and control of air pollution, the State Government, in consultation with the SPCB has the powers to set standards for

				emissions from automobiles, impose restrictions on use of certain industrial plants and prohibit emissions of air pollutants in excess of the standards laid down by the SPCB. It can also make an application to the court for restraining persons from causing air pollution. In addition, it also has the power of entry and inspection, power to obtain information and power to take samples of air emissions and conduct the appropriate follow up. The Act also allows for appropriate penalties and procedures for non- compliance. This Act empowers the CPCB and SPCBs for prosecuting offenders and issuing licenses for construction and operation of any facility. National ambient air quality standard for different regions e.g. industrial, residential is notified under this Act. Air quality monitoring during construction and operation phases, particularly for obtaining consent for establishment and operation will be done under this Act. To empower the Central and State Pollution Boards to meet grave emergencies, the Air (Prevention and Control of Pollution) Amendment Act, 1987, was enacted. The Boards were authorized to take immediate measures to tackle such emergencies and recover the expenses incurred from the offenders. The power to cancel consent for non-fulfillment of the conditions prescribed has also been emphasized in the Air Amendment Act.
12	Water (Prevention & Control of Pollution) Act, 1974 Water (Prevention & Control of Pollution) Rules,	Yes	Construction and Operation	It provides for the prevention and control of water pollution and the maintaining or restoring of water for any establishment. All projects/activities/industries that are being developed, implemented, established, operational and/or being funded, that

	1975 and Amendments (1989)			would lead to generation, treatment of sewage or effluent and further discharge into a stream or well or sewer or land should take cognizance of the provisions or this Act/Rules and take required consent to establish or operate from the State Pollution Control Board/Committee
13	Water (Prevention & Control of Pollution) Cess Act, 1977 Water (Prevention & Control of Pollution) Cess Rules, 1978 and Amendments	Yes	Operation	It provides for the levy and collection of a Cess on water consumed by industries and local authorities. All projects/activities/industries that being developed, implemented, established, operational and/or being funded, that would consume water or give rise to sewage effluent or trade effluent should take cognizance of this Act/Rule and pay required Cess on water consumed to the prescribed authority.
14	Noise Pollution (Regulation and Control) Rules, 2000 and the Noise Pollution (Regulation and Control) (Amendment) Rules, 2010	Yes	Pre- construction, Construction and Operation	It provides for regulations to control ambient noise levels in public places from sources such as industries/construction works/community events, etc. All projects/activities/establishments being constructed, operational and/or funded that deal with sound emitting equipment while operational or during construction should take cognizance of the provisions/standards of these Rules and ensure compliance
15	Ozone Depleting Substances (ODS) Regulation and Rules, 2000 as amended in 2005	Yes	Operation	It provides for regulatory measures so as to ensure progressive phasing out of domestic production and imports of ODS. All businesses/activities/industries being implemented, operational and/or funded that involves the use/ processing/ imports/ exports of Ozone depleting substances should take cognizance and comply with the provisions/schedules of these Rules.

				Note: Applicable *to LKHEP project and Associated Facilities only in case of any activity using ODS.*
16	The Hazardous Waste (Management, Handling and Trans-boundary Movements) Rules, 2008 (Amended 2010)	Yes	Construction and Operation	The Rules require industries to classify wastes into categories and manage them as per the prescribed guidelines and obtain prior authorization for handling, treatment, storage and disposal of Hazardous Wastes. They also provide guidelines for the import and export of hazardous waste in India. Para 25 of the Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules 2008 mentions about Liability of Occupier, Transporter, Operator of any waste facility and Importer. It suggests that the occupier and the operator of the facility shall be liable to pay financial penalties as levied for any violation of the provision under these rules by the SPCB with the prior approval of the SPCB.
17	The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989	Yes	Construction and Operation	It deals with measures, regulations and controls so as to reduce environmental, safety and health risks while manufacturing, handling and storage of hazardous chemicals. The Rule will apply if storing hazardous materials on site. *Note: Applicable to LKHEP project and Associated Facilities only in case of storing hazardous materials on site.*
18	Biomedical Waste (Management and Handling) Rules, 1998 and amended in 2003	No	-	These Rules were formulated along parallel lines, for proper disposal, segregation, transport etc. of infectious wastes.

19	Batteries (Management and Handling) Rules, 2001 and further amendments	Yes	Construction and Operation	It provides for regulations towards proper management & handling of Lead Acid Batteries so as to avoid, mitigate, and minimize adverse impact on environment and human health. *Note: Applicable to LKHEP project and Associated Facilities only in case of any activity being implemented/ operational that involves the handling, purchase and use of batteries.*
20	Notification on Special Areas/ Restricted Activities	No		Notification deals with environmental issues in specific notified zones/areas in different regions and imposition of restrictions/prohibitions on certain industries or activities. All projects/activities being conceptualized, developed, implemented, operational and/or funded should verify the existence/ proximity of any notified area in and around the project site and is found should take cognizance of the provisions of the applicable Special Area Notification
21	The Electricity Act, 2003 and Amendments (2007) and Rules 1956, and Amendments	Yes	Construction and Operation	The Electricity Act 2003 has provision for the Government to make rules specifically for 'the avoidance of public nuisance, environmental damage and unnecessary damage to the public and private property by such works' (Section 67-2-k). Rule 29(1) generally stipulates attention to safety for humans, animals, and property and rules have been also framed for vertical clearance of lines above buildings and streets and other power-lines. *Note: No rules have been framed so far related to environmental aspects for construction and maintenance of power lines; these have been captured in the Environmental Management Plan prepared for the 220 kV transmission line following SPS 2009 and IFC EHS guidelines for Electric Power Transmission and Distribution, in particular EMF exposure limits to*

				sensitive receptors, and occupational health and safety measures.

3.6.1.3 SOCIAL REGULATORY REQUIREMENTS OF INDIA AND STATE

S.No	Type of Regulation related to Land and Labor	Applicability	Duration of Compliance	Brief Description
1	The Land Acquisition Act, 1894 and Amendments	Yes.	Pre- Construction	It provides for facilitation in land acquisition for public purposes in cases where land to acquired has private claims. This Act is superseded by Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. Refer to the Resettlement and Tribal Development Plan (RTDP) document for details and applicability.
2	Draft National Tribal Policy	Yes	Pre- Construction and Construction	The proposed policy addresses the issues such as enhancement of human development index of scheduled tribes, improvement of infrastructure in areas where they dominate to ensure their control over the natural resources, displacement of scheduled tribes from their habitat and relocation, distribution of wealth and opportunities among them and empowerment. Refer to the Resettlement and Tribal Development Plan (RTDP) document for details and applicability.
3	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013	Yes	Pre- Construction and Construction	A broad conceptual and ideological framework for rehabilitation and resettlement, it provides prerequisite data (group-wise and area-wise), on which a Rehabilitation Action Plan (RAP) can be based. The Plan

				provides concepts, principles and framework as well as projections for various alternatives of rehabilitation. It tries to understand and describe the general socio-economic dynamics of the population to be displaced. Moreover, it gives order of expenditure for the implementation of R&R measures. Refer to the Resettlement and Tribal Development Plan (RTDP) document for details and applicability
4	The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 and Rules 2007	Yes	Pre- Construction and Construction	It recognizes and provides for forests rights and occupation in forest land by forest dwelling Scheduled Tribes and other traditional forest dwellers that are integral to the sustainability of the forest ecosystem. Refer to the Resettlement and Tribal Development Plan (RTDP) document for details and applicability.
5	The Provision of the Panchayat (Extension to the Scheduled Areas) Act, 1996	No		This law enacted by the GOI covers the "Scheduled areas", which are not covered in the 73rd Amendment (or Panchayati Raj Act of the Indian Constitution). It was enacted on 24 December 1996 to enable Gram Sabah to self-govern their natural resources. It is an Act to provide for the extension of the provisions of Part IX of the Constitution relating to the Panchayats and the Scheduled Areas. Article 244(2) provides for the Sixth Schedule23 to the Constitution and applies to the administration of certain 'tribal areas' in the States of Assam, Meghalaya, Tripura and Mizoram. Refer to the Resettlement and Tribal Development Plan (RTDP) document for details and applicability.
8	Minimum Wages Act, 1948	Yes	Pre- construction, Construction, and Operation	The Minimum Wages Act, 1948 provides for fixing minimum rates of wages in scheduled industries. The Act purports to achieve to prevent exploitation of labor and the purpose that authorities under this Act have been empowered to take steps to prescribe minimum rates of wages in

				certain employments where labor is ignorant or less organized.
9	Payment of Wages Act, 1936 and Amendments	Yes	Pre-construction, Construction, and Operation	The Payment of Wages Act, 1936 is a central legislation which applies to the persons employed in the factories and to persons employed in industrial or other establishments specified in sub-clauses (a) to (g) of clause (ii) of section 2 of this Act. This Act does not apply to workers whose wages payable in respect of a wage period average INR 1,600/- a month or more. This Act has been enacted with the intention of ensuring timely payment of wages to the workers and for payment of wages without unauthorized deductions. The salary in factories/establishments employing less than 1000 workers is required to be paid by 7th of every month and in other cases by 10th day of every month. A worker, who either has not been paid wages in time or an unauthorized deductions have been made from his/her wages, can file a Claim either directly or through a Trade Union or through an Inspector under this Act, before with the Authority appointed under the Payment of Wages Act. The power for hearing and deciding Claims under this Act has been vested at present with the Presiding Officer of a Labor Court.
10	Workmen's Compensation Act, 1923 (Amended 2009)	Yes	Pre-construction, Construction and Operation	Workmen's Compensation Act 1923 is a central legislation which provides for payment of compensation for injuries suffered by a workman in the course of and arising out of his / her employment according to the nature of injuries suffered and disability incurred, where death results from the injury, the amount of compensation is payable to the dependents of the workmen. All the Deputy Labor Commissioner has been appointed as Commissioner under Workmen's Compensation Act. Where an employer is in default in paying the

				compensation due under this Act, within one month from the date it fell due, the Commissioner shall direct that the employer in addition to the amount of arrears, pay simple interest there on at the rate of 12% per annum or on such higher rates.
11	The Contract Labor (Regulation & Abolition) Act, 1970 and Rules	Yes	Pre- construction, Construction and Operation	With a view to removing the difficulties of contract labor and bearing in mind the recommendations of various commissions and committees and the decisions of the Supreme Court, the Contract Labor (Regulation and Abolition) Act was enacted in 1970. This Act seeks to regulate the employment of contract labor in certain establishments and to provide for its abolition under certain circumstances.
12	The Employees Provident Fund	Yes	Pre-construction, Construction and Operation	The Act is a piece of social security enactment designed to provide for a scheme to make provisions for the future of industrial workers and their dependents in case of their retirement and in the event of their premature death. The benefits are applicable to a wide range of employees working in factories, mines, plantations, construction industries, educational institutions and other classes of establishments in a short period. The Contractor will provide and produce necessary proof and declaration to APGCL regarding compliance of all the provisions, making of timely deposits etc. otherwise a sum of 5% of the gross bill amount will be deducted against EPF deposit from the bill.
13	Employers' Liability Act No. 24 of 1938	Yes	Pre- construction, Construction and Operation	The Act provides scenarios in which the employer may or may not have to take liability for certain accidents and damages faced by employees. It applies to a wide range of industries. Compensation benefits for injured party in case of liability taken up by employers have also been mentioned in the Act.

14	Payment of Bonus Act, 1965 and Amendment Act No.43 of 1977 and No.48 of 1978 and amendments	Yes	Pre-construction, Construction And Operation	The Payment of Bonus Act imposes statutory liability upon the employers of every establishment covered under the Act to pay bonus to their employees. It further provides for payment of minimum and maximum bonus and linking the payment of bonus with the production and productivity. The Act applies to every factory where 10 or more workers are working and every other establishment in which 20 or more persons are employed, on any day during an accounting year. The Payment of Bonus Act, 1965, gives the employees a statutory right to a share in the profits of his employer. The Act enables the employees to get a minimum bonus equivalent to one month's salary or wages (8.33% of annual earnings) whether the employer makes any profit or not. But the Act also puts a ceiling on the bonus and the maximum bonus payable under the Act is equivalent to about 2.5 months' salary or wage (20% of annual earnings).
15	The Personal Injuries (Compensation Insurance) Act, 1963 (as amended)	Yes	Pre-construction, Construction and Operation	This Act provides for imposing liability on employers to pay compensation to workmen sustaining personal injuries and to provide for the insurance of employers against such liability. The act defines the cases under which the employer is liable to pay compensation to the affected employee. It also guides the compensation policy to be followed in case of such events. The Contractor will take into account all the above said financial liabilities in his quoted rates and nothing extra, whatsoever, will be payable to him on this account.
16	The Child Labor (Prohibition and Regulation) Act, 1986	Yes	Pre- construction, Construction and Operation	The Act addresses the issue of Child Labor which is social concern. This Act prohibits the engagement of children below the age of 14 years in certain employments and regulates the conditions of work of children in certain other employments. The Act prohibits employment of child in about 13 occupations and about 51 processes. The Act provides no child shall be permitted or

				required to work between 7p.m. and 8 a.m., for more than 3hrs before he/she has an interval for rest at least one hour. Every child employed in an establishment shall be allowed in each week a holiday for one whole day. The Act also levies the penalty on those who employs or permits any child to work in the occupations and processes in which employment of children is prohibited. This condition will be strictly monitored and enforced and no one under 18 should be employed on the HEP construction site (high risk).
19	Interstate Migrant Workers Act 1979	Yes	Pre-construction, Construction and Operation	In case workers and laborers working at the project sites are migrants from other States. For employment and Contracts, APGCL will give preference to persons from within Assam.

3.6.1.4. OCCUPATIONAL HEALTH AND SAFETY

S.No	Name of Regulation related to Occupational Health and Safety	Applicability	Duration of Compliance	Brief Description
1	Public Liability Insurance Act (PLIA), 1991, and Amendments (1992) and Rules, 1991	Yes	Pre-construction, Construction and Operation	The Act covers accidents involving hazardous substances and insurance coverage. Where death or injury results from an accident, this Act makes the owner liable to provide relief as is specified in the Schedule of the Act. The PLIA was amended in 1992, and the Central Government was authorized to establish the Environmental Relief Fund, for making relief payments.
2	Explosives Rules, 2008 (under Act of 1884)	Yes	Pre-construction and Construction	It provides for regulations for the manufacture, possession, use, sale, transport, import and export of explosives in India. It provides for details and specification on storage areas, safe distances, specification for vehicles for transportation, etc. towards hazard risk mitigation. All project/ activities/ industries/ businesses that are being implemented, operational and/or funded that deal with manufacture, import, export, transport, possession, sell or use of any explosives should take cognizance and comply with the provisions of this Act and obtain required license/authorization for the same.
3	Factories Act, 1948 and Amendments (1987)	Yes	Pre-construction, Construction, and Operation	The Factories Act, 1948 was a post-independence statute that explicitly showed concern for the environment. The primary aim of the 1948 Act has been to ensure the welfare of workers not only in their working conditions in the factories but also their employment benefits. While ensuring the safety and health of the workers, the Act contributes to environmental protection. The Act contains a comprehensive list of 29 categories of industries involving hazardous processes, which are defined as a process or activity where unless special care is taken, raw materials used therein or the intermediate or the finished

				products, by-products, wastes or effluents would: • Cause material impairment to health of the persons engaged • Result in the pollution of the general environment *In case of LKHEP project and Associated Facilities, this Act relates to workers related safety during Construction; and in-case project proponent/operator has more than ten full time employees during the operations phase of the project.*
4	Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	Yes	Pre-construction and Construction	The Act was enacted in 1996 with an objective to provide a comprehensive Central Legislation for workers and laborers. It provides for regulation of employment and conditions of service of the building and other construction workers with respect to their safety, health and welfare measures in every establishment which employs 10 or more than 10 workers. The exception made is only in respect of residential houses for own purpose constructed with a cost not exceeding INR 1.0 Million and such other activities to which the provisions of Factories Act, 1948 and Mines Act, 1952 apply. The Act also has provision for immediate assistance in case of accidents, old age pension, loans for construction of house, premium for group insurance, financial assistance for education, to meet medical expenses, maternity benefits etc. The Act also requires constitution of Advisory Committee at the Central and the State levels and safety committees in every establishment employing 500 or more workers.
5	The Building and other Construction Workers' Welfare Cess Act, 1996	Yes	Pre-construction and Construction	The Act provides for the levy and collection of a Cess on the cost of construction incurred by employers with a view to augmenting the resources of the Building and Other Construction Workers' Welfare Boards constituted under the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. The Act provides for regulating the employment and conditions of service of building and

				other construction workers and also provides for their safety, health and welfare measures and other matters connected therewith or incidental thereto.
6	Central Motor Vehicle Act 1988 & Rules, 1989 and Amendments (2001)	Yes	Pre-construction, Construction and Operation	It provides for regulations, measures and standards to be adopted by motor vehicle for increased road safety, pollution-control and to reduce risks in case of transportation of hazardous and explosive materials. All projects/activities/industries that are being implemented, operational and/or funded that employ the use of motor vehicles for transportation of material/goods should take cognizance of this Act, adhere to the standards and use registered/permitted vehicles
7	National Building Code, 2005 – Part IV: Fire and Life Safety	Yes	Construction	Imposes restrictions on construction of buildings in different fire zones; classifies buildings based on occupancy; and provides specifications for fire protection measures, evacuation of buildings.
8	Petroleum Act, 1934 and Rules 2002	Yes	Pre-construction, Construction and Operation	In cases of storage of diesel on site, an approval is to be sought from the Chief Inspectorate of Explosives for storage of diesel >2500 litres or in containers >1000 litres capacity.
9	Gas Cylinder Rules and Static and Mobile Pressure Vessels (Unfired) Rules, 1981	No	Pre-construction, Construction and Operation	It provides for regulations on import, transport, storage, use, filling and possession of any compressed gas cylinders so as to reduce associated risks and hazards to the environment, health and safety. *Note: Applicable only if there are any pressurized liquid stored or handled on LKHEP project site*

10	CEA (Safety Requirements for Operation, Construction and Maintenance of Electric Plants and Electric Lines) Regulations 2008 and Amendments (2010)[18]	Yes	Construction and Operation	The Electric Plants and Electric Lines to be suitable for a full range of ambient and other environmental conditions as prevailing at the project site.
11	Indian Electricity Rules, 1957 and Amendments (2000)	Yes	Construction and Operation	It provides for regulating the supply, transmission, generation, and use of electricity which includes precautionary measures to be adopted in construction, installation and maintenance of transmission, distribution, generation and use of electricity.

3.6.1.5. STATE OF ASSAM STATUES AND LEGISLATION

S.N	Assam Regulations, Acts, and Legislation	Applicability	Brief Description
1	Assam Ancient Monuments and Records Act, 1959[19]	No	Provide provisions for the preservation and protection of ancient and historical monuments and records in Assam. *Note: The LKHEP project and Associated Facilities do not affect any areas subject to the above Act.*
	Forest related Acts and Rules • Karbi Anglong (Mikir) Hills District Forest Act, 1957 including Karbi Anglong District (Forest) (Amendment) Act, 1965[20] • Assam Forest Protection Force Act, 1986 • Assam Compensatory Afforestation Fund Rules, 1994;		Under the Karbi Anglong (Mikir) Hills District Forest Act, 1957 including Karbi Anglong District (Forest) (Amendment) Act, 1965, the Executive Committee of the (Autonomous) District Council is empowered to constitute any land at the disposal of the (Autonomous) District Council into a "Village Forest" for the collective benefit of the village community Under the Assam Forest Regulation, 1891 including

	and GOA Guidelines for Compensatory Afforestation, 2000 • Assam Forest Regulation, 1891 including Assam Forest Regulation (Amendment) Act, 1995 • The Assam Forest (Removal And Storage of Forest Produce) Regulation Act, 2000 • Assam Revolving Fund (Forest Department) Rules, 2000 • The Assam Forest (Forum of Appeal) Rules 2001 • Assam Forest (Rewards) Rules, 2002 • Assam (Control of Felling and Removal of Trees from Non-Forest Lands) Rules, 2002 • Assam Forest Policy 2004 • The Assam Joint Forest Management Rules, 2004 • The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act ,2006 (FRA 2006) Forest Rights Act, 2006		Assam Forest Regulation (Amendment) Act, 1995, forests may exist in at least four categories: Reserved Forests, Village Forests, Un-classed State Forests and those forests and wasteland which are not the property of the government. The term "unsettled tracts" has also been used in the Regulation and the State government has been empowered to reserve trees in such unsettled tracts. Rules under Assam (Control of Felling and Removal of Trees from Non-Forest Lands) Rules, 2002 prescribe how tree plantations raised in non-recorded forest areas by individuals or institutions are to be governed. Assam Forest Policy has the following objectives: (i) maintain environmental stability, (ii) conserve the natural heritage of the state, (iii) provide livelihood support and alternatives to forest fringe dwellers, (iv) increase the tree cover of the State, (v) meet the livelihood needs of rural poor and tribes in fuel wood and NTFP, (vi) demarcate all forest lands, irrespective of ownership, (vi) promote research on forest related topics and (vii) encourage the conservation of the genetic diversity and the traditional ecological knowledge of Assam. Policy advocates community participation. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA 2006) offers guidelines to protect wildlife, forest and biodiversity, prevent destructive practices affecting their cultural and natural heritage and regulate access to community forest resources.
15	Assam Biodiversity Rules, 2010	Yes	Prescribes tasks for the Assam State Biodiversity Board with regards to the Biodiversity Act 2002.

16	Assam National Park Act, 1968	No	*The LKHEP project and Associated Facilities do not affect any areas subject to the Act.*
17	Assam Land and Revenue Regulation, 1886	Yes	
18	Assam Irrigation Act, 1983	Yes	
19	Assam Fishery Rules, 1953	No	This rules deals with fishing and associated commercial activities. *This is not applicable to the LKHEP project*.
20	Wildlife Protection Rules, 1980	Yes	This rules deals in licencing and permitting for hunting and management of protected areas in State. *This rule is applicable to the LKHEP since the project area is located in forest areas and has presence of wild animals.*

NATIONAL APPLICABLE ENVIRONMENTAL STANDARDS

WATER QUALITY

To ascertain and categorize the existing water quality and its designated best use in and around the project area, the results of the analysis of water quality will be compared with the water quality standards as prescribed by CPCB. Table presents the use based classification of surface water in India whereas water quality standards are presented in Table.

Use Based Classification of Surface Water in India

Use based classification of surface waters in India Designated-Best-Use	**Class of Water**	**Criteria**
Drinking Water Source Without Conventional Treatment but After Disinfection	A	• Total Coliforms Organism MPN/100ml shall be 50 or less • PH between 6.5 and 8.53. • Dissolved Oxygen 6mg/l or more • Biochemical Oxygen Demand 5 days 20^{O}C 2mg/l or less
Outdoor bathing (Organized)	B	• Total Coliforms Organism MPN/100ml shall be 500 or less • PH between 6.5 and 8.53. • Dissolved Oxygen 5mg/l or more • Biochemical Oxygen Demand 5 days 20^{O}C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	• Total Coliforms Organism MPN/100ml shall be 5000 or less • pH between 6 to 9 • Dissolved Oxygen 4mg/l or more • Biochemical Oxygen Demand 5 days 20^{O}C 3mg/l or less
Propagation of Wild life and Fisheries	D	• pH between 6.5 to 8.5 • Dissolved Oxygen 4mg/l or more • Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	• pH between 6.0 to 8.5 • Electrical Conductivity at 25oC micro mhos/cm. Max.2250 • Sodium absorption Ratio Max. 26 • Boron Max. 2mg/l
	Below- E	• Not meeting A, B, C, D & E Criteria

Indian Standard Drinking Water Specification As Per IS 10500:1991

S. No.	Substance/ Characteristic	Desirable Limit	Permissible limit (in the absence of alternative source)	Remarks
1	Colour, Hazen units, Max	5	25	Extended to 25 if toxic substance are not suspected in absence of alternate sources
2	Odor	Unobjectionable		a) Test cold and when heated b) b) Test at several dilution
3	Taste	Agreeable		Test to be conducted only after safety has been established
4	Turbidity NTU, Max	5	10	
5	pH value	6.5 to 8.5	No relaxation	
6	Total Hardness (as $CaCO_3$) mg/lit	600	600	
7	Iron (as Fe) mg/lit, Max	0.3	1.0	
8	Chlorides (as Cl) mg/lit Max	250	1000	
9	Residual Free Chlorine, mg/lit Max	0.2		To be applicable only when water is chlorinated. Treated at consumer end. When protection against viral infection is required, it should be Min 0.5 mg/lit
10	Dissolved Solids mg/l, Max	500	2000	
11	Calcium (as Ca) mg/l, Max	75	200	
12	Copper (as Cu) mg/l, Max	0.05	1.5	
13	Manganese (Mn) mg/l Max	0.1	0.3	
14	Sulphate (As SO_4), Max	200	400	May be extended up to 400 provided (as Mg) does not exceed 30
15	Nitrate (as NO_3) mg/l, Max	45	100	
16	Fluoride (as F) mg/l, Max	1.0	1.5	
17	Phenolic Compounds (as C_6H_6OH) mg/l Max	0.001	0.002	
18	Arsenic (as As) mg/l	0.05	No relaxation	To be tested when pollution is suspected
19	Lead (as Pb) mg/l	0.05	No relaxation	
20	Anionic Detergents (as MBAS) mg/l	0.2	1.0	
21	Chromium (as Cr) mg/l	0.05	1.0	To be tested when pollution is suspected
22	Mineral Oil mg/l	0.01	0.03	
23	Alkalinity mg/l	200	600	
24	Total Coliform	95% of the sample should not contain coliform in 100 ml. 10 coliform /100 ml		

AIR QUALITY STANDARDS (India and IFC EHS Guidelines)

Revised National Ambient Air Quality Standards (NAAQS) for major pollutants were notified by the CPCB in November 2009. The NAAQS prescribe specific standards for industrial, residential, rural and other ecologically sensitive areas.

Revised National Ambient Air Quality Standard V/s IFC EHS Guidelines

Ambient Air Quality Parameter	**Averaging Period**	**IFC EHS Guideline Value**		**GoI Standards for Industrial, Residential, Rural and Other Areas**	**GoI Ecologically Sensitive Area (notified by Central Government)**
Sulfur dioxide (SO_2) ($\mu g/m^3$)	24-hr	125	(Interim target 1)		
		50	(Interim target 2)		
		20	(guideline)	80	80
	10 min	500	(guideline)		
	Annual	None		50	20
Nitrogen dioxide (NO_2) ($\mu g/m^3$)	1 Year	40	(guideline)	40	30
	24 Hour	None		80	80
	1 Hour	200	(guideline)		
PM_{10} ($\mu g/m^3$)	1 Year	70	(Interim target 1)		
		50	(Interim target 2)		
		30	(Interim target 3)		
		20	(guideline)	60	60
	24-hr	150	(Interim target 1)		
		100	(Interim target 2)		
		75	(Interim target 3)		
		50	(guideline)	100	100
$PM_{2.5}$ ($\mu g/m^3$)	1 year	35	(Interim target 1)		
		25	(Interim target 2)		
		15	(Interim target 3)		
		10	(guideline)	40	40
	24-Hour	75	(Interim target 1)		
		50	(Interim target 2)		
		37.5	(Interim target 3)		
		25	(guideline)	60	60
Ozone (O_3) ($\mu g/m^3$)	8-hr daily max	160	(Interim target 1)		
		100	(guideline)	100	100
Lead (Pb) $\mu g/m^3$)	Annual			0.5	0.5
	24 hours			1.0	1.0
	8 hours			2000	2000

Ambient Air Quality Parameter	Averaging Period	IFC EHS Guideline Value		GoI Standards for Industrial, Residential, Rural and Other Areas	GoI Ecologically Sensitive Area (notified by Central Government)
Carbon Monoxide (CO) µg/m^3	1 hour			4000	4000
Ammonia (NH_3) µ/m^3	Annual			100	100

AMBIENT NOISE STANDARDS

Ambient noise level standards have been notified by the MoEF&CC under Noise (Regulation & Control) Rules 2000 and also in the Schedule III of the Environmental (Protection) Rules 1986. Noise levels are measured in dB (A) Leq which denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

MoEF&CC Ambient Noise Level Standards V/s IFC EHS Guidelines

Receptor	IFC EHS Guidelines		GoI NAAQS	
	Daytime	Nighttime	Daytime	Nighttime
	7:00-22:00	22:00-7:00	6:00-22:00	22:00-6:00
Residential	55	45	55	45
Institutional; educational			None	None
Industrial	70	70	75	70
Commercial			65	55
Silence Zone	None	None	50	40

Note: (1) Daytime: 6 AM to 9 P.M., Night-time 9 PM to 6 AM;

(2) Silence zone is an area up to 100 m around premises as hospitals, educational institutions and courts.

Source: Central Pollution Control Board, New Delhi

Noise standards in the work environment are specified by Occupational Safety and Health Administration (OSHA-USA) which in turn are being enforced by Government of India (GoI) through model rules framed under the Factories Act.

Occupational Safety and Health Administration (OSHA) Noise Standards

Total Time of Exposure per Day in Hours (continuous or short term exposure)	Sound pressure level dB(A)
8	90
6	92
4	95
3	97
2	100
3/2	102
1	105
¾	107

½	110
¼	115
Never	>115
Note: No exposure in excess of 115 dB(A) is to be performed. Note that IFC EHS guidance indicates 85 dB (A) as a limit for 8 hour exposure.	

3.7. Environmental Awareness and Training

It is very important to identify the training need and to provide necessary training, induction and awareness sessions so that all the workforce understand their roles and responsibility and the importance of environmental management. This is an integral part for the implementation of CEMP and also for continual improvement of environmental performance during project execution.

Environmental Training, Awareness Session, Induction, Toolbox talks and Familiarization Training will be provided to all work force based on the following Training Matrix.

Table 4: Environmental Training Matrix

Sl .No	Training Topics	Content	Target Audience	Frequency of Training	Remarks
1	EMP Familiarization	All the requirements of EMP including roles and responsibilities	All Supervisor, engineers and other key construction personnel	Before the start of construction work once the CEMP is approved. Also whenever there is a revision and major changes in CEMP	Training will be recorded with remarks and attendance register.
2	Awareness Training	- General environmental requirement of the project. - Critical species in the area. - Forest area greenbelt etc.	All work force and labour	Every month	Training will be recorded with remarks and attendance register
3	Environmental Induction	General EHS induction	All new staff & transferred staff to the project	Within 15 days of joining/transfer	Induction session will be recorded
4	Prestart Briefing	Environmental requirement for a specific activities	At the starting of a new activity	Weekly	Toolbox Session will be recorded

5	Waste Management	Housekeeping Classification of Waste Type Collection Proper Segregation Recycling & Recovery Proper Disposal Reporting Requirement	Logistics, stores personnel & supervising staff concerned with waste management	Before commencement of work and repetition in every six months	Training will be recorded with remarks and attendance register
6	Hazardous Chemical Management	Identification of Hazardous Material Proper Storage Handling Procedure Disposal Procedure	People involved in handling of chemicals and petroleum products including store personnel	As required	Training will be recorded with remarks and attendance register
7	Energy and Resource Conservation	Judicious use of water resource, electricity, fuel, office stationeries (Paper & Cartridge) and conservation of resource through RRR approach.	All work force	Quarterly	Training will be recorded with remarks and attendance register
8	Blasting	Identification of Hazardous Material Proper Storage Handling Procedure Disposal Procedure	Blasting Team	Every month	Training will be recorded with remarks and attendance register
9	Camp behaviour	Housekeeping, Awareness			Training will be recorded with remarks and

		regarding indigenous species.			attendance register
10	AIDS/HIV				Training will be recorded with remarks and attendance register
11	Community awareness				
12	Emergency response				

3.8. Consultation and Communication

The project manager/project director in consultation with EHS in charge/Environmental Representative shall ensure that an appropriate communication method is established for all stakeholders internally as well as externally. Also project will initiate dialogue and consultation with all concerned whenever there is a requirement and interest from any stakeholder.

Communication and consultation will be through briefings and meetings, induction/ orientation, newsletter, posters, e-mails suggestion boxes/schemes, intranet, notice boards containing information on EHS issues. The following topics will be communicated internally as well as externally to vendors, client, visitors, authority and any other interested party.

- L&T HCI IC EHS procedure
- Workplace EHS rules and regulations
- Risk Assessments, Environmental Aspects and Impacts and control measures
- Environmental policy
- Reporting an Incident and non-conformities
- Environmental alerts
- Regulatory and other requirements
- Emergency procedures
- EHS performance
- Results of audits and inspections
- Results of Incident investigations
- Environmental initiatives

Complaint through GRM and feedback received from any stakeholder will be dully addressed and issues will be resolved.

4. Environmental Impacts

During various construction activities, i.e., land clearance, excavation, cutting of trees, concrete and asphalt work, welding & grinding, painting, running of plant and machinery, reclamation, dredging, pilling, site office establishment, material and waste transport etc., there is likely to be negative impact on the surrounding environment. Thus, it is very much important to identify various environmental impacts and to quantify its magnitude so that project team can choose best management practices to mitigate and prevent those negative impacts in to the environment.

4.1. Baseline Environmental Quality

In order to ascertain the net positive or negative impacts resulting from various construction activities, it is very important to know the baseline environmental conditions prevailing in the construction area as well as in the surrounding locality where the sensitive receptors are there. They will be ultimately subjected to the negative impacts if control measures are not in place.

4.2. Environmental Impact Assessment

An environmental aspect is defined as an element of a facility's activities, products, or services that can or does interact with the environment. An environmental impact is defined as any change to the environment, whether adverse or beneficial, resulting from a facility's activities, products, or services.

For the Project, Environmental Impact Assessment Studies has been carried out by **Assam Power Generation Corporation Limited** through consultant/competent agency during planning stage in a macro level. These studies are also regulatory requirements before materialization of this project. In these studies, probable negative impacts on environment were identified and appropriate management plans/controls measures were recommended.

However, L&T HCI IC will prepare activity specific aspect impact assessment for each activity in a micro level incorporating those identified impacts and control measures. The following procedure illustrate the activity specific impact assessment that has been done along with the identification of significant aspects based on the rating matrix.

The project environmental impact assessment is carried out in the following steps

- List all the activities to be undertaken during execution of work
- Identify environmental aspect from those activities
- Identify various environmental impacts associated with each of the aspects in the following areas
    a. Solid waste

b. Noise

c. Hazardous waste

d. Chemical use and storage

e. Air emission

f. Water effluent and release

g. Potential contaminations to land

- Assign numerical value to each impacts against probability vs severity
- The product value of probability and severity of impacts is compared with the significant impacts and hence significant aspects.
- Control/mitigation measures are put in place against each significant aspect
- Once the impact/risk is reduced by implementing control measures again the process is carried out to evaluate the residual impacts.

Assigning Numerical Value to Probability and Severity of Impact

Probability or Likelihood is the frequency of occurrence of an impact that is anticipated during an activity. Severity or Consequences is the degree or extent of environmental harm caused by the impact. The following Table 5 shows the various numerical value assigned to probability and severity of impacts. The product of probability vs severity provides the information on the overall impact magnitude on which action priority is decided. The following Table 6 depicts the environmental impact rating.

Table 5: Probability and Severity Index (4X4 Matrix)

Severity		Value	Probability	
Environmental	**Occupational Health & Safety**			
Massive Catastrophic Effect	Fatality	4	Very Likely	The event is almost certain to occur and has occurred repeatedly in the construction industry
Major Effect (Impact spreads outside of project boundary)	Reportable Injury or illness resulting in > 2 days off work / Permanent Total Disability / Major Pollution	3	Likely	The event will probably occur in most circumstances
Moderate Localized Effect (Impact is contained within Project Boundary)	Non-Reportable Lost Time Injury/ Illness resulting < 2 days off work	2	Unlikely	The event may occur only in exceptional circumstances
Minor Effect (Low Reversible Impact)	Injury or illness requiring First Aid treatment. Minor Pollution	1	Very Unlikely	Very unlikely but remotely possible

Table 6: Environmental Risk/Impact Rating

Risk Matrix

Probability(P) \ Severity (S)	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

Risk Rating	Risk level	Recommended actions
1 to 3	Low Risk	No additional risk control measures may be needed.
4 to 8	Medium Risk	Work can be carried out with Risk controls in place
9 to 16	High Risk	Do not start work. Risk level must be reduced to Medium / low before commencing work.

4.3. Significant Environmental Aspects

Environmental Impacts with rating from medium to high are considered as "SIGNIFICANT" and those aspects are considered as significant aspects. Control measures are evolved to bring these negative impacts from high and medium to lower level of significance. All the legal requirements are considered to be significant only. When determining control measures, or considering changes to existing controls, consideration will be given to reducing the risks according to the following hierarchy.

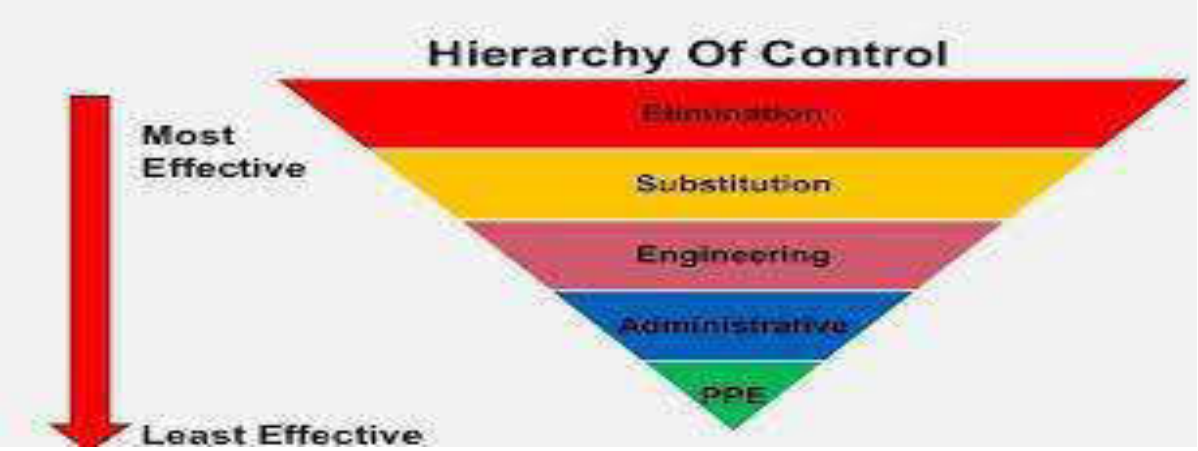


Figure 3: Hierarchy of Control

Residual risks / impacts are the remaining risks / impacts, for which the planned control measures are not able to eliminate the impact completely and residual impacts remain. It will be ensured that the residual risks / impacts are acceptable and manageable.

4.4. Environmental Impact Register

As per the above impact procedure in Section 4.2 and also in line with the Environmental Impact Assessment (EIA Report) for the project, impact register has been prepared against different construction activities within the current scope of work. A complete list of environmental aspect, impact, control measures and residual impact can be found in Annexure 1 covering all anticipated construction activities. Also detailed impact assessment specific to each activity will be included within the method statement developed for of every task and will be submitted to Engineer's office for approval.

4.5. Air Quality Impacts

Air pollution is defined as the alteration of natural composition and/or characteristic of air by industrial emission, vehicular emission, smoke from airplanes, dust and air born particles, open burning, forest fire, construction, pollen, mining, war etc., which makes the air harmful for living world. Please refer to the following Table 7 for various air pollutants, their sources and impacts.

Table 7: Air Quality Impacts

Air pollutant	Source	Impact	Impact Rating
Dust and Particulate Matter	Vehicular movement Loading and hauling of materials Excavation work	Dust pollution and health impacts to workers	Medium
Gaseous Pollutants NOx, SOx, CO, HC etc.	Emission from plant and machinery, transport vehicle, diesel generator and vessel operation, stack emissions	Air pollution	Medium
Greenhouse gases	Burning of fossil fuels during construction work	Global warming	Low
Hazardous fumes	Acid fumes from battery charging area, Emissions from welding works, grinding, hipping and cutting works	Air pollution and deterioration of health of worker	Medium

4.6. Noise & Vibration

Noise pollution is the displeasing or excessive noise that may disrupt the normal life of human and animal kingdom. Continuous subject to high noise results in various occupational health issues to workers.

Please refer to the following Table 8 for source of noise & vibration and its impact.

Table 8: Noise and Vibration Impacts

Source of Noise	Impacts	Impact Rating
Running of plant and machinery, diesel generator, compressor, compactor, jack hammer, drilling, grinding and chipping work, blasting operations	Increased noise level of the surrounding causing annoyance to living organism, occupational health impacts (reduced hearing, deafness, numbness, sleeplessness, depression, high blood pressure, Irritation and headache) to worker	Medium

4.7. Surface Water Quality Impacts

Construction activities will release wastewater and other pollutants to surface water bodies by altering water quality which makes it unfit for drinking, day to day use, and irrigation and also for aquatic animals and plants.

Please refer to the following **Table 9** for various water pollutants, their sources and impacts.

Table 9: Surface Water Quality Impacts

Water pollutant	Source	Impact	Impact Rating
Wastewater	Wastewater from ablution facility, canteen, pantry and kitchen	Water pollution leads to the deterioration of water quality and makes it unfit for drinking, irrigation, domestic use and for the survival of aquatic animals.	Medium
Fuel and lubricants	Hydrocarbon spill		
Hazardous Chemical	Chemical spill		
Wastewater	Surface runoff in construction side containing contaminants		

4.8. Soil & Ground Water Quality Impact

Gaseous and particulate pollutants come to surface during rainfall and contributes to land contamination and groundwater contamination. Wastewater generated from various construction activities and associated work/activities when discharged to ground it contaminated soil as well as ground water. Spill from plants and machinery is another important source of ground contamination.

Table 10: Soil and Ground Water Quality Impacts

Source of Soil and Ground Water Contamination	Impacts	Impact Rating
Discharge of wastewater to ground from sanitation facility, wheel washing, concrete washout, and other maintenance area	Soil and ground water contamination	Medium
Spill of chemicals and hydrocarbons		
Dumping of waste		
Dumping of excavated soil and reclaimed sediments		

4.9. Impacts on Terrestrial Flora and Fauna

Terrestrial ecology comprises plants and animals existing in the project and surrounding areas where they are considered as sensitive receptors. During construction work, land clearing, deforestation, felling of trees may be executed which causes destruction to habitat and disturbs the balance of nature. Also, air pollutants, water pollutants, noise and waste generated during construction work impacts the life cycle of animals, destroy their natural habitats. At times it causes death when they accidentally come across machine and plants.

Table 11: Impacts on Terrestrial Flora and Fauna

Source	Impacts	Impact Rating
Land clearing, felling of trees, excavation, vehicular movement	Loss of plant species, habitat and disturbance to nature	Medium
Operation of plant and machinery during construction work	Accidental death of animals	

Source	Impacts	Impact Rating
Generation of noise and other pollutants from construction activities	Annoyance to animals which push them to migrate	

4.10. Traffic Impacts

There will be an increase in vehicular traffic in the vicinity of the project as a result of construction activities, movement of vehicles during transportation of material, conveyance of workers and other related services.

Please refer to the following Table 12 for anticipated traffic impacts.

Table 12: Traffic Impacts

Activity	Impact	Impact Rating
Vehicular movement for transport of materials, waste and workers	Temporary increase in vehicular traffic	Low
	Temporary increase of air and noise pollution level	Low

4.11. Archaeological Impacts

No such area with remaining of ancient civilization including ancient artefacts, bones, coins etc. is noticed or found during construction, work will be immediately stopped, area will be secured and information will be shared with respective parties including department of archaeology for the respective state.

4.12. Waste Impact

The entire solid waste generated from the construction site can be classified in to the following 4 broad categories, i.e., 1. Construction and Demolition Waste which are generated during day to day construction work that includes waste concrete, rumble, scrap metal, plastics, ceramics and insulation material, 2. Hazardous waste which includes oily rags, used and discarded batteries from plant and machinery, obsolete and discarded chemicals, paints, welding rods etc., 3. Food waste generated from site office, canteen and kitchens and 4. Biomedical waste generated from clinic and first aid centre. If proper waste management practices such as proper collection, storage, handling and recycling & disposal mechanisms are not in place it may cause air pollution, water pollution and land contamination including ground water. Specifically hazardous waste and biomedical waste have significant impact on surrounding environment and human health if not managed properly. E-waste, paper and cardboard, office stationery and packaging materials are released to waste stream from site office activities.

5. Environmental Management Plan

Based on the above identified impact area suitable control measures will be in place to mitigate, control and prevent environmental pollution throughout the entire duration of this project. Control measures or operational controls measures will be implemented against the significant impact categories to reduce the risk/impact level and will be brought to as low as reasonable practicable (ALARP). The following control measures will be in place against each impact area.

5.1. Air Quality Control Plan

The following best management practices (BMP)/operational control procedure will be in place to check air pollution.

Gaseous Emission and Particulate Matter

- Vehicle without having PUC will not be allowed to enter site.
- Diesel Generators will have Stack emission certificate and maintenance regime followed.
- All vehicles and machineries will remain in all times well maintained to ensure that the exhaust is in compliance with vehicular pollution standards; fitness certificates of all the vehicles will be made available.
- All the equipment and machineries will be ensured to remain all time in good condition.
- Stack emission/PUC certificate of each of them will be available.
- Stack Height should be provided as per the CPCB norms.
- Workers working with fly ash and cement will be provided proper PPEs.
- Fully mechanized batching plant will be used to avoid problems related with fly ash and cement dust emission.
- MARPOL compliance fuel for ship engine and all air pollution control devices to be in place for vessel operation.

Dust Control

- Water sprinkling will be carried out to reduce fugitive dust.
- During transportation of soil the dumper will be covered by tarpaulin/polythene sheet so as no dust may arise.
- While undertaking demolition activities the structures to be demolished will be pre-wetted so as to reduce the possibilities of dust emission.
- Excavation activities will be undertaken under the supervision of EHS personnel.
- PPEs like nose masks, goggles etc. will be used in intensive dusty areas.
- Regular water sprinkling will be done in nearby areas of cement and fly ash storage and usage areas.
- Speed limit of all the vehicles running at site will not exceed beyond 10 kmph so as no dust will be generated during their operation.

5.2. Noise & Vibration Control Plan

The following operational control plan/best management practices will be in place to check noise and vibration at construction site,

- Special acoustic enclosures will be provided for individual noise generating construction equipment like DG sets. The special acoustic enclosures may be provided by way of noise shields, if required.
- For protection of construction workers, earplugs should be provided to those workers who will be working very close to noise generation source.
- Strict adherence to maintenance schedule of generators, as specified by vendors, will be observed.
- Smooth movement of vehicles will be ensured (Speed limit 10 KMPH) on the internal roads to avoid idling and honking of vehicles. Caution signs for awareness to operators and drivers will be displayed at prominent locations.
- Generator will conform to the user guidelines specified by MoEF & CC.
- Caution boards will be displayed at all the places where excess noise may occur.
- Substitution by less noise generating equipment.
- Implementing feasible engineering and administrative control.
- Vehicles and Machineries well maintained.
- While handling Jack hammer / Drilling Machine, the operation will be carried out by using Ear Muff / Noise Screen.
- Training on the effect of noise exposure and the proper use of Ear Muff and Plug.

5.3. Erosion and Sedimentation Control Plan

Soil erosion and sedimentation to nearby water bodies and to sea may occurs as result of inadequate and inappropriate erosion and sedimentation control practices. When loose soil is subjected to external factors like wind, precipitation and discharge from dredged materials it blows away/washes away the loose soil and discharge the sediment laden waste water in to water bodies and to the sea causing erosion on land and sedimentation in to the water bodies. Temporary stock piled soil and rocks in the mining area will also be subjected to external factors causing erosion and sedimentation. The following best management practices or control measures will be in place to control erosion and sedimentation control.

  - Temporary stockpiles will be covered, and height will be restricted to 2 to 3 meters.
  - Garland channel will be dug around excavated soil stockpiles to prevent wash away by storm water.
- Vegetation cover/mulching will be provided to exposed loose soil surface.
- Proper slope management, use of silt fence, check dams will be considered to prevent soil erosion as far as practicable during construction work.

- Construct temporary retention wall at dumping site to prevent erosion of topsoil and subsoil as practicable.

5.4. Soil & Ground Water Quality Control Plan

The following best management practices or control measures will be in place for manging soil and ground water quality.

- All the debris resulting from the site would be isolated from the wastewater and disposed of separately.
- Diesel storage areas will be bonded and will be inspected and cleaned at regular intervals.
- Sanitisation facility with septic tanks and dispersion trenches as necessary will be provided
- Proper handling of lubricant oils and fuels will be ensured to avoid ground spillage.
- Implement all reasonable measures to avoid flowing of polluted water from the site, infiltrating into the soil or contaminating other water resources.
- No natural (borehole) water sources shall be used for construction activities or for domestic activities unless specified.
- Water for construction will be obtained from the local authority responsible for the provision of water.
- Investigation of the viability to re-use wastewater will be done.
- All working areas where hazardous substances are handled or stored must be designed to collect and contain hazardous substances.
- Provision for impervious working surfaces, trenches, traps, sumps, or settlement ponds to collect and contain liquid pollutants at all working areas designated for the handling of and/or storage of hazardous substances.
- Polluted water will not be allowed to be disposed on to land or into water medium. They will be disposed in line with legal requirements and guidelines.
- All vehicle maintenance shall occur in a designated vehicle maintenance area.
- Washing of containers, equipment and vehicles will only be carried out at designated washing areas.
- Avoidance of pounding of water and creation of muddy conditions.
- Vehicle washing is not allowed at the side so that no wastewater is discharged directly to soil. If required only wheel washing will be allowed at designated place.
- Any kind of spillage/leakage from fuel and chemical/hazardous chemical handling is avoided by means of good working practice and placing secondary container.
- Minimize trampling and removal of vegetation.
- Compact loose soil as soon as possible after excavation, grading, or backfilling.
- Soils contaminated with fuels, oils, and enamel paints, solvents etc. shall be removed as soon as reasonably possible and disposed of at an appropriate waste disposal facility.

5.5. Surface Water Quality Control Plan

In order to prevent surface water from contamination and degradation as a result of surface run off, wastewater from construction side and water pollutants from other source the following best management practices/ control measures will be in place.

- Appropriate sediment control techniques (diversion banks, silt fences, check dams, sediment traps / ponds) will be incorporated into the construction/civil or mining works, wherever appropriate;
- Wherever feasible wash down practices and the production of effluent & process water will be reduced;
- There will be no discharge of sewage generation from site office or labour accommodation and wastewater will be treated in sewage treatment plant (STP) or diverted to septic tank with prior approval and within load bearing design capacity;
- Wastewater coming out from dump/stockpiles of dredged material will be managed as discussed in **Section 5.3** and **Section 5.5**;
- Wastewater from vehicle wash downs, workshops, concrete mixing facilities, waste storage areas, oils, paint, etc. will be collected separately and sufficient measures will be in place to prevent entry to storm water system or other drainage systems;
- No storage of chemicals, fuels or waste materials (solid or liquid), within significant drainage lines or on open areas where spillage can enter the wrong drainage system or contamination of rainwater can occur. Provision of concrete bund areas (110% volume stored), interceptors, and other forms of containment as well as roofing/covering will reduce potential impact;

5.6. Terrestrial Ecology Control Plan

Terrestrial ecology generally represents plant and animal species existing in the project area and its surrounding environment. The following mitigation measures will be implemented during execution of construction work against the identified impacts in previous sections.

5.6.1. Management of Terrestrial Flora

To protect existing plant species and to mitigate negative impacts the following mitigation measures will be implemented during construction works.

- No open fire policy to be implemented on all projects to reduce potential for outbreak of vegetation fires;
- Felling of trees, bushes and shrubs will be minimised as far as possible;
- Compensatory replantation program will be initiated;
- Cutting of trees will be initiated after due approval from relevant Forest Department;
- Ground clearing will be restricted to the project area only and minimum disturbance to the surrounding flora will be maintained;

5.6.2. Management of Terrestrial Fauna

Avian fauna and other wild animals will be affected during construction work which includes nuisance to their habitat, accident with plants and machinery and interference with their life cycle. The following best management practices will be considered to mitigate the negative impacts on terrestrial fauna.

- Nosie control practices as described in earlier section to minimise nuisance;
- No hunting will be allowed;

- Work restriction to active approved work areas only;
- Due care during excavation work for borrow animals;
- To be vigilant during vehicle movement on forest road to avoid accident with road crossing animal;
- No open dumping of plastic bags, food and other waste material which may attract animals;

5.7. Waste Management Plan

5.7.1 Waste Management Strategy

This document is a clear intent on how L&T Construction will approach for Construction Waste Management and forms the basis of the overall site specific Construction Waste Management Plan. L&T is committed to the universally accepted principles of waste management that are followed as an industry standard. This philosophy employs a tiered approach to waste management that seeks to maximize the value of waste as a resource and reduce the volume of material making its way to landfill and other disposal facilities. The principles of the waste hierarchy are embodied in the following figure and shall be employed by all personnel and contractors working on the project.

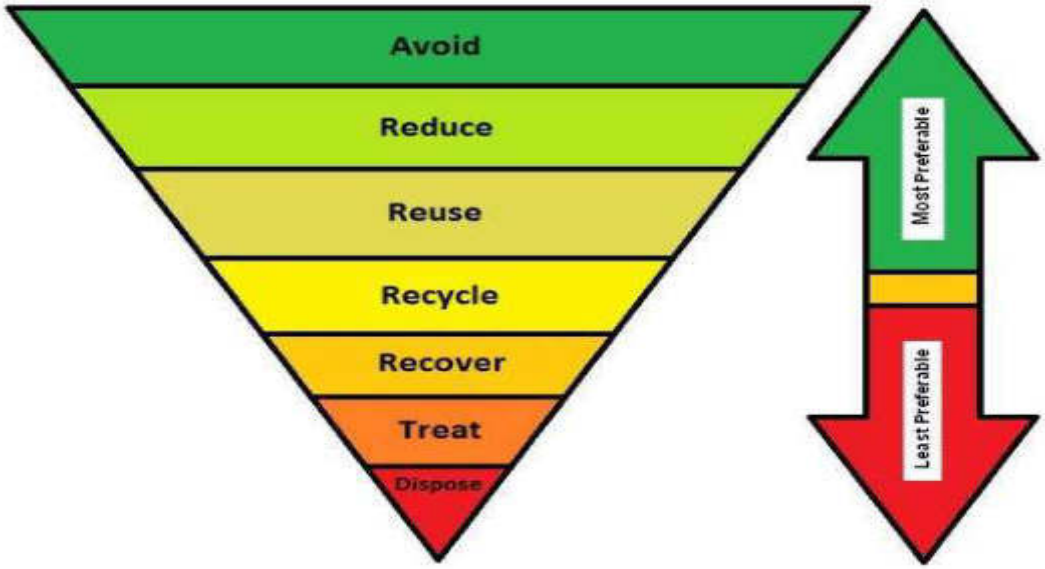


Figure 4: Waste Management Hierarchy

Avoid: Opportunities for eliminating waste production on the site should be investigated. Some options include substitute products/packaging or changes to processes or projects that eliminate the waste stream.

Reduce: Identify opportunities to reduce the amount of waste produced by an activity or process, e.g., reducing the production of waste paper by double side printing or electronic data storage.

Reuse: Involves the re-use of waste materials for a similar purpose to the original, e.g., reusing storage containers.

Recycle: Recycling may involve some intermediate processing or the use of a material that is different to the original use of the material, e.g., recycling of road base material or recycling of office paper.

Treat: On-site or off-site waste treatment may be required to reduce the adverse impact of a waste product on the environment. An example would be the treatment of sewerage waste to reduce the hazardous nature of the waste.

Dispose: Disposal of project waste streams will usually involve a subcontractor/s for transport, treatment and disposal of waste off site. In some cases waste disposal may occur on site, however, would only occur with the written permission of the Workplace Manager. As a general rule, hazardous materials such as asbestos, wastes paints, chemicals, solvents, etc. shall not be buried on site.

5.7.2 Classification of Waste

The entire construction and demolition waste generated during construction activities can be broadly classified in to the following categories based on their physical and chemical properties, recyclability, disposal options and source of generation.

5.7.3 Inert/ Non Hazardous Waste

Waste materials which are relatively stable are called inert waste. **Waste concrete and concrete blocks, ceramics, stone products, scrap metals, glass, plastic, rubber** etc. are inert waste. They are relative inert and non-biodegradable. Main sources of scrap metal are construction sites and workshops through fabrication activities, maintenance of equipment and the replacement of machinery parts. Off-cuts, off-specification rejects; aluminium; iron reinforcement steel bar and structural steel; cladding, copper wire. The main examples of rubber waste generated by projects are tyres from mobile equipment used on site. Waste Concrete and blocks – Waste concrete and concrete blocks are generated during construction and demolition works and the main sources of waste concrete are left over excess concrete and concrete from demolition activities, discarded and damaged concrete blocks etc.

5.7.4 Hazardous Waste

Waste is generally considered to be hazardous waste if it is known to be explosive, combustible, toxic, reactive, corrosive or infectious and has the capacity to harm the environment and affect the health and hygiene of mankind. It may be in liquid, powder or solid form, and with some products even their packaging /containers are considered hazardous. Examples of hazardous wastes are:

- Hydrocarbon waste (used lubricant oil, grease, oily rags, lubricants, contaminated absorbent rags and PPE)
- Chemical waste (discarded and obsolete acids, alkalis, solvents, expired product, paints and other construction chemicals)
- Lead and mercury containing materials (old batteries; aerosol cans, old glues tubes, fluorescent tubes and light bulbs)

5.7.5 Biomedical Waste

Site Clinic and first aid centres are the generators of biomedical waste at construction site. Examples of medical wastes are sharps (injection needles, lancets, broken ampoules, scalpels, suture needles) first aid waste (gloves, bandages, band aids, gauze, cotton wool, dressings etc.), discarded and expired medicines and human tissues (blood, skin, body parts etc.).

5.7.6 E-Waste

E-Waste at construction site generally represents all discarded electronic and gadget equipment which includes but not limited to cell phone, computer and computer parts, printers and cartridges, photocopier machines etc. They will be collected and stored separately in a dedicated place with suitable container and their final disposal will be as per E-Waste (Management) Rules, 2016.

5.7.7 Organic or Biodegradable Waste

Waste from materials which are originated from plants and animal are generally biodegradable and are called as organic or biodegradable waste. The following waste materials are anticipated in a construction site and are organic in nature.

A. Wood and wood products (Paper, Cardboard and Plywood)

Wood and plywoods are used extensively in construction site for temporary works and hence a significant quantity of wood-based waste is generated. Paper and cardboard are released from office use and as packaging material from stores during construction activities and site offices which can be easily recycled through paper and cardboard recycler.

B. Food Waste

Food waste will be generated from site office, canteen, worker mess and kitchens. They will be collected with closed container and will be disposed with municipal authority as the anticipated quantity is small. Proper labelling for collection bin will be maintained. For remote sites, project has to take necessary steps for backward composting of food waste.

C. Bio solids

Bio solids are generated after treatment or settling of sewage and are disposed through further treatment, land or sea disposal. Generally, sludge from STP are categorised as bio solids.

5.8 Waste Segregation and Colour Coding

The first step towards handling of waste material is the segregation of waste at the source so that waste can be collected properly and suitable management options i.e., recycle, reuse, energy recovery and final disposal will be considered. It greatly reduces time and cost and also prevents cross contamination of waste materials.

Waste Class	Type	Details	Color Coding of Collection Bin/Skip
Inert/Non Hazardous Waste	Scrap metal	Steel, Aluminum, Copper, Cable scrap, metal tins, cans etc.	Blue (if considered for recycling)
	Plastic	PVC piping PVC bottles Plastic sheeting	

Waste Class	Type	Details	Color Coding of Collection Bin/Skip
	Waste concrete	Waste concrete, Concrete blocks Concrete masonry unit etc.	
Hazardous Waste	Hydrocarbon products Expired and obsolete construction chemicals Paints Heavy metal containing lamps and bulbs Batteries	Discarded and obsolete construction chemicals, chemicals container, discarded paints, oily sludge, oil contaminated soil, contaminated PPEs, batteries, heavy metals, bulb and tube lights etc.	Red
Biodegradable Waste	Food Waste	Discarded and left over food, food packets, fruit and vegetable peels etc.	Green as it biodegradable
	Wood and wood products	Timber, plywood and other composite wood products	
	Paper & cardboard		
Bio Medical Waste	--	Sharps, syringe, bandage, cotton gauge, expired medicine, tissue and body parts, transfusion tube, fluid bags etc.	Yellow or Red as applicable
E Waste		Discarded computers and hardware, printers, scanners, plotters, laptops, cell phones, cartridges, fax, phones, consumer electricals and electronics (TV, Refrigerator, washing machine, air conditioner etc).	-- To be collected in a secured place
Mixed Construction and Demolition Waste for Landfill	Unsorted mixed construction and demolition waste which are non-recyclable and non-reusable further (waste concrete, glass,	Plastic, Wood, Rubber, Tire, Ceramics, Insulation, Glass, Drywall, Concrete etc.	Grey (will be sent for landfill/disposal yard)

Waste Class	Type	Details	Color Coding of Collection Bin/Skip
	rubber, plastics, ceramics, insulating materials, wood etc.)		

5.9 Collection and Storage

Segregation at source, proper collection in respective container and temporary storage goes hand in hand for the proper management of waste materials in construction site. The following practices will be followed for proper collection and storage of waste materials.

5.9.1 Collection and Storage of Hazardous Waste

For collection and storage of hazardous waste, upmost attention and care must be taken to avoid cross contamination of soil, water and air along with other waste materials from hazardous materials itself. Also, improper collection and storage leads to poor health and hygiene of workers. The following practices will be followed for dealing hazardous waste;

- Red is the colour code for receptacles used to store hazardous waste
- Special storage areas for hazardous waste should be allocated and demarcated.
- Signage of storage areas must be erected to identify the area as a hazardous waste collection point and to warn of dangers. For example, “Danger, No Smoking” and “No Naked Flames” signs shall be erected at collection points for flammable or explosive waste.
- Storage areas and/or containers used for hazardous liquid waste must be able to contain spills to prevent contaminating the environment. Leak proof metal/plastic/glass container should be in use as appropriate and neutral to the type of hazardous waste. The container/skip/bins shall be covered all the time.
- Hazardous waste containers are to be labelled to indicate the contents and presence of hazardous waste. The information on the container must conform to local standards and requirements.
- Do not mix hazardous waste with other waste categories and do not mix together hazardous wastes that are incompatible.
- Incompatible hazardous wastes must be segregated and stored separately, at specified safe distances – projects must identify all wastes generated on site that are incompatible. This and related safety information must be made available to workers. Consult MSDS for information on incompatibility.
- Hazardous waste materials shall be handled using the correct PPE as specified in the product’s MSDS. Where specialist equipment is specified it must be supplied and used.

5.9.2 Collection and Storage of Bio-Medical Waste

Biomedical waste are also another concerned area which needs to be treated with upmost care as there is always a risk of cross contamination. The following practices will be followed for dealing Bio-Medical waste;

- Sharps – must be stored in a rigid-walled, puncture resistant container with a lid that can seal. The biohazard symbol should be displayed on the container.
- First aid waste – gloves must always be worn when handling any first aid waste. Waste should be placed in durable plastic bags and in a receptacle with a lid that can close. Double bag waste if necessary or doubtful about the durability of the bag.
- Significant volumes of first aid waste should not be allowed to accumulate inside the first aid clinic – it should be disposed of frequently (daily if necessary) to secure collection points.
- Waste receptacles shall not be allowed to overflow.

5.9.3 Collection and Storage of Recyclable Waste

All the inert waste materials including paper and cardboard that can be reused and recycled within the project or through approved recyclers should be collected in to suitable receptacles/container/bins or a in designated place for bulk items i.e., scrap metals, waste concrete, wood waste etc. with suitable colour coded receptacles and appropriate labelling. They will not be mixed with other waste for landfill disposal. Common waste materials those will be considered for recycling are waste paper and cardboard, scrap metal, waste concrete and blocks and scrap wood.

5.9.4 Collection and Storage of Biodegradable Waste

Biodegradable waste especially food waste will be collected in green colour coded bins/container with lid/cover and labelling. The container to remain close all the time to deter flies, insects, and other animals and to control odour for decomposing food materials.

5.9.5 Collection and Storage of Bulk Landfill Waste

Bulk construction and demolition waste which cannot be recycled or reused further should be collected at a designated place with proper labelling. These C&D waste (waste concrete, rubber, glass, plastic, ceramics, insulating materials etc.) can be collected together and to be sent for further processing or landfill disposal. The area shall be properly demarcated and secured with appropriate labelling.

5.9.6 Collection and Storage of E-Waste

Discarded computer and computer parts, laptops, printers and cartridges, scanner, cell phone etc. are collectively called E Waste and they shall be collected in a secured place and to be protected from water and moisture.

5.10 Reduce, Reuse and Recycle Approach (R-R-R)

Reduce: Reducing the amount of waste that we generate is the most desirable strategy towards waste management. Proper estimation of our construction material need, procurement of right material in appropriate quantity, optimizing usage is the key to reduce waste generation. The key is to only purchase goods that we need and in the right amount.

The following reduction strategies will be followed especially for the identified materials and products as below.

Concrete:	Reduction of waste concrete amount by Proper estimation of requirement and optimizing the use of fresh concrete.
Paper and Cardboard:	Reduction of unnecessary printout, use of both side of paper, avoidance of multiple copies.
Wastewater:	Limiting the use of excess water, repair of leaks and taps, use of high efficiency low water faucet and taps.

Reuse: The process of reusing starts with the assumption that the used materials that flow through our lives can be a resource rather than refuse. It involves the re-use of waste materials for a similar purpose to the original, e.g., reusing storage containers, discarded wood, rejected concrete for any other similar use at construction site.

Recycle: Recycling is the last option in R-R-R strategy where waste material is processed intermediately for some other products where the waste becomes the raw material for other products. Recycled aggregates, road base, waste paper and cardboard for packaging industry, scrap metal for recycled products are good example of recycling strategy in a construction project. At minimum the following waste materials will be considered for recycling either in the project or through approved recyclers.

Waste Concrete:	Waste concrete can be recycled by utilising for temporary construction works such as blocks, road barriers, fencing equipment etc. Also crossed concrete and blocks can be used as fill materials at site or in any other projects. Aggregate can be recovered from the waste concrete as viable and possible.
Scrap metals:	will be recycled through scrap dealers.
Wood Waste:	Can be utilised for temporary constriction needs.

5.11 Final Disposal

Disposal Requirements for Bio-Medical Waste

Typically, medical waste is destroyed in off-site incinerators (e.g., hospitals) that are licensed by the regulatory authority to receive this kind of waste. Bio-Medical waste will be disposed in line with **"Bio-Medical Waste (Management and Handling) Rules 1998, as amended through 17th September 2003"**. Suitable transporter and facility owner for Bio-Medical Waste will be identified and disposal will be as per the guideline. Proper record keeping and authority reporting will be carried out as per respective guideline and format.

Disposal of Hazardous Waste

Final disposal of hazardous waste will be as per **The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules 2008 dated 24th September 2008, as amended through 13th August 2010**. Approved hazardous waste transporter and facility operator will be identified and disposal will be done through them. Proper record keeping and authority reporting will be carried out as per respective guideline and format.

Disposal of E-Waste

Disposal of E-Waste will be carried out in line with "The E-waste (Management and Handling) Rule, 2011 and The E-waste (Management Rules) 2015". Approved E-Waste transporter and

facility operator will be identified, and disposal will be done through them. Proper record keeping and authority reporting will be carried out as per respective guideline and format.

6 Housekeeping

Good housekeeping results in clean and ordered operations with no loose waste or debris littering the project area; this will reflect L&T commitment to effective safety, health and environmental performance. It will also contribute in reducing the amount of construction waste generated and making sure it's segregated at source with the least amount of effort. For the duration of the construction activities, the Project Manager will allocate adequate time and resources to maintain good housekeeping in all work areas.

All working areas as well as out of the way areas and pedestrian access routes on site, will be kept clean and free from obstructions. All wreckage, rubbish and debris of any kind will be removed and disposed of in accordance with this document.

7 Waste Management Contractor

Suitable waste management contractor/vendor/service provider will be identified for the transport, treatment and final disposal of various types of waste who are working locally. Such service providers/vendors/contractors will be selected based on their eligibility and regulatory approval from respective authority to carry out the said work.

8 Monitoring and Reporting

The environment representative is responsible for ensuring the site team adheres to the requirements of the waste management plan, this will be done through daily regular monitoring of the different activities taking place on site, and direct feedback will be provided to the section managers to rectify any violations

In addition, weekly documented inspection of the waste collection infrastructure and the waste collection/segregation/transportation procedure will be carried out by the environment representative to ensure and document compliance with the waste management plan.

9 Awareness and Training

Training the staff and workforce on the project's waste management practices is the responsibility of the EHS in charge and environmental representative. Training on waste management will be carried out regularly where the training topic included but not limited to identification, segregation, collection, recycling and final disposal of different kind of construction and demolition wastes including hazardous waste.

5.8. Chemical and Hazardous Material Management Plan

Construction chemicals, petroleum products, batteries, paints and coatings and other chemicals in a construction site is considered as hazardous material based on their reactivity, flammability, corrosively and toxicity. If they are not managed properly for storage, transport and handling, it may come in contact with human and environment causing sever health issues and environmental pollution. The following best management practices will be adopted for the management of hazardous material.

- Separate hazardous material store with restricted access where only authorised personnel may attend and be clearly identified as such – the area shall be clearly demarcated and appropriate signage must be erected, e.g. “Hazardous Material Store – authorised personnel only”
- Hazardous substances shall be stored or contained in accordance with manufacturer’s recommendations and / or the requirements set out in the MSDS
- Ventilation – if working in an enclosed storage area, ensure that the doors and windows are open, and all available fans are turned on
- Access – keep the most commonly used substances at the front of the storage area and ensure there is enough room to work
- Keeping materials segregated – avoid a reaction between incompatible substances by keeping paints with paints and solvents with solvents, etc.
- Use secondary containment where possible – for example small containers are sealed and stored within suitable larger containers
- Use bunding to contain spills to prevent contamination of waterways and land (particularly any areas identified as sensitive or protected during the EIA for the project)
- Ensure emergency equipment is available and in good working order – spill kits, fire extinguishers and first aid kits are to be kept stocked, conveniently located and checked regularly
- Making sure appropriate labels and signs are in place – materials need to be clearly labelled in order to prevent the accidental dispensing / supply of the wrong substance and storage areas need to be clearly signed
- Never store hazardous materials in any container which is not labelled or is incorrectly labelled, was previously used for the storage of another product, is damaged in any way or is inappropriate for the storage of the particular substance; and leak proof container made up of appropriate material with chemical compatibility should be always in use
- Proper training will be provided for personnel dealing with hazardous material
- Proper inventory will be maintained

6. Emergency Response Plan

Environmental Emergency Response Plan describes how L&T HCI IC effectively manages and responds to environmental emergencies should they occur during the construction activities. The objective of this emergency plan is;

- Safety of personnel
- Minimise impact on the environment
- Minimise impact on property and assets

This Plan applies to all project areas that may be involved in an emergency and is intended to ensure that the project team is adequately prepared to respond to any emergency during the works being carried out on the project.

Project team will implement this site specific emergency preparedness plan which is relevant to the nature and complexity of the project or service.

This shall cover a range of emergencies such as or chemical spill that are relevant to the project or service.

No less than once each year or at a higher frequency if EHS risks changes, project shall conduct an exercise to simulate an emergency. The purpose of the exercise is to test the suitability of the plan and to train people to respond correctly. It is expected that improvement programmes shall be implemented to address opportunities identified during the exercise.

6.1. Emergency Situation and Severity

The following is a list of anticipated emergency situations (environmental) that the project may come across during execution of construction work.

1. Spills of hydrocarbons and chemicals
2. Fire
3. Discovery of potentially contaminated land
4. Accidental Discharge of wastewater or other pollutants into a drain, water course or land
5. Disturbing or damaging protected species

The following Table show the classification of different emergency situations based on the severity of their impacts.

Table 13: Incident Severity

Low Severity	Moderate Severity	High Severity
Pollution or degradation which has low severity impacts on the community and/or environment in the short-term and is fully reversible with no residual impacts. • No residual contamination of land; • Spill contained to defined area(s) within site or workplace; • No significant clean-up required other than removal of contaminated material to land farm or approved waste area;	Pollution or degradation which has moderate severity impacts on the community and/or environment but is fully reversible with no residual impacts. • Oil or Sewerage spill escapes into offsite flowing watercourse. • Dangerous road surface has potential to result in an accident. • Warning letter or investigation by Local	Pollution or degradation which has high severity impacts on the community and/or environment and may have irreversible residual. • Extensive contamination / pollution of waterways or catchment areas. • Local Government or State Government Agency restricts access/egress to site, significantly affecting program. • Dangerous road surface has potential to result in an accident. • Explosion or leak of hazardous gas.

Low Severity	Moderate Severity	High Severity
• Release of low eco-toxicity substances (refer MSDS). • Oil spill escapes into offsite storm water system where it is contained and does not enter a flowing water course;	Government or State Government Agency.	• Possible or actual evacuation of local vicinity.

6.2. Emergency Response Team

The following Table shows the site specific emergency team that will be formed with specific emergency roles and responsibilities.

Table 14: Emergency Contacts

Name and Designation	Role	Contact Number
Mr. Santanu Majumdar (Project Manager)	EHS Emergency controller	8133936212
Mr. Neba Jyoti Bera (EHS Engineer)	EHS Emergency Response Coordinator/Team Leader	7099002556
Mr. Manoj Yadav (Environmental Officer)	Environmental Emergency Response Coordinator/Team Leader	7838013312 709902557
Mr. Dinesh Sharma (Section In-charge)	Action initiator in their respective area and department	9816866734
Mr. Zakir Hussain Hazarika (Section In-charge)	Action initiator in their respective area and department	9752493367
Mr. Pratik Kumar Bhunia (Plant & Equipment In-Charge)	Action initiator in their respective area and department	9805241445
Mr. Manoj Kumar (Store In-charge)	Response Logistics provider	7082746173
Fire Attendant	Fire fighter	7099002556
Ambulance	Medical Emergency	80083087015
Mr. Somaren Basumatary	First Aider (RMP)	9101373923
Manoranjan Jyoti	First Aider (RMP)	9438147250

6.2.1. Responsibilities

Project Director/Project Manager

The overall responsibility for the implementation of the Emergency Response Plan is with the Project Director/Project Manager, who can delegate his responsibility, but is accountable to all actions of this procedure.

Project EHS in charge

The Project EHS In-charge shall assist the Project Manager/Project Director in implementation of the plan.

Emergency Response Coordinator

The Emergency Response coordinator is to collect all relevant data of an emergency incident and relay the information to the relevant entities. This position is manned 24/7.

Emergency Response Team Leader

The Emergency Response Team Leader is responsible for managing the environmental emergency team members, provide training and to attend and take charge of any incident that the ERT are called out to.

Emergency Response Team

The Emergency Response Team are to be on call 24/7 and respond to any incident call out as required.

This team will be organized and developed within the Project Managements Team, EHS representatives, and medical practitioners (Nurses) in order to be manned 24/7 during the duration of the project.

All Employees and Contractors

To follow the emergency response plan as indicated in the respective work environment.

6.3. Emergency Response Flow Chart

The following flow diagram represents the steps or unit operation that will be followed during an environmental emergency.

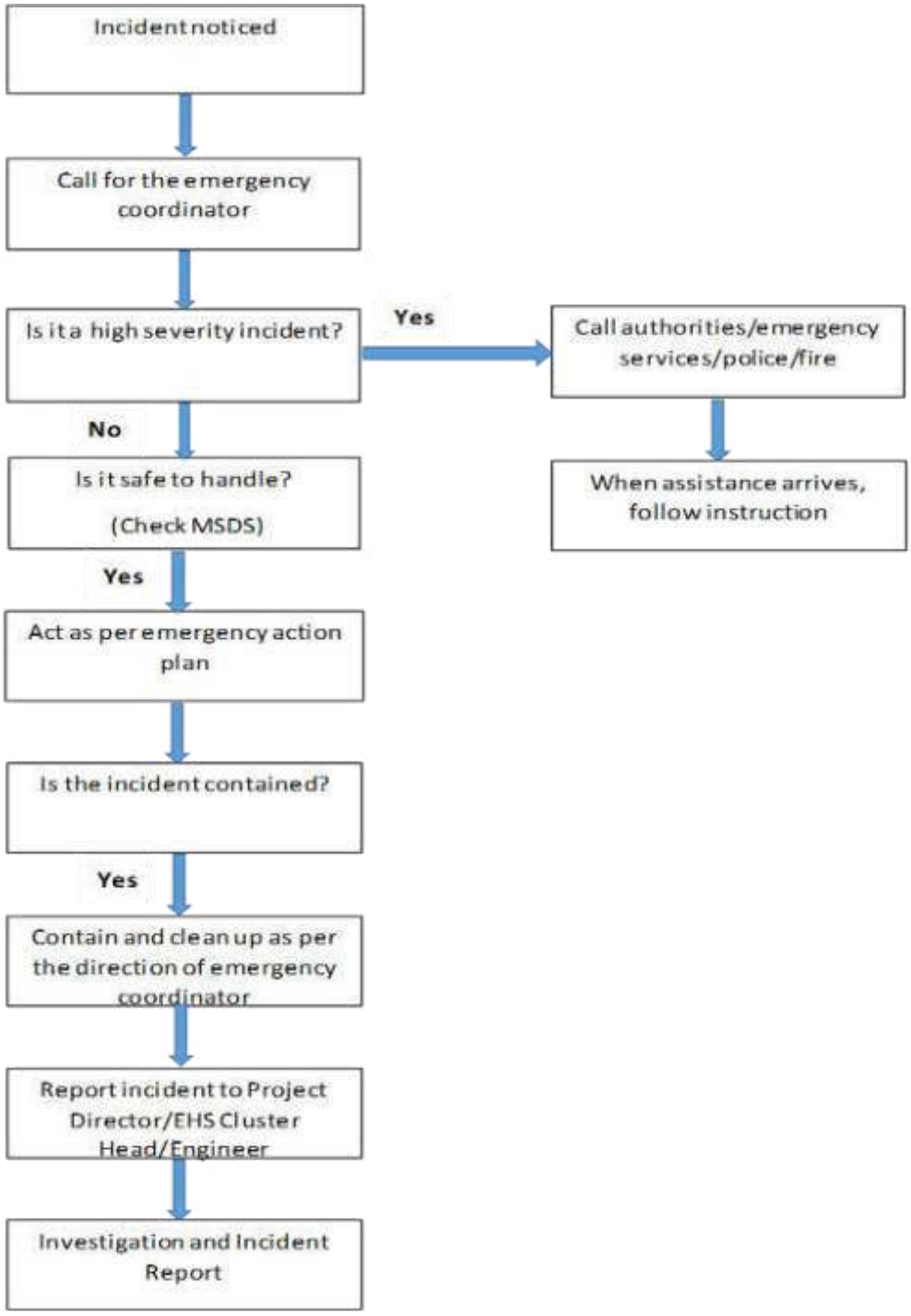


Figure 5: Incident Report Flow Chart

6.4. Emergency Action Plan

Incidents	Actions to be taken

Spills of diesel or other liquids including chemicals	Locate the spill and try to stop it. Contain the spill – use spill kits materials (absorbent granules / booms), sand or drip tray. Check the spill has not reached any drains or watercourse. Report to Management – Details required are: • Location • What was spilled • Has it entered drains /watercourse Clear up using spill kits. Dispose of used spill kits as special waste.
Fire	Stop works immediately Follow the Emergency Fire Plan.
Discovery of potentially contaminated land	Stop excavation / piling / ground breaking works, immediately. Report to Management. Fence area off. Contact environmental representative and EHS in charge. Environmental representative will contact a specialist to inspect the material.
Discharge of waste water or other pollutants into a drain, watercourse or land	Stop works immediately Stop pumps Report to L&T Project Management Contain the discharge – build a bund Install a control system
Disturbing or damaging protected species	Stop works immediately Report to management – Details required are: • What has been disturbed or damaged (plant or animal) • Where it occurred • How it happened Fence off area Contact EPO
All incidents must be recorded and reported on the preliminary incident report and incident investigation report. A copy of the report is to be forwarded to the Corporate EHS Department.	

6.5. Emergency Response Equipment and Materials

- Alarm systems – Air horn for site works, Manual alarm system for site offices

- Emergency lighting and power – temporary generators
- Spill Kits – Fuel Storage Areas, chemical storage and handling chemical areas.
- Proper PPE to handling chemicals.
- Warning tape/post to secure the area
- Bucket and shovel
- Communication facilities – Site Radios

6.6. Training

Training will be provided to the emergency response team members through mock drills or scenario based exercise to perform their duty properly during emergency situations. Environmental representative will provide the training to the response team members.

6.7. Emergency Preparedness and Drill

Emergency drills and or scenario based mock events will be conducted on the Site. These drills will be held every 6 months and will be recorded with lesson learnt.

7. Monitoring and Auditing

Monitoring and auditing is an important exercise to evaluate the compliance and adequacy of this EMP and is an integral part towards environmental management system compliance. It gives an opportunity to evaluate the adequacy and efficacy of control measure that are in place to control, mitigate and prevent environmental pollution and scope of improvement. The whole monitoring and auditing exercise have been explained in the following head.

7.1. Performance Monitoring

Monitoring of compliance condition and implementation of this EMP will be carried out by EHS personnel in a day-to-day basis which includes visual inspection, everyday walk through and random checking of all record, permits by environmental/EHS representative.

7.2. Environmental Inspection

Routine environmental inspection will be carried out once in a week time by Environmental officer and compliance, noncompliance and observations will be recorded with a dedicated checklist. Closeout will be followed against each noncompliance and observation. Inspection record as well as closeout evidence will be maintained at site office.

7.3. Environmental Quality Monitoring

Environmental quality monitoring shall be conducted during construction to assess the status of environment and if there is any release of pollutants from construction activities. It is also an indicator of how our environmental management plan is effective against controlling and preventing pollution. It is important to know the background environmental condition and to compare with the impact of construction activities on various environmental attributes through environmental quality monitoring. This monitoring and reporting to various regulatory agencies is also a regulatory requirement as per the consent condition stipulated in Environmental Clearance received for this project and a reporting requirement to State Pollution Control Board.

Environmental quality monitoring with respect to Ambient Air Quality, Ambient Noise Level, Drinking Water Quality, Waste Water Characteristic, Marine WATER Quality and Soil Quality will be carried out by NABL accredited and MoEF recognised/registered laboratories.

Table 15: Environmental Quality Monitoring

No	Environmental Attributes	Parameters	No. of locations	Frequency	Reporting
I	**Terrestrial Environment**				
1.	AAQ Monitoring for Project	All 12 Parameters as per NAAQS	1. Batching Plants 2. Crushing Plants 3. Quarry 4. Dam site 5. Power House 6. Power Intake 7. any major Construction site suggested by CSC 8. Sensitive receptors - along highway, hospitals, schools, day-care facilities, elderly housing and convalescent facilities (if any)	Once in a season Excluding monsoon for entire duration of construction	APGCL
2.	Ambient Noise Monitoring for Project	Day and Nighttime Equivalent noise Levels			
3.	Ambient Noise Monitoring for DG Sets	Day and Nighttime Equivalent noise Levels			
5.	Drinking Water Quality Assessment for Project	As per BIS 10500	At identified water bodies locations (well and other ground water sources in project area) 1. Dam	Once in a season Excluding monsoon for 2 years	APGCL

No	Environmental Attributes	Parameters	No. of locations	Frequency	Reporting
			2. Adit -1 3. Surge shaft 4. Power House 5. Staff camp 6. Labor camp		
6.	Wastewater Quality Assessment for Project	PH, Dissolved oxygen, BOD, COD, Total coliform count, Total hardness, Calcium, Magnesium, Iron, Manganese, Chlorides, Sulphates, TDS, Temperature, Nitrates, Fluorides, Mercury, Cadmium, Arsenic, Cyanides, Lead, Zinc, Total Nitrogen and Phosphates.	Depends on STP operations, batching plant wastewater generation	Once in a season Excluding monsoon for 2 years	APGCL
8.	DG Stack Monitoring	PM, SO_2, NO_2 , NMHC (as C) and CO	Based on number of stacks associated with DG Sets	Once in a season Excluding monsoon for entire duration of construction	APGCL

7.4. Audit

To ensure compliance with the Environmental Management System, this EMP, regulatory and other requirements audits will be conducted in the project during the entire contract duration in the following Sections. Engineer's Office will be informed regarding the schedule of these office and audit report will be shared.

7.4.1. Internal Audit

Twice in a year or as per the Company Support Audit Schedule, internal audit will be conducted for the project. Auditors from the Corporate Office will conduct the audit to verify the project's compliance with the EMP as well as with procedural requirements set by the company.

7.4.2. External Audit

Once in a year independent 3rd party audit will be carried out to check compliance with EMP which includes but not limited to the regulatory compliance condition, environmental management system requirements (ISO 14001:2015) and any other related national and international requirements.

7.5. Non-conformance, Corrective and Preventive Action

Non Conformance

When materials, products, equipment or work practices are identified as not complying with environmental requirements, they will be brought to the attention of the EHS Committee or Project EHS In-charge who will rectify the issue. Where rectification is not straightforward, it will be resolved by the Project Manager.

Corrective and Preventive Action

For the actions raised as non-conformity, the Project Manager/Project Director ensures that the cause(s) of nonconformity/ observations are investigated. The EHS in charge may suggest or give advice on the corrective and preventive action(s) to be taken by the respective section manager.

All nonconformity or observation corrections must be made in an appropriate timescale to uphold the IMS Management System objectives. However, a maximum of 4 weeks may be given to the project for the rectification of nonconformity and 45 days maximum for an observation.

Corrective and preventive action report has not been closed within the agreed time limit, the Auditor/ EHS Manager/ Environmental Representative informs the Project Director who shall initiate disciplinary measures to ensure immediate compliance.

7.6. Reporting Requirement

There are various reporting requirement to Client, Engineers Office, Regulatory Agencies and other External Agencies under various Environmental Laws, Regulation and Guidelines. The following reports will be generated as per the reporting schedule.

7.6.1. Incident Report

In an event of environmental incident, an incident report will be generated as per Project Emergency Reponses Plan.

7.6.2. Periodic Performance Report

Monthly environmental report will be generated which will address the following subjects.

- Work Progress
- Environmental Incident/Near Misses
- Waste Management Details including hazardous waste details
- Monthly utility usage i.e. electricity, water and fuel consumption
- Aspects and impacts assessment status
- Inspections and audits reports and their closeouts
- Training completed and attendees
- Warning notices/penalty incurred

8. Environmental Management Plan Review and Update

This EMP will be reviewed and amended, if appropriate, to reflect necessary changes at intervals not more than 12 months. If the EMP requires to be amended after the review, the Environmental Officer identifies the nature of changes and makes the necessary changes as appropriate including revision number, marks a new issue date on the revision status and submits the Construction Environmental Plan for approval from Engineer's Office.

9. Control of Documents & Records

The Project Director nominates a Document Controller to manage the control, filing, management of registers and distribution of environmental records and documents as appropriate. A register (file index) in clear reference to a current revision number will be prepared. Filed records will be protected from damage or deterioration and stored in a manner whereby they can easily be retrieved.

Annexure 1: Environmental Impact Register
Annexure 2: Forms and Checklist

Annexure 1: Environmental Impact Register

Sl No	Activity	Hazard/Aspect	Risk/Impact Involved	People/ Property/Environment at risk	Routine(R) / Non-Routine (NR)	Normal/ Abnormal Situation/ Emergency Situation	Assessment			Existing Control Measures	Re-assessment			Additional Control Measures	Re-assessment			Business Risk and/or Opportunity Y/N (If yes explain)
							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
1	Lubricant/oil leakage from mechanical parts, Fuelling, Maintenance of plant and machinery and Fuel and lubricant storage	Oil spill	Soil contamination and water pollution	site workers General site staff Site visitors and public	**R**	**Normal**	2	3	6	EMP Section 5.3. Erosion and Sedimentation Control Plan, 5.5. Surface Water Quality Control Plan and 5.4 Soil & Ground Water Quality Control Plan	1	3	3					

Sl No	Activity	Hazard/Aspect	Risk/Impact Involved	People/ Property/Environment at risk	Routine(R) / Non-Routine (NR)	Normal/ Abnormal Situation/ Emergency Situation	Assessment			Existing Control Measures	Re-assessment			Additional Control Measures	Re-assessment			Business Risk and/or Opportunity Y/N (If yes explain)
							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
2	Running of Plant and Machinery Various Construction works I.e. grinding, chipping, excavation, cutting etc	Noise	Annoyance and occupational health impact	site workers General site staff Site visitors and public	R	Normal	4	3	12	EMP Section 5.2. Noise & Vibration Control Plan	1	3	3					

Sl No	Activity	Hazard/Aspect	Risk/Impact Involved	People/ Property/Environment at risk	Routine(R) / Non-Routine (NR)	Normal/ Abnormal Situation/ Emergency Situation	Assessment			Existing Control Measures	Re-assessment			Additional Control Measures	Re-assessment			Business Risk and/or Opportunity Y/N (If yes explain)
							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
3	Various Construction activities i.e. grinding, blower cleaning etc./ Traffic movement and Excavation, transport of soil and stockpiles	Dust generation	Air pollution	site workers General site staff Site visitors and public	R	Normal	3	3	9	EMP Section 5.1. Air Quality Control Plan	1	3	3					

Environmental Monitoring Report

Project No. 47101-004
Semi-Annual
January 2022

India: Assam Power Sector Investment Program - Tranche 3

PART D

Prepared by the Assam Power Generation Corporation Limited (APGCL) for the Asian Development Bank.

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							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
4	Running of plant and machinery, Running of DG and Compressor, Vehicular transport Welding work	Gaseous Emissions	Air pollution	site workers General site staff Site visitors and public	R	Normal	3	3	9	EMP Section 5.1. Air Quality Control Plan	1	3	3					

Sl No	Activity	Hazard/Aspect	Risk/Impact Involved	People/ Property/Environment at risk	Routine(R) / Non-Routine (NR)	Normal/ Abnormal Situation/ Emergency Situation	Assessment			Existing Control Measures	Re-assessment			Additional Control Measures	Re-assessment			Business Risk and/or Opportunity Y/N (If yes explain)
							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
5	General construction activities Ground clearing	General construction and demolition waste Cutting of trees	Waste generation and increased demand for landfill area, land degradation Loss of biodiversity	site workers General site staff Site visitors and public	R	Normal	5	2	10	EMP Section 5 Environmental Management Plan Construction Waste Management Plan	1	2	2					

Sl No	Activity	Hazard/Aspect	Risk/Impact Involved	People/ Property/Environment at risk	Routine(R) / Non-Routine (NR)	Normal/ Abnormal Situation/ Emergency Situation	Assessment			Existing Control Measures	Re-assessment			Additional Control Measures	Re-assessment			Business Risk and/or Opportunity Y/N (If yes explain)
							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
6	Site office, pantry and canteen	Food Waste General waste E Waste	Contamination Waste generation and increased demand for landfill area, land degradation	site workers General site staff Site visitors and public	R	Normal	5	2	10	Construction Waste Management Plan	1	2	4					

Sl No	Activity	Hazard/Aspect	Risk/Impact Involved	People/ Property/Environment at risk	Routine(R) / Non-Routine (NR)	Normal/ Abnormal Situation/ Emergency Situation	Assessment			Existing Control Measures	Re-assessment			Additional Control Measures	Re-assessment			Business Risk and/or Opportunity Y/N (If yes explain)
							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
7	Site clinic	Bio Medical waste Non-compliance of regulatory requirement with respect to Biomedical waste management resulting from COVID-19 emergency.	Cross contamination and health issue	site workers General site staff Site visitors and public	R	Abnormal	3	3	9	Construction Waste Management Plan - Biomedical Waste. Adherence to newly released company SOP on COVID-19 and Biomedical waste management guideline during COVID Pandemic.	3	1	4					

Sl No	Activity	Hazard/Aspect	Risk/Impact Involved	People/ Property/Environment at risk	Routine(R) / Non-Routine (NR)	Normal/ Abnormal Situation/ Emergency Situation	Assessment			Existing Control Measures	Re-assessment			Additional Control Measures	Re-assessment			Business Risk and/or Opportunity Y/N (If yes explain)
							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
8	Site office, ablution facility, pantry, toilets and canteen	Wastewater generation Use of water for welfare need	Soil and groundwater contamination, water pollution Depletion of resources and water shortage	site workers General site staff Site visitors and public	R	Normal	5	3	15	Construction Waste Management Plan -Surface Water Quality Impacts	5	4	4					
9	Tunnelling Work and Excavation	Muck Soil	Improper disposal may cause land contamination and ground water pollution	Environment	R	N	4	3	12	EMP Section 5.3, 5.4, 5.5 and 5.6 and 5.8	4	1	4	No				

Sl No	Activity	Hazard/Aspect	Risk/Impact Involved	People/ Property/Environment at risk	Routine(R) / Non-Routine (NR)	Normal/ Abnormal Situation/ Emergency Situation	Assessment			Existing Control Measures	Re-assessment			Additional Control Measures	Re-assessment			Business Risk and/or Opportunity Y/N (If yes explain)
							P	S	Risk Level		P	S	Residual Risk		P	S	Residual Risk	
10		Dewatering Water	Soil and Groundwater contamination	People and Environment	R	N	4	2	8	EMP Section 5.3, 5.4, 5.5 and 5.6	4	1	4	No				

Annexure 2: Forms and Checklist

L&T Construction
Heavy Civil Infrastructure

Weekly Environmental Inspection Checklist

Project Name:		***Location / Area:***		
Date:		***Time:***		
	Under Observation Column mark "√ " Acceptable "X" Not Acceptable "N/A" Not Applicable	**Observation**	**Comment**	**Action Taken Yes/No with Date**
1.0	**Waste Management**			
	Waste separated and stored in clearly marked receptacles			
	Waste inventory maintained for all significant waste streams			
	Domestic waste disposed in a hygienic manner			
	Site area litter free			
	Waste and scrap areas demarcated			
	Adequate capacity of the waste area			
	Waste bins cleared regularly			
	Company vehicle provided with rubbish bags (Wherever applicable)			
	Drains being cleaned / cleared of waste materials			
	Waste items re-cycled where applicable			

L&T Construction
Heavy Civil Infrastructure

Weekly Environmental Inspection Checklist

Project Name:		***Location / Area:***		
Date:		***Time:***		
	Under Observation Column mark "√ " Acceptable "X" Not Acceptable "N/A" Not Applicable	**Observation**	**Comment**	**Action Taken Yes/No with Date**
2.0	**Air Pollution**			
	Dust suppression controls e.g., water spraying, implemented on exposed dust generating areas			
	Topsoil or fill material stockpiles covered or temporarily stabilized by grasses			
	Vehicles adhere to project speed limits			
	Plant and vehicles uses on site are well maintained and regularly serviced			
	Engines are switched off when not in use			
	Covered containers for organic wastes			
	Use of water to suppress dust on access routes, stockpiles			
	Cover the loads of vehicles transporting dusty materials			
3.0	**Water Contamination**			
	Prevention of run-off from entering water bodies			
	Stagnant pools of water as a result of the site conditions being managed			

L&T Construction
Heavy Civil Infrastructure

Weekly Environmental Inspection Checklist

Project Name:		***Location / Area:***		
Date:		***Time:***		
	Under Observation Column mark "√ " Acceptable "X" Not Acceptable "N/A" Not Applicable	**Observation**	**Comment**	**Action Taken Yes/No with Date**
	Controls in place to prevent water contamination as a result of the site works			
	Is treated waste water is recycled/reused at project site?			
4.0	**Energy and Material Consumption**			
	Electricity consumption measured and recorded			
	Fuel consumption measured and recorded			
	Site established program to conserve energy and material usage (Fuel, Electricity, Water and Paper)			
5.0	**Is there any environmental incident observed during inspection?**			
	If yes put a note here;			

L&T Construction
Heavy Civil Infrastructure

Weekly Environmental Inspection Checklist

Project Name:		***Location / Area:***		
Date:		***Time:***		
	Under Observation Column mark "√ " Acceptable "X" Not Acceptable "N/A" Not Applicable	**Observation**	**Comment**	**Action Taken Yes/No with Date**
Inspection By:			***Signature:***	

ANNEX 1: BIODIVERSITY CONSERVATION AND MANAGEMENT PLAN

POTENTIAL IMPACTS

Impacts on biodiversity was assessed by mapping the study area with respect to (i) IUCN Red list, (ii) protected areas / biological corridors, (iii) important species and biodiversity areas, (iv) forests, and (v) other potentially sensitive habitats. For distribution and habitat requirements of endangered species, a detailed analysis and species-specific data was noted.

Detailed assessment of distribution and habitat requirements of critical, endangered and Schedule I species and criterion utilized are provided in Annexure II. Note: All the information in this critical habitat assessment will be reviewed on a species basis by the Wildlife Division, Department of Environment and Forests for updating and accuracy.

POTENTIAL IMPACT ON BIODIVERSITY AND MITIGATION MEASURES

S.No	Potential Impact on Biodiversity	Mitigation Measure	Remarks
Construction Stage			
1	Loss of Biodiversity, Disturbance /accidents/ injury, to wildlife and avian fauna.	• Creation of a greenbelt around the perimeter of various project appurtenances, selected stretches along reservoir periphery, access roads to compensate for the loss of habitat (see Chapter 10 – Greenbelt development of EMP) • Conservation actions as proposed by IUCN (during construction and during the initial project operation) such as conducting a comprehensive survey and monitoring in and around the project area to establish range, distribution and population status of vulnerable and critical habitats in the project area for assessing its habitat requirements and identifying threats will be undertaken. • Biodiversity Conservation and Wildlife Management Plan • Compliance with guidelines issued by the National Wildlife Board of India for linear intrusion in natural area pertaining to roads and power lines. • Compliance with guidelines issued by the Central Electricity Authority (CEA) and IFC EHS guidelines for Electric Power • Transmission and Distribution for laying transmission lines in areas critical from the point of view of saving wildlife.	• Rescue and release of wildlife species encountered during construction works: the contractor will be required to contact the Park office in case any wildlife /avifauna are encountered or injured by accident during construction works. The rescue, treatment, and release of wildlife will be done immediately and be as per protocols followed by the Wildlife Division of Department of Environment and Forest and Prevention of Cruelty to Animals Act, 1986). • Some other measures: ○ Provision of wild fruit plantation for wildlife ○ Annual bird count of migratory birds by involving locals and bird experts ○ Rehabilitation with local fruit bearing species in gaps ○ Anti-grazing drive in drawdown area to protect the bird breeding areas in proximity to reservoir during breeding season ○ Construction of check posts / watch towers in key locations

MONITORING MEASURES

Mitigation Measure	Indicators	Period	Responsibility	Monitoring	Frequency
Compensatory afforestation	Acres of land replanted, in Areas designated by Department of Forests	All Phases	Project management And Social Forestry Division with local forestry staff	APGCL	Quarterly
Cut off only those trees marked by the Forestry staff	Number of trees felled in excess of those marker	Pre- Construction	Contractor and Project management	APGCL	Quarterly
Ensure that area cleared is as Per directives/ delineation of Forestry staff	Land clearance as per demarcation	Pre-Construction	Contractor and Project management	APGCL	Quarterly
Creation of a greenbelt around the perimeter of various project appurtenances, selected stretches along reservoir periphery, access roads tocompensate for the loss of habitat (see Chapter 10 -Greenbelt development of EMP)	Length of Greenbelt developed. Number of roads with green belt	Construction and Operation	Project management and contractor	APGCL	Quarterly
Biodiversity Conservation and Wildlife Management\ Plan (see separate section below)	As per biodiversity plan	All Phases	Project management, Wildlife Division of Department of Environment and Forest staff, Assam Biodiversity Board	APGCL	Quarterly
Hand over road to the Department of Environment and Forest for Compensatory Afforestation program to re- vegetate and restore the area to its natural state	Unused access roads re-planted/ no erosion	Operation	Project management	APGCL	Quarterly

BIODIVERSITY CONSERVATION AND WILDLIFE MANAGEMENT PLAN: The Biodiversity Conservation and Wildlife Management Plan for the proposed project have been framed with an objective to:

- Conserve and preserve natural ecosystems around the proposed project;
- Minimize project impacts on rare, endangered or threatened species and rehabilitate keystone species, if any; and
- Develop the information database on biodiversity at the project site.

6 IMPLEMENTATION AND MONITORING SCHEDULE FOR BIODIVERSITY CONSERVATION AND WILDLIFE MANAGEMENT PLAN

Activities	Indicators	Period	Responsibility	Monitoring	Frequency
Establishment of Biodiversity Management Committee	BMC established and Operational Reports of meetings of BMC	All Phases	Project proponent / project management unit (PMU)	Project proponent /PMU	Every quarter
Rescue of flora	Number of floral species rescued	Pre- construction	Partner Implementer	Project proponent/PMU	After pre- construction phase
Up gradation of a Recreational area at Panimur forest ranger station	Recreational area established and operational	Construction	Partner Implementer	Project proponent/ PMU	Every quarter
Ensure minimal land clearing and removal of vegetation	% of trees felled as per marking by forestry staff	Pre- construction	Partner Implementer	Project proponent / PMU	Every quarter
Rehabilitate and Restore All Cleared Sites	Number of sites restored an rehabilitated; degree of restoration	Construction and Operation	Partner Implementer	Project proponent / PMU	Every quarter
Rescue and release program	Number of wildlife species rescued, treated and released	Pre- Construction Construction and Operation	Partner Implementer with assistance of Wildlife Division and Local Animal Hospital	Project proponent / PMU	Every Quarter
Promote wildlife surveys	Number of surveys Conducted Number and Diversity of wildlife species caught on camera traps	Construction and Operation	Partner Implementer with assistance of Wildlife Division	Project proponent / PMU	Every Quarter
Awareness raising	Number of awareness	Construction and Operation	Partner Implementer	Project proponent / PMU	Every quarter

Activities	Indicators	Period	Responsibility	Monitoring	Frequency
	raising meetings held by project Date of distribution of Acts and regulations				
Strengthen patrolling	Number of patrols carried out Budget for equipment purchase handed over to Park and forestry staff	Construction and Operation	Partner Implementer	Project proponent / PMU	Every quarter
Mitigation of human wildlife conflict	Proposal developed for human- wildlife mitigation Implementation of pilot program	Construction and Operation	Partner Implementer with assistance of Wildlife Division	Project proponent / PMU	Every Quarter

ANNEX 2: DISPOSAL OF BIO-MEDICAL WASTE

Dispensaries use a variety of drugs including antibiotics, cytotoxics, corrosive chemicals etc. a part of which is generated as a solid waste. With greater emphasis on disposables, the quantum of solid waste generated in a hospital is quite high. As per the Bio-Medical Waste (Management and Handling) Rules 1998, the bio-medical waste has been classified into various categories which are outlined in Table 2.1.

Table 2.1 :Categories of bio-medical waste as per the Bio-Medical Waste (Management and Handling) Rules 1998

Waste Category No.	Waste category type
Category No. 1	**Human Anatomical Waste** Human tissues, organs, body parts
Category No. 2	**Animal Waste** Animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses
Category No. 3	**Micro-biology and Biotechnology wastes** Wastes from laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell culture used in research and infections agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures
Category No. 4	**Waste sharps** Needles syringes, scalpels, blades, glass, etc. that may cause punctures and cuts, including both used and unused drugs
Category No. 5	**Discarded medicines and cytotoxic drugs** Wastes comprising of outdated, contaminated and discarded medicines
Category No. 6	**Soil Waste** Items contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, lines bleedings other material contaminated with blood.
Category No. 7	**Solid Waste** Wastes generated from disposable items other than the waste sharps, such as tubings, catheters, intravenous sets, etc.
Category No. 8	**Liquid waste** Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities
Category No. 9	**Incineration Ash** Ash from incineration of any bio-medical waste
Category No. 10	**Chemical Waste** Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.

Out of the categories listed in Table-2.2, the biomedical waste categories to be generated in the dispensary proposed to be developed as a part of the project are given in Table 2.2

Table 2.2 Categories of bio-medical waste to be generated in the dispensary proposed to be developed as a part of the project

Waste Category No.	Waste category type
Category No. 1	**Human Anatomical Waste** Human tissues, organs, body parts
Category No. 4	**Waste sharps** Needles syringes, scalpels, blades, glass, etc. that may cause punctures and cuts, including both used and unused drugs
Category No. 5	**Discarded medicines and cytotoxic drugs** Wastes comprising of outdated, contaminated and discarded medicines
Category No. 6	**Soil Waste** Items contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, lines bleedings other material contaminated with blood.
Category No. 7	**Solid Waste** Wastes generated from disposable items other than the waste sharps, such as tubings, catheters, intravenous sets, etc.
Category No. 8	**Liquid waste** Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities
Category No. 9	**Incineration Ash** Ash from incineration of any bio-medical waste
Category No. 10	**Chemical Waste** Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.

The bio-medical waste must be segregated in accordance to the guidelines laid under Schedule-I of Bio-medical Waste (Management and Handling) rules notified by Ministry of Environment and Forests

ANNEX 3: MUCK DISPOSAL PLAN

GENERAL

The total quantity of muck generation has been estimated to be about 10.05 lac m^3. Considering, 40% swelling, the total muck to be handled is 14.07 lac m^3. About 35% material of muck shall be used as construction material Thus, 9.85 lac m^3 of muck is planned to be disposed at the identified disposal areas. The holding capacity of disposal areas is estimated as 10.32 lac m^3.

The component wise detail of muck to be generated and identified zones for accommodating the muck generated is given in Tables 3.1 and 3.2 respectively. The location of muck disposal sites is shown in Figure 3.1.

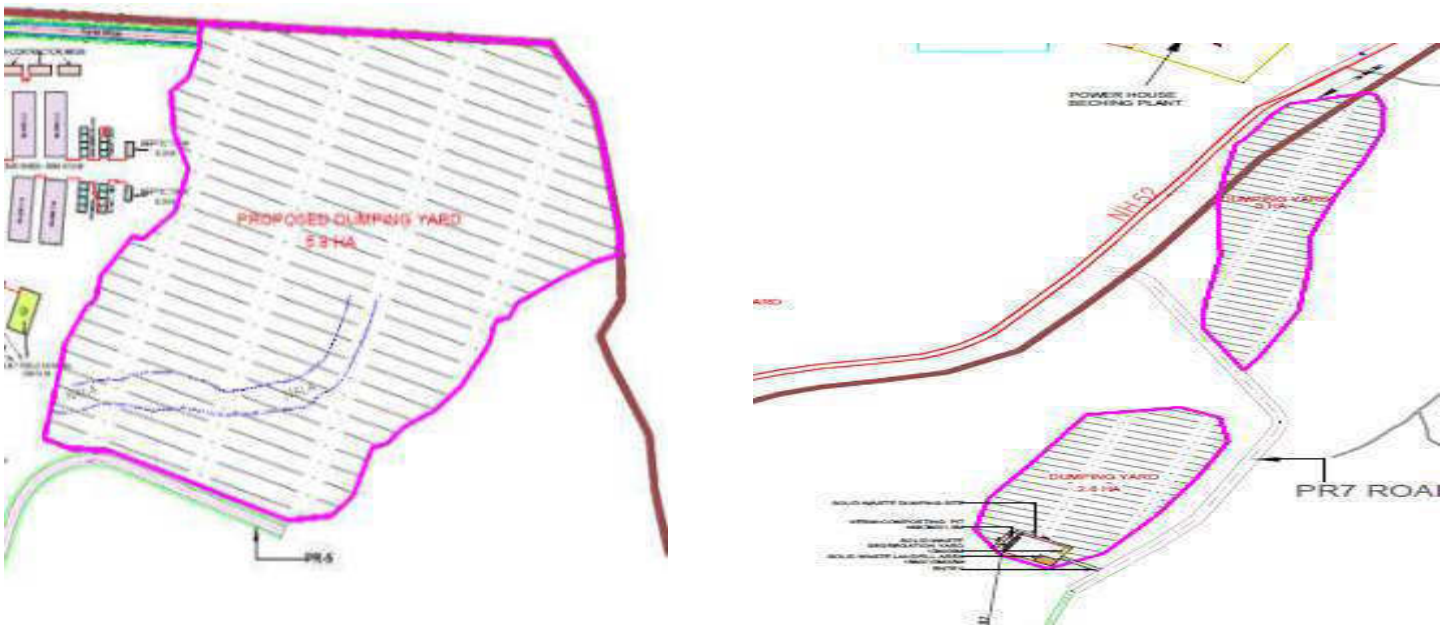
Table 3.1: Component wise details of muck to be generated

Project Component	Quantity of Muck/Debris generated (m^3)	Quantity of muck with 40% swell factor (m^3)	Total Quantity of muck/debris including swell factor (m^3)	Estimated quantity of muck/debris proposed to be utilized 30% of total muck considered) (m^3)	Estimated quantity of muck/debris proposed to be dumped (m^3)	Name of the dumping site as shown in the plan
µ/s Coffer Dam	10,894	4,357	15,251	4,575	10,676	AREA 1
D/s Coffer dam	5,199	2,080	7,279	2,183	5,096	
Diversion Channel	51,473	20,589	72,062	21,618	50,443	
Dam	434,542	173,817	608,359	182,507	425,851	
Power House	28,141	11,256	39,397	11,819	27,577	AREA 2
Surge Shaft	21,561	8,624	30,185	9,055	21,129	
Valve house	54,667	21,867	76,534	22,960	53,573	
Tail Race	71,830	28,732	100,562	30,167	70,393	
Auxiliary Power House Tailrace	76,615	30,646	107,261	32,178	75,082	AREA 1
HRT & Adits	221,716	88,686	310,402	93,120	217,281	AREA1 & AREA 2
Pressure Shaft	27,458	10,983	38,441	11,532	26,909	AREA 2
Auxiliary Pressure Shaft	980	392	1,372	412	960	AREA 2
Total	**1,005,076**	**402,029**	**1,407,105**	**422,126**	**984,971**	

Table 3.2: Muck Disposal Area and Capacities

Specifications	Dumping Area A 1	Dumping Area A2
Area (m^2) approx.	60,000	52,000
Capacity (m^3) approx.	561,000	471,250
Distance from HFL (m) approx.	800	540

Figure 13.1 Location of Muck Disposal Site



Muck, if not securely transported and dumped at pre-designated sites, can have serious environmental impacts, such as:

- Muck, if not disposed properly, can be washed away into the main river which can cause negative impacts on the aquatic ecosystem of the river.
- Muck disposal can lead to impacts on various aspects of environment. Normally, the land is cleared before muck disposal. During clearing operations, trees are cut, and undergrowth perishes as a result of muck disposal.
- In many of the sites, muck is stacked without adequate stabilization measures. In such a scenario, the muck moves along with runoff and creates landslide like situations. Many a times, boulders/large stone pieces enter the river/water body, affecting the benthic fauna, fisheries and other components of aquatic biota.
- Normally muck disposal is done at low lying areas, which get filled up due to stacking of muck. This can sometimes affect the natural drainage pattern of the area leading to accumulation of water or partial flooding of some area which can provide ideal breeding habitat for mosquitoes.

RESTORATION OF MUCK DISPOSAL SITES

The unused material (198 lakh cum of muck) would be piled at an angle of repose at the proposed dumping sites. For stabilization of dumped materials various engineering and phyto- remedial measures are being proposed in the management plan.

Engineering Measures

The Plan and Cross-Section of each Muck Disposal Site is Shown In Figures

Re-vegetation of Spoil Tips

After proper dumping of the muck all three dumping sites shall be rejuvenated using bio- technological approach. The area shall be restored through plantation and turfing on the slope.

ANNEX 4: RESTORATION PLAN FOR QUARRY AREAS

QUARRY SITES

The estimated quantities of principal construction materials are given in Table 4.1.

Table 4.1 : Requirements of Coarse and Fine Aggregates in Wearing and Non-Wearing *Surfaces*

S. No.	Type	Wearing surface (m^3)	Non-Wearing surface (m^3)	Total
1	Coarse Aggregate	72,000	759,000	831,000
2	Fine Aggregate	36,000	378,000	414,000
	Total	**108,000**	**1,137,000**	**1,245,000**

The quarrying would lead to following impacts:

- Creating the pits or quarries requires the removal of virtually all natural vegetation, top soil and subsoil to reach the aggregate underneath. Thus, vegetal cover is lost from quarrying sites.
- Quarrying can disrupt the existing movement of surface water and alter the natural drainage pattern. Engineering activities associated with quarrying can directly change the course of surface water. Pits or depressions created by quarrying can intercept surface water flow.
- Blasting during quarrying is another key adverse impact. Blasting may occur daily or as infrequently. Blasting noise generally increases with the amount of explosive, with specific atmospheric conditions, and with proximity to a blast. The area in front of a blast commonly receives more noise than area behind the blast.
- Earth-moving equipment along with increased vehicular movement are the pother source of noise in quarrying activities. The impacts of noise are highly dependent on the sound source, the topography, land use, ground cover of the surrounding site, and climatic conditions. Topographic barriers or vegetated areas can shield or absorb noise.
- Opening of the quarries will cause visual impacts because they remove some part of the hills. Quarrying operations are semi-mechanized in nature. Normally, quarrying is normally done by cutting a face of the hill. A permanent scar is likely to be left, once quarrying activities are over.
- With the passage of time, the rock from the exposed face of the quarry under the action of wind and other erosion forces, get slowly weathered and after some time, they become a potential source of landslide.

STABILIZATION OF QUARRY SITES

The quarry slopes after excavation of the construction material needs to be stabilized. It is suggested that quarry slopes should be maintained at a slope 1:1. The slope should then be covered with topsoil of at least 30 cm. It is suggested that for stabilization, grass, herbs &shrubs should be grown over these slopes.

Afforestation with suitable plant species of high ecological and economic value along with turfing by suitable grass species can be undertaken over the two quarry sites after providing required slope and laying top soil over the slopes. Wherever required, proper engineering measures like construction of retaining wall etc. would also be constructed for proper slope stabilization.

ANNEX 5: GUIDELINES FOR QUARRY AREA MANAGEMENT

Purpose

Quarries generally required to provide material for road construction sites, can have significant adverse environmental effects, especially on ecologically sensitive areas. Quarries can become environmental hotspots and can significantly affect the visual appearance of an area. Special mitigation and management measures are often required to avoid or minimize the environmental and social impacts of quarries.

Impacts

Some of the potential impacts of quarries are:

- rock blasting causing air pollution, and noise and vibrations
- trucks transporting materials to the site causing air pollution, and noise and vibrations
- ponds of stagnant water forming in excavated areas giving rise to the breeding of mosquitoes and the spreading of malaria and other mosquito-borne diseases
- natural beauty of the landscape being affected by excavations and the removal of vegetation
- natural drainage systems in the area being affected by excavations

Details to be inspected for Monitoring Quarry Area Operation & Management

Attributes	Requirements
Access road	• Only approved access road shall be used
Top soil preservation	• Top soil, if any, should be stripped and stored at designated area before start of quarry material collection; • Top soil should be re-used / re-laid as per agreed plan
Controlled blasting & safety	• Storage of explosive magazine as per threshold quantity with all the safety measures; • Handling of explosive by licensed blaster only; • Use low intensity explosive; • Check unfired explosive, if any, before drilling; • Carryout blasting at lean time only; • Cordoned the area within 500m radius with flagmen having whistle for signaling preparedness; • Using properly designed audio visual signal system i.e. siren and flagmen for blasting; • Keep ready an emergency vehicle near blasting area with first aid facility and with active emergency response system.
Damage to surrounding land	• Movement of man & machinery should be regulated to avoid damage to surrounding land.

Drainage control	• The surface drainage in and around the area should be merged with surrounding drainage;
Dust control	• Haul road should be made metallic; • Suitable dust arrester for drilling; • Water spraying at quarry complex, if required.
Covering material transport vehicle	• Material transport vehicle should be provided with tail board, and cover
Personal Protective Equipment	• Workers shall be provided with helmet, safety shoes, ear muffler and air musk and their use should be strictly enforced.
Redevelopment	• The area should be redeveloped within two months (or as agreed) on completion of material collection as per agreed plan.

ANNEX 6: PLAN FOR ENVIRONMENTAL TRAINING TO WORKERS

- All workers will complete the environmental training programs. The goal of programs will be to educate all workers on the following issues:
    i. Fire arms possession
    ii. Traffic regulations
    iii. Illegal logging & collection of non-timber forestry products
    iv. Non disturbance of resettlement communities
    v. Hunting & fishing restrictions
    vi. Waste management
    vii. Erosion control
    viii. General housekeeping, and construction health and safety trainings
- Where necessary, participants in job-specific training will be identified on the basis of their skills and capacity to undertake the training.
- All training sessions will be conducted in Assamese (and in Hindi, if required) language for local personnel and as appropriate for foreign staff. All written materials will be provided in Assamese (and in Hindi, if required) language and other languages as appropriate.
- A training register will be maintained that will contain details of the following:
    i. Name of training session
    ii. Date of training session
    iii. List of attendees and signatures
    iv. Name of trainer
- Upon completion of each relevant training course, each participant will be issued with a certificate of successful completion. A copy of the certificate will also be placed on each participant's employment file.
- The contractor will implement a rolling program of refresher courses in environmental, health and safety awareness issues through the use of 'tool-box' sessions at construction sites.
- During audits of the construction areas, workers' knowledge of environmental, health and safety issues will be examined.
- Workers who have undergone job-specific training will be examined in relation to their knowledge and skills, and are subject to re-training, if necessary. Records of examination results and any re-training will be kept as part of the training register.
- All new employees will complete relevant training prior to commencement of any activities on the construction site.
- The key messages from the training sessions will be produced in both poster and leaflet form, in Hindi/Assamese and English language. Posters will be displayed prominently in construction work camps and construction areas and leaflets will be distributed to staff on a regular basis

ANNEX 7: PLAN FOR CONSTRUCTION CAMP MANAGEMENT

1. Use of camps

- All workers who are based on the construction site will be basically accommodated by the construction camps.
- Appropriate sanitation facilities will be installed in accordance with Water Quality Management Plan.

2. Disease control, health and safety issues

- Buildings in Residence camps and sub-camps will be made 'mosquito-proof' as far as possible through ensuring adequate sealing of doors and windows, provision of suitable ventilation and as necessary, installing mosquito-nets and other prevention devices.
- Medical, sanitary and disease prevention measures for each camp will be implemented in accordance with the requirements of Project Personnel Health Program.
- Pesticide use in the camps and sub-camps will be carried out in accordance with the requirements of Project Personnel Health Program and the ADB SPS requirements regarding pesticide use.
- Waste generated at the construction camps will be managed in accordance with the requirements of the Waste Management Plan and IFC EHS Guidelines.
- Construction workers will be trained in health and safety issues relating to the camps in accordance with the requirements Annex 16: Plan for Environmental Training for Workers.

3. Camp access

In general, access to the camps will be restricted to construction workers and visitors with an authorized access pass.

Potable water supply

a) All potable water storage facilities will be secured, with access limited to authorized personnel. Local rivers (tributaries only) or underground water will be used as the source of the potable water supply. Regular testing (weekly) of all drinking water sources for staff shall be undertaken to ensure compliance with national water quality standards. The intake for the potable water storage will be located a 100 distance upstream of any wastewater discharge point.

b) Water quality monitoring of the potable water storage in camps and sub-camps will be carried out in accordance with the requirements of environmental monitoring plan (weekly).

4. Camp rules and regulations

A set of rules and regulations applicable to camps and sub-camps will be developed. The rules and regulations will include:

- Prohibitions on hunting and poaching of wildlife, purchasing wildlife meat, fishing, gathering and harvesting medicinal or valued plants and trees, and possessing firearms, snares, traps and other hunting equipment
- Access restrictions for non-construction personnel
- Housecleaning and waste management requirements
- Measures for preserving health and the dissemination of vectors and transmissible diseases
- Residents of the camps shall be provided with written information and training on camp rules and regulations. Camp rules and regulations will be prominently displayed in the camp areas.

Figure 13.1 Location of Muck Disposal Site



ANNEX 8: PROJECT PERSONNEL HEALTH PROGRAM

Following measures will be implemented to take care of project personnel health.

The "Health and Safety Manual", which will be in compliance with the IFC EHS Guidelines, will be distributed to the personnel attending health and safety training in the language used by the workers during trainings. It contains the following contents:

Health

- Anti-malaria precautions
- Precautions for HIV / AIDS and other venereal diseases
- Diarrhea precautions
- Symptoms of other diseases typical of the area (such as dengue fever)
- Recommendations regarding proper disposal of all wastes
- Use of proper drinking water vii Use of appropriate toilets

Safety

- Use of Personal Protective Equipment (PPE)
- Use of specific equipment according to the safety procedures
- Use of appropriate clothing
- Use of appropriate ladders v Use of appropriate slinging
- Attention to signals of danger
- Attention to suspended weights
- Attention to unprotected pits Attention to buried cables Attention to overhead power cables
- Attention to all flammable items
- Procedure for fire extinguishing xiii Miscellaneous safety issues
- First aid teams will be specifically trained and assigned in groups of two to three persons to the different sites
- Medical facilities, including items such as First Aid kits and bedding for patients, should be provided.
- A doctor should be reached when an accident occurs.
- In the event of a spill of any hazardous material, actions and responses will be taken according to Emergency Plan for Hazardous Materials (Annex 27).
- Vector control of mosquitoes and other pests will be managed in the appropriate manner.
- Solid waste that might attract pests such as domestic rubbish and food waste shall be managed properly.
- The water supply and sewage system, especially in camp sites, will be maintained in good working condition through regular monitoring according to the required standards.
- The use of pesticides to control pests will be limited to only those cases deemed necessary. Use and handling of pesticides will be conducted on the appropriate manners.

ANNEX 9: LANDSCAPING AND RESTORATION OF CONSTRUCTION AREAS

RESTORATION OF CONSTRUCTION SITES

Due to various construction activities viz., construction of working areas, office and residential complexes, etc. will disturb the natural environment of the project area. Engineering and biological measures are suggested for the stabilization and beautification of the disturbed area. Following measures should be adopted for the restoration and landscaping of colony areas and construction sites.

•During construction phase, proper roads and lanes would be provided inside the colony area. Open area in the colony and working area would be planted with various plant species. Local native species and local ornamental plants (not invasive) and avenue plantation should be done along the roads and lanes and in open places in the colonies, offices, powerhouse area, dam area and adits.
•Patch plantation may be done at all vacant sites in and around colony area, officers, adits, working areas etc. with plantation in 2-3 or even more rows wherever possible.
•The choice of the tree species for plantation will depend on agro-climatic conditions of the area.
•Retaining walls should be built to avoid landslides and slips. Proper drainage would be provided inside colony for the outlet of the domestic/rain water.
•Parks and play grounds with all play implements will be developed in the colony areas during the construction phase and at vacant spaces after completion of the work.
•Green areas would be developed in front of colony's, offices, canteen etc. during the construction phase.

POST PROJECT CONSTRUCTION LANDSCAPING

After the completion of all the construction activity, the construction sites and other temporary settlements would be removed and area covered with the top soil to support the growth of plant species. These plant species which grow first are considered ecological pioneers and would initiate the process of succession and colonization.

ANNEX 10: ENVIRONMENTAL MANAGEMENT IN ROAD CONSTRUCTION

INTRODUCTION

New roads of about 13.04 km length are proposed to be constructed to connect the various project components. Most of the proposed new roads will be aligned along the slope of hills, muck generated due to the road cutting and would also involve removal of vegetation and trees from slopes and re-working of the slopes in the immediate vicinity of roads. Plantation of suitable soil binding plant species needs to be carried out to stabilize the rim of the roads and for control of the landslides/ slips suitable engineering and biological measures also needs to be framed and implemented. The construction of new roads will provide better connectivity to the villagers of the region with the main road and National Highways. Soil erosion could also increase due to construction activities, which could reduce the photosynthetic activity to some extent of the aquatic plants due to increased turbidity. Adequate measures need to be implemented as a part of EMP to ameliorate this adverse impact to the extent possible.

MANAGEMENT MEASURES

The approach roads will have to be constructed as a part of providing access to the construction site. In a hilly environment, construction of roads sometime disturbs the scenic beauty of the area. In addition, landslides are often triggered due to road construction because of the loosening of rocks by water trickling from various streams.

Steeply sloping banks are liable to landslides, which can largely be controlled by provision of suitable drainage. The basic principle is to intercept and divert as much water as possible, before it arrives at a point, where it becomes a nuisance. The other erosion hazard is that of surface erosion of the bank, which is best controlled by vegetation. However, in a steeply sloping terrain, difficulty lies in growing vegetation on steeply sloping banks. Engineering solutions such as surface drainage, sub-surface drainage, toe protection and rock bolting can be used. Landslides can be stabilized by several methods-engineering or bioengineering measures alone or a combination of these. The cost required for implementation of various measures has already been incorporated in the overall budget earmarked for construction of roads.

In hilly terrain, road construction often generates significant quantity of wastes (muck) due to the stripping of the rocks to make way for the roads. The stripped muck is generally cleared by dumping the material along the slopes. These dumped material finally flow down to the valleys and ultimately finds its way to the river. However, it is recommended to adopt a more systematic approach. The stripped material should be collected and dumped in the designated muck disposal area, which will have check dams to prevent the muck to flow down into the river. After disposal operation is complete at the dump site, the dump yard should be contoured and vegetated.

The various aspects to be considered while making the project roads are briefly described in the following figures and paragraphs.

Construction

- Area for clearing shall be kept minimum subject to the technical requirements of the road. The clearing area shall be properly demarcated to save desirable trees and shrubs and to keep tree cutting to the minimum.
- Where erosion is likely to be a problem, clearing operations shall be so scheduled and performed that grading operations and permanent erosion control of features can follow immediately thereafter, if the project conditions permit; otherwise temporary erosion control measures shall be provided between successive construction stages. Under no circumstances, however, should very large surface area of

erodible earth material be exposed at any one time by clearing.

- The method of balanced cut and fill formation shall be adopted to avoid large difference in cut and fill quantities.
- The cut slopes shall be suitably protected by breast walls, provision of flat stable slopes, construction of catch water and intercepting drains, treatment of slopes and unstable areas above and underneath the road, etc.
- Landslide prone areas shall be treated with location specific engineering protection measures.
- Where rock blasting is involved, controlled blasting techniques shall be adopted to avoid over- shattering of hill faces.
- Excavated material should not be thrown haphazardly but dumped duly dressed up in a suitable form at appropriate places where it cannot get easily washed away by rain, and such spoil deposits may be duly trapped or provided with some vegetative cover.

Drainage

- Drainage of the water from hill slopes and road surface is very important. All artificial drains shall be linked with the existing natural drainage system.
- Surface drains shall have gentle slopes. Where falls in levels are to be negotiated, check dams with silting basins shall be constructed and that soil is not eroded and carried away by high velocity flows.
- Location and alignment of culverts should also be so chosen as to avoid severe erosion at outlets and siltation at inlets.

Grassing and Planting

- Tree felling for road construction/works should be kept bare minimum and strict control must be exercised in consultation with the Forest Department. Equivalent amount of new trees should be planted as integral part of the project within the available land and if necessary, separate additional land may be acquired for this purpose.
- Depending on the availability of land and other resources, afforestation of roadside land should be carried out to a sufficient distance on either side of the road.

ANNEX 11: SOLID WASTE MANAGEMENT PLAN

INTRODUCTION

Residential buildings will be required to house staff working during the construction of the project and subsequently for the operational staff at both the dam site and at the powerhouse. Permanent buildings may be considered only if these are required in the post construction period also. The following tables below give the details of residential and non-residential buildings.

Other temporary facilities including Contractor's colony and Labor Colonies will be placed at respective location near to the site area. This will include temporary residential colony near to the dam complex area on the right bank at available terrace. Labor colonies will be near to the dam complex location and at adit portal location, powerhouse location.

It is proposed to provide two offices complex at suitable topographic location one near Powerhouse site and other close to dam site. In addition other buildings such as Hydro Mechanical workshop, Electro Mechanical, Plant Machinery workshop and Contractor camp shall also be prepared. The total plinth area for residential buildings –Temporary works out to be 9,506 m^2.

QUANTITY OF SOLID WASTE GENERATION

The quantity of waste generated in Indian cities reported to be in the range of 0.2-0.6 kg/capita

/day as per the "Manual on Solid Waste Management" prepared by Central Public Health & Environment Engineering Organization (CPHEEO), Ministry of Urban Development, Govt. of India. The Waste Generation pattern is very much dependent on the living style of the population. As the major share of the population is labor force will stay in project area, the waste generation factor of 210 g/capita/day has been taken into consideration.

Solid waste generation will be the leading problem among the negative impacts assuming that huge quantity of municipal waste that would be generated from residential colony, labor camps and office buildings when the project is constructed. Huge amount of sewage will also be generated from the similar sources during the construction and operation phase of the proposed project. The major generation sources for sewage and municipal wastes would be as follows:

- Municipal waste from residential colony, labor camps, office buildings
- Sewage from residential colony, labor camps, office buildings
- Hazardous wastes (i.e. Bio-Medical wastes) from primary health center and hospitals

It is also expected that if proper management measures for solid waste are not adopted, it will degrade the nearby environment, create hazards for labor and staff that would be posted in the project area during construction/ operation period of the project. Therefore, all the problems due to origination of solid waste require proper management facilities. The types of wastes, its composition and major generation sources during the construction/ operation of proposed Project are indicated in Table 11.1.

Table 11.1: Expected typical composition of waste in proposed project

Waste Type	Composition of waste	Sources of waste generation
Municipal waste	Food wastes, plastics, paper, sewage, glass, vegetables waste.	From residential and labor camp areas
Construction waste	Empty cement begs, dust, debris, demolition and construction wastes, scrap, dust and ashes etc.	From construction site and crusher etc.

Bio-medical waste	Syringes, cotton, bandages, glas tubes, etc.	s From primary health centers

COMPOSITION OF MUNICIPAL SOLID WASTES

The composition of garbage in India indicates lower organic matter and high ash or dust contents. It has been estimated that recyclable content in solid waste varies from 13 to 20% and compostable materials is about 80-85%. a typical composition of municipal solid waste is given in Table 11.2.

Table 11.2 : Typical composition of municipal solid wastes expected in the proposed project

Description	Percent by weight
Vegetable, leaves	40.15
Grass	3.80
Paper	0.81
Plastic	0.62
Glass/ceramics	0.44
Metal	0.64
Stones/ashes	41.81
Miscellaneous	11.73

Source: Central Pollution Control Board

Chemical composition of solid waste is another important aspect for evaluating alternative processing and energy recovery point of view. The details of typical chemical composition of municipal wastes in India are given in Table 11.3.

Table 11.3: Chemical components of municipal solid wastes expected in the proposed project

Component	C (%)	H (%)	O (%)	N (%)	S (%)	Ash (%)
Food wastes	48	6.4	37.6	2.6	0.4	5
Paper	43.5	8	44	0.3	0.2	6
Card board	44	5.9	44.6	0.3	0.2	5
Plastic	60	7.2	22.8	-	-	10
Textiles	55	6.6	31.2	4.6	0.15	2.5
Rubber	78	10	-	2	-	10
Leather	60	8.0	11.6	10	0.4	10
Garden trimming	47.8	6	38	3.4	0.3	4.5
Wood	49.5	6	42.7	0.2	0.1	1.5
Dirt, ashes, brick etc.	26.3	3	2	0.5	0.2	68

Source: Central Pollution Control Board

ADMINISTRATIVE SET UP

Administratively, a Solid Waste Management Committee (SWMC) comprising of the project representatives will look after the management of solid waste. The SWMC may comprise of the following:

- In-charge of civil works, at least of the rank of Senior Manager/Manager (1 No.)
- Supervisors/JEs (2 Nos.)

The SWMC will be supported by sanitary workers, sweepers etc., the number of which may be decided by the SWMC after assessing the work requirement.

SOLID WASTE MANAGEMENT PLAN

A solid waste management system works on four basic principles viz. segregation & primary storage at the source, collection, transportation, treatment and disposal. Report performance internally against management plan and seek improvements if needed.

Segregation at source

- Segregation of waste is one of the critical activities in the Solid Waste Management as it saves undue efforts on transportation and disposal of recyclable or inert wastes. The segregation of such wastes, before they are transported to the processing/ disposal site, should be carried out.
- Waste segregation cannot be introduced without public awareness and should be implemented in a phased manner. In order to achieve this, the following strategy may be adopted for promoting public awareness:
    a. The residents shall be educated about appropriate use of biodegradable waste like kitchen & garden wastes.
    b. Extensive awareness campaigns have to be organized by SWMC for educating the public on the aspects related to impacts of solid waste on environment and health, ill effects of littering and burning of wastes, segregation of municipal solid wastes, proper primary storage within their house premises, etc. The awareness can be spread through posters, distribution of pamphlets etc. SWMC may involve NGOs for organizing awareness programs at project school, hospital etc.
    c. Residents may be advised to develop the habit of segregating the biodegradable waste material like kitchen and garden waste and store in a separate bag or a bin installed at their respective houses.

- The SWMC would educate its sanitary workers about the revenue earning potential of recyclable waste and various options to earn revenue. The sanitary workers (licenced contractor) should be advised to collect such waste separately. To encourage collection of recyclables, SWMC may think of devising a plan which can provide some revenue opportunities for the sanitary workers. Market potential with respect to the forward linkages for effective disposal of recyclable waste is to be identified and exploited by the SWMC for the purpose.
- Collection and segregation of hazardous wastes from the workshops viz. used batteries, transformer oil, used oil, metal scraps etc. and selling them to CPCB registered vendors having Environmentally Sound Management (ESM) system.
- The operator of waste processing/disposal facility should be advised to carry out inspection of waste received to further segregate recyclables and sell them to recyclers. If it is not feasible to segregate recyclables on their own, the processing/disposal facility operator may allow registered scavengers to enter the premises of the waste disposal facility (existing) and pick recyclable waste. This would ensure reduction in rejects, reducing burden on processing plant as well as landfill.
- SWMC may register the names of recyclers for the recyclables such as plastics, newspapers, glass, metals etc. from residential and commercial sources and the names of registered recyclers should be published or made known to the public residing in the project / labor colonies / labor sheds.
- SWMC may associate and involve residents, shop owners, hospital & school staff and NGOs/ Voluntary Organizations of the area working in the field of waste management in increasing awareness among the people to segregate recyclable material at source and hand it over to a designated waste collector identified by SWMC.

DISPOSAL OF SOLID WASTE (NON-DEGRADABLE PORTION)

As per the requirements of the Municipal Solid Waste (Solid Waste Management & Handling) Rules 2000, land filling would be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall be done following proper norms and landfill sites shall meet the specifications

as given in these rules. It will also follow IFC EHS Guidelines on Waste Management. The quantum of solid waste to be disposed for landfill is given in Table

Estimation of Quantity of waste to be disposed to landfill

S. No.	Description	Data
1.	Per capita MSW generation at present	0.21 kg per capita per day
2.	Population during construction stage of the project	2,800
3.	Total Solid Waste (SW) generation at the rate of 0.21 kg/capita/day	588 kg/day
4.	Considering the fraction of bio-degradable waste as 45 % of total SW generated, total quantity of bio-degradable waste to be generated (for vermi-composting)	265 kg/day
5.	Inorganic waste for disposal (48% of total waste) to landfill (considering that recyclable waste in form of paper, glass, metals, plastic etc. constitute 7 % of total waste)	283 kg/day
6	Hence total waste to be disposed in landfill at present	548 kg/day
7.	Waste to be disposed to landfill, annually	200 tons/year
8.	Waste to be disposed to landfill in 4 years	800 ns/year

The details of landfill site are given as below:

- Length 16 m
- Width 10 m
- Depth of fill 5 m

Figure 13.1: Section diagram of Solid waste dumping site



A provision of 15% of the total area, for accommodating infrastructure facilities has also been included while working out requirement of space (the exact location of the landfill is still being determined, but following IFC EHS guidelines). The liner system will comprise of the following layers below the waste:

- 0.30 m thick drainage layer comprising of coarse sand or gravel (stone dust with no fines)
- 0.2m thick protective layer of sandy silt
- 1.50mm thick HDPE geomembrane
- 1.0 m thick clay layer/amended soil layer, amended soil layer comprising of local soil + bentonite is to be provided).

Figure 13.2 Location of Muck Disposal Site

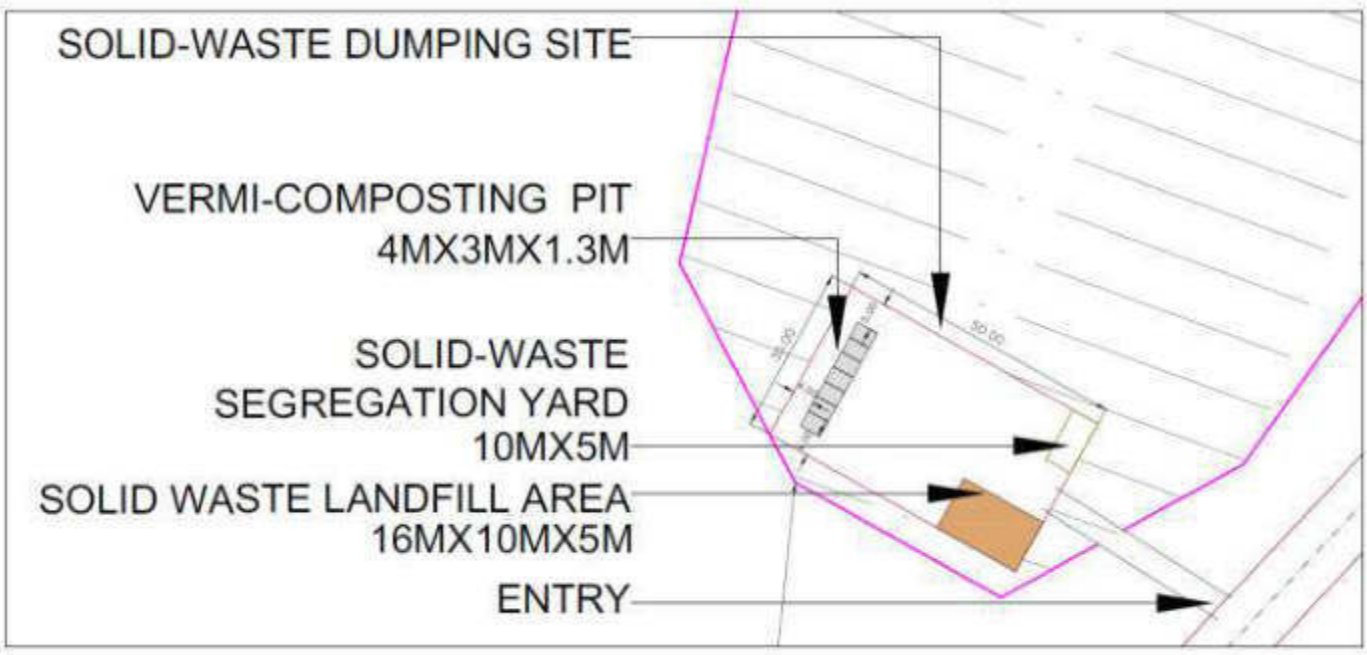
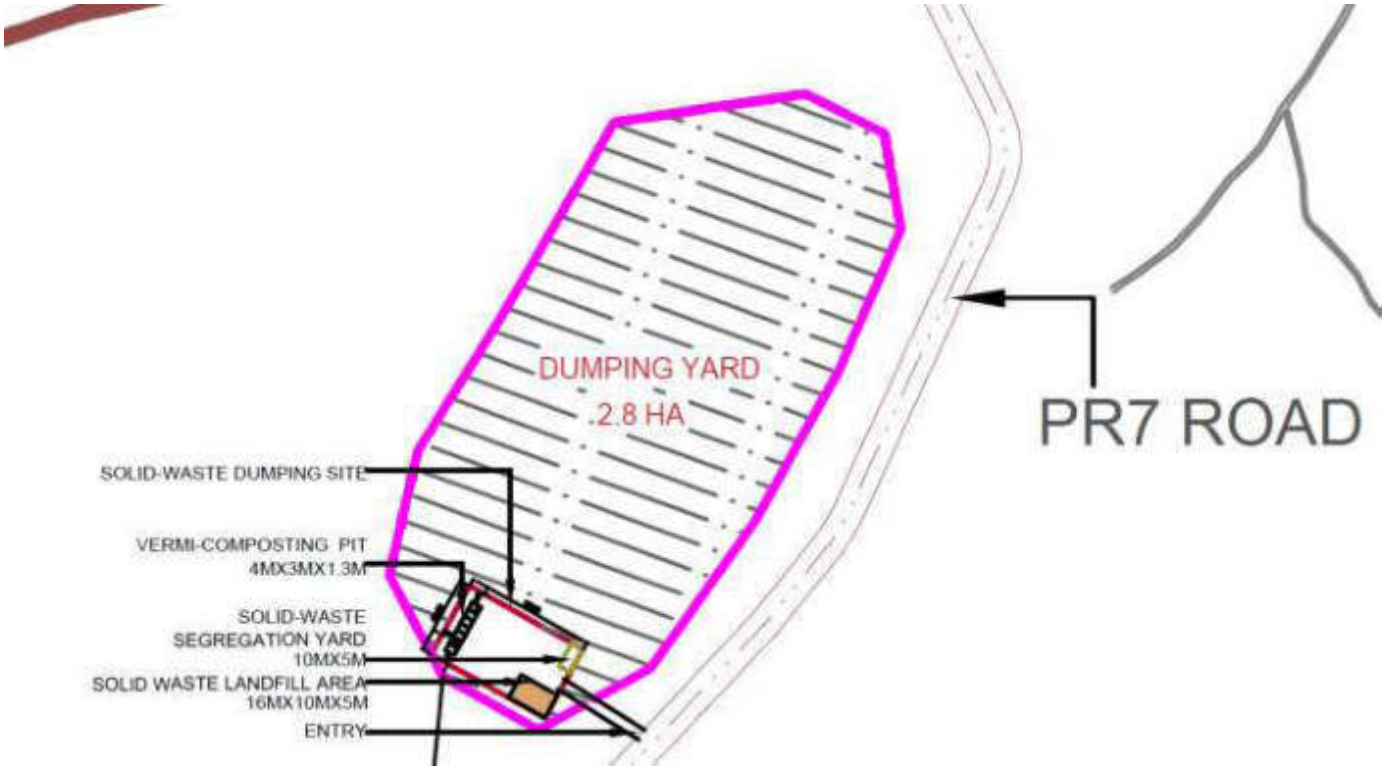


Figure 13.3 Location of Muck Disposal Site



TREATMENT OF SOLID WASTE (DEGRADABLE PORTION)

Considering the fraction of bio-degradable waste as 45% of total SW generated, total quantity of bio-degradable waste to be generated (for vermi-composting), which amounts to about 0.8 m^3/day. The vermi-composting the process takes around 60 days to mature. Thus the total capacity of pits required would be (60*0.8) 48 cu m.

The locations of the compost pits will be selected in compliance with IFC EHS guidelines in waste management. A pit of 2m x 1.5m x 1.3m deep (0.3m freeboard) size can take 3.0 cu m of compostable waste. Thus the no. of pits required shall be 16. The total area will be almost three times the pit area as some area in between pits will be required for transportation and stacking of waste. Hence, total area required will be 150m^2. The pits will be covered with GI sheets. Additional 80 sq. m would be kept for storage for compost plus screening and other activities.

The pits to be constructed will have around 25 cm of bottom lining consisting of about 5 cm thick stone grit over which 15 cm thick coarse sand followed by 15 cm thick earth lining will be done.

The refuse along with animal dung will have to be laid in layers of 5 to 10 cm thickness. The pit will be then watered on alternate days. Thereafter waste is laid in 5 to 10 cm thick layers twicein a week till the whole pit is filled up. Every week the waste will need to be turned up and water will have to be sprinkled every day to keep adequate moisture. The process will take around 45 to 60 days where after the composted waste from the pit is taken out and after drying it is screened with screens having 2 mm dia holes. The screened compost would be filled in plastic bags and used as good manure especially for cultivation of vegetables and flowers.

ANNEX 12: EMERGENCY PLAN FOR HAZARDOUS MATERIALS

Spill Response Procedures

In the event of a spill of any hazardous material, work will be ceased in the immediate vicinity and the area will be cleared of all construction personnel except those involved in the clean-up activities, if necessary.

In the event of a spill of any hazardous material, the following response hierarchy will apply and will be used in the development of the detailed emergency response procedures:

a) First priority is to seek medical attention for any injured personnel

b) Second priority is to prevent further injury to personnel

c) Third priority is to prevent environmental damage

d) Fourth priority is to clean-upspill

e) Fifth priority is to remediate area of spill

f) Sixth priority is to complete reporting requirements

For spills of hazardous materials, appropriate treatment and disposal methods for the known range of hazardous materials will be applied by trained personnel.

Emergency Contact Details

At each construction site, information on emergency response procedures, emergency contact numbers and communication and reporting procedures (to be implemented in case of an emergency situation) will be clearly displayed.

Training of Personnel

At each construction site where hazardous materials are used and where there exists a potential for a spill, there will be at least two employees on-site at all times who are trained in appropriate emergency response procedures and communication and reporting procedures to be implemented in case of an incident (refer to Environmental Training for Workers Plan).

All construction personnel will be trained in basic emergency response procedures including communication and reporting procedures to be implemented in case of an emergency situation.

Emergency Incident Communication Process

In the event of an accidental release or spill of a hazardous material, the following communication processes will be implemented:

a) ESO (Environmental and Social Officer) immediately notifies ESMMU

b) ESMMU immediately notifies emergency response team

c) ESMMU immediately notifies external emergency authorities (if required) Communication will initially be verbal, with written communication as soon as practical.

The communication processes will include the following information in relation to accidental releases or spills:

a) Location of spill

b) Nature of material spilt
c) Amount of material spilt
d) Clean-up processes to be implemented
e) Any injuries to personnel
f) Need for emergency or external assistant
g) Any safety/evacuation requirements to be implemented on the construction site

Within 48 hours of the completion of a spill clean-up, a report will be submitted to the Owner. The report will be used to identify any required corrective or preventive actions and emergency response procedures and training programs will be modified accordingly.

Sulfur Hexafluoride

Fugitive emissions of SF_6 will be monitored following the requirements of Institute of Electrical and Electronics Engineers (IEEE) and International Electro-technical Commission (IEC). Annual inventory on the use of SF_6 will be conducted to monitor usage and losses. A very high grade sealing system and erection methodology will be followed to keep the loss of SF_6 within 0.1% every year. SF_6 gas handling system for evacuation and storage will always be used for the maintenance of the circuit breaker. Relevant standards from the WB EHS Guidelines for Power Transmission and Distribution 2007 and Central Pollution Control Board (CPCB) on handling SF_6 and other hazardous materials will be complied with.

ANNEX 13: MEASURES FOR AIR POLLUTION CONTROL

IMPACTS ON AIR QUALITY

In a water resources project, air pollution occurs mainly during project construction phase. The major sources of air pollution during construction phase are:

- Fuel combustion in various construction equipment, e.g. crushers, drillers, rock bolters, diesel generating vehicles, etc.
- Fugitive emissions from crusher
- Impacts due to vehicular movement

Pollution due to fuel combustion in various equipment

The operation of various construction equipment require combustion of fuel. Normally, diesel is used in such equipment. The major pollutant, which gets emitted as a result of diesel combustion, is SO_2. The SPM emissions are minimal. Based on past experience in similar projects, PM10, PM2.5, NOx and SO_2 are not expected to increase significantly. Thus, in the proposed project, no significant impact on ambient air quality is expected as a result of operation of various construction equipment.

Emissions from crusher

The operation of the crusher during the construction phase is likely to generate fugitive emissions, which can move even up to 1 km in predominant wind direction. During crushing operations, fugitive emissions comprising of the suspended particulate will be generated. There could be marginal impacts to settlements close to the sites at which crusher is commissioned. However, based on past experience, adverse impacts on this account are not anticipated. However, during finalizing the project layout, it should be ensured that the labor camps, colonies, etc. are located on the windward side (upwind) and outside the impact zone (about 1.5 to 2 km) of the crushers.

Impacts due to vehicular movement

During construction phase, there will be increased vehicular movement for transportation of various construction materials to the project site. Large quantity of dust is likely to be entrained due to the movement of trucks and other heavy vehicles. However, such ground level emissions do not travel for long distances. Thus, no major adverse impacts are anticipated on this account.

MITIGATION MEASURES

Control of Emissions

Minor air quality impacts will be caused by emissions from construction vehicles, equipment and DG sets, and emissions from transportation traffic. Frequent truck trips will be required during the construction period for removal of excavated material and delivery of select concrete and other equipment and materials. The following measures are recommended to control air pollution:

- The contractor will be responsible for maintaining properly functioning construction equipment to minimize exhaust.
- Construction equipment and vehicles will be turned off when not used for extended periods of time.
- Unnecessary idling of construction vehicles to be prohibited.
- Effective traffic management to be undertaken to avoid significant delays in and around the project area.
- Road damage caused by sub-project activities will be promptly attended to with proper road repair and maintenance work.

Air Pollution control due to DG sets

The Central Pollution Control Board (CPCB) has issued emission limits for generators up to 800 KW. The same are outlined in Table 13.1, and are recommended to be followed.

Table 13.1:Emission limits for DG sets prescribed by CPCB

Parameter	Emission limits (gm/kwhr)
NOx	9.2
HC	1.3
CO	2.5
PM	0.3
Smoke limit*	0.7

Note : * Light absorption coefficient at full load (m^{-1})

Dust Control

The project authorities will work closely with representatives from the community living in the vicinity of project area to identify areas of concern and to mitigate dust-related impacts effectively (e.g., through direct meetings, utilization of construction management and inspection program, and/or through the complaint response program). To minimize issues related to the generation of dust during the construction phase of the project, the following measures have been identified:

- Identification of construction limits (minimal area required for construction activities).
- When practical, excavated spoils will be removed as the contractor proceeds along the length of the activity.
- When necessary, stockpiling of excavated material will be covered or stacked at offsite location with muck being delivered as needed during the course of construction.
- Excessive soil on paved areas will be sprayed (wet) and/or swept and unpaved areas will be sprayed and/or mulched.
- Contractors will be required to cover stockpiled soils and trucks hauling soil, sand, and other loose materials.
- Clean the wheels of vehicles leaving the site to control the mud spread onto the public road.
- Contractor shall ensure that there is effective traffic management at site.
- Dust Suppression – The roads, construction area and vicinity (access roads, and working areas) shall be swept, sprinkled with water on daily basis to suppress dust.

ANNEX 14: MEASURES FOR NOISE POLLUTION CONTROL

IMPACTS ON NOISE LEVELS

In a water resource projects, the impacts on ambient noise levels are expected only during the project construction phase, due to earth moving machinery, etc. Likewise, noise due to quarrying, blasting, vehicular movement will have some adverse impacts on the ambient noise levels in the area.

MITIGATION MEASURES

The contractors will be required to maintain properly functioning equipment and comply with occupational safety and health standards. The construction equipment will be required to use available noise suppression devices and properly maintained mufflers.

- vehicles to be equipped with mufflers recommended by the vehicle manufacturer. Prohibiting works vehicles queuing on the public road.
- staging of construction equipment and unnecessary idling of equipment within noise sensitive areas to be avoided whenever possible.
- notification will be given to residents within 300 m of major noise generating activities (1km for blasting). The notification will describe the noise abatement measures that will be implemented.
- monitoring of noise levels will be conducted during the construction phase of the project. In case of exceeding of pre-determined acceptable noise levels by the machinery will require the contractor(s) to stop work and remedy the situation prior to continuing construction.

The following Noise Standards for DG sets are recommended for the running of DG sets during the construction:

- The maximum permissible sound pressure level for new diesel generator sets with rated capacity up to 1,000 KVA shall be 75 dB(A) at 1 m from the enclosure surface.
- Noise from the DG set should be controlled by providing an acoustic enclosure or by treating the enclosure acoustically.
- The Acoustic Enclosure shall be made of CRCA sheets of appropriate thickness and structural/ sheet metal base. The walls of the enclosure shall be insulated with fire retardant foam so as to comply with the 75 dB(A) at 1 m sound levels specified by CPCB, Ministry of Environment & Forests.
- The acoustic enclosure/acoustic treatment of the room shall be designed for minimum 25 dB(A) Insertion Loss or for meeting the ambient noise standards, whichever is on the higher side.
- The DG set shall also be provided with proper exhaust muffler.
- Proper efforts shall be made to bring down the noise levels due to the DG set, outside its premises, within the ambient noise requirements by proper siting and control measures.
- A proper routine and preventive maintenance procedure for the DG set shall be set and followed in consultation with the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

Noise due to crusher

Based on literature review, noise generated by a crusher is in the range of 79-80 dB(A) at a distance of 250 ft or about 75 m from the crusher. Thus, noise level at a distance of 2 m from the crusher shall be of the order of 110 dB(A). The exposure to labor operating in such high noise areas shall be restricted up to 30 minutes on a daily basis. Alternatively, the workers

need to be provided with PPEs (ear muffs or plugs), so as to attenuate the noise level near the crusher by at least 25 dB(A), to bring noise level down to 85 dB(A). The exposure to noise level in such a scenario to be limited up to 4 hours per day.

It is known that continuous exposure to noise levels above 85 dB(A) (IFC EHS standard) affects the hearing of the workers/operators and hence has to be avoided. Other physiological and psychological effects have also been reported in literature, but the effect on hearing acuity has been specially stressed. To prevent these effects, it has been recommended by international specialist organizations that the exposure period of affected persons be limited as specified in Table 14.1.

Table 14.1: Maximum Exposure Periods specified by OSHA (IFC guideline is 85 dB (A))

Maximum equivalent continuous noise level dB(A)	Unprotected exposure period per day for 8 hrs/day and 5 days/week
90	8
95	4
100	2
105	1
110	½
115	¼
120	No exposure permitted at or above this level

Measures to control noise due to blasting

Various measures outlined for control of noise due to blasting is given as below:

- Use of backfill cover has the potential to reduce air overpressure levels by 10 dB (A).
- Air overpressure levels may also be reduced by deck loading. In a blast with a significant vertical free face, this reduction may in some circumstances be obtained by deck loading the front row holes fired on the initial delays only, without needing to deck load all the front row holes.
- Rock excavation by blasting shall be done for all solid rock in place which cannot be removed until loosened by blasting, barring or wedging, removal of all big boulders or detached pieces of massive rock.
- Rock excavation close to the final excavated surfaces shall be performed using controlled blasting methods such as "pre-splitting", "cushion blasting" or “smooth blasting". Line- drilling shall be used to limit the over break and damage of surround rock.
- All excavations shall be performed using methods and techniques that will produce smooth and sound rock surfaces with minimum over break and fracturing beyond the lines and grades or limits of excavation. Drilling and blasting shall be done in such a manner as to ensure that the rock will break along the desired lines and grades. Rock faces and slopes shall be scaled or cleaned of loose or overhanging rock immediately after excavation.
- Blast holes shall be drilled not exceeding two-third of the depth of rock to be excavated from the elevation at which the hole is started. The holes shall not be larger than necessary to permit easy passage of whole sticks of explosives to the bottom of the holes. As the excavation approaches its final limits, the depth of holes for blasting and the amount of charges for the holes shall be reduced progressively.
- Blasting shall be carried out with non-electric detonators only except for the cord/fuse initiation by electric detonators. A separate circuit, independent of power and light circuits, shall be used for blasting.
- Charging, tamping and firing of drilled holes shall be done by an approved licensed person under his personal direction. Proper signals by siren shall be given before each operation of blasting.
- Blasting shall be permitted only when proper precautions are taken for the protection of persons, work and property. Any damage done to the work or property by blasting shall be repaired immediately.

A trained professional shall be hired to monitor the technical specifics of the blast, such as size and depth of drilled holes, and the type and amount of explosive used.

ANNEX 15: MEASURES FOR WATER POLLUTION CONTROL

All sites have the potential to pollute watercourses, so the approach should be adopted at the earliest stage of the project.

CONTROL OF WATER POLLUTION DURING CONSTRUCTION PHASE

Effluent from crushers

During construction phase, at least one crusher will be commissioned at the quarry site by the contractor involved in construction activities. It is proposed only crushed material would be brought at construction site. The capacity of the crusher shall be of the order of 500 tph. Water is required to wash the boulders and to lower the temperature of the crushing edge. About 0.1 m^3 of water is required per ton of material crushed. The effluent from the crusher would contain high- suspended solids. A total quantity of 50 m^3/hr of effluent is expected to be generated from various crushers. The effluent, if disposed without treatment, can lead to marginal increase in the turbidity levels in the receiving water bodies. The natural slope in the area is such that, the effluent from the crushers will ultimately find its way in river Kopili.

It is proposed to treat the effluent (to CPCB effluent discharge standards) from crushers in settling tank before disposal so as to ameliorate even the marginal impacts likely to accrue on this account.

Effluent from tunneling sites

During tunneling work the ground water flows into the tunnel along with construction water, which is used for various works like drilling, shotcreting, etc. The effluent thus generated in the tunnel contains high suspended solids. Normally, water is collected in the side drains and drained off into the nearest water body without treatment. It is recommended to construct a settling tank of adequate size to settle the suspended impurities. The effluents are expected to be generated from these locations, which shall be treated (to CPCB effluent discharge standards) prior to disposal.

Effluent from Batching Plants

During construction phase, batching plants will be commissioned for production of concrete. Effluent containing high suspended solids shall be generated during operation and cleaning of batching plants. However, no major adverse impacts, are anticipated due to small quantity of effluent and large volume water available for dilution in river Kopili. It is proposed to treat the effluent (to CPCB effluent discharge standards) before disposal to ameliorate even the marginal impacts likely to accrue on this account.

Effluent from Fabrication Units and Workshops

The fabrication units and workshops which shall be functional during construction phase will generate effluents with high suspended solids and oil and grease level. It is proposed to treat the effluent from fabrication units and workshops (to CPCB effluent discharge standards) prior to disposal.

CONTROL OF WATER POLLUTION DURING OPERATION PHASE

In the project operation phase, a plant colony with 50 quarters and nonresidential buildings is likely to be set up. It is recommended to provide a suitable Sewage Treatment Plant (STP) to treat the sewage generated from the colony.

WATER POLLUTION INCIDENT EMERGENCY RESPONSE

All site personnel should be aware of the appropriate action in case an emergency happens, e.g. the spillage of potentially polluting substances. Emergency response procedure should be developed for the site. Any pollution to surface water or groundwater should be reported.

ANNEX 16: ENERGY CONSERVATION MEASURES

INTRODUCTION

Various construction and other activities of the proposed LKHEP would lead to increased demand for fuel wood and fodder in the project area and its vicinity and would therefore exert pressure on forest areas located around the project. The major source of energy in the villages of the project area is fuel wood, acquirement of which is one of the main causes of ecological degradation and human drudgery. It is estimated that during the construction of the project, which would last for about 8 years, around 2,800 laborers (including their family members) will be working. Majority of the labor force will be outsiders and it will be very important to meet their energy requirement in an ecologically sustainable manner.

ENERGY CONSERVATION DURING CONSTRUCTION PHASE

The following energy conservation measures would be undertaken during construction works:

- Efficient work scheduling and methods that minimize equipment idle time and double handling of material
- Throttling down and switching off construction equipment when not in use
- Switching off truck engines while they are waiting to access the site and while they are waiting to be loaded and unloaded
- Switching off site office equipment and lights and using optimum lighting intensity for security and safety purposes
- Careful design of temporary roads to reduce transportation distance
- Designing roads on site to reduce transportation distances.
- Regular maintenance of equipment to ensure optimum operations and fuel efficiency
- The specification of energy efficient construction equipment.

ANNEX 17: GREEN BELT DEVELOPMENT PLAN

INTRODUCTION

The forest loss due to the reservoir submergence and construction of other project appurtenances shall compensated as a part of compensatory afforestation. However, it is proposed to develop greenbelt around the perimeter of various project appurtenances, selected stretches along reservoir periphery, etc. The main objectives of creating a green belt around a reservoir are to:

- Check soil erosion around the reservoir
- Check landslides and slips around the reservoir
- Develop the habitat for wildlife particularly avi-fauna

The general consideration involved while developing the greenbelt are:

- Trees growing up to 10 m or above in height with perennial foliage should be planted around various appurtenances of the proposed project.
- Planting of trees should be undertaken in appropriate encircling rows around the project site.
- Generally fast growing species should be planted.
- Since, the tree trunk is normally devoid of foliage up to a height of 3m, it may be useful to have shrubbery in front of the trees so as to gives coverage to this portion.

PLANTATION

The tree plantation will be done at a spacing of 2.5 x 2.5 m. The maintenance of the plantation area will also be done by the project proponent. The treated waste water and the manure generated by composting of solid waste generated for labor camps will be used for the greenbelt development. The species shall be recommended for greenbelt development in consultation with the Forest Department.

ANNEX 18: FIRE PROTECTION IN LABOUR CAMP AND STAFF COLONIES

INTRODUCTION

It has been envisaged that the fire protection planning in labor camps and staff colonies shall be taken up. The details are given in following sections of this chapter.

CONSTRUCTION OF CAMPS ETC. AND PLACEMENT OF FIRE PROTECTION EQUIPMENT

It has been planned that all facilities to be constructed shall be fully equipped with the fire protection equipment's as per IS standards. The analysis of fire hazard in the construction of these camps, colonies and other facilities is given in Table 18.1

Table 18.1: Analysis of fire hazard in the construction of camps, colonies and other facilities

S. No	Stage	Potential hazard	Remedial Measures
1.	Construction of labor camps and staff colonies	• Fire prevention and firefighting not considered in design • Inadequate fire protection measures during construction phase	**BY PROJECT PROPONENT** • While construction of Field hostels, Guest House/office and other facilities owned by project proponent shall provide the fire protection system as per IS Standards for Fire code. • Proper housekeeping will also be ensured and maintained during these facilities to protect them from any fire related incidents. • It will be ensured that the firefighting equipment's are placed at common place also including work place preferably within 15 meters of work place. **BY CONTRACTORS** • Clear term of reference will be given to contractor at tendering stage for incorporating fire code as per IS Standard. • Firefighting equipment's will be placed at all common places (within 15 meters of work place)

IMPLEMENTATION OF FIRE PROTECTION SYSTEM

During construction, it has been envisaged to set up full-fledged Environment Health & Safety (EHS) department reporting directly to Head of Project. This department shall also take care of the adequacy of Fire Safety measures set up in all facilities created either owned by project proponent or any of its Contractors. The analysis of responsibility for this EHS team in respect of Fire protection system is given in Table 18.2.

Table 18.2:Responsibility for this EHS team in respect of Fire protection system

S.No.	Stage	Potential hazard	Remedial Measures
1.	During Occupation	• Fire incident due to electrical short circuit/LPG Leakage/ Improper handling of flammable liquids/lack of precaution • Improper access to and from the location • In adequate fire fighting arrangements • Lack of knowledge • Lack communication • Lack of Knowledge on fighting fire and handling fire equipment • Inadequate emergency response	• Residential complex will be constructed as per the approved design and will be checked for completeness on fire aspect before allotment to residents • Each Block Colony/ camp will be provided with rated estimated trip off circuit breaker will be installed on each block. • All residents are made aware of fire hazard by training, regular campaigns and by placing posters and signs • LPG Cylinders/Flammable liquids will be stored at designated storage area. The storage will be well protected, ventilated with adequate provision of fire equipment. • Each block of the colony will be provided with DCP fire extinguishers. • Additionally fire point containing fire buckets, CO_2 extinguishers, DCP Extinguisher will be provided at the common place covering four residential blocks in labor camp. • Placement of written posters of preventive measures in each accommodation block • Regular EHS inspection of the camp site • Placement of placard of emergency numbers to be contacted in case of Emergency • Dedicated phone line will be provided in labor camps for effective communication. • Ensure proper access is maintained around and to the residential blocks • Identification of emergency Muster points at safe distance

RESPONSIBILITY

Project In charge is responsible for implementation of plan through his authorized representative on site. Site EHS Team shall monitor the implementation of plan and report non-compliance to site management.

TRAINING AND AWARENESS

Training of employees on fire prevention and fire fighting is important to prevent occurrence of fire incident in project area. All employees will be given brief overview of fire prevention, fire fighting procedure and response process at the time EHS Induction training. Project proponent will also carry out regular campaigns on fire prevention around the site. EHS Department is responsible for providing required training.

ANNEX 19: SAFETY PRACTICES DURING CONSTRUCTION PHASE

INTRODUCTION

The information on following aspects pertaining to safety have been presented in this chapter:

- Personal Safety Equipment
- Rescue Team
- Illumination and Earthing
- Maintenance of Traffic and Safety on Public Roads
- Blasting
- Ventilation of Underground Works
- Control of Dust, Silica and Noxious Gases in Underground Works
- Management of Explosives
- Traffic management during construction phase
- Measures to be taken during excavation of earth
- Safety practices during construction phase
- Fire protection in labor camp and staff colonies

PERSONAL SAFETY EQUIPMENT

General

- All the personnel as well as the site representatives and visitors shall be equipped with appropriate personal safety equipment. The use of such equipment shall be compulsory.
- Every person entering the working area in open air or in underground shall wear a protective helmet. Every person entering into underground works shall have a battery operated electric lamp. No one can enter or work underground without the confined spaces training.
- The safety-lock footwear with steel caps and sole plate shall be worn by all employees engaged in work having an inherent danger to the feel. Light footwear such as sandals, canvas or tennis shoes shall not be permitted for construction work.
- During the drilling works and in the areas where the employees are exposed to harmful noise levels, car protectors shall be made available and required to wear.
- Employees engaged in work having an inherent danger of eye or face injury shall be furnished and required to wear protection glasses, goggles or masks Where irritant or toxic substances may come in contact with the skin or clothing, employees shall be wearing the protective clothing or shall be required to apply a protective ointment by a competent physician.
- Employees working on sleep slopes or otherwise subject to possible falls from levels not protected by fixed guardrails or safety nets, shall be secured by safety bells and lifelines.

Requirements for Underground Works

Emergency material shall be provided at each underground excavation heading. This equipment shall consist of the following, as a minimum:

a) Stretchers
b) 3 woolen blankets
c) 2 appliances for artificial breathing
d) oxygen flask
e) 3 explosion-proof lamps
f) wound dressing and disinfecting material
g) pain-killing injections
h) gas masks

- At least two members of the Rescue Team as described hereinafter, properly instructed and trained in the rescue procedures, shall be in each crew working underground

RESCUE TEAM

- Prior to the commencement of construction, a Rescue Team shall be formed. This Rescue Team shall be capable to render help after accidents caused by flooding, fire, gas explosion, etc.
- The Rescue Team shall be organized in such a way that sufficient number of members will be ready for action at any time until the Completion of Works.
- The Rescue Team members shall be instructed and trained for their task by a qualified and experienced person. If required, an outside specialist shall be hired to perform such training. A refresher training for all members of the Rescue Team shall be conducted at least every six months.
- Each Rescue Team member shall be skilled in giving the first aid, dealing with the appliances for artificial respiration, and lire fighting equipment and shall possess a good local knowledge. Adequate equipment for reaching even the remotest working area shall be at their disposal.

ILLUMINATION AND EARTHING

General

- All working sites in the open, transit areas, excavation sites, access to tunnels, etc., shall be adequately illuminated during night work by electrical lights as specified in the Section "Site Installations and Services".
- Illumination of Underground Works
- Each working face shall be brightly illuminated.
- The vaults along the entire length of the tunnel adits and shaft shall be illuminated with electrical light throughout the duration of construction works. The lamps shall be located as follows;
    a) Every 25 m in unlined stretches,
    b) Every 50 m in lined stretches.

The lamps shall be installed in a particular area immediately after the rock supporting measures have been completed.

- Electrical cables shall be well insulated, protected and firmly fixed to tunnel walls by means of adequate insulators, Lamps shall be well protected against damage.
- Lighting by flame is expressly forbidden in the underground.

Earthling, Wet Work Areas, Control of Electric Discharges

- All equipment and appliances, which are exposed to lightning, shall be earthed electrically, and the effectiveness of such earthling shall be periodically checked by the specialized personnel.
- No equipment electrically powered by more than 24 Volts shall be operated by personnel standing in water.
- Only air, battery-powered or hydraulic tools shall be permitted in the wet areas.
- Where electrical blasting will be used, equipment shall be installed to control possible electric discharges in the ground due to storms, electrical motors, etc. As soon as such discharges arc noted, electrical blasting operations shall be suspended, or the detonator type changed.

MAINTENANCE OF TRAFFIC AND SAFETY ON PUBLIC ROADS

- All necessary precautions for the protection of the work and the safety of the public on the roads affected by his activities shall be taken.Where the work will be carried out at the site of, or close to an existing road, the vehicular and pedestrian traffic shall be maintained safe at all times. If any operations can cause traffic hazards, the repair or fence or any such other measures shall be taken for ensuring safety.
- Roads subject to interference by the work shall be kept open or suitable detours shall be provided and maintained,

and all necessary barricades, suitable and sufficient flashlights, flagmen, danger signals, and signs be provided.

- Roads, which will be closed to traffic, shall be protected by effective barricades on which acceptable warning and detour signs shall be placed. All barricades shall be kept illuminated and all lights shall be kept on from sunset to sunrise.
- The temporary passes and bridges shall be provided to give an access to the existing villages, houses, etc., to the satisfaction of the authorities concerned whenever he disturbs such existing way during the execution of the Works.

BLASTING

General

- All blasting shall be carried out in a workmanlike and safe manner by a competent, licensed and experienced blasting engineer or foreman. No blasting shall be done without his approval.
- Blasting will be permitted only after adequate provisions have been made for the protection of persons, the Works, and public or private property. Responsibility for the safety of persons and property shall be ensured. All claims resulting from personal injury and damage to property and equipment that may resulting from its blasting operations shall be taken care of. Any damage done to the Works or property by blasting shall be repaired.
- Blasting in the open air shall be carried out only at certain hours of (he day in accordance with a schedule. Barriers shall be erected and warning shall be given to the workers at the Site and to the public immediately before blasting, so that no person will enter the danger zone until blasting is finished.
- Upon completion of blasting, an "all clear" signal shall be given by the responsible blasting engineer after he has satisfied himself that all charges loaded have detonated and that no delay-explosions or misfiring arc to be expected.
- Such methods of blasting shall be employed that shock and vibration are minimized.
- No blasts involving charges larger than 200 kg shall be carried without at least one hour prior to the blast.
- No blasting shall be permitted within 25 m of any concrete placed within the previous 7 days, except backfill concrete behind steel ribs. After 7 days. Blasting will not be permitted within 10 m of structures or installations vulnerable to damage by blasting.
- No charging and firing will be permitted during thunderstorms and other electrical disturbances.
- Mats or rubber tires tied together with rope shall be used as protection from flying debris to cover the charges where blasting may expose persons or properly to injury or damage.

Underwater Blasting

- Only water resistant blasting caps and detonating cord shall be used in underwater blasting operations.
- Loading tubes and casings of dissimilar metals shall not be permitted because of possible electrical transient current from galvanic action.
- When more than one charge is placed underwater, a float device shall be attached to an element of each charge in such manner that it will be released by the firing.
- No drilling, digging or excavating shall be permitted until all misfires have detonated or the explosives are removed from the missed holes.

VENTILATION OF UNDERGROUND WORKS

General

- Installation and operation of ventilating systems for underground construction sites, shall be done. Calculations of fresh air supply volume, type of ventilation scheme, duct diameters, materials and equipment and position of ventilators and dust arrestors shall be performed. Description of the working cycle including number of persons employed, number and capacity of diesel-powered equipment working at one time at each tunneling face shall also be included.
- All parts of the Works shall be maintained in a slate which will not be injurious to the health of the personnel. The

air in underground shall contain no less than 20% oxygen and shall not contain a concentration of gases, vapours or dust greater than is safe for the health of workmen.

- If requited, the ventilating system shall be kept in operation also after breakthrough in tunnels, galleries and shafts in order to maintain the fresh air volume requirements staled hereafter
- Intermediate fans attached to the main duct line shall be provided as required to ensure satisfactory removal of contaminated air. All ventilation ducts shall be maintained in an airtight condition.
- Ventilation ducts shall be firmly fixed to the vault in such position that a minimum clearance of 200 mm remains between the duct and the extremities of train or vehicular traffic employed in the underground.
- Should the volume of fresh air at the heading face not reach the required amount and quality, the whole duct system shall be pressure-and-volume tested in portions not exceeding a few hundred meters. Measuring stations shall be located not closer than 10 times the duct diameter from any fan or other flow disturbance within the duct.

Ventilating System

- The ventilating system shall be of such efficiency that the average air velocity in the largest excavated profile is not less than 0.3 m/s. In case the presence of methane gas is detected or suspected this value shall be increased to 0.5 m/s.
- Furthermore, the main ventilating system shall ensure that both of the following minimum fresh air volume requirements are satisfied at all times:
- 3.0 m^3/min for each person employed underground at one time
- 6.0 m^3/min for each metric horse power (PS) of diesel-powered equipment at work underground at one lime. This value may be reduced to 3.0 m^3/min providing the equipment is using diesel oil low in Sulphur content (max. 0.2% of Sulphur by volume).
- These fresh air volumes shall be cumulative and the design calculations for the maximum number of persons and diesel-powered equipment working in the underground at any one time. Any estimated losses, e.g. due to the leaks in the ducts, shall be added to the figures stated above.
- The ventilating system in the underground excavation performed by drilling and blasting shall consist of two parts:
    a) Main ventilating system,
    b) Secondary ventilating system.
- The main ventilating system shall be designed to allow the flow to be reversed and shall be operated as follows:
    a) Prior to the blasting, the system will be put in the exhaust mode of operation. Blasting fumes shall be extracted as close as possible to the excavation face. Exhaust air and blasting fumes shall be discharged in such a way that they can neither escape in any other working place nor be re-circulated in the fresh air supply system.
    b) Prior to the commencement of mucking and removal of material the system will be put in the forced mode of operation which will continue till termination of mucking.
- The secondary ventilating equipment of the forced type shall be installed to provide adequate ventilation of the area between the heading face and the air intake/outlet of the main system. This system shall be switched on prior to the blasting and shall be operating until the main system has been put into forced mode of operation. The air intake shall be located at a sufficient distance from the heading face to ensure that blasting fumes do not permeate into this area and cause a recycling of blasting fumes. The outlet of this duct shall be located so close to the heading face that the driving of the blasting fumes and dust away from the face into main system is ensured. The minimum capacity shall be at least 70% of the main system capacity. The end diameter of the duct shall be such that the air discharge velocity is not less than 20 m/s.
- Re-entry to the heading face and resuming of the work may not occur earlier than IS minutes following each blast.

MANAGEMENT OF EXPLOSIVES

General requirements of responsible persons

- All persons charged with, responsible for or involved in the storage, transportation and handling of explosives are to have received appropriate training, are to be suitably qualified and experienced and are to be familiar with the details and guidelines of this chapter.
- Persons responsible in whatever capacity for the storage, transportation and/or handling explosives are to be in good health.
- Persons not qualified to store, transport or handle explosives may carry, load and unload dangerous material into vehicles or storage under supervision of a qualified person, provided they are verbally briefed on safety measures prior to handling explosives.
- All transportation and storage of explosives, temporarily or permanent must be recorded in a log book showing the amount of explosives transported or stored and the amount of explosives being used.

Environmental Requirements

The environmental requirements (temperature, humidity and vibration) of explosives vary, and are dependent on their intended storage conditions (including shelf life), transportation, handling and use. The performance of explosives will be unpredictable and the safety will be reduced if the manufacturers' environmental conditions are not met. In general, explosives should be:

- Kept dry and well ventilated.
- Kept as cool as possible and free from excessive or frequent changes of temperature.
- Protected from direct sunlight
- Kept free from excessive and constant vibration.

Storage Requirements

The key aspects to be considered while considering the storage site are:

- All storage facilities require adequate ventilation to prevent dampening and heating of stored explosives. Climatic conditions, size of magazine and location will determine the amount of ventilation required.
- Permanent and/or main storage facilities shall be fire-resistant, theft resistant, weather resistant and ventilated.
- Portable storage facilities, such as a skid-mounted container, trailer or semi-trailer shall be theft-resistant, fire-resistant and weather-resistant. The magazine should be constructed of steel with an interior lining of timber.
- Magazines of less than one cubic metre in size should be fixed to the ground to prevent theft of the entire magazine.
- A day box is used for the on-site storage of explosives required for daily operation and shall be:
  - Weather resistant and able to be locked.
  - Wherever possible or practical it should be of steel construction
  - but can be wooden boxes or other appropriate containers.
  - They shall contain no more than 10 kg of explosives and or (including) appropriate quantity of initiating means to fire the given quantity of explosives.
- Detonators and/or other means of initiation are to be stored and carried in a separate box from explosives.
- Vehicles are not to be left loaded with explosives at any time unless they are under continuous security guard and are not to be used as overnight storage facilities.

Additional Safety Measures for Storing and Handling of Explosives

These following shall be implemented and adhered to by the contractor/ project proponent:

- A trained and qualified person is to be responsible for managing the receipt, storage, guarding and issuing

explosives at all levels

- Only authorised persons are to enter any storage facility and where appropriate and relevant to be escorted at all times.
- All smoking materials, including cigarettes, matches, lighters etc. and any object or item that might cause fire are prohibited from the storage facility. At the entrance to the facility there is to be a warning sign stating 'NO SMOKING OR SMOKING MATERIALS ALLOWED BEYOND THIS POINT'**.**
- Clothing and shoes of all workers are to be in accordance with rules on storage of explosives. Shoes are to be manufactured in such a manner as not to cause sparks.
- The storage facility is not to be used for anything other than storing explosives. It should be kept free from any other tools, equipment of items and should at all times be kept as clean and tidy as is practicable.
- The facility is to be secured at all times except when it is being ventilated when it should be guarded.
- Facilities are to be constructed in such a way as to provide protection from static electricity.
- If thunderstorms are predicted all work in and around the facility is to stop and personnel are to go to a safe place.
- In the event that the facility repair, all explosives and explosive accessories are to be removed before repairs are started.

Requirements when preparing to Transport Explosives

Persons responsible for the transportation of explosives are to ensure:

- That suitable communications systems are available that will allow for communicationfrom the vehicle to the project throughout the complete journey.
- That an appropriate communication plan (covering as a minimum a radio check prior to leaving the start location and informing on arrival at destination) is in place for thejourney.
- That a route card is prepared covering the complete journey. That the driver and drivers assistant are aware of all actions to be taken covering all possible eventualities during the journey i.e. breakdown, accident, robbery, etc.
- Explosives will not be transported unless securely packed in appropriate boxes. Boxes or individual packages are to have specific identification marks on them.
- Each box is to be marked with the applicable hazardous classification code.
- Boxes are to be closed and made waterproof in order to prevent any loss or spilling and moisture ingress during transport. If the vehicle is not a covered vehicle, boxes are to be covered with a waterproof cover.
- Detonators are to be securely packed in a separate metal box from explosives. Boxes containing detonators are to be carried in a separate compartment of the vehicle from boxes containing explosives. UNDER NO CIRCUMSTANCES ARE DETONATORS TO BE CARRIED IN THE SAME BOX AS EXPLOSIVES.
- Detonators and explosives are to be loaded on to the vehicle in such a way that they do not move about during transportation.
- Boxes, pallets and other packaging for transport of explosives are to be evenly distributed over the whole deck area, and can be loaded up to the height of the sides of the truck. All individual packaging and boxes with explosives are to be loaded and fixed to prevent spillage from boxes and turning over or impact inside boxes.

Requirements of vehicles used for the Transport of Explosives

Vehicles employed to transport explosives are to be roadworthy, well maintained, and in good working order. Persons in charge of the transport of explosives will check the following prior to any movement of vehicles carrying explosives.

- The vehicle is marked appropriately.
- The driver and driver's assistant are briefed about the type of explosives to be transported as well as their destination and the route they are to take. The type and quantity of explosives and conditions of roads to be travelled on are to be considered when deciding the type of vehicle to be used.
- If vehicles carrying explosives are travelling in convoy, then the distance between vehicles is to be a minimum of 100 metres.

All vehicles that are employed for the transport of explosives should also carry the following equipment:

- At least two appropriate fire extinguishers, one for the vehicle engine and one for the load, extinguishers are to be charged with a content that will efficiently extinguish an explosives fire.
- Two hand-torches, Two warning triangles for marking the vehicle when stationary on the road.
- Vehicles transporting explosives shall be fitted with an earthing-strap to take away static electricity from the vehicle to the ground.
- No passengers are to be carried in vehicles transporting explosives.
- Vehicle crews are to consist only of a driver and a driver's assistant.
- No material that may cause a fire may be carried in vehicles transporting explosives.
- No repairs that might cause fire by sparking due to impact or violent contact may be carried out.
- No smoking is allowed in the driver's cabin or any other part of the vehicle.
- The vehicle is not to be left unattended.
- The driver will drive with care and at an appropriate speed for the roads and conditions which in all cases shall never exceed 70 KPH or 80% of the highest speed determined for the road whichever is less.
- If the explosives are stolen, the project, contractor or persons transporting the explosives are to take measures to find it and to report the incident to the person in charge of the transport and also inform the local authorities.
- Explosives and the means to initiate explosives may be transported
- together only when the quantity of explosives does not exceed 50 kg, and
- 100 detonators. This will only be allowed provided that the detonators are in their originally packed boxes, and that the explosives is packed and loaded separately from the detonators.

TRAFFIC MANAGEMENT DURING CONSTRUCTION PHASE

Temporary diversions will be constructed with the approval of the Engineer. Detailed Traffic Control Plans will be prepared and submitted to the Engineer for approval, at least 5 days prior to commencement of works on any section of road. The traffic control plans shall contain details of temporary diversions, details of arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, safety measures for transport of hazardous material and arrangement of flagmen.

The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. He shall inform local community of changes to traffic routes, conditions and pedestrian access arrangements. The temporary traffic detours will be kept free of dust by frequent application of water.

MEASURES TO BE TAKEN DURING EXCAVATION OF EARTH

While planning or executing excavation the contractor shall take all adequate precautions against soil erosion, water pollution etc. and take appropriate drainage measures to keep the site free of water, through use of mulches, grasses, slope drains and other devices. The contractor shall take adequate protective measures to see that excavation operations do not affect or damage adjoining structures and water bodies. The recommended measures are listed as below:

- Ensure unobstructed natural drainage through proper drainage channels/ structures.
- Dispose surplus excavated earth at identified sites. Ensure minimum hindrance to locals.
- All excavations will be done in such a manner that the suitable materials available from excavation are satisfactorily utilized as decided upon beforehand. The excavations shall conform to the lines, grades, side slopes and levels shown in the drawings or as directed by the engineer.

FIRE PROTECTION IN LABOUR CAMP AND STAFF COLONIES

It has been envisaged that the fire protection planning shall be taken up in the following manner:

Construction of Camps etc. and placement of fire protection equipment's.

It has been planned that all facilities to be constructed shall be fully equipped with the fire protection equipment's as per IS standards. The analysis of fire hazard in the construction of labor camps, colonies and other facilities along with management measures is summarized in Table 19.1.

Table 19.1: Analysis of fire hazard in the construction of labor camps, colonies and other facilities

S. No	Stage	Potential hazard	Remedial Measures
1.	Construction of Camp/colony	• Fire prevention and firefighting not considered in design • In adequate fire protection measures during construction	**By Project authorities** • While construction of Field hostels, Guest House/office and other facilities owned by the project. • The project proponent shall provide the fire protection system as per IS Standards for Fire code. • Proper housekeeping will also be ensured and maintained during these facilities to protect them from any fire related incidents. • It will be ensured that the firefighting equipment's are placed at common place also including work place preferably within 15 meters of work place. **By Contractors** • Clear term of reference will be given to contractor at tendering stage for incorporating fire code as per IS Standard. • Firefighting equipment's will be placed at all common places (within 15 meters of work place)

b) Maintenance of fire protection equipment's as the safety measures thorough dedicated EHS Team.

During construction, it has been envisaged to set up fully fledged Environment Health & Safety (EHS) department reporting directly to Head of Project. This department shall also take care of the

adequacy of Fire Safety measures set up in all facilities created either owned by project or any of its Contractors. The analysis of responsibility for this EHS team in respect of Fire protection system is outlined in Table 19.2.

Table 19.2: Analysis of responsibility for this EHS team

S. No	Stage	Potential hazard	Remedial Measures
1.	During Occupation	• Fire incident due to electrical short circuit/LPG Leakage/ Improper handling of flammable liquids/lack of precaution • Improper access to and from the location • In adequate fire fighting arrangements • Lack communication • Lack of Knowledge on fighting fire and handling fire equipment • Inadequate Emergency response	• Residential complex will be constructed as per the approved design and will be checked for completeness on fire aspect before allotment to residents • Each Block Colony/ camp will be provided with rated estimated trip off circuit breaker will be installed on each block. • All residents are made aware of fire hazard by training, regular campaigns and by placing posters and signs • LPG Cylinders/Flammable liquids will be stored at designated storage area. The storage will be well protected, ventilated with adequate provision of fire equipment's. • Each bloc of the colony will be provided with 10 kg DCP fire extinguishers. • Additionally fire point containing fire buckets, CO_2 extinguishers, DCP Extinguisher will be provided at the common place covering four residential blocks in labor Camp. • Placement of written posters of preventive measures in each accommodation block • Regular EHS inspection of the camp site • Placement of placard of emergency numbers to be contacted in case of Emergency • Dedicated phone line will be provided in labor camps for effective communication. • Ensure proper access is maintained around and to the residential blocks • Identification of emergency Muster points at safe distance

RESPONSIBILITY

Project In charge is responsible for implementation of plan through his authorized representative on site. Site EHS Team shall monitor the implementation of plan and report which are non- compliance to site management.

TRAINING AND AWARENESS

Training of employees on fire prevention and fire fighting is important to prevent occurrence of fire incident in project area. All employees will be given brief overview of fire prevention, fire fighting procedure and response process at the time EHS Induction training. Project proponent will also carry out regular campaigns on fire prevention around the site. EHS Department is responsible for providing required training.

IMPLEMENTATION OF SAFETY PLAN

The implementation of this plan will be mandatory for all contractors involved in the projects. The requirements of this plan will be part of contract agreement, therefore no cost has been kept under this plan in the EMP.

ANNEX 20: EMP AND EMOP FOR ROAD COMPONENT

This EMP is applicable to Roads and Infrastructure Component of LKHEP

Table 20.1 Environmental Management Plan

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
Construction Stage								
1. Air Quality								
1.1 Dust Generation due to construction activities and transport, storage and handling of construction materials	• Transport, loading and unloading of loose and fine materials through covered vehicles. • Paved approach roads. • Storage areas to be located downwind of the habitation area. • Water spraying on earthworks, unpaved haulage roads and other dust prone areas.	MORT&H Specification s for Road and Bridge works Air (P and CP) Act 1981 and Central Motor and Vehicle Act 1988	Throughout corridor.	PM_{10} level measurements Dust pollution or complain of locals	Standards CPCB methods Observations Public consultation	Included in Construction cost	Contractor	APGCL/ CSC
1.2 Emission of air pollutants (HC, SO_2, NO_X, CO etc.) from vehicles due to traffic congestion and use of equipment and machinery	• Regular maintenance of machinery and equipment. • Batching, asphalt mixing plants and crushers at downwind (1km) direction from the nearest settlement. • Only crushers licensed by the PCB shall be used • DG sets with stacks of adequate height and use of low sulphur diesel as fuel. • Ambient air quality monitoring • Follow traffic management plan.	The Air (Prevention and Control of Pollution) Act, 1981(Amend ed 1987) and Rules1982	Asphalt mixing plants, crushers, DG sets locations	Monitoring of ambient air quality & checking PUC certificates	Standards CPCB methods	Included in Construction cost	Contractor	APGCL / CSC
1.Noise								

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
2.1 Noise from Construction vehicle, equipment and machinery.	• All equipment to be timely serviced and properly maintained. • Bottlenecks to be removed. • Construction equipment and machinery to be fitted with silencers and maintained properly. • Only IS approved equipment shall be used for construction activities. • The regulation near residential, built up and forest area construction shall be restricted to daylight hours. • Timing of noisy construction activities shall be done during night time and weekends near schools and selected suitable times near temples when there are no visitors, concurrent noisy operations may be separated to reduce the total noise generated, and if possible re-route traffic during construction to avoid the accumulation of noise beyond standards. Else provision of temporary noisebarrier at sensitive locations or near sources.	Legal requirement Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof +Clause No 501.8.6. MORT&H Specifications for Road and Bridge works. IFC Noise standards	Throughout section especially at construction sites, residential and identified sensitive locations.	Noise levels Measurements Complaints from local people	As per Noise rule, 2000 Consultation with local people	Included in Construction cost Plantation cost is separate	Contractor	APGCL/ CSC
3. Land and Soil								
3.1 Land use	• Non-agricultural areas to be used as borrow areas to the extent possible.	As per requirement	Throughout the section	Borrow pit Locations	Review borrow area plan, site	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
Change and Loss of productive/top soil	• If using agricultural land, top soil to be preserved and laid over either on the embankment slope for growing vegetation to protect soil erosion.		and borrow areas	Top soil storage area	visits			
3.2 Slope failure and Soil erosion due to Construction activities, earthwork, and cut and fill, stockpiles etc.	• Bio-turfing of embankments to protect slopes. • Slope protection by providing frames, dry stone pitching, masonry retaining walls, planting of grass and trees. • The side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub as per design specifications. Care should be taken that the slope gradient shall not be greater than 2:1 • The earth stockpiles to be provided with gentle slopes to prevent soil erosion.	IRC: 56 - 1974 recommended practice for treatment of embankment slopes for erosion control Clause No.306 and 305.2.2 MORT&H Specifications for Road and Bridge works Guidelines IX for Soil erosion	Throughout the entire road especially along hilly areas	Occurrence of slope failure, landslides or erosion issues	Review of design documents and site observation	Included in Construction cost	Design consultant and Contractor,	APGCL/ CSC
3.3 Borrow area management	• Non-productive, barren lands, upland shall be used for borrowing earth with the necessary permissions/consents. • Depths of borrow pits to be regulated and sides not steeper than 25%.	IRC Guidelines on borrow areas and for quarries(Environmental Protection Act	Borrow sites location	Existence of borrow areas in inappropriate unauthorized locations. Poor borrow area	Review of design documents and site observation	Included in Construction cost	Design consultant and Contractor,	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	• Topsoil to be stockpiled and protected for use at the rehabilitation stage. • Transportation of earth materials through covered vehicles. • IRC recommended practice for borrow pits (IRC 10: 1961). • Borrow areas not to be dug continuously. • To the extent borrow areas shall be sited away from habituated areas. Borrow areas shall be leveled with salvaged material or other filling materials which do not pose contamination of soil. Else, it shall be converted into fishpond in consultation with fishery department and land owner/community. • Rehabilitation of the borrow areas as per Guidelines for redevelopment of Borrow Areas.	And Rules,1986; Water Act, Air Act)+ Clause No. 305.2.2 MORT&H Specification s for Road and Bridge works Guidelines V for Borrow Areas management		Management practices. Incidents of accidents. Complaints from local people.				
3.4 Quarry Operations	• Aggregates will be sourced from existing licensed quarries. • Copies of consent/ approval / rehabilitation plan for a new quarry or use of existing source will be submitted to EO, APGCL. • The contractor will develop a Quarry	Clause No. 111.3 MORT&H Specifications for Road and Bridge works Guidelines VI for Quarry Areas	Quarry area locations	Existence of licenses for all quarry areas from which materials are being sourced Existence of a	Review of design documents, contractor documents and site observation	Included in Construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	Redevelopment plan, as per the Mining Rules of the state and submit a copy of approval to EA.	Management		Quarry redevelopment Plan				
3.5 Compaction of soil and impact on quarry haul roads due to movement of vehicles and equipment	• Construction vehicles, machinery, and equipment to be stationed in the designated ROW to avoid compaction. • Approach roads/haulage roads shall be designed along the barren and hard soil area to reduce the compaction. • Transportation of quarry material to the dumping site through heavy vehicles shall be done through existing major roads to the extent possible to restrict wear and tear to the village/minor roads. • Load of haulage trucks will be monitored to ensure they do not exceed the standard limits to avoid safety issues and excessive damage on the roads • Land taken for construction camp and other temporary facility shall be restored to its original conditions.	Design requirement	Parking areas, Haulage roads and constructio n yards.	Location of approach and haulage roads Presence of destroyed/compac ted agricultural land or land which has not be restored to its original condition	Site observation	Included in construction cost	Contractor	APGCL/ CSC
3.6 Contamination of soil due to	• Construction vehicles and equipment will be maintained and refueled in such a fashion that	Design requirement	Fueling station, Construction sites, and construction	Quality of soil near storage area Presence of	Site observation	Included in construction cost.	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	oil/diesel spillage does not contaminate the soil. • Fuel storage and refueling sites to be kept away from drainage channels. • Unusable debris shall be dumped in ditches and low lying areas. • To avoid soil contamination Oil-Interceptors shall be provided at wash down and refueling areas. • Waste oil and oil soaked cotton/ cloth shall be stored in containers labeled 'Waste Oil' and 'Hazardous' sold off to MoEF&CC/SPCB authorized vendors • -bituminous wastes to be dumped in approved borrow pits with the concurrence of landowner and covered with a layer of topsoil conserved from opening the pit. • Bituminous wastes will be disposed off in an identified dumping site approved , appropriately designed, compliant waste management facilities (landfills).		n camps and disposal location.	spilled oil or bitumen in area				
4. Water Resources								
4.1 Sourcing of water during Construction	• Requisite permission shall be obtained for abstraction of	-	Throughout the section	Approval from competent authority	Checking of documentation	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	groundwater from Central Groundwater Authority • Arrangements shall be made by contractor that the water availability and supply to nearby Communities remain unaffected.			Complaints from local people on water availability	On Talk to local people			
4.2 Disposal of water during construction	• Provisions shall be made to connect road side drains with exiting nearby ponds otherwise make provision of water harvesting pits intermittently.	Clause No. 1010 EP Act 1986 MORT&H Specifications for Road and Bridge works	Throughout the section.	Design of road side drains Existence of Proper drainage system for disposal of waste water	Standards methods Site observation and review of documents	Included in construction cost	Contractor	APGCL/ CSC
4.3 Alteration in surface water hydrology due to embankment	• Existing drainage system to be maintained and further enhanced. • Provision shall be made for adequate size and number of cross drainage structures esp. in the areas where land is sloping towards road alignment. • Road level shall be raised above HFL level wherever road level is lesser than HFL.	Design requirement, Clause No 501.8.6. MORT&H Specifications	Near all drainage channels, river crossings etc. specially locations of 9 no. of slab culverts and 33 no. of box culverts.	Design of road side drains	Review of design Documents Site observation	Included in construction cost	Contractor	APGCL/ CSC
4.4 Siltation in water bodies due to construction activities/ earthwork	• Embankment slopes to be modified suitably to restrict the soil debris entering water bodies.	Design requirement , Clause No 501.8.6. MORT&H	Near all water bodies, river embankenment	Siltation of rivers, streams, ponds and other water bodies in area	Field observation	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	• Provision of Silt fencing shall be made at water bodies. • Silt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be re- vegetated. • Earthworks and stone works to be prevented from impeding natural flow of rivers, streams and water canals or existing drainage system.	Specifications for Road and Bridge works (CP and CP) and worldwide best practices	slopes.					
4.5 Deterioration in Surface water quality due to leakage from vehicles and equipment's and waste from construction camps.	• No vehicles or equipment should be parked or refueled near water-bodies, so as to avoid contamination from fuel and lubricants. • Oil and grease traps and fueling platforms to be provided at re-fueling locations. • All chemicals and oil shall be stored away from water and concreted platform with catchment pit for spills collection. • All equipment operators, drivers, and warehouse personnel will be trained in immediate responsefor spill containment and eventual clean-up. Readily available, simple to understand and preferably written in the local language emergency response	The Water (Prevention and Control of Pollution) Act, 1974 and amendments thereof.	Water bodies, refueling stations, construction camps.	Water quality of ponds, streams, rivers and other water bodies in project area. Presence of oil floating in water bodies in area	Conduction of water quality tests as per the monitoring plan Field observation	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	procedure, including reporting, will be provided by the contractors. • Construction camp to be sited away from water bodies. • Solid Wastes shall be collected, strong and taken to the approved, appropriately designed, compliant waste management facility (landfills) only. • Water quality shall be monitored periodically • All equipment's operators, divers, and ware house personal will be trained in immediate response for spill containment and eventual cleanup. Readily available, simple to understand and preferably retain in the local language emergency response procedure, including reporting, will be provided by the contractor,							
5. Flora and Fauna								
5 .1 Vegetation loss due to site preparation and construction activities	• Minimize tree cutting to the extent possible. • Roadside 611 trees to be removed with prior approval of competent authority. Compensatory plantation at 1:10 basis and additional plantation as per the IRC guidelines in consultation	Forest Conservation Act 1980 & IRC SP: 21 and IRC SP:66	Throughout Road corridor	ROW width 611 no. trees for felling Compensatory plantation plan 6,110 no. trees	Review of relevant documents – tree cutting permit, compensatory plantation	Road side Plantation cost is included in . costs.	Relevant agency specialized in afforestation	APGCL / CSC

	with Forest Department. • Regular maintenance of all trees planted. • Provision of LPG in construction camp as fuel source to avoid tree cutting, wherever possible. • Plantation of trees on both sides of the road. Integrate vegetation management (IVM) with the carriage way completely clear of vegetation. From the edge of the road to the boundary of ROW, vegetation structured with smaller plants near the line and larger trees further away to avoid costly and provide habitats for a wide variety of plants and animals. Additional plantation near river banks to check erosion as part of compensatory plantation. • In the event of design changes during the construction stages additional assessments including the possibility to save trees shall be made by the EA. Road side Plantation Strategy as per IRC specifications including manuring.							
5.2 Wildlife/animal disturbance due to site preparation and construction activities	• Identify the locations for animal corridor crossing the alignment and provide propose passage as per site condition/geography. • Provisions of adequate signages and speed limit on road sections within forest areas to avoid	Forest Conservation Act 1980 & Wildlife Protection Act, 1972	In Mandap Reserve Forest along the road Elephant crossings are reported by locals once	Barricading the corridor for alignment crossing to guide elephant passes at one location	Physical check on conditions	Included in construction cost	Contractor	APGCL/ CSC

	accidental road kills . • Monitoring poaching activities in workers areas and well as community areas (as per Annex 9).		in year (during November-December months).					
6. Construction Camps								
6.1 Impact associated with location	All camps should maintain minimum distance from following: - 500 m from habitation - 500 m from forest areas where possible - 500 m from water bodies where possible 500 m from through traffic route where possible	Design Requirement	All construction camps	Location of campsites and distance from habitation, forest areas, water bodies, through traffic route and other construction camps	On site Observation Interaction with workers and local communit y	Included in construction cost	Contractor	APGCL/ CSC
6.2 Worker's Health in construction camp	• The location, layout and basic facility provision of each labor camp will be submitted to SQC prior to their construction. The construction shall commence only after approval of SQC. The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner as approved by the EA. • Adequate water and sanitary latrines with septic tanks attached to soak pits shall be provided. • Preventive medical care to be provided to workers including a First-Aid kit that	The Building and Other Construction workers (Regulation of Employment and	All construction camps	Camp health Records Existence of proper first aid kit in camp site	Camp Records Site Observation Consultation	Part of the Contractors costs	Contractor	APGCL/ CSC

	must be available in the camp. • Waste disposal facilities such as dust bins must be provided in the camps and regular disposal of waste must be carried out . • The Contractor will take all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides hitch should comply with local regulations. • No alcoholic liquor or prohibited drugs will be imported to, sell, give, and barter to the workers of host community. • Awareness raising to immigrant workers/local community on communicable and sexually transmitted diseases.							
7. Management of Construction Waste/Debris								
7.1 Selection of Dumping Sites	• Unproductive/wastelands shall be selected for dumping sites. • Away from residential areas and water bodies • Dumping sites have adequate capacity equal to the amount of debris generated. • Public perception and consent from the village Panchayats has to be obtained before finalizing the location.	Design Requirement and MORT&H guidelines	At all Dumping Sites	Location of dumping sites Public complaints	Field survey and interaction with local people	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
7.2 Reuse and disposal of construction and dismantled waste	• The existing bitumen surface shall be utilized for paving of cross roads, access roads, and paving works in construction sites and camps, temporary traffic diversions, and haulage routes. • Unusable and - bituminous debris materials should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. For removal of debris, wastes and its Disposal MOSRTH guidelines and IFC EHS guidelines should be followed. • Unusable and surplus materials, as determined by the . Engineer, will be removed and disposed off-site. • All excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping.	MORT&H and IFC EHS guidelines	Throughout the corridor	Percentage of reuse of existing surface material Method and location of disposal site of construction debris	Contractor Records Field Observation Interaction with local people	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
8. Traffic Management and Safety								
8.1 Management of existing traffic and safety	• Temporary traffic diversion shall be planned by the contractor and approved by the 'Engineer'. • The traffic control plans shall contain details of diversions; traffic safety arrangements during construction; safety measures for night time traffic and precautions for transportation of hazardous materials. Traffic control plans shall be prepared in line with requirements of IRC's SP 55 document'. • The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. • On stretches where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will be constructed. • Restriction of construction activity to only one side of the existing road. • The contractor shall inform local community of changes to traffic routes, and pedestrian access arrangements with Assistance from "Engineer".	Design requirement and IRC SP:55	Throughout the . corridor especially at intersections.	Traffic management plan Safety signs on Site Number of traffic accidents	Review traffic management plan Fiel observation of traffic management and safety system Interaction with people in vehicles using the road	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
8.2 Pedestrians, animal movement	• Temporary access and diversion, with proper drainage facilities. • Access to the schools, temples and other public places must be maintained\ when construction takes place near them. • Fencing wherever cattle movement is expected. • To avoid the need for cattle underpasses, some of the proposed culverts near habitations may be widened to facilitate cattle movement.	Design requirement And IRC: SP: 27 -1612 IRC:SP: 32 - 1988 Road Safety for Children (5-12 Years Old) IRC:SP: 44 - 1994 Highway Safety Code IRC: SP: 55 – 2001 Guidelines for The Building and other Construction workers Act 1996 and Cess Act of 1996 Factories Act 1948	Near habitation on both sides of schools, temples, hospitals, graveyards, construction sites, haulage roads, diversion sites.	Road signage & drainage as per IRC guideline Complaints from local people	Field observation Interaction with local people	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
8.3 Safety of Workers and accident risk from construction activities	• Contractors to adopt and maintain safe working practices. • Usage of fluorescent and retroflector signage, in local language at the construction sites • Training to workers on safety procedures and precautions. • Mandatory appointment of safety officer. • All regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress shall be complied with. • Provision of PPEs to workers. • Provision of a readily available first aid unit including an adequate supply of dressing materials.		Construction sites	Availability of Safety gears to Workers Safety signage Training records on safety Number of safety related accidents	Sit Observation Review records on safety training and Accidents Interact with construction workers	Included in construction cost	Obligation of Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	• The contractor will not employ any person below the age of 18 years for any work • Use of hazardous material should be minimized and/or restricted. • Emergency plan (to be approved by engineer) shall be prepared to respond to any accidents or emergencies. • Accident Prevention Officer must be appointed by the contractor.							
8.4 Accident risk to local community	• Restrict access to construction sites to authorized personnel. • Physical separation must be provided for movement of vehicular and human traffic. • Adequate signage must be provided for safe traffic movement		Construction sites	Safety signs and their location Incidents of Accidents Complaints from local people	Site Inspection Consultation with local people	Included in construction cost	Contractor	APGCL/ CSC
9. Site restoration and rehabilitation								
9.1 Clean-up Operations, Restoration and Rehabilitation	• Contractor will prepare site restoration plans, which will be approved by the 'Engineer'. • The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. • All construction zones including river-beds, culverts, road-side areas,	As per requirement	Throughout the corridor, Construction camp sites and borrow areas	Clean and restored camp Sites Presence/absence of construction material/debris After completion of construction	Site Observation Interaction with locals Issue completion certificate after restoration	Included in construction cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the . will be left clean and tidy, at the contractor's expense, to the satisfaction of the Environmental officer. • All the opened borrow areas will be rehabilitated and 'Engineer' will certify in this regard.			works on construction site	of all sites are found satisfactory			
C. Operation stage								
1. Air quality								
1.1 Air pollution due to due to vehicular movement	• Roadside tree plantations shall be maintained. • Regular maintenance of the road will be done to ensure good surface condition. • Vehicular air pollution will be managed and monitored. • Ambient air quality monitoring. If monitored parameters are above the prescribed limit, suitable control measures must be taken. • Technological and behavioral changes • Road signs shall be provided reminding the motorist to properly maintains their vehicles to economize on fuel consumption and unprotect the environment.	Environment al Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981	Throughout the Corridor	Ambient air quality (PM10, PM2.5, SOx, CO, NOx) Survival rate of trees planted	As per CPCB requirements Site inspection	Included in Operation/ Maintenance cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
2. Noise								
2.1 Noise due to movement of traffic	• Effective traffic management and good riding conditions shall be maintained to reduce the noise level throughout the stretch and speed limitation and honking restrictions may be enforced near sensitive locations. • The effectiveness of the multilayered plantation should be monitored and if need be, solid noise barrier shall be placed. • Create awareness amongst the residents about likely noise levels from road operation at different distances, the safe ambient noise limits and easy to implement noise reduction measures while constructing a building close to the road.	Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof	Sensitive Receptors (School, Hospital, and residential areas)	Noise levels	Noise monitoring as per noise rules ,2000 Discussion with people in sensitive receptor sites	Included in Operation/ Maintenance cost	Contractor	APGCL/ CSC
3. Land and Soil								
3.1 Soil erosion at embankment during heavy rain fall.	• Periodic checking to be carried to assess the effectiveness of the stabilization measures viz. turfing, stone pitching, river training structures etc. • Necessary measures to be followed wherever there are failures	As per requirement	At bridge locations and embankment slopes and other probable soil erosion areas.	Existence of soil erosion sites Number of soil erosion sites	On site observation	Included in Construction cost	Contractor	APGCL/ CSC
4. Water resources/Flooding and Inundation								

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
4.1 Siltation	• Regular checks shall be made for soil erosion and turfing conditions of river training structures for its effective maintenance.	As per requirement	Near surface Water bodies	Water quality	Site observation	Included in Operation/ Maintenance cost	Contractor	APGCL/ CSC
4.2 Water logging due to blockage of drains, culverts or streams	• Regular visual checks and cleaning of drains shall be done along the alignment to ensure that flow of water is maintained through cross drains and other channels/streams. • Monitoring of water borne diseases due to stagnant water bodies	As per requirement	Near surface Water bodies	Presence of flooded areas or areas with water stagnation	Site observation	Included in Operation/ Maintenance cost	Contractor	APGCL/ CSC
4.3 Road inundation due to choking of drainage channels	• APGCL will ensure that all drains (side drains and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding.	As per requirement	Flood prone sections	Incidents of flooding and road inundation with details on change	Field observation Interaction with local community	Included in Operation/ Maintenance cost	Contractor	APGCL/ CSC
5. Flora								
5.1 Vegetation	• Planted trees, shrubs, and grasses to be properly maintained. • The tree survivalist audit to be conducted at least once in a year to assess the effectiveness	Forest Conservation Act 1980	Tree Plantation sites	Minimum of 70% of tree survival	Records and fields observations	Operation and Maintenance Cost	Contractor	APGCL/ CSC
6. Maintenance of Right of Way and Safety								
6.1 Accident Risk due to uncontrolled growth of vegetation	• Efforts shall be made to make shoulder completely clear of vegetation. • Regular maintenance of plantation along the road side.	As per requirment	Throughout the route	Presence of and extent of vegetation growth on	Visual Inspectio Accident records	Included in operation/ Maintenance cost	Contractor	APGCL/ CSC

Environmental Issue/ Component	Remedial Measure	Reference to laws /guidelines	Location	Monitoring indicators	Monitoring Methods	Mitigation Coast	Institutional Responsibility	
							Implementation	Supervision
	• Invasive plant not to be planted near the road.			either side of road Accident data				
6.2 Accident risks associated with traffic movement.	• Traffic control measures, including speed limits, will be enforced strictly. • Further encroachment of squatters within the ROW will be prevented. • No school or hospital will be allowed to be established beyond the stipulated planning line as per relevant local law • Monitor/ensure that all safety provisions included in design and construction phase are properly maintained • Highway patrol unit(s) for round the clock patrolling. Phone booths for accidental reporting and ambulance services with minimum response time for rescue of any accident victims, if possible. • Tow-away facility for the break down vehicles if possible.	IRC:SP:55	Throughout the route	Police records on Accident Condition and existence of safety signs, rumble strips etc. on the Road Presence/absence of sensitive receptor structures inside the stipulated planning line as per relevant local law	Review accident records Site observation	Included in operation/Maintenance cost	Contractor	APGCL/ CSC
6.3 Transport of Dangerous Goods	• Existence of spill prevention and control and emergency responsive system • Emergency plan for vehicles carrying hazardous material		Throughout the stretch	Status of emergency system – whether operational or not	Review of spill Prevention and emergency response system	Included in operation/ Maintenance cost.	Contractor	APGCL/ CSC

Site Specific Environnemental Management Plan

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
DESIGN AND PRE-CONSTRUCTION PHASE							
1.	Tree cutting	Cutting of trees during site clearance	• Restricting tree cutting within construction limit. • Avoiding tree cutting at ancillary sites. • Providing and maintaining compensatory tree plantation i.e. three times of cutting. • Compensatory afforestation plan prepared.	No. of trees to be cut	Observations	Contractor/ Forest Dept. / PIU	PIU
2.	Removal of vegetative covers (dust, pollution)	Work site clearance	• Use of controlled clearing activities • Use of dust controlled measures • Collection and disposal of debris and muck.	Vegetation to be cleared	Observations	Contractor/PIU	Forest Dept. / PIU
3.	Removal of utilities	Work site clearance	• Necessary planning and coordination with concerned authority and local body. • Prior notice to and consultation with concerned authority, local body and public to be affected so as to ensure that work does not get affected and impact on public is minimum.	Utility shifting plan	Observations	Contractor/ Concerned utility agencies / PIU	CSC/ PIU
4.	Camp site and contractor facilities	Establishment of contractors' facilities	• Obtain permits and NOCs from ASPBC and other statutory agencies. • Contractor to submit a camp and site office plan defining all facilities to be created. These include human waste disposal facilities and solid waste management facilities. The basic plans provided in Annex 17) to be updated and finalized by contractor.	NOCs and permits	Document check.	Contractor/ PMU/PIU	ASPCB, PMU
5.	Project facilities and commencement of construction	Clearances and permits	• Obtain environmental clearance from MoEF&CC • Obtain forest clearance from forest departments • Include EMP in the contract documents.	Clearance letters	Document check.	PMU/PIU/ Contractor	MoEF&CC, Forest Dept., PMU
CONSTRUCTION PHASE							

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
1.	Impact and air, water, noise, soil	Civil construction work for power house, tunnel, office, substation, access roads, colony etc.	**Air Pollution**: • All the vehicles must have valid PUC certificates at all the time during construction phase of the project. • Water sprinkling shall be done to suppress the dust emissions from the site. • All the DG sets used for construction shall have valid consents from Assam State Pollution Control Board and shall have built-in stacks to reduce the air emission impacts. • Refer to Annex 24: Measures for Air Pollution Control	PM10, Dust pollution, Complaints from local residents Equipment/ vehicle maintenance record	Measurement Observations, public discussions	Contractor	PMSC / PIU
			Noise Pollution: • Construction materials shall be properly maintained and noise barriers, if needed, shall be provided around worksites, to reduce the noise levels. Design of such barriers will be finalized by CSC environment specialist. • All the workers will be provided with personal protective equipment including ear plugs and other necessary provisions by the contractor.	Noise level, complaints from local residents, vehicle maintenance record, awareness programs implemented	Noise level measurement, field observations, discuss with local residents	Contractor	PMSC / PIU
			Water Quality: • Quality of water (river and wastewater discharged from the construction site) shall be analyzed monthly during construction, for its compliance to the disposal standards of pollution control authority.	Drainage systems, Total solids and turbidity level	Review records, site visit and observations, turbidity level and other water quality parameters to be checked	Contractor	PMSC / PIU
	Exposure to safety related risks Infrastructure provisions at labor camps	Health and hygiene at workers camps	**Others**: • Proper plantation all around colony. Refer to Annex: Green Belt Development Plan • Drainage with De silting chamber, will be provide all around power house, office, substation and colony. • Solid waste storage bean system will be provided at required location. Refer to Annex 22: Solid Waste Management Plan • All buildings designed constructed as per seismic zone provision. • Safety system will be provided at required location. Refe Occupational, Health and Safety Plans. • Contractor during the progress of work will provide, erect and maintain necessary living accommodation	Planning for waste management Planning for health and safety, practices being implemented	Review of planning and practices for waste management, site visit, observations Review of planning and practices for seepage and spoil disposal, control, site visits	Contractor	PMSC / PIU

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
			• and ancillary facilities for labor as per the requirements of applicable labor regulations of Government of India. • All the work sites and camp sites shall also be provided with basic sanitation and infrastructure as per the requirements of Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996. • Refer to Annex: Public Health Delivery System • Refer to Annex: Project Personnel Health Plan • Refer to Annex: Fire Protection in Labor Camps and Staff Colonies Refer to Annex : Safety Practices during Construction				
2	Infrastructure provisions at labor camps	• Health and hygiene at workers camps	• Contractor during the progress of work will provide, erect and maintain necessary living accommodation and ancillary facilities for labor as per the requirements of applicable labor regulations of Government of India. • All the work sites and camp sites shall also be provided with basic sanitation and infrastructure as per the requirements of Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996. • Refer to Annex: Public Health Delivery System • Refer to Annex: Project Personnel Health Plan • Refer to Annex : Fire Protection in Labor Camps and Staff Colonies • Refer to Annex : Safety Practices during Construction	Planning for health and safety, practices being implemented	Review of planning and practices for seepage and spoil disposal, control, site visits	Contractor	PMSC / PIU
	Fire Protection in Labor Camp and Staff Colonies	• Safety Practices During Construction Phase Refer Annex: Fire Protection in Labor Camps and Staff Colonies	• Safety Practices During Construction Phase • Refer to Annex : Fire Protection in Labor Camps and Staff Colonies	Planning for health and safety	Check record, observations, discussion with workers	Contractor	PMSC / PIU
3.	Solid Waste Management	• Construction camps	• Collection and disposal of human waste as per waste management plan. • Refer: Solid Waste Management Plan	Quantity of SW collected and disposed	Record check, observations	Contractor	PMSC / PIU

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
4.	Muck disposal	• Tunneling and excavation activities	• Muck generated from various tunnelling and excavation activities would be dumped suitably to designated sites • Refer to Annex: Muck Disposal Plan	Quantity of muck generated and disposed	Record check, observations	Contractor	PMSC / PIU
5.	Construction sites	• Restoration of sites	• Restoration of construction sites. • Refer to Annex : Construction Site Restoration Plan.	Physical inspection of sites	Record check, observations	Contractor	PMSC / PIU
6.	Noise and vibrations	• Equipment layout and installation	• Construction techniques and machinery selection seeking to minimize ground disturbance. • Refer : Measures for Noise Pollution Control	Noise and vibration levels	Noise and vibration monitoring record	Contractor	PMSC / PIU
7.	Disturbed farming activity	• Physical construction	• Construction activities on cropping land time to • avoid disturbance of field crops (within 1 month of harvest wherever possible).	Crops damaged	Observations	Contractor	PMSC / PIU
8.	Noise vibration and operator safety, efficient operation, equipment wear and tear	• Mechanized construction	• Construction Mechanized maintenance and turning of plant. • Proper maintenance and turning of plant • Implement environmental mitigation and good- construction as integral component of each civil • activity and as day-to-day activity	Planning for health and safety	Record check, observations	Contractor	PMSC / PIU
9.	Increase in airborne dust particles	• Construction of access roads	• Existing roads and tracks used for construction and maintenance access to the site wherever possible. • Refer to Annex 24: Measures for Air Pollution Control	Dust levels	Record check, observations	Contractor	PMSC / PIU
10.	Increased land requirement for temporary accessibility	• Construction of access roads	• New access ways restricted to a single /intermediate carriageway width. • Refer to Annex 20: Road Construction Management Plan	Planning for access roads	Observations	Contractor	PMSC / PIU
11.	Temporary blockage of utilities	• Construction work	• Temporary placement of fill in drains/canals not permitted	Water blockage	Observations	Contractor	PMSC / PIU

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
12.	Loss of vegetative cover	• Site clearance	• Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	No. of trees to be cut	Review clearance papers, field observations	Contractor	PMSC / PIU
13.	Fire hazards	• Trimming/cutting of trees	• Trees allowed growing up to a specified height within the work areas by maintaining adequate • clearance between the top of tree and the conductor as per the regulations.	No. of trees to be cut	Observations	Contractor /PIU	PMSC / PIU
14.	Loss of vegetation and deforestation	•	• Trees that can survive pruning to comply should be pruned instead of cleared. • Felled trees and other cleared or pruned vegetation to be disposed of as authorized by the statutory bodies.	No. of trees to be cut	Review clearance papers, field observations	Contractor /PIU	PMSC / PIU
	Loss of vegetation and deforestation	• Reservoir clearing	• Removal of maximum commercially viable timber. • All remaining timber, after commercial and salvage logging operations have been completed, will be cut as necessary and burnt. • Avoid removing stumps, as disturbed soil may release far more nutrients in water.	Area to be cleared	Review clearance papers, field observations	Contractor / Forest Department	PMSC / PIU
15.	Loss of vegetation and deforestation	• Wood/vegetation harvesting	• Construction workers prohibited from harvesting wood in the project area during their employment, (apart from locally employed staff continuing current legal activities). • Contractor should arrange LPG gas for cooking of food for their workers. • Refer to Annex 17: Plan for Construction Camp Management	Fuel supply to workers	Review clearance papers, field observations	Contractor	PMSC / PIU
16	Loss of Biodiversity, Disturbance / accidents/ injury, to wildlife and avian fauna	Construction and clearing of forest areas	• Implementation of Compensatory afforestation plan. • Creation of a greenbelt around the perimeter of various project appurtenances, selected stretches along reservoir periphery, access roads to compensate for the loss of habitat • Provisions of adequate signages and speed limit on road sections within forest areas to avoid accidental roadkills . • Poaching activities should be monitored in workers areas and well as community areas (as per Annex 9). • Implementation of Biodiversity Conservation and Management Plan (Annex 9) • Compliance with guidelines issued by the National Wildlife Board of India for linear intrusion in natural area pertaining to roads and power lines.	Incidences of wildlife loss	Review clearance papers, field observations	Contractor	PMSC / PIU

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
			• Compliance with guidelines issued by the Central Electricity Authority (CEA) for laying transmission lines in areas critical from the point of view of saving wildlife. • Provision of wild fruit plantation for wildlife • Annual bird count of migratory birds by involving locals and bird experts • Rehabilitation with local fruit bearing species in gaps Anti-grazing drive in drawdown area to protect the bird breeding areas in proximity to reservoir during breeding season – only in winter season. Grazing by local people will be allowed during dry season. • Construction of check posts / watch towers in key locations • Conservation actions as proposed by IUCN (during construction and during the initial project operation) such as conducting a comprehensive survey and monitoring in and around the project area to establish range, distribution and population status of vulnerable and critical habitats in the project area for assessing its habitat requirements and identifying threats are proposed. • Establishment of biodiversity conservation committee. • Refer to Annex : Biodiversity Conservation and management Plan • Refer to Annex : Green Belt Development Plan				
17.	Runoff to cause water pollution, solid waste disposal	• Surplus earth work/soil	• Excess fill from excavations disposed of next to roads or on barren land or personal in agreement with the local community or land owner. • Soil excavated from power houses will be disposed as safe & scientific manner by • placement on barren land or along back fill trench weir etc.	Vehicle maintenance record, review plans for waste management and oil handling practices	Review of planning and 348ractice for seepage and spoil disposal, control, site visits	Contractor	PMSC / PIU
18.	Loss of soil and water pollution	• Substation construction	• Fill for the substation foundation obtained by creating or improving local water supply ponds or drains, with the agreement of local communities. • Construction activities involving significant ground disturbance (i.e., substation land forming) not undertaken during the monsoon season.	Planning for soil conservation	Record check, observations	Contractor	PMSC / PIU

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
19.	Contamination of receptors (land, water, air)	• Storage of chemicals and materials	• Fuel and other hazardous materials securely stored above high flood level with safety measures. • Refer to Annex : Project Personnel Health Plan	Vehicle maintenance record, review plans for waste management and oil handling practices	Record check, observations	Contractor	PMSC / PIU
20.	Noise nuisance	• Construction schedules	• During work near settlements construction activities only undertaken during the day and local communities will be informed of the construction schedule.	Noise level monitoring	Record check, observations	Contractor	PMSC / PIU
21.	Contamination of receptors (land, water, air)	• Provision of facilities for construction workers	• Construction workforce will be provided for certain facilities it includes proper sanitation, water supply and waste disposal facilities. • Refer to Annex : Construction Camp Management Plan	Planning for health and safety	Review of planning and practices for seepage and spoil disposal, control, site visits	Contractor	PMSC / PIU
22.	Loss of agricultural productivity	• Encroachment into agricultural land	• Use of existing roads wherever possible. • Ensure existing irrigation facilities are maintained in working condition. • Protect/Preserve topsoil and reinstate after construction completed. • Repair/reinstate damaged bunds, etc. after construction completed	loss of agricultural products	Record check, observations	Contractor	PMSC / PIU
23.	Social inequities	• Encroachment into agricultural land	• Compensation for temporary loss in agricultural production as per provisions of Resettlement and Tribal Development Plan	CRTDP	Record check, observations	Contractor	PMSC / PIU
25.	Losses to neighboring land uses/values	• Nuisance to nearby properties.	• Contract clauses specifying careful construction practices on every stage. • Maximum existing access ways will be used. • Productive land will be reinstated following completion of construction.	Construction planning	Record check, observations	Contractor	PMSC / PIU
26.	Social inequities	• Nuisance to nearby properties.	• Compensation will be paid for loss of production, if any as per provisions of Resettlement and Tribal Development Plan	CRTDP	Record check, complaints, observations	Contractor	PMSC / PIU

Sl.	Environmental Issue	Activity/ Location	Mitigation Measures	Monitoring Indicators	Monitoring Methods	Implementing Agency	Supervising & Monitoring Agency
27.	Flooding and loss of soils, contamination of receptors (land, water)	• Flooding hazards due to construction impediments of natural drainage.	• Avoid natural drainage pattern/ facilities being disturbed/ blocked/ diverted by ongoing construction activities. • Refer to Annex 30: Dam Break Analysis And Disasters Management Plan	Construction planning	Record check, observations	Contractor	PMSC / PIU
28.	Contamination of receptors (land, water)	• Equipment submerged under flood	• Equipment stored at secure place above the high flood level (HFL) i.e. 185.34 m.	Construction planning	Record check, observations	Contractor	PMSC / PIU
29.	Loss of land values	• Inadequate siting of borrow areas	• Existing sites (if available) will be used, therefore, no need to develop new sources of aggregates.	Construction planning	Record check, observations	Contractor	PMSC / PIU
30.	Injury and sickness of workers and members of the public.	• Environment, Health and safety	• Arrangement of Environment awareness programme. • Contract provisions specifying minimum requirements for construction camps. • Preparation and implementation of health and safety plan. • Arrangement of primary health center with medicine and instrument with a knowledgeable health staff. • Arrangement for health and safety training sessions. • Refer to Annex 12: Public Health Delivery System • Annex 16: Plan for Environmental Training of Workers •	Training and awareness programs, Health and safety plans	Review of planning and practices for seepage and spoil disposal, control, site visits	Contractor	PMSC / PIU
31.	Likely to maximize damages	• Inadequate construction stages monitoring.	• Training to personal of implementing agency for environmental monitoring work. • Implementation of effective environmental monitoring and reporting system using checklist of all contractual environmental requirement. • Appropriate contact clauses to ensure satisfactory • implementation of contractual environmental mitigation measures.	Training and awareness programs, Environment monitoring plans	Record check, observations	Contractor	PMSC / PIU
OPERATION PHASE							
1.	Loss of vegetation and deforestation	• Wood/vegetation harvesting	• Staff working at site prohibited from harvesting wood in the project area during their employment, (apart from locally employed staff continuing current legal activities). APGCL / Contractor should arrange LPG gas for cooking • of food for their workers.	Loss of forests	Record, observations	Contractor/Forest Dept. / PIU	APGCL

2.	Tree plantation	• -	• Compensatory afforestation plan.	Survival rate of trees (70% minimum)	Field observations	Contractor during DLP/ Forest Dept. / PIU	APGCL
6.	Dam Break and Disaster management	• Dam Break and Disaster management	• Installation of alert system in control room • Setting up of communication system in various villages • Flood Forecasting Arrangements • Follow Disaster Management Plan (Refer to Annex 30)	Disaster Management Plan	Record, observations	Contractor /APGCL	APGCL
7.	Water Quality	• Water quality change	• Monitoring once in every season at various locations • Monitoring of water quality restoration plan	Water quality parameters	Record, observations	Contractor /APGCL	APGCL
10.	Injury and sickness of staff/workers	• Inadequate provision of staff/workers health and safety during operations	• Careful design using appropriate technologies to minimize hazards. • Safety awareness raising for staff. • Preparation of emergency plan and training given to staff, for their implementation. • Adequate sanitation and water supply facilities will be provided.	Training and awareness plan, safety plans	Record, observations	Contractor /APGCL	APGCL
11.	Injury/mortality to staff and public	• Electric shock Hazards	• Careful design using appropriate technologies to minimize hazards. • Security fences around substations/ powerhouse/ head works. • Barriers to prevent climbing on/dismantling of transmission towers. • Appropriate warning sign on facilities. • Electric safety awareness rising in project areas. • Fire hydrant point and fire extinguisher may be placed at appropriate places.	No. of incidences	Record, observations	Contractor /APGCL	APGCL
12.	Unnecessary environmental losses of various types	• Operation and maintenance staff skills less than acceptable	• Adequate training in O&M to all relevant staff of substations and transmission line maintenance crews. • Preparation and training in the use of O&M manuals and standard operating practices.	Training plans	Record, observations	Contractor /APGCL	APGCL
16.	Operational performance	• All environmental aspects	• APGCL shall monitor the operational performance of the various mitigation measures implemented in the project.	Environment and ecological parameters	Record, complaints, observations	Contractor /APGCL	APGCL

APGCL = Assam Power Generation Corporation Ltd., PMU = Project Management Unit, PIU = Project Implementation Unit, PMSC = Project Management and Supervision Consultant

Annexure 1. Crusher Management Plan

L&T Construction
Heavy Civil Infrastructure

CRUSHER PLANT MANAGEMENT PLAN FOR 120MW LOWER KOPILI HYDROELECTRIC PROJECT, ASSAM (PACKAGE-2)



Review & Approval:

	Name	Position	Date	Signature
Prepared by Sr. Manager Mining	Sushant Roy	Sr. Manager Mining	09-12-2021	
Approved by L&T Project Head	Santanu Majumdar	Project Manager	10-12-2021	
Approval by Client (if applicable)				

AMENDMENT RECORD SHEET

Sl. No.	Document	Rev No.	Date of Submission	Reason for Amendment
1	PROJECT CRUSHER MANAGEMENT PLAN	R0	10-11-2021	First Issue
2	PROJECT CRUSHER MANAGEMENT PLAN	R1	10-12-2021	Second Issue

Sensitivity: LNT Construction Internal Use

Project Description

To meet the ever-increasing demand of reliable and sustainable power in Assam and North-Eastern (NE) region, the EA has proposed the LKHEP (project) which consists of building a dam across Kopili river at Longku. The proposed project is situated in the Karbi Anglong and Dima Hasao (also known as North Cachar Hills) Autonomous District Council (ADC) areas of Central Assam. The Kopili river has two hydroelectric power plants already operational, both upstream of the proposed project: Khandong HEP (75 MW, served from Khandong reservoir on Kopili river) and Kopili HEP (200 MW, served from Umrong reservoir on the Umrong river). Umrong river is tributary of Kopili river, and receives water from the Umrong river as well as the tail water from the Khandong power plant. Both the existing power plants upstream of the proposed project are owned and operated by North Eastern Electric Power Corporation Limited (NEEPCO).

Table 1: Project Details

Client	Assam Power Generation Corporation Limited (APGCL)
Employer's Representative	AF-Consult India Pvt Ltd
Contractor	L&T Construction
Contract Value	1163 Cr. (Including GST)
Project Duration	48 Month
No. Of Stations & Location	Longku, Dima Hasao

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Project Location

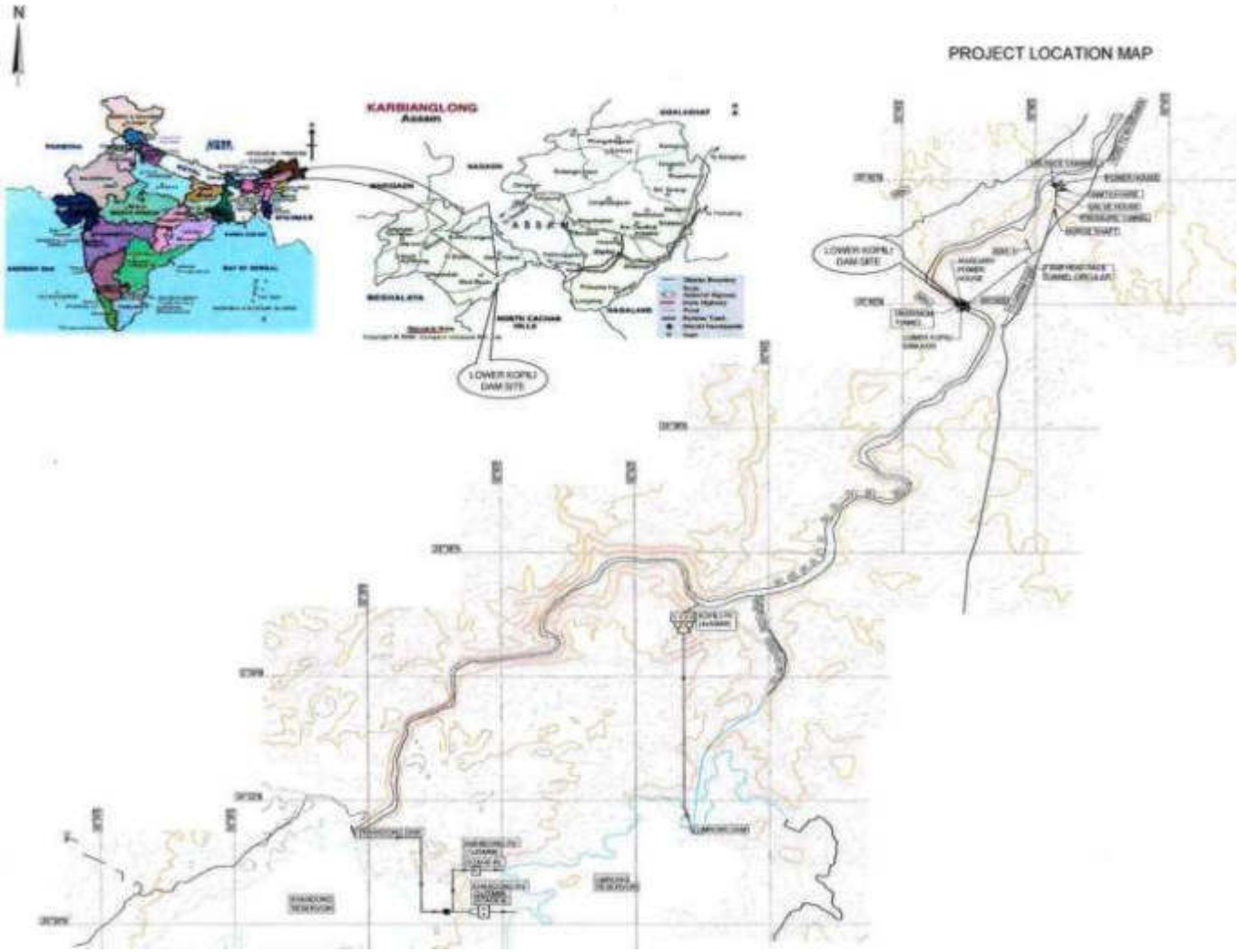


Figure 1: Project Location Map

Value: No Sale as Crusher Product will exclusively used for construction of Hydro Electric Project and ancillary works

Month & Year of preparation of this Project Report: October, 2021
Prepared by: Sushant Roy

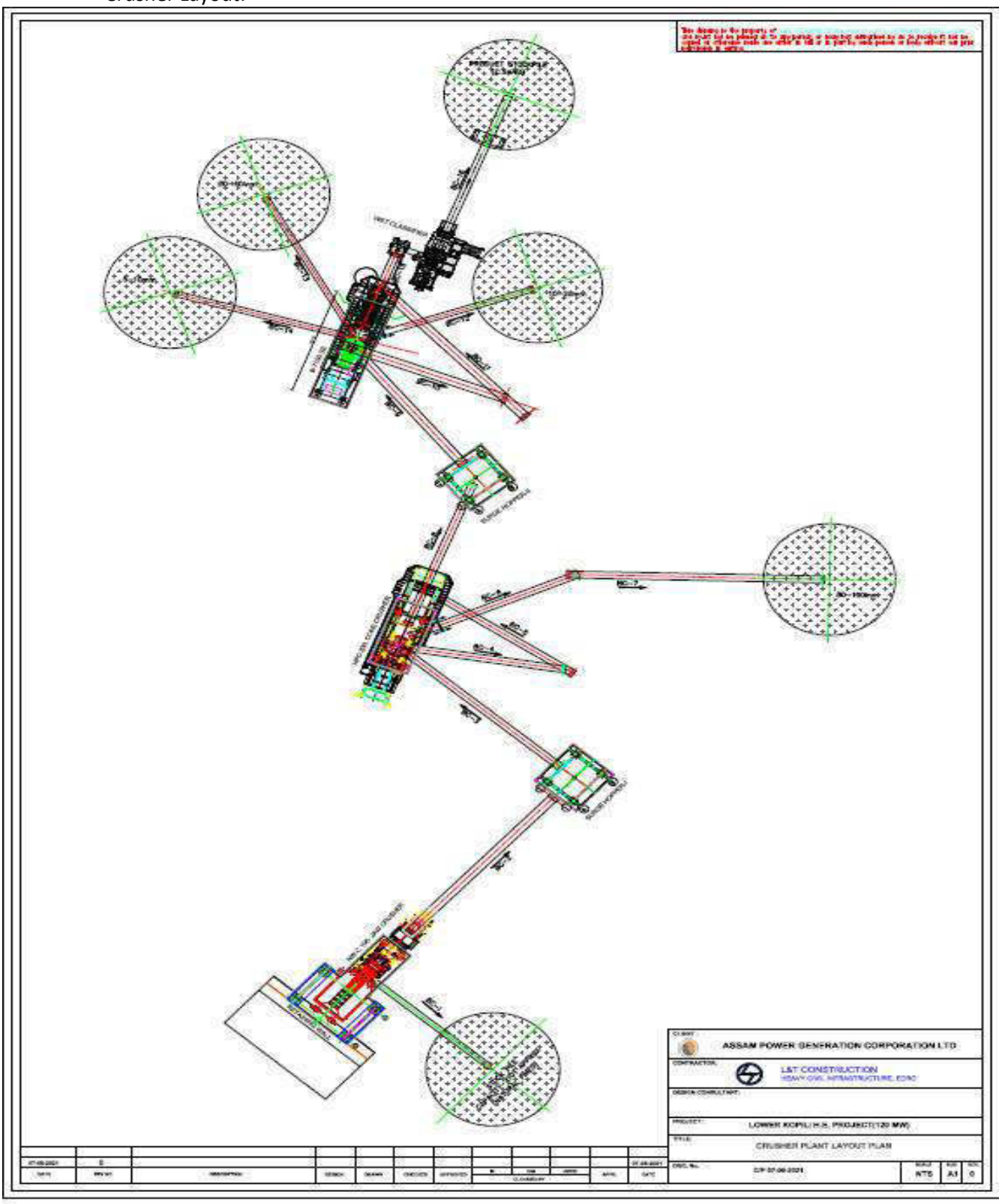
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Photo Graph of Crusher Site



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Crusher Layout:



Introduction:

GEOLOGY: The Assam plateau lies along the continuation of the Archeans of Bihar and comprises Garo, Khasi, Jayantia hills and to its north-east is the detached area of Mikir hills. Tertiary rocks are well developed in the north-eastern and south-eastern part where they exhibit a more or less complete geological succession ranging from Paleocene to Lower-Pleistocene.

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Local Geology: The area allotted to Assam Power Generation Corporation Ltd. lies within Dima Hasao district. The geology of the Mining Permit area shows that the rock types available in the area are sandstone and quartzite. The bore hole data indicates that the sandstone and quartzite are underlain by quartzo-feldspathic gneisses. Quartzite is coarse grained while sand stone is medium to fine grained. Rocks are found to be hard and compact

Crushed stone is segregated into various sizes viz. 30mm, 20mm, 10mm etc. for different uses. Crushed stone aggregates are used for construction of 120 MW Lower Kopili Hydro Electric Project

Plant Capacity 200TPH

Market & Demand: Crushed stone aggregates will exclusively used for construction of 120 MW Lower Kopili Hydro Electric Project

Raw Materials: Raw materials required for this project is stone boulders of various sizes will source from the Quarry which is situated inside the project area.



Technical Aspects:

Manufacturing Process:

It is advantageous if the stone crushing unit is set up near the quarries and project area where the boulders of various sizes are available for the crushing unit.

- ROM from the Quarry will be used for the Crusher unit.
- ROM of various sizes will feed into the jaw crushers for size reduction.
- Depending on the desired output size of the crushed stone, the raw materials may be fed to one cone crushers in a sequence.
- These crushed stones are then passed to the VSI for shape and rotary screen for size gradation.
- Material is handled through a belt conveyor to the different places of operation.

Detail process is as follows- The system consists of three stage crushing and two stage screening for producing coarse and fine aggregates.

Stage -1 – Primary Crushing – for crushing ROM (below 500mm) to 150 mm

Stage – 2 – Secondary Crushing – for crushing 150 mm to 40mm

Stage – 3 – Tertiary crushing – for crushing 40 mm to sand as per specifications

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CORE EQUIPMENTS:

DESCRIPTION OF MACHINERY	QNT	MODEL	SERIAL NO	MOTOR RATED POWER KW	CAPACITY IN (TPH)	YEAR OF MANUFACTURE	MAKE
Wheeler mounted Crusher (Primary)	1	C-106	41215	110KW	200		METSO
Wheeler mounted cone Crusher (Secondary)	1	Cone- HPC-200 & Screen -CVB1845, 4 deck	41156	132KW	200		METSO
Wheeler mounted Crusher Tertiary	1	NW B 7150 SE & Screen -CVB1845, 4 deck	41213	220KW	200		METSO
Wet classifier Classifier	1	Weir Mineral, 100 TPH	WMSP 100TPH	80KW	100		METSO
Screens, Conveyor, Feeders and Hydraulics				230KW			

BOULDER FEED: The 500 mm down-size boulders from quarry are fed to the feed hopper of C-106 Jaw Crusher through the feed ramp. The feed ramp will have gradient of 1 in 12 and will be provided with sufficient steel and earthen platform at the top of ramp for the tippers to reverse and tip the boulders into the feed hopper. C-106 Jaw Crusher will be fed directly from the quarry / intermediate stockpile. Required feed rate shall be 200 TPH.

GRIZZLY FEEDER: The boulders from the feed hopper are extracted into the Grizzly feeder. Grizzly feeder is of double deck having 75 mm opening at the top and adjustable up to 20 mm in the bottom deck. 500mm down boulders to C-106 Jaw Crusher are fed by Grizzly Feeder.

C-105 Jaw Crusher: The primary crusher (C-106) has single toggle mechanism. Wide range of jaw gap settings are possible in this machine and normally jaw gap settings will be set between 125 to 90mm which gives an output of 0-140mm at the rated capacity. The crushed stones are fed into the secondary (Surge) hopper via belt conveyor.

HPC 200 Cone Crusher: The 120 mm down crushed stones are extracted from the secondary feed hopper by a vibrating feeder, which provides uniform thickness flow of materials to HPC 200 Cone Crusher.120mm down boulders are crushed in between the gap of Bowl Liner and Mantle. Bowl Liner is fitted on body of Cone Crusher and Mantle is fitted on Vertical shaft of the Cone Crusher. 20- 25mm Gap settings are normally set so that our required production rate of -40mm will come. This produced coarse and fine aggregate are fed to Primary screening unit via Belt Conveyor for Separation the aggregates.

PRIMARY SCREENING UNIT: It consists of a Vibrating screen having four deck screen clothes (wire meshes) with 42 sq.mm opening wire mesh at the top for separation of 40mm and 22.5mm sq.mm opening wire mesh at the second top deck for 20mm separation. 12.5mm sq.mm opening wire mesh at the third top deck for 10mm separation and 4.5sq.mm or 6.0 mm opening wire mesh at the bottom deck for separation of dust.

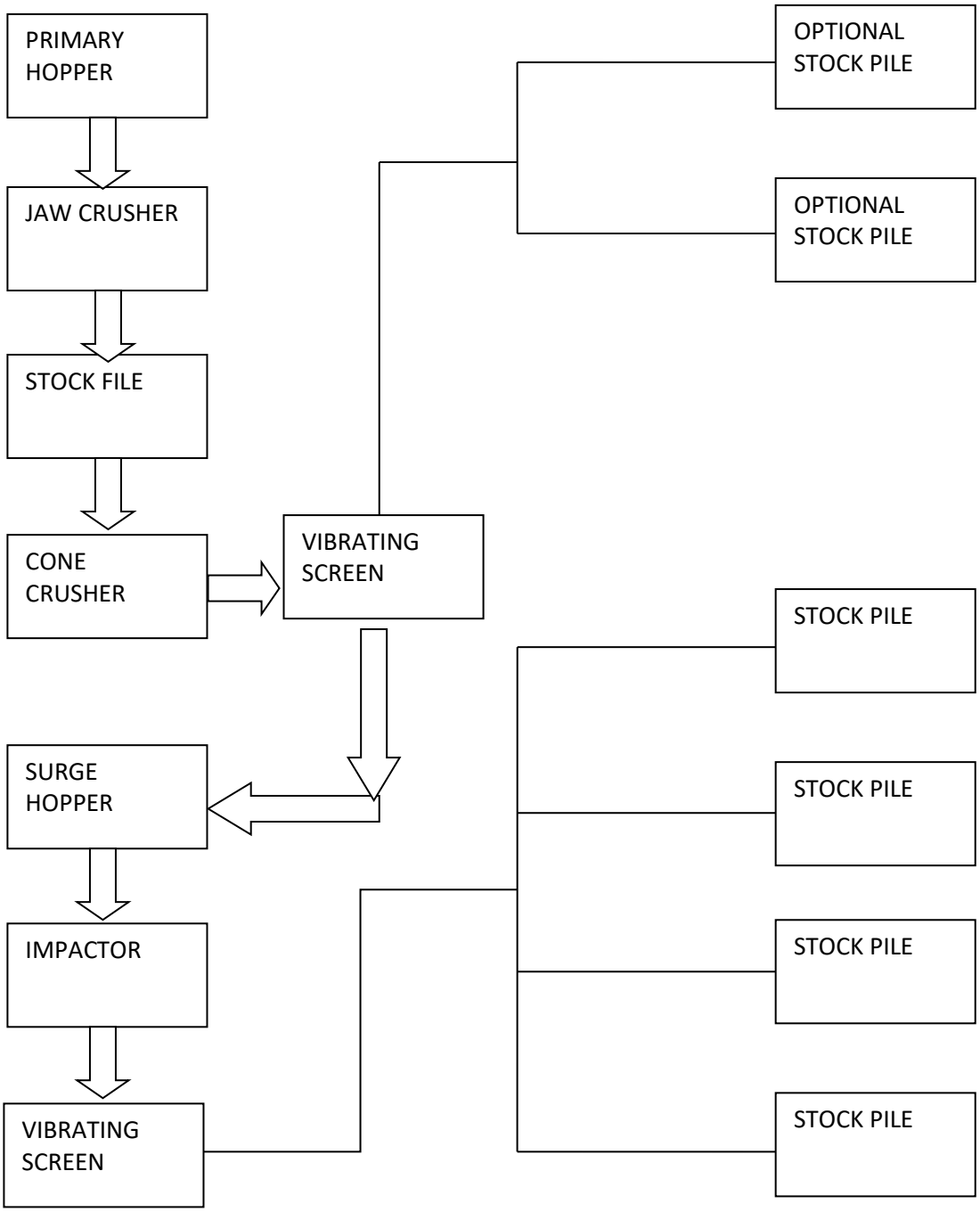
The +40 mm product retained at the top deck will be directly feed to the HPC 200 Cone Crusher for recycling. The produced aggregates are directly stocked at ground via stacking Conveyors. This process is done, when we

Sensitivity: LNT Construction Internal Use

need not to crush the third stage for shaping purpose. If we go to third stage then except 44sqmm opening mesh at top, other meshes are removed and all aggregates are feed to third hopper via belt conveyor. Otherwise collected all aggregates are directly stocked at ground as GSB via another Belt Conveyor.

SECONDARY VIBRATING UNIT: It consists of a Vibrating screen having four deck screen with 42 sq.mm opening wire mesh at the top for separation of 40mm and 22.5mm sq.mm opening wire mesh at the second top deck for 20mm separation. 12.5mm sq.mm opening wire mesh at the third top deck for 10mm separation and 4.5sq.mm opening wire mesh at the bottom deck for dust separation. The end product of 40mm, 20mm, 10mm and Dust are directly stocked at ground via stacking conveyor.

FLOW DIGRAM



Sensitivity: LNT Construction Internal Use

Basis & Presumptions:

1. The production has been calculated on the basis of two shift of 8 hours and 300 working days in a year.
2. The full production capacity presumed to be achieved in the 2nd year of operation.
3. Labour wages has been considered based on market rates but not less than the rates prescribed by the Govt. at the locality.

As Crusher Setup is exclusively for the purpose of construction of 120 MW Lower Kopili Hydro Electric Project Cost factors only consider for feasibility assessment of the Crusher unit not for open business purpose

Quality Control and Standards

There are no Indian Standard specifications for the quality of crushed stone. However, crushed stone is graded into different sizes viz. over 35mm, 20mm, 12mm etc. for different uses.

Crusher Plant Environment Management Plan (Pollution Control)

Lot of fine dust emerges out at the time of crushing operation. Suitable dust collection is required to be installed with extension pipes etc.

Our Specific Commitments are as follows:

1. We L&T Ltd. LKHEP shall construct and maintain fenced boundary of the unit.
2. We L&T Ltd. LKHEP shall construct at least wind breaking wall through Green Cloth.
3. We L&T Ltd. LKHEP shall install fixed type water sprinklers to cover all dusty place in the premises to impart water spraying intermittently and during loading, unloading of raw materials/products and wastes.
4. We L&T Ltd. LKHEP shall not do crushing activities unless and until WE obtain Consent to Operate from the Assam State Pollution Control Board.
5. We L&T Ltd. LKHEP shall submit Ambient Air Quality and Ambient Noise level monitoring reports within the consent period.
6. We L&T Ltd. LKHEP shall store all raw materials and products under shed and shall as far as practicably do their processing and transfer under fool proof cover(s) and shall install dust catchers over uncovered spaces of processing and transfers.
7. We L&T Ltd. LKHEP shall obtain raw material only from our quarry only.
8. We L&T Ltd. LKHEP shall maintain register for production and dispatch and submit return to the Board.
9. We L&T Ltd. LKHEP shall make all road pukka and shall maintain good housekeeping by regular cleaning & wetting of the premises and dust prone areas.
10. We L&T Ltd. LKHEP shall maintain the concentration of dust up to 10 meters from the crusher within 600 µg/Nm3.
11. We shall submit compliance report every year to the Authorities.
12. We L&T Ltd. LKHEP shall, plant trees of different species and maintain it till our project period. Will submit the photographs of plantation with count Nos. and name of species planted,
13. We L&T Ltd. LKHEP shall, implement Rain water harvesting system and will submit the photographs of Rain water harvesting being implemented.
14. We L&T Ltd. LKHEP will install fixed water sprinkling system
15. We L&T Ltd. LKHEP will comply all conditions of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of the Air (Prevention & Control of Pollution) Act, 1981

EHS Policy Statement

L&T HCI IC EHS policy outlines management's commitment to prevent, mitigate and control pollution and damage to the environment. Compliance with this policy is achieved by developing and implementing a management system for this Project. This Construction Environmental Management Plan reflects our environmental commitment and forms a subsidiary document to the Project Management Plan.

Environmental policy, environmental objectives and targets shall be displayed on notice boards, meeting rooms and from reception areas to site offices. The objectives of the Policy shall be communicated to all L&T HCI IC employees and subcontractor employees throughout the course of the Project.

Sensitivity: LNT Construction Internal Use



Corporate Environment, Health & Safety (EHS) Policy

We remain committed to safeguarding the health and safety of our employees and other stakeholders and preserving the environment.

To fulfil the above commitment, we will ensure the following:

- Incorporate applicable EHS requirements across all processes, right from tendering, planning, design, recruitment and procurement, production, execution, operation and maintenance to align with their respective business objectives
- Meet or exceed all applicable legal and other compliance obligations, irrespective of the stipulations of the enforcement authorities in the country of operation
- Pay serious attention to workmen welfare, especially to their habitat, to improve morale, retention and thereby productivity
- Impart structured training and augment resources for effective EHS performance
- Prevent adverse environmental impact and occupational health and safety risks
- Conserve natural resources, minimize waste generation, environmental emissions and reduce carbon footprint
- Encourage communication, consultation and collaboration with all stakeholders
- Establish SMART EHS objectives to permanently reduce EHS risks by eliminating hazards or substituting with less harmful equipment, material, methods and review implementation to achieve continual improvement.

This policy to be communicated to all our stakeholders and reviewed periodically to ensure that it remains relevant to our business and effective to improve performance.

Date: 1st April, 2021

S N SUBRAHMANYAN
Chief Executive Officer
& Managing Director

LARSEN & TOUBRO
It's all about Imagineering

Figure 1: Corporate EHS Policy Statement



Project Environment, Health & safety (EHS) Policy

Aligned with the Corporate EHS policy, we are committed to protect the Environment and Providing a safe and healthy workplace for our employees and stakeholders. With this propose was created an internal EHS Policy specific for 120MW Lower Kopili HEP to provide the guideline to all in achieving those objectives. By this reason and to get the objectives proposed is requested to all:

- Understand and transmit the Corporate EHS Policy to all involved in the Project.
- Ensure the application and compliance during the execution of the Project from all legal requirements, Internal and external standers, and the requirements from the Client.
- Identify and prevent incident for all Class 1 risk activities.
- Provide and deploy all available resources required in case of potential incident or emergency situation.
- Report and investigate all incidents that occur in our Project.
- Give EHS induction and training for all L&T employees, subcontractors, and visitors.
- Identify all potential occupational health & hygiene hazards at workplace and implement the required control measures by conducting regular EHS inspection and reports.
- Conduct all Project activities in an environmentally friendly manner, by adopting a multi-pronged strategy focusing on minimizing / recycling waste, disposing waste according the norms, conserving energy, optimising resource, and regular monitoring of environment.
- Provide good housekeeping in all Project.
- Follow up and respect all the internal procedures and collaboration with all the L&T employees, Subcontractors, and visitors.

01.10.2020

Santanu Majumdar
Project Manager

Finger 2A: Project EHS policy

Regulatory and Other Requirements

L&T HCI IC operations are subject to the relevant local, regional, national, international and nautical regulations depending on the location as well as to the region where the project takes shape. These regulations

contain a number of environmental obligations / requirements and are regulatory, technical, administrative and organisational.

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To ensure compliance with all legal and contractual requirements the project shall identify and maintain a contractual compliance register.

Each element of the contractual /legal requirement is assessed, and applicable appropriate plans and actions are stated and recorded in order to allow a full compliance check.

Environmental Management Plan

Based on the above identified impact area suitable control measures will be in place to mitigate, control and prevent environmental pollution throughout the entire duration of this project. Control measures or operational controls measures will be implemented against the significant impact categories to reduce the risk/impact level and will be brought to as low as reasonable practicable (ALARP).

Air Quality Control Plan

The following best management practices (BMP)/operational control procedure will be in place to check air pollution.

Gaseous Emission and Particulate Matter

- Vehicle without having PUC will not be allowed to enter site.
- Diesel Generators will have Stack emission certificate and maintenance regime followed.
- All vehicles and machineries will remain in all times well maintained to ensure that the exhaust is in compliance with vehicular pollution standards; fitness certificates of all the vehicles will be made available.
- All the equipment and machineries will be ensured to remain all time in good condition.
- Stack emission/PUC certificate of each of them will be available.
- Stack Height should be provided as per the CPCB norms.
- Workers working with fly ash and cement will be provided proper PPEs.
- Fully mechanized batching plant will be used to avoid problems related with fly ash and cement dust emission.
- MARPOL compliance fuel for ship engine and all air pollution control devices to be in place for vessel operation.

Dust Control

- Water sprinkling will be carried out to reduce fugitive dust.
- During transportation of soil the dumper will be covered by tarpaulin/polythene sheet so as no dust may arise.
- While undertaking demolition activities the structures to be demolished will be pre-wetted so as to reduce the possibilities of dust emission.

Sensitivity: LNT Construction Internal Use

- Excavation activities will be undertaken under the supervision of EHS personnel.
- PPEs like nose masks, goggles etc. will be used in intensive dusty areas.
- Regular water sprinkling will be done in nearby areas of cement and fly ash storage and usage areas.
- Speed limit of all the vehicles running at site will not exceed beyond 10 kmph so as no dust will be generated during their operation.

Noise & Vibration Control Plan

The following operational control plan/best management practices will be in place to check noise and vibration at construction site,

- Special acoustic enclosures will be provided for individual noise generating construction equipment like DG sets. The special acoustic enclosures may be provided by way of noise shields, if required.
- For protection of construction workers, earplugs should be provided to those workers who will be working very close to noise generation source.
- Strict adherence to maintenance schedule of generators, as specified by vendors, will be observed.
- Smooth movement of vehicles will be ensured (Speed limit 10 KMPH) on the internal roads to avoid idling and honking of vehicles. Caution signs for awareness to operators and drivers will be displayed at prominent locations.
- Generator will conform to the user guidelines specified by MoEF & CC.
- Caution boards will be displayed at all the places where excess noise may occur.
- Substitution by less noise generating equipment.
- Implementing feasible engineering and administrative control.
- Vehicles and Machineries well maintained.
- While handling Jack hammer / Drilling Machine, the operation will be carried out by using Ear Muff / Noise Screen.
- Training on the effect of noise exposure and the proper use of Ear Muff and Plug.

Water Quality Control Plan

Effluent from Crusher Plants

During construction phase, Crusher plants will be commissioned for production of aggregate. Effluent containing high suspended solids shall be generated during operation and cleaning of Crusher plants. However, no major adverse impacts, are anticipated due to small quantity of effluent and large volume water available for dilution in river Kopili. It is proposed to treat (settling tank) the effluent (to CPCB effluent discharge standards) before disposal to ameliorate even the marginal impacts likely to accrue on this account.

CPCB Condition

This CTE is valid as per specific information and documents provided by the occupier as well as site inspection and preliminary assessment by the Board and same is granted subject to the General and specific conditions stipulated below:-

1. No Air, Water, Soil pollution shall be created by the industry beyond the permissible limits prescribed by the Board. The industry would incorporate adequate pollution control measures before they put the plant into operation.

2. To regularize the subsequent process, the legal provisions of "Consent to Operate" as per Act shall have to be timely adhered to.

3. The solid waste generated from the unit shall be disposed in a scientific way as per Solid Waste Management Rules, 2016.

4. Environmental Statement in prescribed form V should be submitted on or before the 30' September every year.

5. Fire warning (Alarm, Siren) is to be installed by the unit to guard against accidental pollution/ mishap together with fire fighting devices.

6. Proper housekeeping and adequate maintenance has to be ensured/ enforced as per provisions of Acts.

7. Healthy working environment for the worker must be maintained and there should not be health Hazard to the workers for inadequate arrangement for ventilation, dust removal to arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.

8. The Plastic waste generated from the unit shall be disposed in a scientific way as per Plastic Waste Management Rules, 2016.

9. Healthy working environment for the worker must be maintained and there should not be health Hazard to the workers for inadequate arrangement for ventilation, dust removal to arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.

10. The project proponent shall develop a greenbelt / Plantation area with native trees only at at- least 33% of total plot area.

11. The industry is to provide dust extraction arrangement at all transfer points.

12. The Industry should install water sprinkler system to suppress the dust which may arise due to plying of vehicles etc.

13. Necessary steps are to made to bring the noise within the prescribed limit as stipulated below as per GSR 7, dtd Dec 22' 1998

Limit in dB (A) Leq.	
Day Time	Night Time
75	70

14. The until shall apply for authorization under the Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016 within 30 days from the date of issue of this order.

15. The industry must comply to the National Ambient Air Quality Standards as per Schedule-VII under Rule, 3 (3B) of the Environment (Protection) Rules, 1986, especially with respect to PM2.5, PM10, SO2 & NO2 as follow:

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air	
			Industrial, Residential Rural & Other Area	Ecologically Sensitive Area (Notified by Central Government)
1	Perticulate Matter (Size less than 10 ug) or PM10 ug/m^3	Annual* 24 Hours **	60 100	60 100
2	Particulate Matter (Size less than 2.5 ug) or PM10 2.5 ug/ m^3	Annual* 24 Hours **	40 60	40 60
3	Sulphur Dioxide (SO2), ug/ m^3	Annual* 24 Hours **	50 80	20 80
4	Nitrogen Dioxide (NO2), ug/ m^3	Annual* 24 Hours **	40 80	30 80

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Annexure 2. Batching Plant Management Plan

Sensitivity: LNT Construction Internal Use

BATCHING PLANT MANAGMENT PLAN FOR 120MW LOWER KOPILI HYDROELECTRIC PROJECT, ASSAM (PACKAGE-2)

Review & Approval:

	Name	Position	Date	Signature
Prepared by Environmental Manager	Manoj Yadav	Environmental Manager	09-12-2021	
Approved by L&T Project Head	Santanu Majumdar	Project Manager	10-12-2021	
Approval by Client (if applicable)				

AMENDMENT RECORD SHEET

Sl. No.	Document	Rev No.	Date of Submission	Description of Revision	Reason for Amendment
1	PROJECT CRUSHER MANAGEMENT PLAN	R0	10-11-2021	First Issue	
2	PROJECT CRUSHER MANAGEMENT PLAN	R1	10-12-2021	Second Issue	

Sensitivity: LNT Construction Internal Use

Project Description

To meet the ever-increasing demand of reliable and sustainable power in Assam and North-Eastern (NE) region, the EA has proposed the LKHEP (project) which consists of building a dam across Kopili river at Longku. The proposed project is situated in the Karbi Anglong and Dima Hasao (also known as North Cachar Hills) Autonomous District Council (ADC) areas of Central Assam. The Kopili river has two hydroelectric power plants already operational, both upstream of the proposed project: Khandong HEP (75 MW, served from Khandong reservoir on Kopili river) and Kopili HEP (200 MW, served from Umrong reservoir on the Umrong river). Umrong river is tributary of Kopili river, and receives water from the Umrong river as well as the tail water from the Khandong power plant. Both the existing power plants upstream of the proposed project are owned and operated by North Eastern Electric Power Corporation Limited (NEEPCO).

Table 1: Project Details

Client	Assam Power Generation Corporation Limited (APGCL)
Employer's Representative	AF-Consult India Pvt Ltd
Contractor	L&T Construction
Contract Value	1163 Cr. (Including GST)
Project Duration	48 Month
No. Of Stations & Location	Longku, Dima Hasao

Sensitivity: LNT Construction Internal Use

Project Location

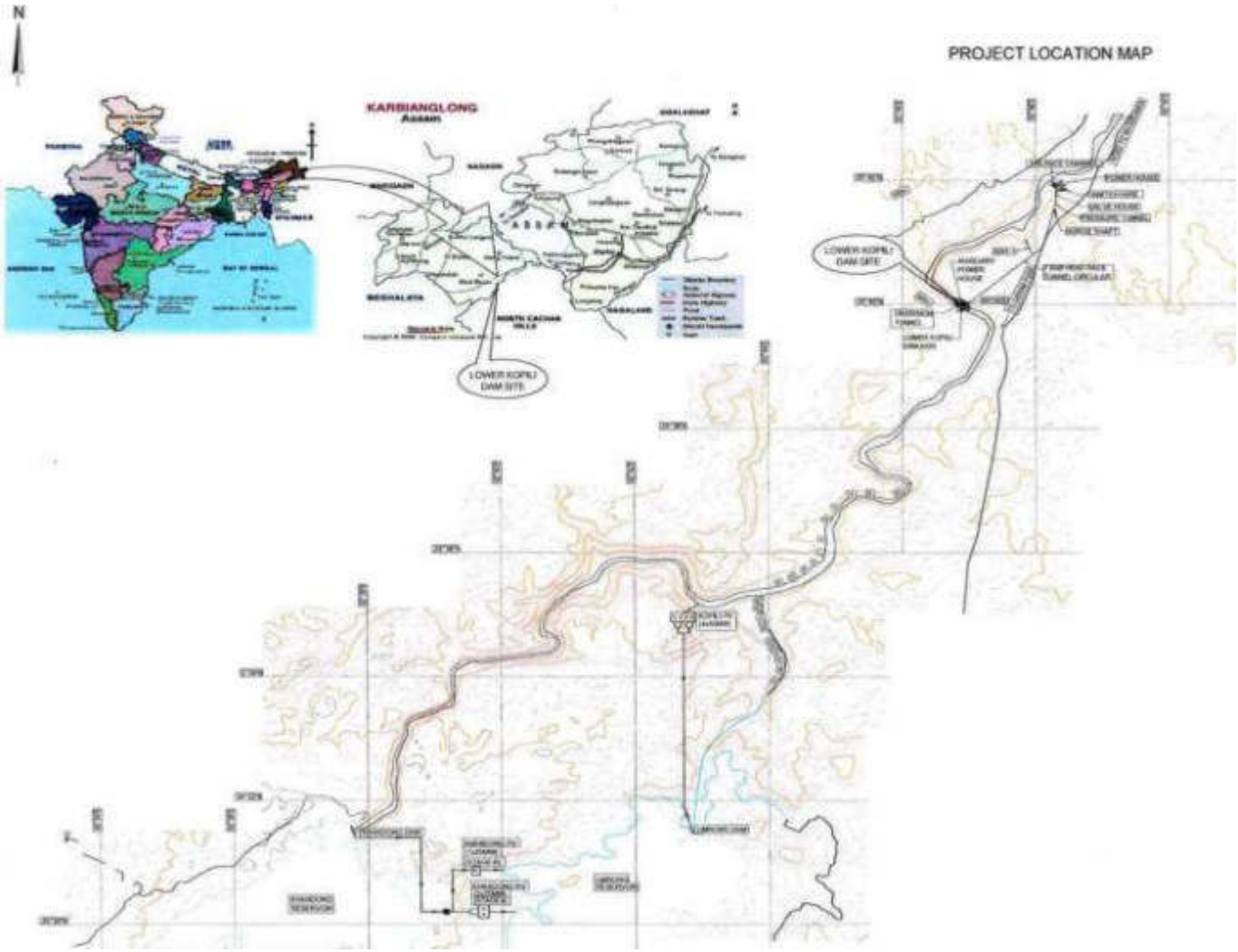


Figure 1: Project Location Map

Value: No Sale as Crusher Product will exclusively used for construction of Hydro Electric Project and ancillary works

Month & Year of preparation of this Project Report: October, 2021
Prepared by: Manoj Yadav

Sensitivity: LNT Construction Internal Use

Photo Graph of Crusher Site



Crusher Layout:

Introduction:

GEOLOGY: The Assam plateau lies along the continuation of the Archeans of Bihar and comprises Garo, Khasi, Jayantia hills and to its north-east is the detached area of Mikir hills. Tertiary rocks are well developed in the north-eastern and south-eastern part where they exhibit a more or less complete geological succession ranging from Paleocene to Lower-Pleistocene.

Local Geology: The area allotted to Assam Power Generation Corporation Ltd. lies within Dima Hasao district. The geology of the Mining Permit area shows that the rock types available in the area are sandstone and quartzite. The bore hole data indicates that the sandstone and quartzite are underlain by quartzo-feldspathic gneisses. Quartzite is coarse grained while sand stone is medium to fine grained. Rocks are found to be hard and compact

Plant Capacity:
CP 60 TPH : 1 No
Market & Demand: Crushed stone aggregates will exclusively used for construction of 120 MW Lower Kopili Hydro Electric Project

Raw Materials: Raw materials required for this project is stone boulders of various sizes will source from the Quarry which is situated inside the project area.

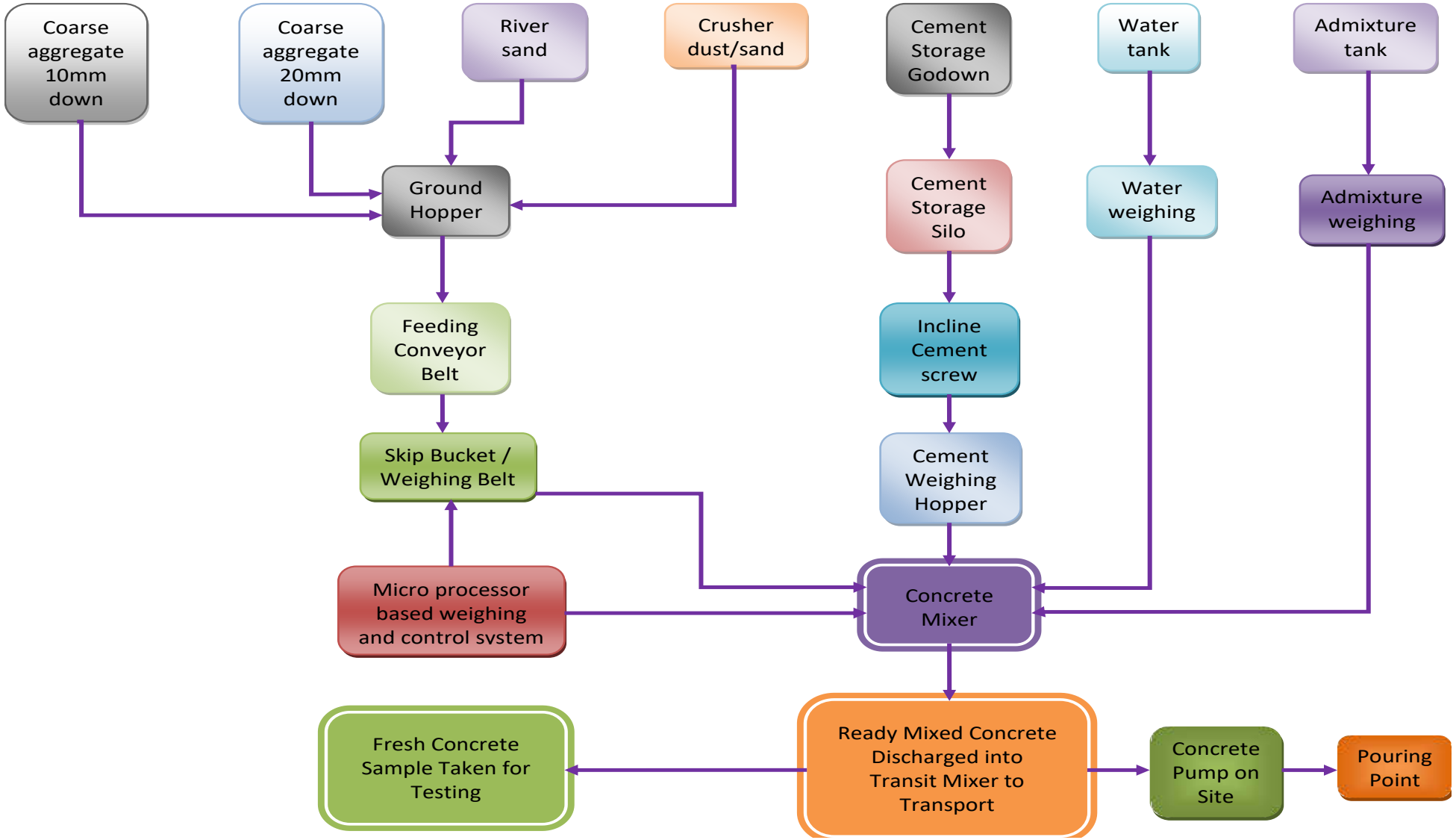
Sensitivity: LNT Construction Internal Use

Technical Aspects:

CORE EQUIPMENTS:

DESCRIPTION OF MACHINERY	QTY	MODEL	SERIAL NO	MOTOR RATED POWER KW	CAPACITY IN (TPH)	YEAR OF MANUFACTURE	MAKE
JCB 3DXL	1	3DXL	CHASIS NO – HAR3DXLSE02806497	-	-	2019	JCB
TM	3	BS6 2820	Chasis no MB1H3LHD8MRDP9930,MB1H3LHD4MRCR5832 & MB1H3LHD6MRDP9683	-	-	2021	ASHOK LAYLAND
M1 BATCHING PLANT	1	M1	8218023626	-	60CUM	07/2012	SCHWING STETTER
1) SKIP MOTOR	1	R137	DRS160MC4BE20HR	15	-	-	-
2) MIXURE MOTOR	1	-	-	37	-	-	-
3) Cement screw conveyor motor	2	-	MT12060647 & MT12024245	11 each	-	2017	-
Admixture dosing motor	2	SS100	1205228 & 2101240	0.75 each	-	-	-
Admixture discharge motor	1	SS100	1205196	0.75 each	-	-	-
Compressor motor	1	CE1E2	3GIJ20520001902770	2.2	-	2020	--
Water discharge motor	1	-	-	7.5	-	-	-
Feeding belt conveyor motor	1	-	-	5	-	-	-
Vibrator	4	-	-	0.18	-	-	-
Submersible pump	2	-	-	3.7 each	-	-	-
Cement feeding blower motor	2	-	-	15 & 37	-	-	-

FLOW CHART FOR READYMIX CONCRETE MANUFACTURING PROCESS



Sensitivity: LNT Construction Internal Use

ENVIRONMENT MANAGEMENT AND MONITORING

Environmental and Waste Management Plan and Staff Training

Suggested management and monitoring measures for the concrete batching plant are presented on Figure 2. It is suggested that Figure 2 be placed on a company noticeboard and that all onsite staff undertake training to ensure the EWMP is implemented and environmental risk factors are monitored.

Contingency Measures

In the event of a non-routine situation such as identification of contaminated runoff or significant environmental impact, personnel observing the impacts must report it to the site manager or site owner. Depending on the potential environmental risk and/or severity of the impact, the site manager or owner should seek advice from a suitability qualified environmental professional (i.e. Beveridge Williams). Appropriate actions to prevent adverse impacts must be implemented immediately.

Environmental Monitoring

The site owner has ultimate responsibility for ensuring that the EWMP is implemented and that environmental risks are monitored appropriately. It is considered prudent to complete an audit of raw material and waste generation periodically after operations commence to improve overall environmental performance of concrete batching operations.

Environmental and Waste Management Plan Review

Beveridge Williams considers it prudent to review the contents of the EWMP on an annual basis, after any significant environmental events or if site operations change substantially.

Basis & Presumptions:

1. The production has been calculated on the basis of two shift of 8 hours and 300 working days in a year.
2. The full production capacity presumed to be achieved in the 2nd year of operation.
3. Labour wages has been considered based on market rates but not less than the rates prescribed by the Govt. at the locality.

As batching plant Setup is exclusively for the purpose of construction of 120 MW Lower Kopili Hydro Electric Project Cost factors only consider for feasibility assessment of the batching plant unit not for open business purpose

Quality Control and Standards

There are no Indian Standard specifications for the quality of crushed stone. However, crushed stone is graded into different sizes viz. over 35mm, 20mm, 12mm etc. for different uses.

Batching Plant Environment Management Plan (Pollution Control)

Our Specific Commitments are as follows:

1. We L&T Ltd. LKHEP shall construct and maintain fenced boundary of the unit.
2. We L&T Ltd. Shall insure all stormwater to be directed to site sediment detention pond as per site Soil and water Management Plan. Water to be treated if required, and as identified by sampling, prior to discharge within licensed limits (pH/turbidity).
3. We L&T Ltd. LKHEP shall install fixed type water sprinklers to cover all dusty place in the premises to impart water spraying intermittently and during loading, unloading of raw materials/products and wastes.
4. We L&T Ltd. LKHEP shall not do Batching plant activities unless and until WE obtain Consent to Operate from the Assam State Pollution Control Board.
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Sensitivity: LNT Construction Internal Use

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Date: 1st April, 2021

S N SUBRAHMANYAN
Chief Executive Officer
& Managing Director

LARSEN & TOUBRO
It's all about Imagineering

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Sensitivity: LNT Construction Internal Use

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Water Quality Control Plan

Effluent from Batching Plants

During construction phase, batching plants will be commissioned for production of concrete. Effluent containing high suspended solids shall be generated during operation and cleaning of batching plants. However, no major adverse impacts, are anticipated due to small quantity of effluent and large volume water available for dilution in river Kopili. It is proposed to treat (settling tank) the effluent (to CPCB effluent discharge standards) before disposal to ameliorate even the marginal impacts likely to accrue on this account.

CPCB Condition

This CTE is valid as per specific information and documents provided by the occupier as well as site inspection and preliminary assessment by the Board and same is granted subject to the General and specific conditions stipulated below:-

1. No Air, Water, Soil pollution shall be created by the industry beyond the permissible limits prescribed by the Board. The industry would incorporate adequate pollution control measures before they put the plant into operation.
2. To regularize the subsequent process, the legal provisions of "Consent to Operate" as per Act shall have to be timely adhered to.
3. The solid waste generated from the unit shall be disposed in a scientific way as per Solid Waste Management Rules, 2016.
4. Environmental Statement in prescribed form V should be submitted on or before the 30' September every year.
5. Fire warning (Alarm, Siren) is to be installed by the unit to guard against accidental pollution/ mishap together with fire fighting devices.
6. Proper housekeeping and adequate maintenance has to be ensured/ enforced as per provisions of Acts.
7. Healthy working environment for the worker must be maintained and there should not be health Hazard to the workers for inadequate arrangement for ventilation, dust removal to arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.
8. The Plastic waste generated from the unit shall be disposed in a scientific way as per Plastic Waste Management Rules, 2016.
9. Healthy working environment for the worker must be maintained and there should not be health Hazard to the workers for inadequate arrangement for ventilation, dust removal to arrangements should be adequate and full proof for the health of the workers. Their health should be regularly monitored.
10. The project proponent shall develop a greenbelt / Plantation area with native trees only at at- least 33% of total plot area.
11. The industry is to provide dust extraction arrangement at all transfer points.
12. The Industry should install water sprinkler system to suppress the dust which may arise due to plying of vehicles etc.
13. Necessary steps are to made to bring the noise within the prescribed limit as stipulated below as per GSR 7, dtd Dec 22' 1998

Limit in dB (A) Leq.	
Day Time	Night Time
75	70

14. The until shall apply for authorization under the Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016 within 30 days from the date of issue of this order.
15. The industry must comply to the National Ambient Air Quality Standards as per Schedule-VII under Rule, 3 (3B) of the Environment (Protection) Rules, 1986, especially with respect to PM2.5, PM10, SO2 & NO2 as follow:

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air	
			Industrial, Residential Rural & Other Area	Ecologically Sensitive Area (Notified by Central Government)
1	Perticulate Matter (Size less than 10 ug) or PM10 ug/m^3	Annual* 24 Hours **	60 100	60 100
2	Particulate Matter (Size less than 2.5 ug) or PM10 2.5 ug/ m^3	Annual* 24 Hours **	40 60	40 60
3	Sulphur Dioxide (SO2), ug/ m^3	Annual* 24 Hours **	50 80	20 80
4	Nitrogen Dioxide (NO2), ug/ m^3	Annual* 24 Hours **	40 80	30 80

Sensitivity: LNT Construction Internal Use

Sensitivity: LNT Construction Internal Use

APPENDIX -2 – Health and Safety PLan of Package 2

L&T Construction
Heavy Civil Infrastructure

Health & Safety Management Plan

Project: 120 MW LOWER KOPILI HEP

L&T LIFE Work Incident Free to Live Injury Free Each day	Reference: **IM 08 A**

Review & Approval:

	Name	Position	Date	Signature
Prepared by Project EHS In-charge	Nabajyoti Bera	Asst. Manager EHS	18.02.2022	
Reviewed by L&T Project Head	Santanu Majumder	Project Manager	18.02.2022	
Approval by Client (If applicable)				

Revision History:

Revision	Date	Change Summary
	13.09.2020	First Issue
	03.04.2021	Updated as reviewed by customer
	17.06.2021	Updated as reviewed by customer
	17.01.2022	Updated as reviewed by customer
	18.02.2022	Updated as reviewed by customer and Organization Chart

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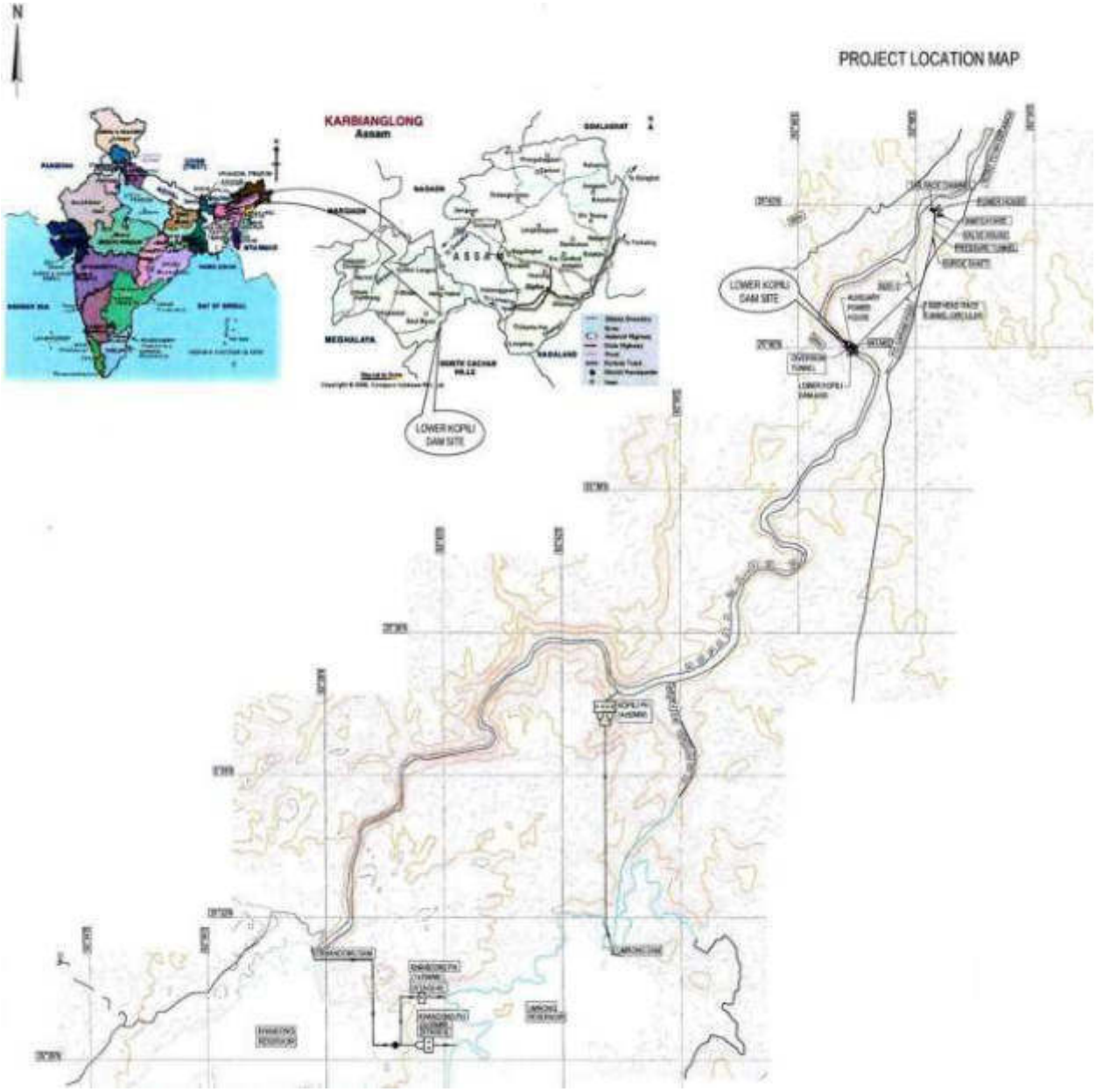
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PART A: Project HS Management

1 PROJECT HIGHLIGHTS

This section shall provide the following details of the project:

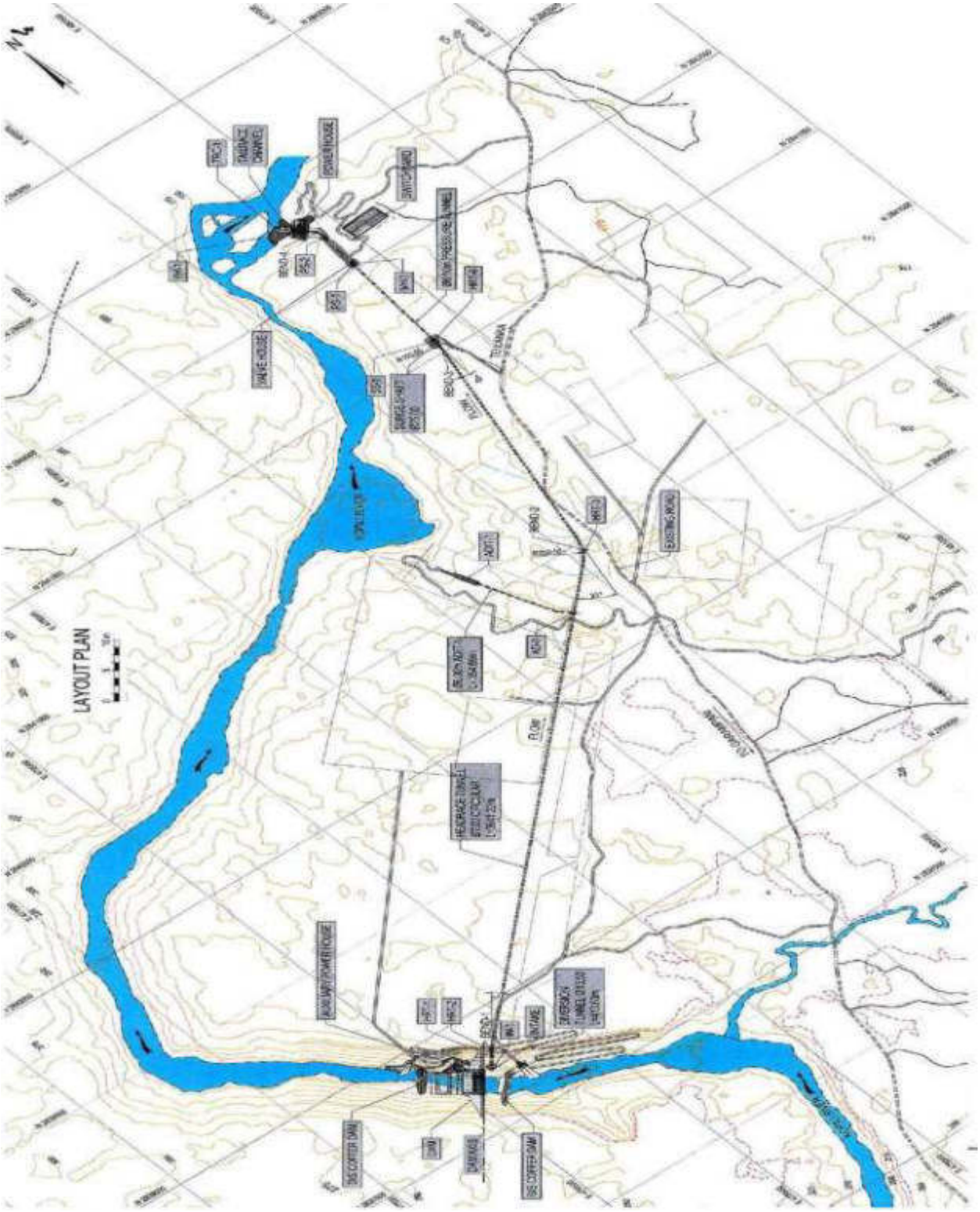
1. Name/ Identity of the project : 120 MW Lower Kopili Hydroelectric Project (Package 2)
2. Job Number : LE200685
3. Client / Consultant : Assam Power Generation Corporation Limited – APGCL
4. Location : The Lower Kopili H. E. Project is in Karbi Anglong & Dima Hasao District of Assam. The Project location (dam site) is defined by 25°39'57.39"N latitude and 92°46'53.62"E longitude.



5. Overall scope of work & List of Activities : Engineering, Procurement, Construction and Commissioning of Project Roads, Civil and Hydromechanical Works for 120 MW Lower Kopili Hydroelectric Project, Assam,

India (Package-2)

6. Project Layout



2 SALIENT REQUIREMENTS TO BE FOLLOWED

2.1 Identification of requirements

The following salient requirements shall be identified and included in the IM-07-A register during project inception and the register to be maintained up to date during project execution:

2.1.1. Legal requirements

Sl. No	List of Applicable Legal and Other HS Requirements
1.	Building and other construction workers (regulation of employment and conditions of service) act, 1996 and assam rules 2007
2.	Building and other Construction Workers' Welfare Cess Act, 1996
3.	CEA (Safety Requirements for Operation, Construction and Maintenance of Electric Plants and Electric Lines) Regulations 2008 and Amendments (2010)
4.	Central Motor Vehicle Act 1988 & Rules, 1989 and Amendments (2001)
5.	Child Labour (Prohibition and Regulation) Act, 1986
6.	Child labour (prohibition and regulation) act, 1986 and rules, 1988
7.	Contract Labour (Regulation & Abolition) Act. 1970 and Rules
8.	Electricity Act, 2003 and Amendments 2014
9.	Employees Provident Fund and Miscellaneous Provisions act, 1952
10.	Employers' Liability Act I Yes No. 24 of 1938
11.	Employers' Liability Act No. 24 of 1938
12.	Environment (protection) act, 1986 and rules, 1986
13.	Explosives Rules, 2008 (under Act of 1884)
14.	Factories Act, 1948 and Amendments (1987)
15.	Gas Cylinder Rules 2016
16.	Gas Cylinder Rules and Static and Mobile Pressure Vessels (Unfired) Rules, 1981
17.	Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016
18.	Hazardous Waste (Management, Handling and Trans-boundary Movements) Rules, 2008 (Amended 2010)
19.	Hazardous Wastes (Management and Handling) Rules, 1989
20.	Indian electricity act 2003 and rules 1956
21.	Indian Electricity Rules, 1957 and Amendments (2000)
22.	Indian Road Congress Code IRC: SP: 55-2001 'Guidelines on Safety in Road Construction Zones.
23.	Interstate Migrant Workers Act 1979
24.	Is 4756 (1978): safety code for tunnelling work [cede 29: construction management including safety in construction]
25.	Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989
26.	Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989
27.	Motor vehicles (amendment) act, 2019 & Central motor vehicles rules, 1989
28.	Municipal Solid Wastes (Management and Handling) Rules, 2000

Sl. No	List of Applicable Legal and Other HS Requirements
29.	National Building Code, 2005 – Part IV: Fire and Life Safety
30.	Noise Pollution (Regulation and Control) Rules, 2000
31.	Notification on Control of Noise from Diesel Generator (DG) sets, 2002
32.	Personal Injuries (Compensation Insurance) Act, 1963 (as amended)
33.	Petroleum Act, 1934 and Rules 2002
34.	Public Liability Insurance Act (PLIA), 1991, and Amendments (1992) and Rules, 1991
35.	Tunnelling requirements identified are limited to Indian legislation, national codes, and bs 6164.
36.	Workmen's Compensation Act, 1923 (Amended 2009)

2.1.2. Client requirements

Sl. No	List of Applicable Legal and Other EHS Requirements
1.	Client document section 5 – Environnent management plan
2.	Client document section 6_employer's requirements- 6.26 health & safety
3.	ADB Safeguard Policy Statement 2009
4.	IFC EHS Guidelines
5.	SOP for containment of COVID-19 at workplace

2.1.3 Implementation of requirements

5.2.1 The Legal & Other Requirements mentioned in IM-07-A register shall be communicated to all concerned section in-charges defining their responsibilities for implementation.

5.2.2 While preparing the Activity HS Risk Assessment and Safe Work Method Statement, the IM-07-A register (to be updated and should cover all the relevant laws in volume 5 of the contract) shall be referred, and relevant requirements shall be incorporated.

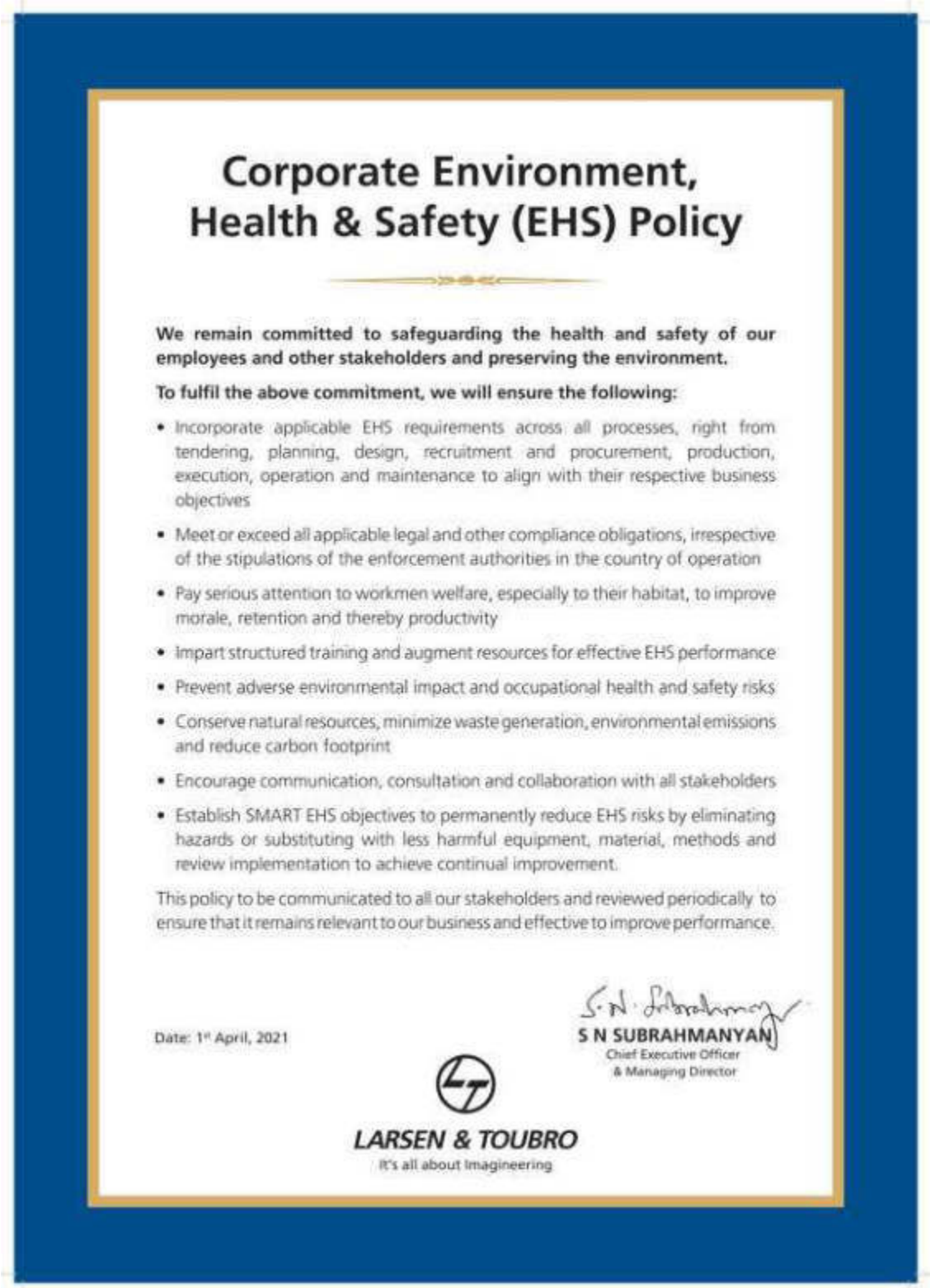
2.2 Monitoring compliance

2.3.1. Monitoring compliance to be as per approved Health and Safety Management Plan and other relevant provisions of the laws and regulations related to Labour, workers and including COVID 19 guidelines.

3 EHS POLICY

3.1 List of EHS Policies

3.1.1 Corporate EHS Policy



Corporate Environment, Health & Safety (EHS) Policy

We remain committed to safeguarding the health and safety of our employees and other stakeholders and preserving the environment.

To fulfil the above commitment, we will ensure the following:

- Incorporate applicable EHS requirements across all processes, right from tendering, planning, design, recruitment and procurement, production, execution, operation and maintenance to align with their respective business objectives
- Meet or exceed all applicable legal and other compliance obligations, irrespective of the stipulations of the enforcement authorities in the country of operation
- Pay serious attention to workmen welfare, especially to their habitat, to improve morale, retention and thereby productivity
- Impart structured training and augment resources for effective EHS performance
- Prevent adverse environmental impact and occupational health and safety risks
- Conserve natural resources, minimize waste generation, environmental emissions and reduce carbon footprint
- Encourage communication, consultation and collaboration with all stakeholders
- Establish SMART EHS objectives to permanently reduce EHS risks by eliminating hazards or substituting with less harmful equipment, material, methods and review implementation to achieve continual improvement.

This policy to be communicated to all our stakeholders and reviewed periodically to ensure that it remains relevant to our business and effective to improve performance.

Date: 1st April, 2021

S N SUBRAHMANYAN
Chief Executive Officer
& Managing Director

LARSEN & TOUBRO
It's all about Imagineering

3.1.2 Driving Policy

L&T Construction
Heavy Civil Infrastructure

Driving Policy

L&T LIFE Work Incident Free to Live Injury Free Each day

L&T Heavy Civil Infrastructure IC recognizes that the driving and the use of company vehicles carries significant high risk of injury or death.

As part of L&T L.I.F.E and a Commitment to Action, L&T Heavy Civil Infrastructure IC is committed to improve the safety of its employees and other stakeholders with the ultimate goal of minimizing injuries due to vehicle transportation and operation.

Safe driving is one of the Golden Rules of L&T L.I.F.E and all employees and other stakeholders are required to adhere to this policy when driving or operating with L&T or hired vehicles at all times and encouraged to comply when driving or operating with their personal vehicle either to and from work location or on routine journeys.

Management Commitment:

1) Ensure when providing any vehicle that it is suitable and sufficient for the purpose it is being used for.
2) Provide L&T owned or contracted vehicles, where applicable with all legal documentation and insurances for use by employee/operator.
3) Ensure all L&T owned and contracted vehicles are well maintained, in good running condition and suitable for the purpose and equipped with all safety and emergency equipment/devices.
4) Investigate driving incidents and analyze them with a view to identifying causes and defining possible measures to avoid their reoccurrence. Discipline any person who violates this policy.
5) All drivers & employees who drive company or their personal vehicles are encouraged to undertake defensive driving training from EHS department.

The following control measures have been identified and must be implemented and complied with and are the minimum requirements for compliance by all drivers:

1) **Competence** - Must have a valid driving license with minimum 3 years driving experience and at least 18 years of age to be authorized to drive or operate a company vehicle.
2) **Physically Fit** - Must be in good health and physically able to perform the duties of driving.
3) **Driving Hours** - Drivers should take sufficient rest periods and it is recommended to make journey plan to reach the destination.
4) **Adverse Weather Condition / Driving at Night** - Where roads are affected by fog, rain, ice etc. and in the hours of darkness extra precaution must be taken into consideration either delay or make alternative travel arrangements.
5) **Seat Belts** - It is compulsory that driver and passengers must wear seat belts.
6) **Traffic Regulations** - Must abide by the speed limits and the traffic regulations established by local regulations and site management.
7) **Safe Distances** - A safe distance must be maintained from the vehicle in front to achieve safe braking distance.
8) **Two Wheelers** - When driving any two-wheeler a suitable head protection shall be correctly worn by both driver and pillion rider.
9) **Emergency Procedures** - In case of breakdown or incident the driver must have a list of emergency contacts
10) **Mobile Phones** - Driver must not use a hand held mobile phone while driving.
11) **Prevent Distractions** - Driver must not eat, drink or smoke when operating a vehicle and always have eyes firmly on the road.
12) **Alcohol & Drugs** - Driving under influence of alcohol, drugs or other controlled substances is strictly prohibited. If taking prescription drugs please inform your line manager immediately
13) **Incident Reporting** - Driver and passengers are responsible for reporting all incidents to L&T Local Administration and EHS teams.

Date: 9th May, 2016

S.V.Desai
Executive Vice President and Head
Heavy Civil Infrastructure

3.1.3 Project EHS Policy

L&T Construction | Kopili Hydro Electric Project | L&T LIFE Work Incident Free to Live Injury Free Each day

Project Environment, Health & safety (EHS) Policy

Aligned with the Corporate EHS policy, we are committed to protect the Environment and Providing a safe and healthy workplace for our employees and stakeholders. With this propose was created an internal EHS Policy specific for 120MW Lower Kopili HEP to provide the guideline to all in achieving those objectives. By this reason and to get the objectives proposed is requested to all:

- Understand and transmit the Corporate EHS Policy to all involved in the Project.
- Ensure the application and compliance during the execution of the Project from all legal requirements, Internal and external standers, and the requirements from the Client.
- Identify and prevent incident for all Class 1 risk activities.
- Provide and deploy all available resources required in case of potential incident or emergency situation.
- Report and investigate all incidents that occur in our Project.
- Give EHS induction and training for all L&T employees, subcontractors, and visitors.
- Identify all potential occupational health & hygiene hazards at workplace and implement the required control measures by conducting regular EHS inspection and reports.
- Conduct all Project activities in an environmentally friendly manner, by adopting a multi-pronged strategy focusing on minimizing / recycling waste, disposing waste according the norms, conserving energy, optimising resource, and regular monitoring of environment.
- Provide good housekeeping in all Project.
- Follow up and respect all the internal procedures and collaboration with all the L&T employees, Subcontractors, and visitors.

01.10.2020

Santanu Majumdar
Project Manager

3.2 Communication & Awareness

3.2.1 EHS Policies shall be displayed at all conspicuous locations including Project offices, L&T L.I.F.E Notice boards, workmen camp and canteen to promote visibility and spread awareness.

3.2.2 Awareness about the existence of EHS Policy shall be spread to all concerned by discussing in EHS meetings, daily pre-start briefings, etc.

3.3 Review and update

3.3.1 Corporate EHS Policies shall be reviewed at HQ level periodically (once in two years) to ensure that it remains relevant and appropriate to the organization.

3.3.2 Project EHS Policy shall be reviewed at project level periodically (once in two years) to ensure that it remains relevant and appropriate to the project.

4 EHS OBJECTIVES

4.1 4.1 Project EHS Objectives

EHS objectives applicable for the project for the current year shall be included here. This shall be in line with the IC level EHS Objectives.

1. To determine broad parameters of EHS management at site.
2. Establish & define individual responsibilities, hazard prevention & safety promotion responsibility at each level of the construction team.
3. Identify highly hazardous operations within the scope of work and specify integrated preventive measures to mitigate the same.
4. To ensure compliance with relevant applicable legislation.
5. Continual EHS performance improvement by directing focus on the key areas for improvement in a consistent manner.

Following highlighted key management areas identified to focus which require to be priority driven to enable demonstrated implementation.

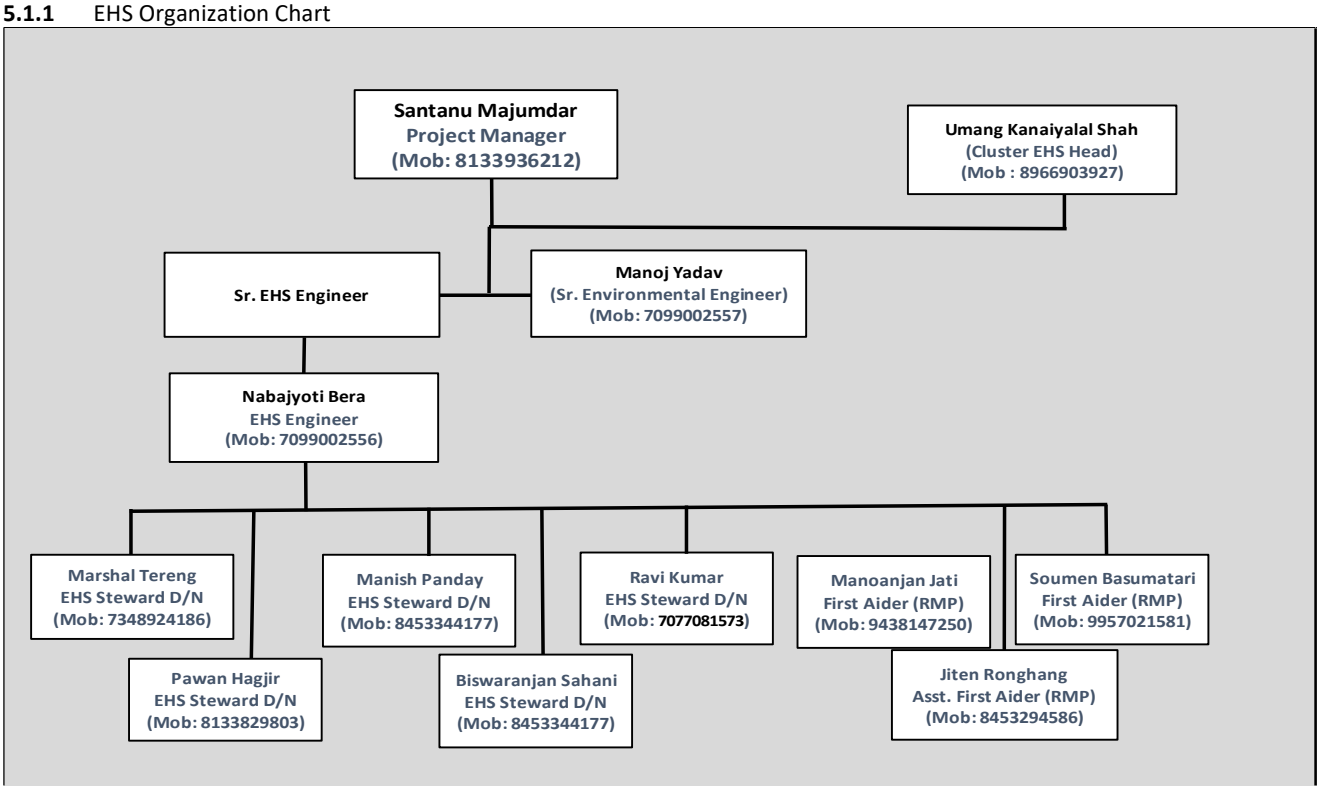
- Occupational Health Management
- Cranes & Lifting Management
- Quarry operations
- Vehicle, Plant & Equipment
- Work at Height
- Working near land sliding area
- Muck Management.
- Maintenance of environmental flow
- Setting of Stone crusher,
- Setting batching plant,
- Procurement of natural resources and stocking.
- Preventive measurement to spread of COVID-19
- Front line supervisor training to all execution front line supervisors directly working for L&T and Subcontractors.
- Accountability of project to deliver EHS programs into the business.

5 EHS ORGANIZATION & RESOURCE MANAGEMENT

This section shall be in line with the requirements stipulated in the IMS Procedure 'Resource Management'.

5.1 Human Resource

5.1.1 EHS Organization Chart



5.2 Organizational Infrastructure (induction room setup, general EHS equipment)

5.2.1 Within a month of project inception, the availability of the following minimum resources shall be ensured:

- EHS Induction room (provided with minimum 20 chairs)
- Computer with multimedia facilities
- Over Head Projector with screen
- Monitoring devices - Portable handheld Digital Sound Level Meter, Portable handheld Digital Lux Meter
- Digital camera
- Portable loudspeaker (for daily pre-start briefing & emergency purpose)
- Copy of L&T Induction package

6 EHS ROLES & RESPONSIBILITIES

All staff working for or on behalf of L&T have an important role to fulfil and will be made aware of these EHS roles and responsibilities.

SL. No.	KPI- (Planned-Action)	Who's action	Target Completion
1	Review, Update & Issue of the following EHS roles & responsibilities and all employees within the project shall understand and sign them: - Project Heads - Project Service Function In-charges - Construction Managers - Site Engineers - Supervisors *Note: IC EHS Head and HR Head to decide on the effective mode*	IC EHS Head in coordination with HR Head and approved by IC Head	Jan-2021

Defining Roles & Responsibility

EHS management is a line responsibility requiring active participation of all levels of management & supervision. Individual EHS roles and responsibilities, along with task and target shall be distributed to the individuals for action.

The EHS Roles & Responsibilities for the following categories shall be defined:

- Project Head
- All Section In-charges
- All Site Engineers
- All Front-Line Supervisors / Foremen
- Project EHS In-charge / EHS Engineers
- Project EHS committee members
- All Employees
- Subcontractors
- General workforce

Communication & Awareness

EHS management is a line responsibility requiring active participation of all levels of management & supervision.
Individual EHS roles and responsibilities, along with task and target shall be distributed to the individuals for action, as described below.

6.1. Project Manager

NO.	TASK	TARGET	VERIFICATION DOCUMENT
1.	Responsible for completion of the project with total implementation of the company's EHS policy requirement, EHS Management System & requirements of this plan and comply with the relevant legislations.	Project Duration	-
2.	Ensure sufficient resources are available at project. He shall ensure through: – Reviewing EHS Plan implementation and discuss any outstanding issues in Project EHS Committee Meeting. – Investigating non-compliance and non-implemented items.	Project Duration	1) MOM – Project EHS Committee Meetings 2) EHS audits
3.	Ensure that all staff & workmen are competent to perform their tasks safely in compliance with EHS Management System and this plan requirement. He shall do so by ensuring: – Screening of workmen is effectively implemented by the time office & site execution engineers. – EHS Induction provided for all staff & workmen by EHSO before	Project Duration	Screening Record of workmen EHS Induction for

	deployment. – Regular monitoring and organise continuous in-house EHS trainings. – Establishing adequate control measures for the employee's fitness to avoid fatigue, stress, extended working etc.		Workmen EHS Training Record
4.	Project EHS Inspection and EHS Plan implementation monitoring	Project Duration	Inspection report
5.	Investigate all high potential incidents and non-compliance and ensure immediate remedial action to stop recurrence.	As & when notified	Investigation Reports and action plans

6.2. Cluster EHS Manager

NO.	TASK	TARGET	VERIFICATION DOCUMENT
1.	Supplement Project EHS inspections & relevant EHS training at the projects in co-ordination with EHSO.	Once in Six Months	BU-EHSM Site Visit Report
2.	Investigate all serious incidents & recommend preventive actions at projects.	As and when required	Incident Investigation Report
3.	Co-ordinate purchase and quality control activities related to PPE / safety gadgets.	After receiving Material Request	Approved Vendor List
4.	Monitor all EHSO activities & co-ordinate with Clients, Project In charges, CH, BUH, Service Dept. Heads	As and when required	No documentary evidence
5.	Organise campaigns, competitions & other special emphasis programmes to promote EHS at workplace.	During January & as and when required	Record of EHS Campaign and competitions
6.	Conduct EHS Audit and Inspection during the Project duration.	As per schedule	Audit Report

6.3. EHSO

NO.	TASK	TARGET	VERIFICATION DOCUMENT
1.	Disseminate and Communicate EHS Policy, EHS Management System requirements to project personnel.	Project Duration	-
2.	Provide necessary advice, information, and support in the effective implementation of the EHS Management System requirements and this EHS plan.	Project Duration	-
3.	Update the EHS Plan to the requirements of the activities being carried out when there is a revision.	Project Duration	EHS Plan
4.	Plan and conduct Internal EHS training programs, initiate drive to promote EHS awareness and performance.	Project Duration	EHS Training Records
5.	Carry out EHS inspection of Work Area, P&M Equipment's & Machineries, etc. as per the IMS requirement.	As per Monthly Activity Plan	Inspection Reports
6.	Creating EHS awareness through Toolbox talks.	Every day	Toolbox talk Report
7.	Advice and co-ordinate with line management in preparing EHS Risk Assessment for new activities.	Project Duration	EHS Risk assessment Records
8.	Conduct investigation of all incidents & recommend appropriate corrective measures.	When reported	Investigation Report
9.	Convene EHS Committee meeting & minute the proceedings for circulation & follow-up action.	Min Frequency – Once in a month	MOM – Project EHS Committee Meeting
10.	Advice & co-ordinate for implementation of Work Permit Systems.	Whenever work requiring WPS is executed	Completed Work Permit
11.	Plan procurement of PPE & safety devices and inspect before use as per laid down norms.	Project Duration	Requirement & Release of Safety Materials, Delivery Challan

			Records
12.	Report to BU-EHSM on all matters pertaining to status of EHS and promotional programme at project level.	Regular basis	-
13.	Facilitate screening of workmen and conduct EHS induction.	Project Duration	Screening & Induction Records
14.	Monitor administration of First Aid.	Project Duration	First Aid Register
15.	Conduct Fire Drill, Procure, inspect, and arrange to maintain Fire Extinguishers.	As scheduled in the monthly activity plan	Fire Drill Register, Fire extinguishers inspection register
16.	Organise campaigns, competitions & other special emphasis programmes to promote EHS in the workplace.	As and when required	Record of EHS Campaigns & Competitions
17.	Register Customer complaints and take corrective action.	Project Duration	Customer Compliant Register
18.	Record, analyse and cascade lateral learning points from First Aid Cases, Near Miss Cases & Accidents to all project personnel and analyse the trends & effectiveness.	Monthly	First Aid Register; Incident Investigation Report
19.	Maintain all EHS related documents Update EHS training records	Continuous	EHS related Documents

6.4. Section / Area In-charges

NO.	TASK	TARGET	VERIFICATION DOCUMENT
1.	Ensure that all the workmen engaged under him are selected through the screening system and have undergone EHS Induction before assigning any task at site.	Project duration	Screening & EHS induction records
2.	Ensuring compliance of L&T ECCD Infrastructure OC basic EHS rules and applicable specifications by – Taking prompt action of project inspection and hazard findings. – Closing all the points identified in inspection reports – Ensure EHS Risk Assessment is done for all the jobs under him.	Project duration	EHS Inspection report, EHS Risk Assessment records
3.	Ensure that all near miss cases / Reportable LTI / Dangerous Occurrence / Fatality are reported promptly.	As & when notified	Reports
4.	Participate regularly in EHS meetings.	As scheduled	MOM

6.5. All Employees

NO.	TASK	TARGET	VERIFICATION DOCUMENT
1.	Report all unsafe acts and condition to the immediate supervisor.	Continuous	-
2.	Start work only when conditions are safe and stop work when it is unsafe.	Continuous	-
3.	Operate equipment only when authorised and in prescribed manner. (If applicable)	Continuous	Inspection records
4.	Report any incident immediately.	Continuous	Reports

6.6. Environmental Engineer/Officer/Manager

NO.	TASK	COMPLIANCE TARGET	VERIFICATION DOCUMENT
1.	Environment officer will develop and revise Environment Management Plan and steer the overall environmental management for the project.	Continuous	Environment Management Plan

2.	Coordinate the preparation of the EMP and associated management plans	Continuous	Environment Management Plan
3.	Develop strong working relationships with regulatory agencies and stakeholders.	Monthly	Monthly Environment Report
4.	Together with senior project personnel and specialist assistance, ensure that the commitment to excellence in environmental management is communicated to and understood by all project members.	Monthly	Monthly Environment Report
5.	Liaise with the project team in refining the EMP	Monthly	Monthly Environment Report
6.	Working with and through the Engineer, liaise with Respective State pollution control board, district collector and other agencies on all matter concerning pollution affecting naval establishments and units	Monthly	Monthly Environment Report
7.	Ensure that key environmental management deliverables are provided within required timeframes	Monthly	Monthly Environment Report
8.	Identify and propose solutions to significant environmental issues in consultation with key construction personnel	Monthly	MOM – EHS Committee Meeting
9.	Ensure that environmental risks are appropriately identified, communicated, and effectively managed	As per schedule	EHS Inspection Report
10.	Coordinate investigation and response to environmental complaints and inquiries	When reported	Investigation Report
11.	Attend EHS committee meetings	Monthly	MOM – EHS Committee Meeting
12.	Manage and deliver the environmental induction and training program	Project Duration	EHS Training Records
13.	Establish the project environmental compliance reporting protocols and templates	As per schedule	EHS Inspection Report
14.	Contribute to resolving environmental issues in conjunction with project team members	As per schedule	EHS Inspection Report
15.	Identify all environmental approvals and permits required.	Project Duration	EHS Risk assessment Records
16.	Deliver the environmental component of toolbox sessions	Every day	Toolbox talk Report
17.	Arrange and coordinate 3rd parties' lab test & monitoring activities required by this document	Quarterly	Monthly Environment Report
18.	Ensure that instructions are issued, and adequate information provided to field-based employees who relate to environmental risks on site	Project Duration	EHS Risk assessment Records
19.	Identify resources required for implementation of the EMP.	Project Duration	Environment Management Plan
20.	Coordinate action in emergency situations and allocating required resources	When reported	Emergency response Plan

6.7. Site Engineers

NO.	TASK	COMPLIANCE TARGET	VERIFICATION DOCUMENT
21.	Understand the EHS requirements of the Project from this Plan, EHS Management Systems, EHS Manual and follow the same in work execution.	Continuous	No. of findings in the EHS Inspection
22.	Give Toolbox talk to the workmen under him.	Daily	Toolbox Report
23.	Ensure the workmen under him wear the necessary personal protective equipment relevant to the job.	Continuous	Subcontractor Evaluation Report
24.	Eliminating all unsafe conditions in the workplace.	Continuous	EHS Inspection Report
25.	Keeping the workplace neat & clean	Continuous	EHS Inspection Report
26.	Know the critical activities of his job based on EHS Risk Assessment and ensure implementation of the control measures.	Project Duration	EHS Risk Assessment & Safe work method
27.	Participating with the EHSO or the committee Members in the Project EHS Inspection.	As per schedule	EHS Inspection Report
28.	Follow all work permit system as per client requirements or L&T ECCD Infrastructure OC EHS Management System before starting of work.	As and when required	Work Permit System
29.	Report all near miss cases / reportable LTI /dangerous occurrences / fatality to EHSO immediately verbally & submitting the preliminary incident report within 12 hours.	As and when required	Preliminary Incident Report
30.	Inform the concerned authority as per the emergency response plan.	As and when required	Emergency Response Plan

6.8. Project EHS Committee Members

NO.	TASK	COMPLIANCE TARGET	VERIFICATION DOCUMENT
1.	Attend meeting regularly as per schedule to discuss and decide the ways and means of eliminating the factors affecting EHS.	Minimum once in a month	MOM – EHS Committee Meeting
2.	Analyse all the activities of the forthcoming period and identify the possible hazards and finalizing the precaution to be taken.	Minimum once in a month	MOM – EHS Committee Meeting
3.	Monitor the EHS Performance of the project and suggesting improvements whenever needed.	Minimum once in a month	MOM – EHS Committee Meeting
4.	Actively participate in the EHS Committee Inspections & assess Key performance indicators on EHS.	As per Schedule	EHS Inspection Report, KPI on EHS report

6.9. Sub-Contractors

All Subcontractors / Vendor / Supplier / Third Party performing services at the Project shall be subject to this plan requirement.

NO.	TASK	COMPLIANCE TARGET	VERIFICATION DOCUMENT
1.	Understand the EHS code of practice for subcontractors and sign the same as a token of acceptance before starting the activity.	Before starting the activity	EHS Code for Sub contractors
2.	Subcontractor, his Supervisor, and his workmen shall adhere all the laid down EHS rules & regulations while working at site, follow the instruction / advice of Site engineer & EHSO from time to time.	Continuous	Monthly Evaluation of Subcontractors

6.10.1. Communication & Awareness

The defined EHS Roles & Responsibilities shall be communicated to all concerned and such records shall be maintained. Cascading any EHS messages down the line is vital for the success of any EHS Management System and to ensure that all personnel are aware of EHS issues the following technique shall be adopted.

NO.	TASK	ACTION BY	COMPLIANCE TARGET	VERIFICATION DOCUMENT
1.	**EHS NOTICE BOARD** Fix EHS Notice board at project office and other conspicuous locations for cascading EHS messages such as EHS Notices, Safety Alerts, Posters, and incident evaluation etc., and regularly update. Install and maintain EHS performance board showing Safety statistics i.e., days without LTI etc.	EHSO	Daily / Weekly update	EHS Notice Board
2.	**PROMOTION** **Monthly Incentive** Select "Safe Man of the month" based on EHS performance evaluation and award certificate of commendation along with a token gift.	PM / EHSO	Monthly	Incentive Scheme record

7 PROJECT EHS COMMITTEE

FORMATION OF PROJECT EHS COMMITTEE

Name of the Project : **120 MW LOWER KOPILI HEP**

Job Number : **LE200685**

Business Unit : **HYDEL & TUNNELS**

Revision No. : 00

CIRCULAR

EHS Committee

The following EHS Committee is constituted / updated with immediate effect:

Chairman : Mr Santanu Majumdar

Members :

1	Mr. Pratik Kumar Bhunia	P&M In-charge
2	Mr. Dinesh Sharma	Construction Manager
3	Mr. Akhilesh Pathak	Administration In-Charge
4	Mr. Vijay Kumar	Mining Manager
5	Mr. Manoj Yadav	Asst. Manager Environment

Secretary : Nabajyoti Bera

Periodicity

The committee will meet at least once in a month on the day (specify date)

Agenda

Secretary will circulate agenda of the meeting at least two days in advance of the schedule date of the meeting.

Circulation

MOM (IM-10-B) circulated to the following by the secretary

1. Chairman
2. Members
3. Invitees
4. Cluster EHS In charge
5. Others concerned

Date: 08.01.2021

Signed By:

Note: The list of EHS Committee members shall be updated whenever changes take place

Distribution

Gist of the meeting will be in the standard format and circulated to the following under the signature of the secretary.

1. Chairman
2. Members
3. Invitees
4. Regional safety coordinator
5. Others concerned

EHSO as the secretary to the safety committee facilitates convening of the meeting & prepares minutes (on or before two days from the date of meeting), compliance & follows up its implementation.
Agenda for the meeting is finalized well before the meeting & the same is circulated among the members with schedule of meeting. The date & time of the meeting at least once in a month are fixed well in advance & conveyed to all members for their participation.

The format of committee meeting MOM

L&T Construction Heavy Civil Infrastructure	Environment, Health and Safety Integrated Management System Manual	L&T LIFE Work Incident Free to Live Injury Free Each day

IM Format No. : 06 B

MINUTES OF EHS MEETING

Project: Business Unit: Job No:		Meeting No. Date of Meeting: Location of Meeting:
MEMBERS PRESENT (L&T)	INVITEES	MEMBERS ABSENT (L&T)

REPORT SENT TO					
No. of Copies	Name / Dept.	No. of Copies	Name / Dept.	No. of Copies	Name / Dept.

Prepared By: Location: Date:

MINUTES OF EHS MEETING

Item No.	Description of Discussion	Action By	Target	Remarks
1	Review of MOM of previous meeting			
2	Suggestions and Complaints received from Clients and corrective and preventive action			
3	NCR's / Observation from external parties			
4	Evaluation of compliance to Legal requirements			
5	Status of implementation of Objectives & Programmes			
6	Analysis of First - Aid cases / Reportable accident cases			
7	Three month look-ahead plan and EHS specific requirements			
8	Status of implementation of Project EHS Plan			
9	Critical EHS non-compliances & action plan for compliance			
10	Subcontractor EHS performance based on monthly evaluation			
11	Specific inputs from last Subcontractor EHS meet			
12	Need for any specific system / training / PPE's / resources			
13	Observation of EHS committee during last walkdown			
14	Analysis of KPI assessment			

Next meeting is scheduled on:_____

8 EHS RISK MANAGEMENT

8.1 Introduction

As L&T Heavy Civil Infrastructure IC moves towards a zero-harm vision through the L&T L.I.F.E. program, there requires a management game changing shift and a complete gradual overhaul of what was done in the past to meet the current business model.

EHS Risk Management is an integral part of the IMS and combines technical, consultative, systematic, and managerial approaches to identify any foreseeable hazards that have the potential to harm employees, contractors, JV Partners, visitors, and members of the public.

8.2 Scope

This procedure is applicable for Lower Kopili HEP and the EHS Risk Management shall cover:

All routine and non-routine activities.

Activities of all personnel having access to the workplace (including contractors, visitors)

Facilities at the workplace (i.e., office, canteen, workmen facilities etc).

8.3 Purpose

The Risk management procedure applied through the five steps to risk management and is the key driver for risk control in business. To achieve this is required that:

All relevant parties including construction & EHS teams must be involved in risk assessments and the risk management process.

Risk assessments & Safe Work Method statement must be developed and approved prior to any work activity starting.

All Identified risks and risk mitigation plans must be documented, approved, and simply communicated to all parties.

8.4 Definitions

8.4.1. Class 1 Risk Activities

The activities carried out within the project that has the potential to cause fatal, serious injury within the business.

8.4.2. Hazard

Source, situation, or act with a potential for harm in terms of human injury or ill health or a combination of these.

8.4.3. Risk

Combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s).

8.4.4. Risk Assessment

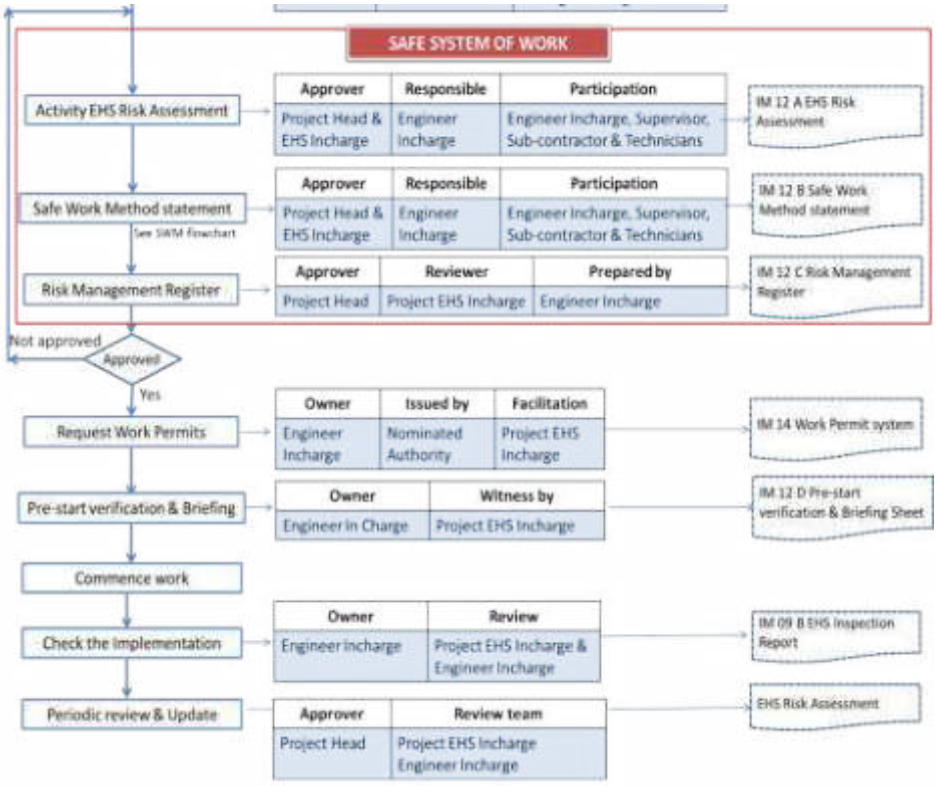
Process of evaluating the risk(s) arising from a hazard(s), considering the adequacy of any existing controls, and deciding whether the risk(s) is acceptable.

8.5 Responsibilities

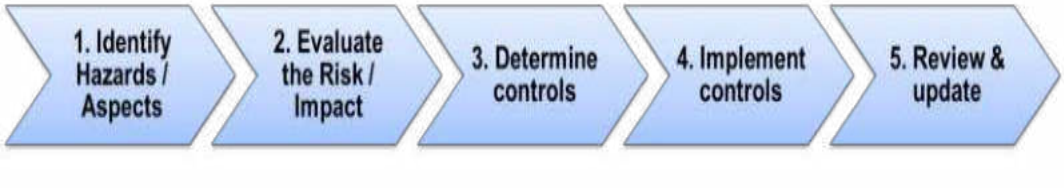
The responsibilities are identified in the EHS Risk Management / Assessment Roles & Responsibilities document, approved for Lower Kopili HEP.

8.6 Method

Risk Management Flowchart



8.7 5 Steps of EHS Risk Management process



8.8 Risk Assessment & Risk Reviews at various levels

All the activities under the project scope shall be covered in the process and it shall be recorded in IM 12 A EHS Risk Register / Risk Assessment from the IMS Manual. The frequency of the reviews is identified in the EHS Risk Management / Assessment Roles & Responsibilities document, approved for Lower Kopili HEP.

S No	Activity	Project EHS Risk Register	Activity EHS Risk Assessment
1	Who leads the EHS Risk review?	Project EHS In charge	Engineer In charge
2	What is the timeline?	30 days from start of project	7 days before commencement of work
3	What are the references?	Corporate EHS Risk Register	Project EHS Risk Register
4	Who reviews the implementation?	Project Head & Project EHS In charge	Engineer In charge & Project EHS Engineer
5	How often the EHS Risk Register reviewed?	Monthly (as a part of EHS committee meet)	Whenever any significant changes in work process, method, resources.

According to the procedure for EHS risk assessment, this shall be done for all the activities to determine the risk/impact level and select preventive measures for these activities.
For this matter, the EHS risk assessment shall be done for:

- Routine and non-routine activités.
- Activities of all personnel having access to the workplace (including subcontractors and visitors).
- Facilities at the workplace.

8.9 Input for EHS Risk Assessment

The input for conducting the EHS Risk Assessment shall include:

- List of work activities (are identified on the point 2.9 Major Plant & Machinery Proposed, form this EHS Plan).
- List of machinery and tools used (are identified on the point 2.9 Major Plant & Machinery Proposed, form this EHS Plan).
- Records of past incidents.
- Relevant legislations, codes of practice or specifications.
- Details of existing control measures.
- Feedback from staff, clients, suppliers, interested parties.
- Other information such as MSDS, manufacturer's instruction manual.
- Copies of any relevant previous risk assessments.

8.10 Identification of Health & Safety Hazards, Environmental Aspects

During the Project, the Health & Safety Hazards, Environmental Aspects must be identified according to these points:

- Hazards originating outside the workplace capable of adversely affecting the health and safety of persons under the control of organization within the workplace.
- Environmental aspects created in the vicinity of the workplace by work-related activities under the control of the organization.
- Human behaviour, capabilities, and other human factors.
- Infrastructure, equipment, and materials at the workplace, whether provided by us or others.
- Changes or proposed changes in the organization, its activities, or materials.
- Modifications to the EHS management system, including temporary changes and their impacts on operations, processes & activities.
- Design of work areas, processes, installations, machinery / equipment, operating procedures, and work organization, including their adaptation to human capabilities.

8.11 Evaluation of Health & Safety Risk, Environment Impact level

The evaluation of Health & Safety risk, Environment shall be done by:

- Identifying the existing risk control measures.
- Determining the likelihood of occurrence (probability).
- Assessing the potential severity of the health & safety hazards, environmental aspects.
- Ascertain the risk / impact level based on the likelihood and severity.

8.12 Existing Risk Control

The presence of existing control measures shall be first identified for each of the Health & Safety hazard, Environment aspect. By considering the effectiveness of the existing controls and the consequences of their failure, the risk / impact level can be assessed.

8.13 Risk Assessment Method

8.13.1 Likelihood of occurrence (Probability)

Likelihood of occurrence of an incident is classified as per the table given below.

Probability Descriptions (The highest category will always be used)		
VALUE	**Status**	**Description**
4	Very Likely	The event is almost certain to occur and has occurred repeatedly in the construction industry
3	Likely	The event will probably occur in most circumstances
2	Unlikely	The event may occur only in exceptional circumstances
1	Very Unlikely	Very unlikely but remotely possible

8.13.2 Severity

Severity is the degree or extent of harm that can be caused by the hazards or the environment aspect because of an incident. Severity is classified as per the table given below.

Severity Descriptions (The highest category shall always be used)	
VALUE	**Result of Hazard to Personnel / Environmental impact**
4	Fatality
3	Reportable Injury or illness resulting in more than 2 days off work / Permanent Total Disability /Major Pollution
2	Non-Reportable Lost Time Injury or Illness resulting in less than 2 days off work
1	Injury or illness requiring First Aid treatment. Minor Pollution

8.13.3 Assessment

Once the likelihood and severity have been established, the risk / impact level can be determined.

To determine the risk / impact level, select the appropriate row for Severity and the appropriate column for Likelihood; the cell where they intersect indicates the Risk / Impact Level.

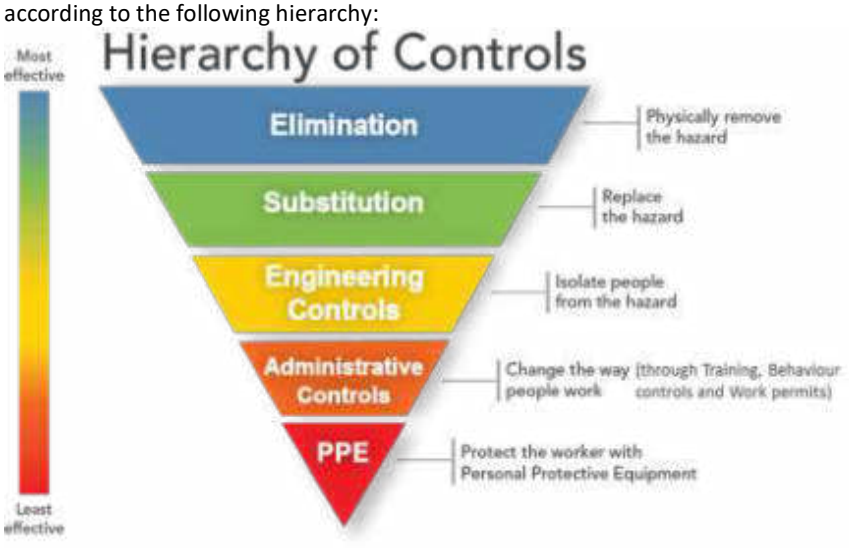
		Severity (S)			
		1	2	3	4
Probability (P)	1	1	2	3	4
	2	2	4	6	8
	3	3	6	9	12
	4	4	8	12	16

8.13.4 Determining Controls

Based on the level determined, controls should be selected to reduce the risk / impact level to an acceptable level. This can be done by reducing the Severity and/or Likelihood.

Risk Rating (P x S)	Risk level	Recommended actions
1 to 3	Low Risk	No additional risk control measures may be needed.
4 to 8	Medium Risk	Work can be carried out with Risk controls in place
9 to 16	High Risk	Don't start work. Risk level must be reduced to Medium / low before commencing work.

As indicated in the risk matrix, when the risk level is "High" effective controls must be implemented to bring down the High-Risk level to medium or low risk Level "As low as reasonably practicable".
When determining controls, or considering changes to existing controls, consideration shall be given to reducing the risks according to the following hierarchy:



8.13.5 Residual Risks / Impact

Residual risks / impacts are the remaining risks / impacts, for which the planned controls are not able to effectively remove or control. It shall be ensured that the residual risks / impacts are acceptable and manageable.

8.14 Safe Work Method statement

The Engineer In charge shall prepare the Safe Work Method statement (form IM 12 B from IMS Manual) in consultation with Project EHS In charge considering the existing & proposed risk controls listed in the activity EHS Risk Assessment at least 7 days prior to commencing work.

The Risk Assessment and SWM will be submitted together to Project EHS In charge for review and Project Head for approval. If the SWM is found to be unacceptable, then it will be returned to the Engineer In charge for revision and re-submission.

Safe Work Method - Status clarification

o ACC - Accepted (proceed with work)
o AAN - Accepted as Noted (incorporate all comments prior to proceeding with work)
o RAR - Revise and Re-submit (rejected).

8.15 Risk Management Register

The list of activities under each Engineer In charge / Section In charge will be detailed with like start and completion dates. The availability of EHS Risk Assessment and approved Safe Work Method will be updated on monthly basis.

The Project EHS In charge maintains the Risk Management Register for whole project and this will be overseen by Project Head.

8.16 Implement controls

Commence work as per the approved Safe Work Method statement. Ensure availability of adequate resources to implement the controls while work execution.

8.17 Work Permit System

- Work permit systems will be implemented for the activities which are required to be performed under controlled environment. Follow the Work Permit System procedure (IM 14 from IMS Manual).
- The following work permits shall be followed as applicable
    - Working at height permit
    - Confined Space work permit
    - Hot work permit
    - Excavation work permit
    - Radiography work permit
    - Permit to work on Plant & Machinery
    - Electrical work permit
    - Blasting permit

8.18 Daily Pre-start verification and briefing to workmen

- The Engineer In charge will complete the 'Daily Pre-start verification and Briefing sheet' before starting the work every day.
- Pre-start verification' ensures that the EHS risks involved in the day's task are assessed and site condition verified for compliance in line with the Risk Assessment and SWM.
- Before starting the day's work, the workforce shall be briefed about the nature of the risks involved and the control measures implemented in line with the Risk Assessment and Safe work method statement. Language of briefing shall be understandable to the workforce.

8.19 Review & Update of EHS Risk Management/Assessment

- The review and update are identified in the EHS Risk Management / Assessment Roles & Responsibilities document, approved for Lower Kopili HEP

9 COMPETENCE TRAINING & AWARENESS

The project shall ensure that all employees & workmen are competent based on appropriate education, training, or experience. The training needs of all personnel shall be evaluated, and necessary training shall be imparted to them.

This section shall address the site arrangement for ensuring compliance to the IMS procedure 'Competence, Training & Awareness'. This section shall include the following:

A. Competency Criteria & Screening of Workmen
B. EHS Induction arrangement
C. Training Matrix (typical matrix given in Annex B) and Training Calendar
D. Pre-start Verification & Briefing arrangement

9.1 Competence

9.1.1 Competence of L&T employees:

L&T HR department shall recruit employees who qualify a stringent recruitment process which include competency evaluation by a panel of technical experts.
The Project Head shall deploy managers, engineers, and supervisors who are competent both with respect to the work under construction, and in the techniques of management, Communications, and supervision.

9.1.2 Competence of Subcontractor's workforce:

During screening process, the Engineer In-charge shall ascertain the suitability of workers for the specified job, for which he is due to be engaged, in consultation with EHS Department. Refer the IMS format – 'Proforma for screening workmen'.
Specialized categories of workforce shall be screened and authorized by the respective department heads before engaging at site. For instance, all plant operators, drivers, and electricians should be competent and authorized by P&M Department before engaging at site.

9.2 EHS induction:

9.2.1 Infrastructure Requirements for EHS Induction facilities

The Project Head shall ensure that standard infrastructure facilities are provided as given below:

1. EHS Induction room (provided with minimum 20 chairs)
2. Computer with multimedia facilities and portable loudspeakers
3. Over Head Projector with screen (minimum 40-inch screen)
4. Printer & Laminating device for Helmet Stickers for issuing to workers
5. Digital camera

9.2.2 Full site EHS Induction for employees & workforce

- Project EHS In charge shall ensure that all new employees and workforce shall be provided project specific EHS induction before deployment at site and an induction register shall be maintained with the details of inducted employees & workforce.
- Project EHS In charge shall develop a full site EHS induction module as per the standard structure given in
- IM-11-B1 and made specific for the project for the induction of all employees and workforce.
- The duration of the site induction course is dependent on the hazards & risk associated with individual projects and will not be less than 2 hours in duration. The mode of training and trainers shall be planned considering the differing levels of responsibility, ability, language skills & literacy of participants.
- All new workers are at a much higher risk of injury during the first month on the job and hence shall be monitored and guided by the frontline supervisors during the first month on the job.

9.2.3 Refresher EHS induction

- A Refresher EHS induction shall be provided for all employees and workforce at least every 12 months. The refresher program shall be administratively linked to the renewal of ID card / gate pass.

9.2.4 Visitor EHS Induction

- Project Head shall ensure that all visitors to site should be given visitor EHS induction before entering the site. They should be accompanied by one of the project employees when on site.
- The format IM-11-C shall be used for visitor EHS induction and records shall be maintained.

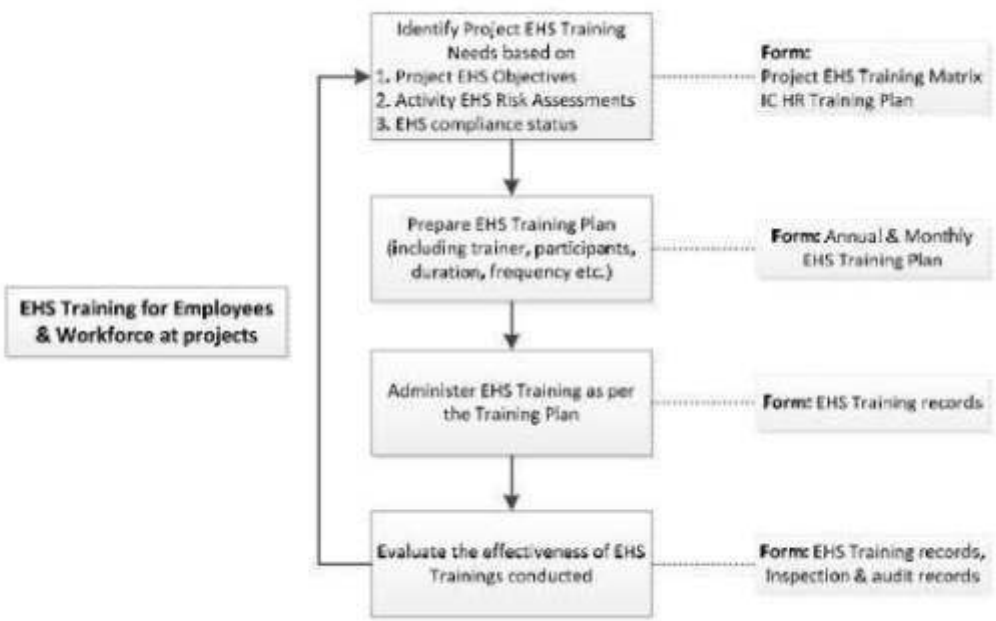
9.2.5 Temporary / Emergency EHS Induction for specific cases

- In the event of a person requiring an induction to enable him to work on site in the case of an emergency, personnel replacement, or maintenance callout etc., a temporary induction may give which is valid for 48 hours only. The individual shall be escorted or under the supervision of a person who has always completed the full site induction when on site
- the temporary EHS induction shall include a brief snapshot of all the contents of full site EHS induction course. The duration shall not be less than 20 minutes.

9.2.6 EHS induction for Office based Staff

- All office (HQ and Cluster office) based staff shall be given office EHS induction during the first month of posting in office. The office administration coordinator in coordination with EHS.
- Department shall issue the office EHS induction form as per IM 11 B2 to the new staff as a part of the joining procedure at office.

9.3 EHS training & awareness:



9.3.1 Activity / Trade Specific EHS training

- In addition to the general EHS induction, activity / trade specific training shall be planned conducted for all employees and workforce in regular intervals depending on their area of responsibility and the health & safety risks they might encounter at work. A training matrix should be prepared by the Project EHS In charge as per the format IM-11-A.

9.3.2 EHS Training requirements stipulated in IC EHS Strategy document

- IC EHS Head shall identify EHS training needs for all projects within the IC and minimum training requirements for employees and workforce shall be stipulated in the IC EHS Strategy document approved by IC Head.
- Project Head shall ensure that the training requirements stipulated in the IC EHS Strategy document for the current year are fulfilled in his project.

9.3.3 Daily briefing to workforce

- The Engineer In-charge shall ensure that before starting the day's work, the workforce shall be briefed about the nature of the risks involved and the control measures implemented in line with the Risk Assessment and Safe work method statement. Language of briefing shall be understandable to the workforce.

9.3.4 Mass Toolbox talks

- The Engineer In-charge shall ensure that mass toolbox talks on EHS are conducted at least every week to the entire workforce to raise general EHS awareness relevant to the activities performed at site. Language of talks shall be understandable to the workforce.

9.3.5 Records

- Training & Induction records shall be maintained by EHS department for a minimum retention period of 3 years or till completion of the project whichever is earlier.

9.3.6 Associated Forms & Templates

- IM-11-A Training Matrix
- IM-11-B1 Full site EHS Induction course content structure
- IM-11-B2 Office EHS Induction course content structure
- IM-11-C Visitor Induction format
- Proforma for Screening workmen
- Sample EHS Induction room set up

9.3.7 EHS TRAINING MATRIX

Annexure-B- please refer to the end of the Plan.

9.3.8 EHS Induction details

Course Name	**General Site EHS Induction**	
Duration	**190 Minis**	
Location	**Project Induction Hall**	
Trainer	**EHS Officer**	
Objective	**1. Attendance to understand the general EHS requirements of the respective site.** **2. Attendee to identify the special / high risk tasks on site.** **3. Attendance to point out the emergency reporting procedures, emergency Assembly Points and other critical Locations**	
Time frame	**Topic**	**Assisting facilities / material**
30 minutes depends on the class size.	**Administration** • **Fill in attendance form & Rules receipt** • **Check and copy related certificates** • **Issue EHS handbook & Golden safety rules.**	**Attendance form & rules receipt EHS handbook & Golden Safety Rules**
5 – 10 minutes	**Opening** • **Welcoming Speech** • **Icebreaking activities**	
5 minutes	**Body** **1. Identify the scope of training**	**PowerPoint**
5 minutes	**2. Display the site layout and introduce the project scope**	**PowerPoint poster/ Photos**
10 minutes	**3. Introduce the L&T EHS Policy, Project EHS policy and organization structure**	**PowerPoint**

15 minutes	**4. Introduce the L&T Golden Safety rules and general duties of employers and employees**	**PowerPoint**
5 minutes	**5. Identify the project emergency team, location of assembly points and other critical locations**	**PowerPoint / posters / guidelines**
5 minutes	**6. Introduce accident, incident and near misses reporting procedures**	**PowerPoint**
10 minutes	**7. Introduce the fire, adverse weathers and others emergency responding procedures**	**PowerPoint**
20 minutes	**8. Highlight the specific / high risk tasks on site and specify the corresponding safety precautions & relevant specific safety rules**	**PowerPoint / SSR / Video Sharing**
5 minutes	**9. Introduce the permit to work system applied on the site.**	**PowerPoint**
5 minutes	**10. Introduce the safe working cycle practicing on site**	**PowerPoint**
10 minutes	**11. Introduce the Specific PPE to be used with demonstration**	**PowerPoint**
5 minutes	**12. Introduce the access and security control**	**PowerPoint**
10 minutes	**13. Introduce the L&T L-I-F-E programme and Behavior**	**PowerPoint**
10 minutes	**14. Introduce the site-specific incentive schemes**	**PowerPoint**
5 minutes	**15. Introduce the penalty scheme for those being misconduct or violate any safety rules.**	**PowerPoint**
15 minutes	**16. Identify the first Aid / site nurse station and highlight common health issues** **17. Manual Handling** **18. Mosquito Control** **19. Heat stress** **20. Dengue fever** **21. Health Surveillance Programme** **22. Site Facilities i.e., location of drinking water facilities, resting and smoking areas**	**PowerPoint**
10 minutes	**Closing** **23. Question and recap** **24. Course Evaluation** **25. Issue induction possess and helmet stickers**	**PowerPoint / Passes / Stickers**
Total 160 Minutes + 30 Minutes (for Administrative Procedure)		

10 SUBCONTRACTOR MANAGEMENT

The project shall ensure that all Subcontractors are made aware of the project EHS requirements before deployment. Also, the EHS performance of all Subcontractors shall be evaluated and monitored every month.

This section shall include the following:

A. Prequalification of subcontractors
B. Subcontractor EHS Code of Practice
C. Arrangement for Monthly Subcontractor EHS Meeting
D. Arrangement for Monthly EHS Evaluation of Subcontractors

All Subcontractors / Vendor / Supplier / Third Party performing services at the Project shall be subject to this plan requirement.

NO.	TASK	COMPLIANCE TARGET	VERIFICATION DOCUMENT

1.	Understand the EHS code of practice for subcontractors and sign the same as a token of acceptance before starting the activity.	Before starting the activity	EHS Code for Sub contractors
2.	Subcontractor, his Supervisor, and his workmen shall adhere all the laid down EHS rules & regulations while working at site, follow the instruction / advice of Site engineer & EHSO from time to time.	Continuous	Monthly Evaluation of Subcontractors

10.1 Associated Forms & Templates

1. PROJECT EHS GUIDELINES / RULES FOR SUB-CONTRACTORS
2. MONTHLY SUB-CONTRACTOR'S EHS PERFORMANCE EVALUATION

LARSEN & TOUBRO

Larsen & Toubro Limited,
L&T Construction
Heavy Civil Infrastructure
Mount Poonamallee Road
Manapakkam, P. B. No. 979
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Annexure-1

Project EHS Guidelines/rules for sub-contractors

1. No workmen below 18 years and above 58 years of age shall be engaged for a job.
2. All workmen shall be screened by L&T HCI IC as per Project Medical Screening procedure before engaging them on the job. Physical fitness of all employees shall be considered to ensure employees are fit to carry out their assigned job safely i.e. height pass for work at height, vision and audiometry test as minimum for Drivers & Operators etc. before employment. The final decision rests with the L&T HCI IC site management to reject any person on the ground of physical fitness.
3. All workmen deployed by Sub-Contractor must attend EHS orientation prior to commencing work.
4. Workmen shall attend safety briefings and tool box meetings conducted at site before start the job.
5. Sub-Contractor shall deploy only those equipment and plants which are inspected and approved by site management confirming fit for use and holding a valid **"GREEN CARD"** issued by the site management. Subsequently, these equipment shall also be subjected to monthly periodical inspection and the deviations identified during inspection shall be rectified within given time and then only validity of GREEN CARD will be extended for next one month.
6. Sub-Contractor must ensure daily pre-use checks by the user/operator for all equipment, vehicles, tools and tackles and portable power tools.
7. All lifting equipment and gears must meet L&T HCI IC requirements. These shall be certified by third party periodically as per the local legislation/L&T HCI IC CEHSS and IM Procedure.
8. Sub-Contractor shall ensure that all the vehicles / machinery are operated by only authorized persons holding valid driving license which shall be carried by them at all times and they must respect the traffic rules and signage.
9. Sub-Contractor shall ensure that workmen /supervisors are not using mobile phones when operating vehicles /equipment, or working at height or while walking at construction workplace.

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10. Appropriate mandatory personal protective equipment shall be worn by all of Sub-Contractor workmen / supervisors at all times when working at site (e.g. safety helmet, safety boots, reflective vest in all work locations and other risk based personal protective equipment as recommended by the EHS dept. for the specific work area). Personal protective equipment shall be kept in good condition. Any defects shall be reported to Sub-Contractor immediate supervisor.
11. Sub-Contractor shall obtain Permit-to-work before commencing any specialized work for which a Permit-to-Work system applies e.g. Confined Space, Hot work, Excavation Works, Lifting, Radiography, and Working at height etc.
12. Sub-Contractor shall ensure that electrical connections / repairs to be carried out by only authorized electricians. All electrical installations shall meet the standards i.e. All the connections to electrical installations, light fittings, power driven equipment are connected through the power source routed through ELCB / RCCB.
13. Sub-Contractor shall ensure that adequate illumination is provided at workplace. No work to be continued with inadequate illumination.
14. Sub-Contractor shall ensure that none of workers smoke at workplace or consume alcohol / drugs while they are on work.
15. Sub-Contractor shall ensure that none of the equipment deployed by Sub-Contractor is overloaded while carrying out lifting activities, material transportation and transportation of workmen.
16. Sub-Contractor shall provide safe means of transportation to the workmen being transported to the workplace. In cases of using L&T HCI IC transportations they must follow L&T HCI IC requirements.
17. None of Sub-Contractor workmen are allowed to do cooking inside the living rooms in workmen accommodation.
18. Good housekeeping to be maintained at all locations. Sub-Contractor shall ensure that the workplace be kept clean and tidy. Clear access shall be maintained at all times in the work locations. Materials shall not be stacked to the dangerous height at workspace.
19. All excavated pits shall be provided with hard barricades, signs posted. Barricade to be maintained till the backfilling is done. Safe access / egress shall be ensured for all excavations. TRAP (Traffic Risk Assessment Procedure) shall be followed.

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20. All the incidents including near miss accident cases shall be reported to the concerned L&T HCI IC EHS engineer / Site engineer.
21. Sub-contractor shall rectify all the unsafe conditions / unsafe acts reported immediately. Any STOP WORK instruction by the EHS engineer shall be respected in view of prevailing hazards and work can be resumed only if the safe conditions are restored and after getting clearance from the area EHS personnel.
22. Sub-Contractor shall appoint a competent Safety engineer /safety supervisor to co-ordinate and follow up the compliance of safety requirements under the guidance of L&T HCI IC project safety team.
23. Sub- Contractors shall ensure adequate supervisor at workplace. They shall ensure that all persons working under them shall perform the job safely and don't create any hazard to self or to any co-workers.
24. All the dangerous moving parts of the portable / fixed machinery being used shall be adequately guarded.
25. Ladders being used at site shall be adequately secured at the bottom to top. Ladders shall not be used as work-platforms.
26. Erection zones and dismantling zones shall be barricaded and nobody will be allowed to stand under suspended load.
27. Horseplay and running is completely prohibited at workplace.
28. Materials shall not be thrown from heights. While loading/ unloading the barricading to be provided to prevent unauthorized personnel entry.
29. All scaffoldings/work platform shall be strong enough to withstand the expected load. Scaffolding erection, dismantling and modification shall only be done by trained and certified scaffold erectors. Entire activities shall be supervised by training and certified supervisor. Scaffolding shall be inspected weekly by the inspector/supervisor and tagged as per L&T HCI IC procedure.
30. All tools and tackles shall be inspected before use. Defects are to reported immediately. No lifting tackles to be used unless it is certified by the P&M In charge/ Safety Coordinator.
31. Adequate fire equipment's shall be made available at work place and persons are to be trained in firefighting techniques with co-ordination of Site Safety Co-coordinator.
32. Work area shall be secured to prevent entry of unauthorized personnel.

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Environmental

1. Sub-Contractor shall abide all the regulatory and contractual environmental compliance requirement pertaining to their scope of work.
2. They will be responsible for the management of their waste materials which includes but not limited to C&D waste, hazardous waste, biomedical waste, E-waste any other waste stream as identified during the execution of their scope of work.
3. Sub-contractor shall be responsible for dust control resulting from their work.
4. Sub-Contractor shall take necessary action to control and mitigate pollution and emission resulting from their activities which included but not limited to emission control of plant and machinery, diesel generators, vehicular pollution, waste water generation, spill and any other source of pollutants as identified during construction/execution of work.
5. Sub-Contractor shall be liable for recordkeeping of all environmental documents which includes but not limited to waste record and disposal approvals, emission records, hazardous material classification details and related approval for its procurement, storage, movement and final disposal.
6. Sub-Contractor shall ensure that construction plant and machineries are regularly maintained in a sound workable condition with routine service, free from any spillage and leaks and emissions are within the regulatory limits.
7. Sub-Contractor/supplier/service provider shall ensure that environmental consideration has been given priority in their supply chain to reduce carbon foot print by giving priority preference for ecofriendly materials I.e., materials and products with recycling content, regionally sourced materials & products, product with high bio degradable and inert contents and energy efficient product and services.
8. Sub-Contractor shall ensure that they will consider energy and resource conservation initiatives through recycling & reuse, energy and water conservation, reduction in consumption of office stationery specially papers.

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9. Sub-Contractor shall provide full cooperation to L&T for the implementation of its environmental program and will provide all necessary environmental training to its workforce.

Any non-compliance to the above requirements is liable for imposing penalty. EHS performance shall be monitored monthly. Repetitive /serious non-compliances may be dealt with termination of contract and will not be considered for award of future jobs of L&T HCI IC.

I agree to the above guidelines and shall abide by it without fail.

Accepted my me

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IM Format No. : 13 A

MONTHLY SUB-CONTRACTOR'S EHS PERFORMANCE EVALUATION

Name of the Project: Lower Kopili-120 MW **BU : Hydel** **Month: January**

Sl. No	ATTRIBUTES \ SUB-CONTRACTOR													
1	Zero Fatalities (Zero Fatality - 10 Points, else Zero mark)	10												
2	Number of Lost Time Injuries (Zero LTI-10Points, 1-5LTI -5Points, >5LTI -0Points)	10												
3	Fitness of Plant and Machinery (Equipment is deployed after the Fitness Test and Green Tag)	10												
4	Participation in EHS Trainings	10												
5	Compliance to EHS requirements	10												
6	PPEs Compliance	5												
7	Good Housekeeping standard	5												
8	Workmen discipline (adharance to policies)	5												
9	Waste management (segregation and disposal)	10												
10	Timely closeout of corrective and preventive actions from incidents, inspections & audits).	10												
11	Incident Reporting	10												
12	Innovative idea and implementation to save losses	5												
	Total Points	100												

Points	0 - 70
Rating	Poor

Note: 1. The above record is maintained as per periodical EHS inspection

Signature of EHSO Date

Signature of PM Date

IM: 13 – Sub-Contractor Management Revision 01 dt: 02.02.2018 Page **1** of **1**

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11 MONTHLY EHS PERFORMANCE REPORTING

This section addresses the site arrangement for EHS performance reporting internally and externally.

11.1 Reporting Method

The monthly EHS performance reporting is aimed at measuring the EHS performance (lag and lead indicators) of the project and to measure the status of compliance to EHS targets & objectives. The reporting shall identify areas of improvement and focus on the specifics to reinforce efforts for improving performance.
The reporting requirements shall address

A. Monthly Reporting to HQ / BU / Cluster (as per the IMS procedure 'Monthly EHS Performance Reporting')
B. EHS Performance Reporting within the project

Project Head & Project EHS In charge shall send the Monthly EHS performance reports to Cluster EHS Head, HQ – EHS and EHSINFRA@LNTECC.COM in the specified format (IM 20A) before 3rd of the next month.

The monthly EHS performance report **covers** the following parameters,

- Monthly EHS Statistics
- Incident Register
- Incident Analysis Dashboard
- EHS Evaluation of Subcontractors
- EHS Training Master
- EHS Staff Register
- Compliance status of COVID 19 SOP
- Vaccination status

11.2 Associated Forms & Templates

- IM 20 A Monthly EHS Statistics
- IM 23 D Incident Register
- IM 20 B Incident Analysis Dashboard
- IM 20 C EHS Evaluation of Subcontractors
- NA EHS Training Master
- IM 20 D EHS Staff Register

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Monthly EHS Statistics Report | **IM Format No. : 20 A**

"Write the Project Name"

Date:

Job Number: **BU:** **Month & Year:**

Name of the Project Head: **Name of the Project EHS Incharge:**

Description	For the Month	FY: 2020-21	Remarks
Statistics			
No. of workforce (including staff and workmen)	0		
Total Manhours worked	0		
Safe manhours from last Reportable Lost Time Injury			Mention date of last RLTI
Incident details			
No. of Fatalities (Category 1 Incident) - (Zero fatality*)			
No. of Reportable Lost Time Injuries (Non-fatal) (Category 2 Incident)			
No. of Mandays Lost			
Dangerous Occurrences (Category 3 Incident)			
Reportable Sick Cases (Category 4 Incident)			
Major Environment Incidents (Category 5 Incident)			
Non-Work Related Incident (not included in statistics)			
First Aid Cases (Category 6 Incident)			
Near Miss Reports (Category 7 Incident) - (5 Near miss cases per million man hours*)			
Minor Environment Incidents (Category 8 Incident)			
Frequency Rate - No. of RLTI (incl. fatal) per million manhours worked (AFR <0.17*)			
Severity Rate - No. of mandays lost per million manhours worked			

Breakup of Total Manhours worked for the Month:

Description	Number	Manhours Worked	OverTime performed	Total Manhours
Company Staff				0
Departmental workmen (including regular supply)				0
Subcontractor's workmen (including security personnel)				0
Grand Total of Manhours worked	0			0

EHS Leading Indicators

	For the Month	FY: 2020-21	Remarks
Number of Project EHS committee meetings held - 1 per month*			
Number of Monthly Workmen Safety Meetings held - 1 per month*			
Number of Monthly EHS Coordination meetings with EHS teams held- 1 per month*			
Number of Risk Assessments / Safe work procedures developed -Activities must be performed with approved SWP.			
Number of key EHS documents reviewed (EHS plan, Emergency plan, etc.) - 100%*			
No. of Risk Assessment & SWMS reviewed & implemented - Minimum once for a new activity immediate within a week & consecutively on every 3 months			
No. of SWM checklist completed for implementation- IM 12 J SWM Summary Checklist			
No. of Class 1 Risk identified and reviewed for implementation			
Number of Emergency Mock Drills -once in every 6 months.*			
Number of observations posted in EHS observation App- 100%*			
Number of IVRS complaints closed			
Number of Safety Moments recorded			
Number of pre-start verification &briefing conducted for the month-100% as per plan*			

EHS Performance Measurement & Monitoring - Audits & Inspections

EHS Inspections	Number of Inspections conducted during the Month	No of UA/UC observed during the Month	No of UA/UC rectified during the month	Current Financial Year UA/UC Closure % (No. of total closed / No. of total UA/UC)
Executive EHS inspections conducted by Project Head-1 per Month*				%
EHS Inspections conducted by Project EHS Incharge - 2 per Month*				%
EHS Inspections conducted by EHS Engineers & Supervisors - 1 per week*				%
Workplace OHS monitoring Program- As per activity Risk*				%

EHS Audits	Number of Audits during the Month	No of NCs & Observations raised	No of NCs & Observations closed	Current Financial Year Observation Closure % (No. of total closed / No. of total Observations)
EHS Risk management audit conducted by Project EHS Incharge- 1month & verify all CAT compliance*				
Cluster EHS head Risk Management audit- 2 per year per project.				
Intra site EHS audits conducted within projects-All projects audited once in a year & After any Major category incidents.*				
Internal EHS audits conducted by IC- 2 per year per project.				
Cluster level cross projects EHS Audit- 2 per year per project.				
External EHS audits conducted by Client / Consultant / 3rd Party				
Occupational Health & Hygiene inspections				

Training Details	Yes / No	Details
Availability of Site Annual EHSTraining Plan		
Is Project Head IOSH- Managing Safety qualified		
Is Project EHS Incharge NEBOSH qualified		
Project has atleast two qualified internal EHS auditor*?		If yes: write the 2 auditor name.
Project has atleast two qualified incident investigator*?		If yes: write the 2 investigator name.

Note: Please update the below training details in EHS Training Master sheet every month	No of eligible people	No. of People attended during the month	No. of People attended till now FY: 2020-21
IOSH Managing Safely Course (All technical employees from M-1A & Above)*100%			
EHS certification course on ATL (All employees up to M10 including trainees)*100%			
Refresher EHS Leadership and Risk management training (All employees from O2 to Project Head)*100%			
Front Line Supervisor EHS Training (Supervisory staff up to O1)*100%			
Front Line Supervisor EHS Training (site appointed supervisors, JV partner, sub-contractor supervisors)-*100%			

Cranes Operator Training (Operators of L&T owned cranes)*100%			
Rigger Training(Site nominated Rigger)*100%			
Scaffold Inspector Certification Training from STI, USA.* 100% To all relevant Scaffold Inspector at site.			
All New procedures & standards briefing * To all relevant parties including employees & workers.			
Site BBS Training * To all relevant employees			
Safety in Marine Construction Training * To all relevant parties including employees & workers.			
Comprehensive Waste Management Training(Hazardous Waste and Food Waste) *Site Staff and Workers			
Online assessments on procedures*All project execution staffs			
Follow system*B1 to M1A project execution staffs			
Environment Management at Site Awareness Course* To all relevant employees			
	For the Month	**FY: 2020-21**	**Remarks**
Number of personnel attended the EHS induction programme as per new procedure- All new joinees*			
Total Training Manhours (Staff)- 100% as per plan*			
Total Training Manhours (Site appointed Supervisors+JV+ SC supervisor) 100% as per plan*			
Total Training Manhours (Workers)-100% as per plan*			
EHS Mobile App	**No. of Eligible**	**No. of Installed**	**No. of Using**
Pre-Start Verification & Briefing App- 100% as per plan*			
Near Miss Reporting App- 100% as per plan*			
EHS inspection App- 100% as per plan*			
Environment	**For the Month**	**FY: 2020-21**	**Remarks**
Environmental Initiative			
No of Trees Cut including Mangroves			
No of Trees Planted including Mangroves			
No of Community Cleanup Activity Organised			
No of Awareness Campaign Organised for School Children /Slum Dwellers/Local Community/Vendors			
Any other environmental initiative (Road Show/ Animal Rescue/Award etc.)			
Energy Consumption			
Electricity Consumption for the Project (Grid Source)- Kwh			
Renewable Source of Energy Produced and used at Project - (Solar Heater, Sloar Lighting, Solar Blinkers etc) Kwh			
Diesel Consumption for Generators & Construction Equipments (Litre)			
Diesel Consumption for Road Transport (Office&Hired Vehicle) (Litre)			
Petrol Consumption for Road Transport (Office&Hired Vehicle) (Litre)			
Water and Wastewater			
Total Potable/Fresh Water Consumption (Labour Camp+Site Office+Construction Work) (Litre)			
Treated or Partially Treated Waste Water Discharged to Land/Surface Water/Marine /Sewer/Storm Water etc (Litre)			
Treated Waste Water Recycled/Reused (Irrigation, Toilet Flushing, Cleaning Etc.) (Litre)			
Waste Management			
General Combined C&D Waste Sent for Land Disposal/Dumping- m3			
Waste Concrete Sent for Disposal - m3			
Waste Concrete Recycled/Reused at Site or Sent to 3rd Party for Recycling- m3			
E-waste for Recycling- m3			
Paper / Cardboard for Recycling- Kg			
Plastic Waste for Recycling- Kg			
Metal Scrap for Recycling (Steel + Aluminum + Copper)- kg			
Used Lubricating Oil for Recycling- Litres			
Other Hazardous Waste (Paint, Construction Chemicals etc. Sent for Treatment/Disposal)- m3			
Bio-Medical Waste for Disposal- Kg			
Food Waste Disposal through Municipal Solid Waste Disposal - m3			
Food Waste Treated at Site through Composting or Cattle Farm Feeding - m3			
Training and Awareness			
HCI IC Environmental Management System (Training Hours)			
Waste Management (Training Hours)			
General Environmental Awareness (Training Hours)			
Environmental Sustainability Skills for Workforce/Managers (Training Hours)			
Marine Environmental Management			
Environmental Inspection			
Environmental Inspection Conducted (Min. 1 Per Week)			
No of Non Conformance Raised			
No of Non Conformance Closed			
Regulatory Violation			
Number of NCN/Violation/Warning/Prohibition Notice Received from Authority (MoEF&CC, SPCB, CPCB, Local Municipality etc.)			
Total Fine/Penalty Amount if any			
Environmental Monitoring			
Total Number of Ambient Air Quality Monitoring Conducted			
Total Number of Noise Monitoring Conducted			
Total Number of Water Quality Monitoring/Testing Conducted for Treated Sewage/Potable Water			
Total Number of Soil/Sediment Testing Conducted for Contamination			
Total Number of Marine Water Quality Monitoring Conducted			
Total Number of Ecological Study Conducted (Flora and Fauna)			
Health			
Name the Occupational Health Coordinator Identified for the Project		mention the name	
Details of Health & Hygiene Activities Performed uring the Month		brief details	
Write the details of key EHS initiatives implemented during the month if any (as per EHS strategy KPI's for EHS incharge)			
Environment :			
Wellbeing:			
Health:			
Safety:			
Write the details of customer appreciation/ feedback/ complaints/ penalties/ audit remarks/Site disciplinary action for EHS non compliance by EHS etc. if any			
Give details of any Legal non-compliance if any			

Information furnished are duly scrutinized and correct. The relevant records will be maintained at project till completion of project.

Signatures: _____ Project EHS incharge

Signatures: _____ Project Head

* Target as per the approved 2020/21 EHS Strategy

IM Format No.: IM 08 A

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L&T LIFE Work Incident Free to Live Injury Free Each day

IM-23-D INCIDENT REGISTER

IM Format No. : 23 D

Incident Register for the financial year of 2020-2021

All Major and Minor Incidents - 1. Fatality, 2. PLTI, 3. Dangerous Occurrence, 4. Reportable Work Cases, 5. Major Environment Incident, Non-Work Related Incident (not included in statistics), 6. First Aid Cases, 7. Near Miss Reports 8. Minor Environment Incidents

Sr.	Month	Date & Time	Incident Type	Location	Brief Description	Name of Person(s) Injured	Age	Designation	Presumed Duty on	Investigation Report Circulated (Yes / In progress / Not applicable)	Incident Alert Circulated (Yes / In progress / Not applicable)	Closure of Remedial action
					dittd							

Signatures: _____ Project EHS incharge

Signatures: _____ Project Head

IM : 20 -Monthly EHS Performance Reporting

Revision 05 dt: 25.07.2018

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IM-20-B INCIDENT ANALYSIS DASHBOARD | IM Format No. : 20 B

	Major Incidents	Minor Incidents	Analysis Major	Analysis Minor
Total number of incidents				
Human factors				
Inexperienced/ Unauthorised/ untrained worker	1	1		
Medically or physically unfit	1	1		
Poor task behaviour/ shortcuts	1	1		
PPE not used / worn	1	1		
Unsafe behaviour of worker (horseplay/ mobile phone usage etc.)	1	1		
Golden Safety rules violated	1	1		
Standing & operating in unsafe position	1	1		
Others (Specify)	1	1		
Physical condition				
Wrong selection of equipment / tools.	1	1		
Faulty equipment / tools (not safety inspected)	1	1		
Unsafe operation / Safety devices not working	1	1		
Poor housekeeping	1	1		
Poor storage of materials	1	1		
Unsuitable work area (inadequate space)	1	1		
Unsafe Work environment (light / noise / dust / smoke / weather condit	1	1		
Hazards originated due to external factors	1	1		
Others: (specify here)	1	1		
Management System				
Hazard & controls not identified previously	1	1		
Unsafe work method / Generic	1	1		
Design safety issues	1	1		
Risk control measures not implemented	1	1		
Not enough training or instruction	1	1		
Poor safety inspection & compliance	1	1		
Lack / incompetent supervision	1	1		
Poor selection/quality/no issue of PPE	1	1		
Inadequate emergency response	1	1		
Analysis of Injuries (Fatals, LTI, first aid cases) - Type of Injury				
Fracture	1	1		
Sprain/strain	1	1		
Amputation	1	1		
Poisoning	1	1		
Laceration / Cut	1	1		
Abrasion	1	1		
Burn	1	1		
Internal organ damage	1	1		
Stab / Penetration	1	1		
Others (specify)	1	1		
Analysis of Injuries (Fatals, LTI, first aid cases) - Body part injured				
Head	1	1		
Eye	1	1		
Face	1	1		
Neck	1	1		
Shoulder	1	1		
Chest	1	1		
Front body	1	1		
Back body	1	1		
Hand/Wrist/Arm	1	1		
Finger	1	1		
Leg	1	1		
Ankle/Foot	1	1		

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EHS STAFF REGISTER

IM Format No. : 20 D

Sl No.	PS Number	Name	Cadre	Company Email	Mobile	Responsibility (Roles\Area)	Highlight the new additions in last 6 month duration		
							Education (BE/DIP/BSC)	Aditional education Education (NEBOSH/Dip. Industrial safety/RLI/M.E safety)	ATL completed status (Yes/No)

Update the register in every quarter (month of April,July,Oct,Jan)

12 INCIDENT REPORTING, INVESTIGATION & ANALYSIS

The project shall ensure that all incidents are reported, investigated, analysed and actions followed up to prevent recurrence.

This section shall address the site arrangement for Incident reporting, Investigation and Analysis. This shall be in line with the IMS procedure 'Incident Reporting, Investigation & Analysis' and include the following:

12.1. List of qualified Incident Investigators

a. Dinesh Sharma
b. Kailash Chandra Maharana
c. Manoj Yadav
d. Nabajyoti Bera

12.2. Incident Classification Matrix

Part 1 Major Incidents	**Category 1**	**Fatality**
	Category 2	**Reportable Lost Time Injury (RLTI)** (Non-fatal > 48 hours)
	Category 3	**Dangerous Occurrence**
	Category 4	**Reportable Sick Case**
	Category 5	**Major Environment**
Part 2 Minor Incidents	**Category 6**	**First Aid Case**
	Category 7	**Near Miss Case**
	Category 8	**Minor Environment**
Non-work-related incident	**NA**	**Non-work-related incident**

12.3. Definitions

12.1.1 Incident:

Work-related event(s) in which an injury or ill health or fatality occurred or could have occurred. Note 1: An accident is an incident which has given rise to injury, ill health, or fatality.
Note 2: An incident where no injury, ill health, or fatality occurs may also be referred to as a "near miss", "near-hit", "close call" or "dangerous occurrence".
Note 3: An emergency is a particular type of incident.

12.1.2 Category 1- Fatality

A death resulting from a workplace incident.

12.1.3 Category 2 - Reportable Lost Time Incident (RLTI) (Non-fatal > 48 hours)

An injury causing disablement of the injured person for 48 hours or more excluding the day of the shift on which the incident occurred.
Note: Statutory Incident reporting requirement may vary at overseas projects, so country specific statutory incident reporting requirement shall be followed. However, for L&T Heavy Civil Infrastructure IC internal RLTI reporting shall be same as defined above.

12.1.4 Category 3 - Dangerous Occurrences

An incident that results in significant loss or property damage but did not result in any injury. The following incidents are categorized as dangerous occurrences,

1. Collapse of formwork.
2. Collapse of scaffold or false work (Shoring Systems).

3. Collapse of permanent structure.
4. Collapse or failure of lifting equipment and / or accessories.
5. Collapse of excavation.
6. Flooding of excavation or confined space.
7. Contact with overhead / underground services.
8. Electrical short circuit or overload causing a fire and/or explosion.
9. Any unintentional explosion, ignition, misfire, projection of material beyond the boundary of the explosive safe zone.
10. Unintentional release or escape of any substance/chemical/gas which could cause personal injury to any person.
11. Failure of a pressure system.
12. Failure of compressed gas cylinders.
13. Fire or explosion.
14. Malfunction of breathing apparatus.
15. Vehicle / plant collision or damage.

Note: If a dangerous occurrence involves human injuries, it shall also be reported under the appropriate category (RLTI or First Aid case).

12.1.5 Category 4- Reportable Sick Case

A sickness case causing disablement of the affected person for 48 hours or more excluding the day of work on which he fell sick. The sickness symptoms related to the following diseases are termed as reportable sick cases.

1. Occupational dermatitis.
2. Occupational Cancer.
3. Asbestos.
4. Silicosis.
5. Lead poisoning including poisoning by any preparation or compound of lead or their sequelae.
6. Benzene poisoning, including poisoning by any of its homologues, their nitro or amino derivatives or its sequelae.
7. Occupational asthma.
8. Pesticide poisoning.
9. Carbon monoxide poisoning.
10. Toxic Jaundice.
11. Toxic anaemia.
12. Compressed air illness (Caisson's disease).
13. Noise induced hearing loss.
14. Isocyanates poisoning.
15. Toxic nephritis.

12.1.6 Category 5 - Major Environment Incidents

Incidents are defined as of pollutants that have been spilled or unintended discharges to the atmosphere, water supplies, sewerage systems, rivers, other watercourses, to the ground and damage to existing trees, protected local habitats, protected species, fauna & flora & archaeology/historical sites which will require emergency clean up involving other agencies and/or additional resources not available with local L&T management.
Environmental incidents shall be deemed major environmental incidents that may result in fines or stop work order as a subsequent event of violation of law and regulation etc.

12.1.7 Non-Work-Related Incidents

An incident causing serious injury or fatality to any L&T employee or subcontractor worker, which is not related to site activities and occurred outside site premises. These incidents are not accounted in the safety statistics, but they are reported, investigated, and actioned to prevent untoward incidents from happening in our workplace. i.e., Road Traffic Incidents, Incidents at workmen colony etc.
Note: The EHS Department from Cluster / HQ shall be consulted if there is any lack of clarity/misperception in categorizing any incident as non-work-related incident.

12.1.8 Category 6 - First Aid Cases

First Aid Case is any one time or short-term medical treatment such as minor scratch, cuts, burns, splinters, or any other minor workplace injury and does not cause the injured person to be off work for over 48 hours.

12.1.9 Category 7 – Near Miss Cases

An incident where no injury, ill health or fatality occurs but had the potential.

12.1.10 Category 8 - Minor Environment Incidents

Minor environmental incidents are classified as situations that can be managed controlled and corrected locally with little effort and without specialist support within the confines of the L&T project.

12.4. Responsibilities

Project Head

- Shall be accountable for implementing the incident reporting, investigation, and analysis procedure at the project.
- Shall participate in the investigation process in major incidents (Category 1 - 5).
- Shall review and acknowledge all incident reports to ensure that the investigation is carried out in the manner prescribed in this procedure.
- Shall oversee that necessary corrective action has been taken and that he/she has addressed any items that may require action on his/her part.
- Shall in case of category -1 incident present incident causes and actions implemented to prevent recurrence incidents to top management.
- Ensure that Section In charges are aware of their responsibilities regarding incident reporting and investigation process and to ensure effective information flow and coordination of remedial actions is clearly communicated.
- Provide resources and other support in conducting incident investigation and corrective action process.
- Shall ensure all notifications and completed reports are issued on time.
- Implement, monitor, and verify the effectiveness of this procedure.
- Attend training and refresher training when requested.

Project EHS In charge

- Establish incident notification, reporting, investigation system at project site.
- Deliver or facilitate delivery of necessary training to introduce this procedure and periodical refresher training.
- Support project teams in securing the scene of the incident which should be left intact to the greatest extent possible with nothing moved or disturbed until the investigation is complete
- Aid project head in setting up appropriate teams for investigation and follow- up of serious EHS related incidents.
- Review incident reports initiate further investigations and/or recommend extra corrective action as considered necessary to reduce risk.
- Maintain records of original incident reports in accordance with prevailing company and legal requirements.
- Ensure details of incidents are incorporated in the Monthly EHS reports.

Section IN charges and Site Engineers

- Shall promptly report all workplace incidents verbally and in writing (all categories of incident).
- Section In charge / Site Engineer responsible for the activity shall submit the Preliminary incident report to Project Head / Project EHS In-charge before end of the shift and not later than 12 hours from occurrence.
- Shall secure the scene of the incident which should be left intact to the greatest extent possible with nothing moved or disturbed until the investigation is complete. However, lifesaving is the priority.
- Shall participate in the investigation process, where they are responsible or where their expertise would help in the investigation process.
- Shall conduct regular reviews of all incidents reported within their areas and ensure that necessary actions arising from these reviews are followed up.
- Ensure timely completion of corrective/preventative actions and provide regular progress reports to the Project leader.
- Attend training and refresher training when requested.

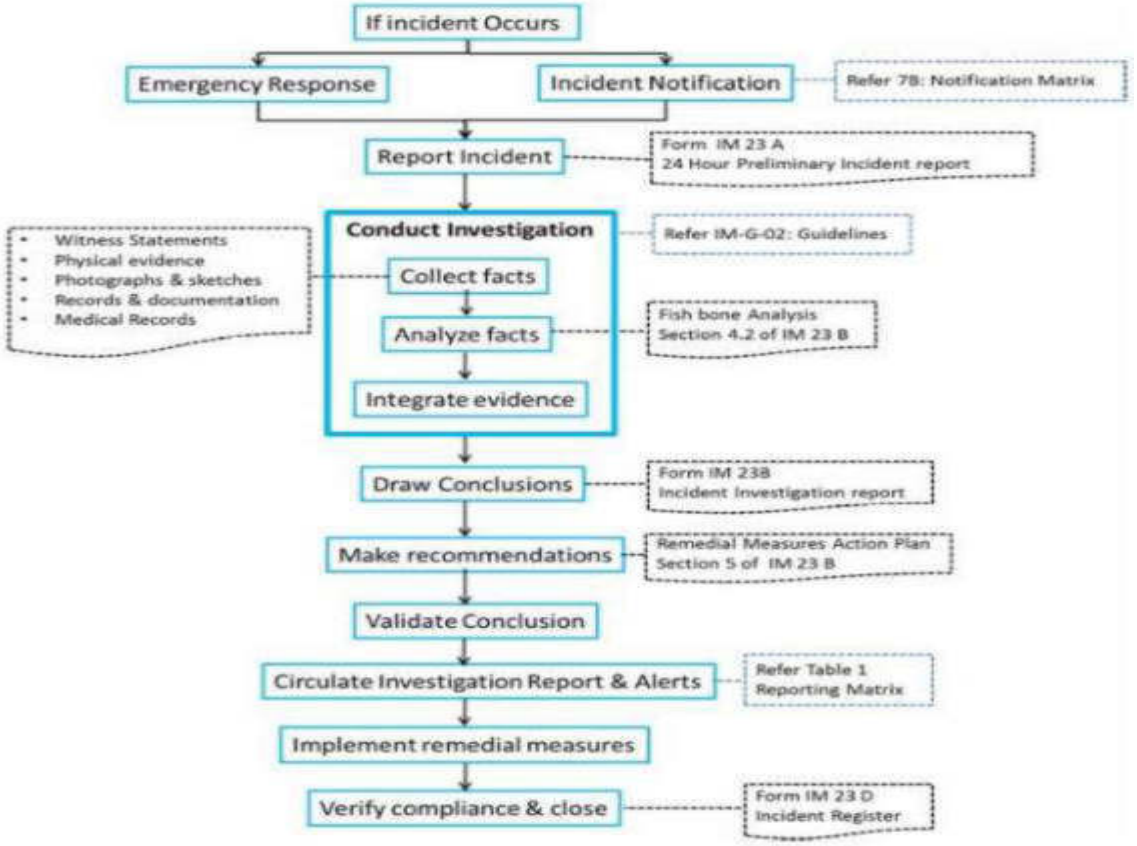
Employees

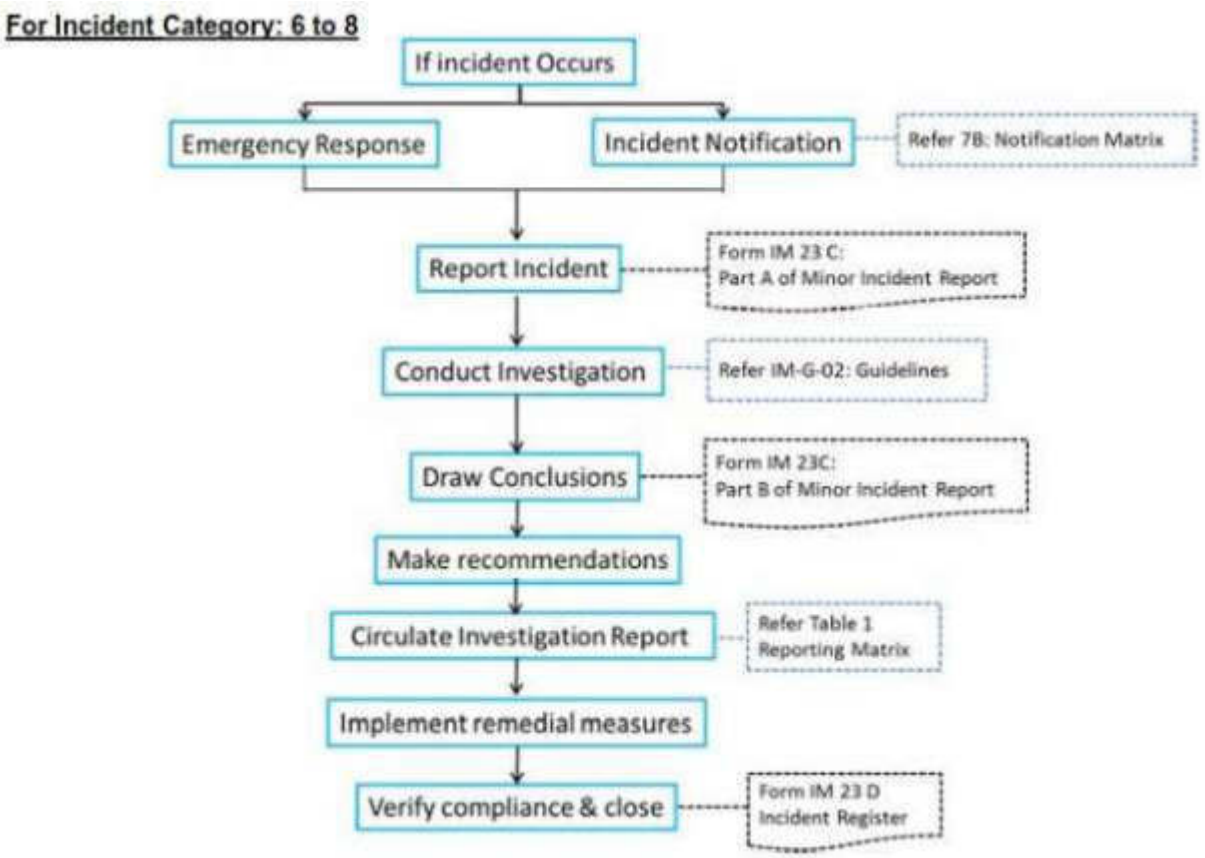
- Notify all incidents to their supervisors immediately or as soon as the employee becomes aware of a hazard.
- Participate in subsequent investigations and implementation of preventive action as required.
- Attend training and refresher training when requested.

12.5. Method

Sequence of events-Flow chart

For Incident Category: 1 to 5 (including Non-work related incident)





Notification Matrix

	Who will report?	Whom to report?	How to report?
Within Project (For all incidents)	• Engineer In-charge of the activity • All employees who are aware of the incident	• Immediate Superior • Project Head • Project EHS In-charge	**Immediate notification** by the quickest communication mode possible such as phone call, text message or email describing what had happened and the current state of emergency response.
Project to Cluster / BU / IC HQ (For major incidents: Category 1 – 5 and non-work-related incidents)	Project Head (in his absence EHS In-charge)	• IC EHS Head • BU Head • Segment Head • Cluster Head • Cluster EHS Head • ehsinfra@lntecc.com • Head – Admin Services	
Fatal Incidents & Other serious incidents	IC EHS Head	• IC Head • Deputy Managing Director & President • Senior EVP (Infrastructure) • Head - HR • Head - Finance, Accts & Admin	

Incident Investigation & Reporting:

- Refer Table-1 for Incident Investigation and Reporting Matrix.
- The incident investigation shall be carried out as per the guidelines (Refer Document IM-G-02)

Implementation of remedial measures & Closure:

- The concerned Project Head is accountable for implementing all the remedial measures outlined in the investigation report.
- Every incident shall undergo the complete cycle of this process and the Incident register shall be maintained up to date with status.
- The Analysis of Incidents (Category: 1 to 8) shall be discussed in the monthly EHS committee meeting. This shall be sent to HQ-EHS as a part of the monthly EHS performance reporting.

Presentation to Top Management in case of Category 1 incident:

- Project Head shall present the incident investigation findings, its root causes and actions implemented to prevent recurrence to top management consisting of IC Head, IC EHS Head and BU Head within 30 days from the date of incident.

Corrective & Preventive Action across the IC:

Project shall circulate incident alerts for all major incidents (Category 1-5) to HQ-EHS.
Incident alerts shall be shared among all employees and workforce through safety meetings, notice boards, toolbox talks etc. All projects shall review the existing control measures associated with similar activities and initiate preventive actions wherever necessary.

Table-1: Incident Investigation and Reporting Matrix

<table>
<tr><th>Incident Classification</th><th>Preliminary Report</th><th>Investigation Team</th><th>Investigation Report</th><th>Incident Alert</th></tr>
<tr><td>Fatality (Category 1)</td><td rowspan="2">Site Engineer shall submit the preliminary incident report to Project Head / Project EHS In-charge before end of the work shift and not later than 12 hours of occurrence.

Project Head shall forward the same to the following positions within 24 hours of occurrence:
• IC EHS Head
• BU Head
• Segment Head
• Cluster Head
• Cluster EHS Head
• ehsinfra@lntecc.com
• Head – Admin Services</td><td>• Project Head
• EHS Incharge
• Section Incharge
• Site Engineer
• Subcontractor
• Witnesses
• Cluster EHS Head
• IC EHS Head</td><td rowspan="2">Project Head or Project EHS Incharge (in the absence of Project Head) shall issue the completed Incident Investigation Report (IM 23 B) to Cluster EHS Head for review.

Cluster EHS Head shall scrutinize the report and upon satisfaction, he shall forward to IC EHS Head for approval.
IC EHS Head shall verify and approve the report (IM 23 B).

• Report to be completed and issued within seven days.
• If the report can't be completed within the stipulated time, interim report shall be issued and an agreed completion date shall be specified and formally submitted to Cluster EHS Head.

IC EHS Head shall ensure circulation of the approved Incident Investigation report to
• BU Head, Segment Head & Cluster Head
• EHS Compliance Head & Cluster EHS Head

IC EHS Head shall issue the Category 1 Incident Investigation report to IC Head, Senior EVP (Infrastructure), Head – HR & Head – Finance, Accts & Admin.

Cluster EHS Head shall circulate to Project Head and Project EHS In-charge and ensure actions are closed out.</td><td rowspan="2">HQ-EHS shall circulate incident alerts to all projects to enable them to take necessary preventive action in their projects.</td></tr>
<tr><td>Major Incidents (Category 2-5) and Non-work related incidents*</td><td>• Project Head
• EHS Incharge
• Section Incharge
• Site Engineer
• Subcontractor
• Witnesses
• Cluster EHS Head
(on need basis)</td></tr>
<tr><td>Minor Incidents (Category 6-8)</td><td>Site Engineer shall complete the Part A of IM 23 C.</td><td>• Site Engineer
• EHS Engineer
• Subcontractor
• Witnesses</td><td>Part B of Minor Incident report (IM 23 C) shall be completed by the EHS Engineer. The completed report shall be circulated to Project Head, Project EHS In-charge and all concerned departments in the project within three days.</td><td></td></tr>
</table>

12.6. Associated Forms & Templates

IM 23 A 24 Hour Preliminary Incident Report
IM 23 B Incident Investigation Report
IM 23 C Minor Incident Report
IM 23 D Incident Register
IM 23 E Incident Alert

24 Hour PRELIMINARY INCIDENT REPORT

1. Details of the Project	
Name of the Project & Job Number:	Business Unit:
Site Engineer (with P.S. No):	Section In charge (with P.S. No):
P&M In charge (if P&M related incident):	Name of the EHS In charge:
Name of the Project Head:	Name of Subcontractor / Vendor code:

2. Category of Incident (Tick as applicable)		
Major Incidents	Category 1	☐ Fatality
	Category 2	☐ Reportable Lost Time Injury (Non-fatal > 48 hours)
	Category 3	☐ Dangerous Occurrence
	Category 4	☐ Reportable Sick Case
	Category 5	☐ Major Environment
	-	☐ Non-Work-Related Incident (not included in statistics)

3. Details of the Incident (Write N.A if not applicable)

Name of the Injured	Age	Sex	Designation	Nature of Injury

Date & Time of Incident:	
Exact Location where the Incident occurred:	
Describe briefly how the incident occurred:	

First Aid treatment details:

Incident Investigation Report

Name of the Witnesses:	
Immediate Action taken to prevent recurrence:	
Please insert relevant photographs below:	
To describe the incident site: long shot +ADD PHOTO+	**Incident scene** +ADD PHOTO+
[Photo No. & photo description]	[Photo No. & photo description]
Close view of damage / abnormal condition +ADD PHOTO+	**Close view 2 of damage / abnormal condition / Sketch** +ADD PHOTO+
[Photo No. & photo description]	[Photo No. & photo description]
Name of the Site Engineer: PS No :	Signature:
Reviewed and forwarded by	
Project Head signature: _____	EHS In-charge signature: _____
Forward the Incident Investigation Report to	
• Cluster Head & Cluster EHS Head • BU Head & Segment Head • IC EHS Head, IC Compliance Head, ehsinfra@lntecc.com and Head – Admin Services	

INCIDENT DATE & TIME:	
INCIDENT CATEGORY:	
NAME OF THE PROJECT:	
BU NAME:	



IM Format No.: IM 08 A

Incident Investigation Report

Ref.	Content	Attached (Yes/No)	Page Nos.
Main Report	**Incident Investigation Report**		
Annexure-1	**Screening Form, Pre-Employment Medical Check-up Records**		
Annexure-2	**Daily Pre-Start Briefing Records & Permits**		
Annexure-3	**Statutory Records/Evidence**		
Annexure-4	**Records of Relevant Training**		
Annexure-5	**Records of PPE Issued**		
Annexure-6	**Details of Medical Treatment administrated to Injured.**		
Annexure-7	**Witness Statement**		
Annexure-8	**Previous EHS Inspection Report**		
Annexure-9	**Previous Risk Assessment & Safe Work Method (SWM)**		
Annexure-10	**Incident Notification Report**		
Annexure-11	**Incident Alert**		
Annexure-12	**FIR Copy (if any)**		
Annexure-13	**Post-mortem Copy (if any)**		
Annexure-14	**Cost of the incident (IM 23 B3)**		
Annexure-15	**Updated (after the incident) Risk Assessment & Safe Work Method**		
Annexure-16	**Action plan Compliance evidence**		
Annexure-17	**Others (if any)**		

IM Format No.: IM 08 A

INCIDENT INVESTIGATION REPORT

1. Details of the Project

Name of the Project & Job Number:	Business Unit:
Site Engineer (with P.S. No):	Section In charge (with P.S. No):
P&M In charge (if P&M related incident):	Name of the EHS In charge:
Name of the Project Head:	Name of Subcontractor / Vendor code:

2. Category of Incident (Tick as applicable)

Part 1 Major Incidents	Category 1	☐ Fatality
	Category 2	☐ Reportable Lost Time Injury (Non-fatal > 48 hours)
	Category 3	☐ Dangerous Occurrence
	Category 4	☐ Reportable Sick Case
	Category 5	☐ Major Environment
	-	☐ Non-Work-Related Incident (not included in statistics)

3. Details of the Incident (Write N.A if not applicable)

3.1 Injured person details

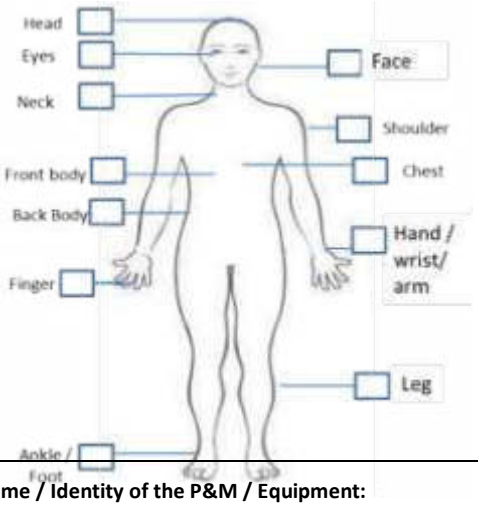
Name of the Injured	Age	Sex	Designation	Date of Joining	Date of EHS induction
Date & Time of Incident:					

3.2) Exact Location where the Incident occurred:

3.3) Injury details:

Body Part Injured (Strike out if DO)	Type of Injury

IM Format No.: IM 08 A

Tick the injured body part	Tick the type of injury
	☐ Fracture ☐ Sprain/strain ☐ Amputation ☐ Poisoning ☐ Laceration / Cut ☐ Abrasion ☐ Burn ☐ Internal organ damage ☐ Stab / Penetration ☐ Others (specify)

3.4) Name / Identity of the P&M / Equipment:

Asset Code: _____ Registration No: _____ Owned by: L&T ☐ Subcontractor ☐

3.5) Describe in detail how the incident occurred:

Note: *Any investigation report should only be based on supported factual evidence. It is to be in a structed logical format that clearly identifies direct cause. The following Headings and Notes are to support the report content requirements. EHS Procedure - - gives an example report*

3.5.1 Introduction: (delete below bullets/sub points and add accordingly)

Note: *The introduction is to outline the accident/Incident details, and put into context what the activity was, or being undertaken. Who was involved directly, indirectly, and their position, and their company? It must consider any external influence such as Weather, or other activities at the time.*

- On **XXXX** date in **XXX** shift **XXX** activity planned at **XXXX** Location
- What was the plan to carry out on the day with whom?
- Who has instructed what?

3.5.2. Investigation **(delete below bullets/sub points and add accordingly)**

Note: *The investigation content must put into context, in a detailed structured manner, specific details of the activity, and how, or what, led to the injury, or incident from the activity. This must be supported with factual evidence. i.e., photo or Witness Statement, and referenced to that evidence. Each Sentence or paragraph must be under numeric, subheading.*

3.5.2.1 At **XXXX** time ……
3.5.2.2. Explain in detail about the activity
3.5.2.3 At **XXXX** time describe in detail with the reference to the photo 1.
3.5.2.4 At **XXXX** time describe in detail with the reference to the photo 2.
3.5.2.5 At **XXXX** time describe in detail with the reference to the witness statement 1.
3.5.2.6 At **XXXX** time describe in detail with the reference to the witness statement 2.

3.5.3 Conclusion: (delete below contents and add accordingly)

Note: *The conclusion is to place into context the factual findings described in the investigation section (3.5.2) When concluding what the direct cause was, and the subsequent root causes, reference must be used to support the conclusion. This is to allow the reader to fully understand the investigation has critically analysed the factual evidence and the conclusion is based on this. In this section the author may offer and opinion if certain evidence is not factually available.*

From the incident investigation it was identified that **XXXXX** as per the **XXXXX** statement……

During the operation the **XXXXX** violation was done and the **XXXX** was the root cause of the accident.

Therefore, it was concluded that **XXXX** was reason for the incident.

3.6) Incident Investigation findings (Build Event line Analysis, add photos / sketches)

1.

2.

3.

4.

3.6.1: Build Event line Analysis:

Sl. No	Date & Time	Event sequence

3.6.2: Photos/Sketches:

To describe the incident site: long shot +ADD PHOTO+	**Incident scene** +ADD PHOTO+
[Photo No. & photo description]	[Photo No. & photo description]
Close view of damage / abnormal condition +ADD PHOTO+	**Close view 2 of damage / abnormal condition / Sketch** +ADD PHOTO+

4. Causes of the Incident

4.1) Direct Causes:

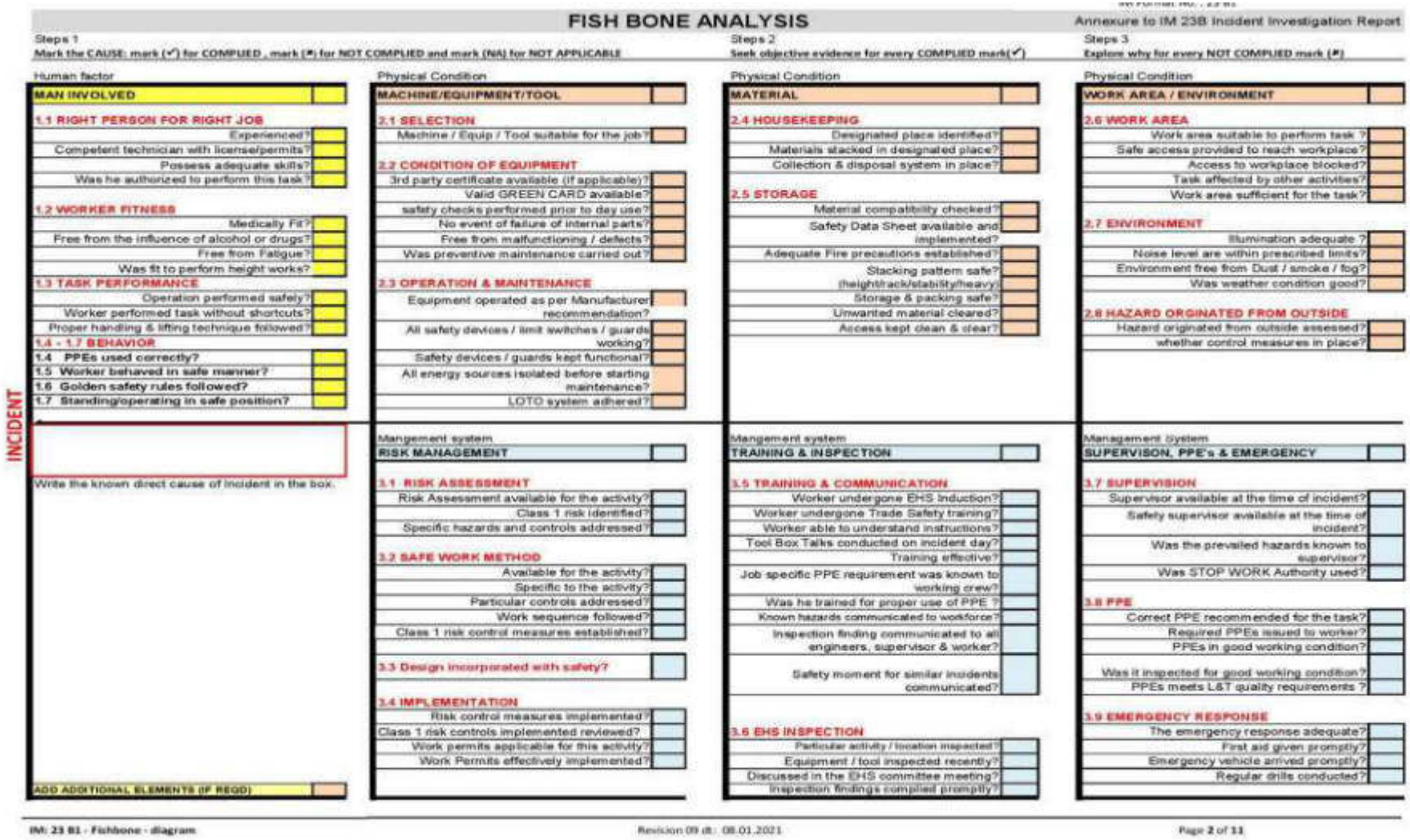
4.2) Root Cause Analysis using Fish bone Analysis: (Enclose the analysis sheet)

Categorize the findings of Root Cause Analysis: (Tick the root causes)

1. Human factors	✓	2. Physical condition	✓	3. Management System	✓
1.1 Inexperienced/ Unauthorised/ untrained worker		2.1 Wrong selection of equipment / tools.		3.1 Hazard & controls not identified previously	
1.2 Medically or physically unfit		2.2 Faulty equipment / tools (not safety inspected)		3.2 Unsafe work method / Generic	
1.3 Poor task behaviour/ shortcuts		2.3 Unsafe operation / Safety devices not working		3.3 Design safety issues	
				3.4 Risk control measures not implemented	
1.4 PPE not used / worn		2.4 Poor housekeeping			
1.5 Unsafe behaviour of worker (horseplay/ mobile phone usage etc.)		2.5 Poor storage of materials		3.5 Not enough training or instruction	
		2.6 Unsuitable work area (inadequate space)		3.6 Poor safety inspection & compliance	
1.6 Golden Safety rules violated					
		2.7 Unsafe Work environment (light / noise / dust / smoke / weather condition)		3.7 Lack / incompetent supervision	
1.7 Standing & operating in unsafe position					
1.8 Others		2.8 Hazards originated due to external factors		3.8 Poor selection/quality/no issue of PPE	
		2.9 Others:		3.9 Inadequate emergency response	

Categorize the findings of Root cause (Selected Above)	Briefing about the Root cause	Who was responsible to implement	Why was it not implemented?

4.3 Fishbone Analysis



5. Remedial Measures Action Plan							
No.	Immediate Action **(To Prevent recurrence)**	Date for completion	Responsible person	Action required for preventing recurrence of similar incidents in future	Date for completion	Responsible person	Status Open/Closed
Signature of EHS In-charge: Date:				Signature of Project Head: Date:			
Whether the Risk Assessment and method statement are revised after this incident? If yes, please enclose the documents.							

6. Witness Details

Sl No.	Name of the Witness	Designation	Witness report given (Yes/No)
1			
2			
3			
4			

7. Validation of Conclusion

Names of the Investigation Team	

Closure of Corrective Actions

All the remedial measures mentioned in the Action plan are implemented. The incident report is closed, and the project incident register is updated.

Signature of EHS In-charge: _____ Date: _____	Signature of Project Head: _____ Date: _____

Project shall send the Incident Investigation Report to Cluster Head & Cluster EHS Head.

Cluster EHS Head shall scrutinize the report and verify the closure of action plan and forward the report to IC EHS Head.

Cluster EHS Head: Signature

Review comments from IC EHS Head:

Signature

Communicate the closure of Incident Investigation Report to all concerned.

Annexure-1	Screening Form, Pre-Employment Medical Check-up Records
Annexure-2	Daily Pre-Start Briefing Records & Permits
Annexure-3	Statutory Records/Evidence
Annexure-4	Records of Relevant Training
Annexure-5	Records of PPE Issued
Annexure-6	Details of Medical Treatment administrated to Injured.
Annexure-7	Witness Statement
Annexure-8	Previous EHS Inspection Report
Annexure-9	Previous Risk Assessment & Safe Work Method
Annexure-10	Incident Notification Report
Annexure-11	Incident Alert
Annexure-12	FIR Copy (if any)
Annexure-13	Post-mortem Copy (if any)
Annexure-14	Cost of the incident (IM 23 B3)
Annexure-15	Updated (after the incident) Risk Assessment & Safe Work Method
Annexure-16	Action plan Compliance evidence
Annexure-17	Others (if any)

MINOR INCIDENT REPORT

PART A – TO BE FILLED BY SITE ENGINEER		
1. Details of the Project		
Name of the Project & Job Number:		Business Unit:
2. Category of Incident (Tick as applicable)		
Part 2 Minor Incidents	Category 6	☐ First Aid Case
	Category 7	☐ Near Miss Case
	Category 8	☐ Minor Environment

3. Details of the Incident (Write N.A if not applicable)

Name of the Injured	Age	Sex	Designation	Date of Joining	Date of EHS induction

Date & Time of Incident:	

3.2) Exact Location where the Incident occurred:

3.3) Injury details:

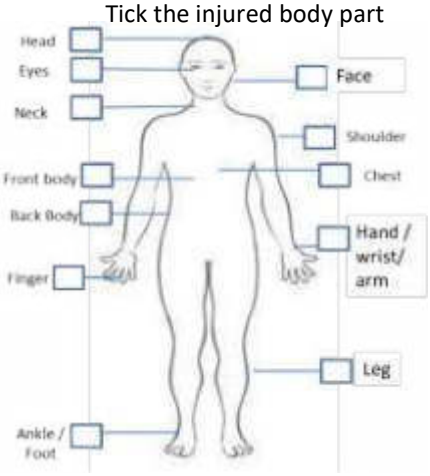
3.4) Name / Identity of the P&M / Equipment:

Asset Code: _____ Registration No: _____ Owned by: L&T ☐ Subcontractor ☐

3.5) Describe briefly how the incident occurred:

Name of the Section In charge / Site Engineer:	Signature:

PART B – TO BE FILLED BY INVESTIGATION TEAM	
Body Part Injured	**Type of Injury**

Tick the injured body part	Tick the type of injury
	☐ Sprain/strain ☐ Poisoning ☐ Laceration / Cut ☐ Abrasion ☐ Burn ☐ Internal organ damage ☐ Stab / Penetration ☐ Others (specify)

4. Causes of the Incident

4.1) Direct Causes:

4.2) Root Causes: (Tick the root cause)

1. Human factors	✓	2. Physical condition	✓	3. Management System	✓
1.1 Inexperienced/ Unauthorised/ untrained worker		2.1 Wrong selection of equipment / tools.		3.1 Hazard & controls not identified previously	
1.2 Medically or physically unfit		2.2 Faulty equipment / tools (not safety inspected)		3.2 Unsafe work method / Generic	
1.3 Poor task behaviour/ shortcuts		2.3 Unsafe operation / Safety devices not working		3.3 Design safety issues	
				3.4 Risk control measures not implemented	
1.4 PPE not used / worn		2.4 Poor housekeeping			
1.5 Unsafe behaviour of worker (horseplay/ mobile phone usage etc.)		2.5 Poor storage of materials		3.5 Not enough training or instruction	
		2.6 Unsuitable work area (inadequate space)		3.6 Poor compliance to safety inspection	
1.6 Golden Safety rules violated		2.7 Unsafe Work environment (light / noise / dust / smoke/ weather condition)		3.7 Lack / incompetent supervision	
1.7 Standing & operating in unsafe position					
		2.8 Hazards originated due to external factors		3.8 Poor selection/quality/ no issue of PPE	
1.8 Others		2.9 Others:		3.9 Inadequate emergency response	

5. Remedial Measures Action Plan

5. What are the precautions taken / being taken to prevent similar occurrence?

Names of the Minor Incident Investigation Team:

EHS In-charge:	Signature:

13 EHS AUDIT & COMPLIANCE

The EHS audit process is designed to evaluate progress towards compliance of the EHS Policy, objectives and targets and the effectiveness of the L&T Integrated Management system (IMS) and regulatory compliance.

This section shall address the site arrangement for managing EHS Audits & compliance and shall address the following,

A. Internal EHS Audit & compliance (as per IMS procedure 'Internal EHS Audit & Compliance')
B. External EHS Audit & compliance (as per site specific requirements)
C. Client EHS Audit & compliance (as per client requirements)

13.1. Definitions

Audit

Systematic, independent, and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled

Audit evidence

Statements of fact or other information which are relevant to the audit criteria and verifiable

Audit findings

Results of the evaluation of the collective audit evidence

Auditor Competence

1. Qualified Internal Auditor (trained on OHSAS 18001:2007 & ISO 14001:2015)
2. Auditing experience of at least 3 audits, or he should have participated as co-auditor for two audits at least.

Criteria for selection of auditors

1. General construction EHS process experience at high performance projects like Nuclear, Metro and another stringent project site
2. Independent of the auditing project site or departments within project.
3. Refresher Internal Auditing training program shall be held every 3 years.

13.2. Responsibilities

Project Head

- Shall chair the audit opening and closing meetings of all EHS audits conducted at project.
- Shall oversee the audit process and support smooth conduct of audit. Exercise STOP WORK Authority when any imminent danger situation noticed.
- Finalize the action plan for the EHS observations, assign responsibilities and compliance targets.
- Shall direct the project team for timely compliances to audit observations. Submit the audit compliance reports to clusters and corporate.

Project EHS In-charge

- Co-ordinate and conduct quarterly cross functional site audits,
- Assist the auditor in providing necessary inputs for audit preparation.
- Participate and Support for smooth conduct of EHS audit. Exercise STOP WORK Authority when any imminent danger situation noticed. Assist to work out action plan for EHS observations and assist for compliance and reporting.
- Ensure timely submitting the audit compliance report with evidence in prescribed form.

Section In charges and Site Engineers

- Shall participate in the audit process and derive the action plan for compliance. Exercise STOP WORK Authority when any imminent danger situation noticed.
- Ensure timely completion of corrective/preventative actions and provide regular progress reports to the Project Head and Project EHS In-charge.

Auditor

- Adhere to the Audit flowchart.
- Initiate STOP WORK notice to project team when any imminent danger situation noticed.
- Adhere to the Code of ethics given below:

Auditor Code of ethics

- To act in a strictly trustworthy and unbiased manner in relation to both the company and the project involved in an audit performed by you or by personnel under your direct control.
- To disclose to IC EHS Head / Cluster EHS Head any relationships you may have with the project to be audited before undertaking any audit function in respect of that project.
- Not to accept any inducement, gift, commission, discount, or any other profit from the project audited, from their representatives, or from any other interested person nor knowingly allow personnel for whom you are responsible to do so.
- Not to disclose the findings, or any part of them, of the audit team for which you are responsible or of which you are part of, or any other information gained during the audit to any third party, unless authorized.
- Not to act in any way prejudicial to the reputation, interest, and credibility of the company and EHS department.
- In the event of any alleged breach of this code, to co-operate fully in any formal enquiry procedure.

Auditee

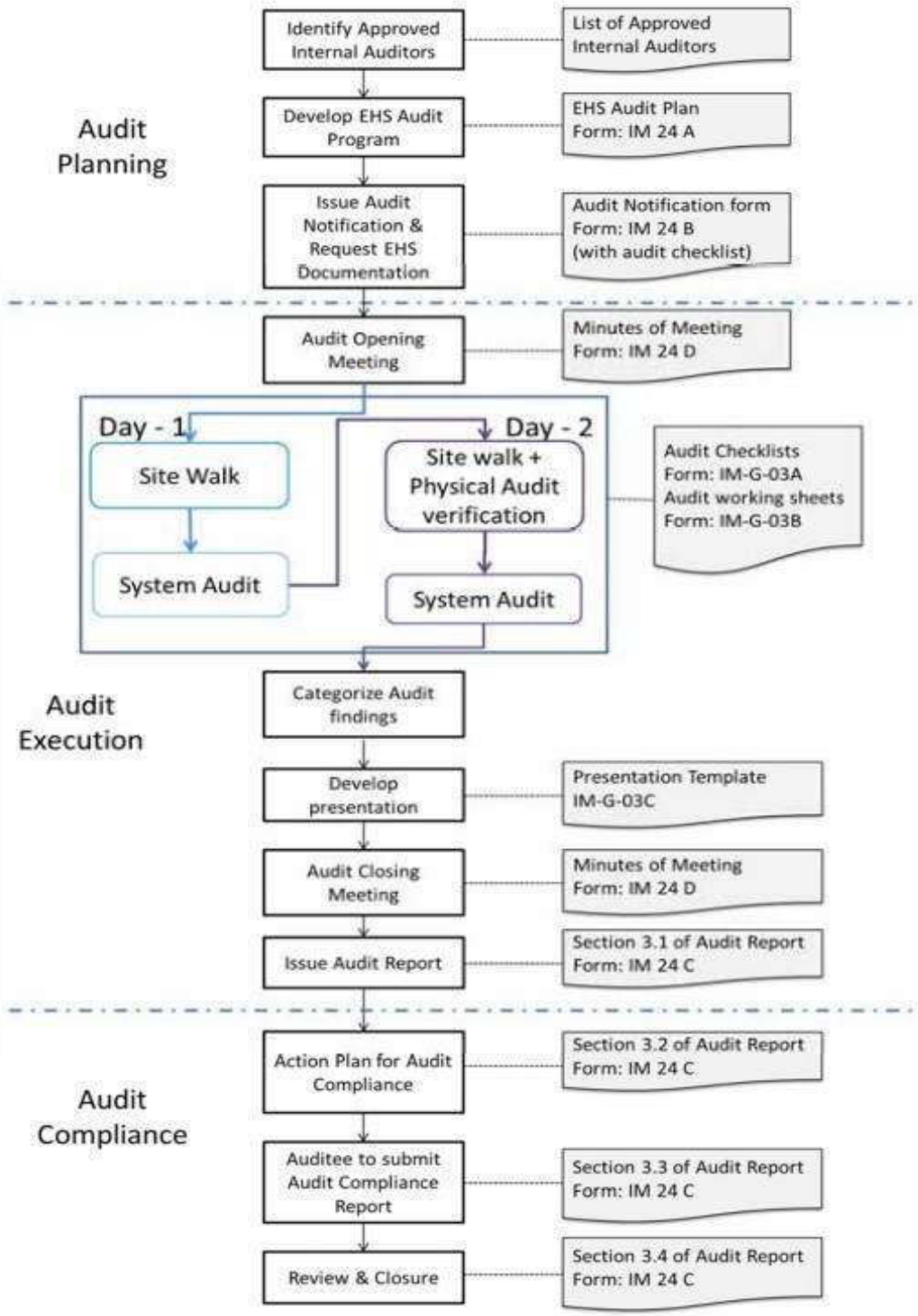
- Participate in the Audit opening meeting and closing meeting. Participate in the physical audit and system audit of the auditee's area of responsibility. Exercises STOP WORK Authority when any imminent danger situation noticed.
- Shall support the audit by timely producing the objective evidence, engaging discussions with auditor about the findings to determine control measures
- Shall analyses the root cause of findings and work out best possible control measure for
- Correcting and preventing from recurrence.

Employees & Sub-contractor

- Shall readily participate in the audit process, as and when invited.
- Shall communicate freely the systems and practices adopted and engage in discussions of findings with respect to system requirements.

13.3. Method

Audit Flow Chart



Audit Scheduling

- The Audit Plan shall be prepared in form IM 24 A, and this shall be in line with the year's IC EHS objectives & targets.
- The audit frequency may increase based on the project criticality and specific requirement from Business and may decrease based on project running status.
- Audit shall be held at least for 2 days. The audit dates can be increased depending on the criticality, volume and spread over of the project. This shall be decided by IC EHS Head or Cluster EHS Heads.

Audit Criteria

The audits shall be conducted based on the following

- Heavy Civil Infra IC IMS Manual, current EHS systems and practices
- L&T HSE Manual
- Project specific EHS Plans & programs
- Customer requirements
- Legislative requirements

Audit Notification

- Auditor shall issue audit notification in FORM IM-24-B to the auditing sites 14 days prior to audit date.
- Auditor shall send the audit checklist along with audit notification. The auditor shall seek project details and documents necessary through the notification for audit preparation.
- The audit will be conducted, only when the auditor receives confirmation and required documents from auditee site before 7 days of audit at least.

Audit Opening Meeting

- The audit process shall begin with audit opening meeting. The auditor and the Project Head shall chair the opening meeting. Senior Management as requested are to attend.
- The auditor shall be briefed about the present status of the project and critical activities and class 1 risk activities. Agree upon the site walk with Project Head and senior persons, section / department wise audit schedule, audit scope and agreeing the closing meeting schedule.
- The discussion shall be recorded in form IM 24 D - EHS Audit Minutes sheet.

Physical & System audit

Audit shall be carried out based upon predefined checklists refer IM-G-03A. Auditor shall use audit working sheets (refer IM-G-03B) to systematically record the audit findings. Photographs may also be used to record evidence. Physical audit shall be conducted in accordance with specific Risk Assessment, Safe Work Method / L&T HSE manual. The audit checklist shall be referred for scoring. Choose at least 10 class 1 risk activities from the checklist for scoring purpose.

Day - 1

- Immediate after the opening meeting, quick site walk shall be held along with Project Head and senior persons.
- IMS Management system and site specific EHS Plans & programs shall be audited.

Day - 2

- It is recommended to begin the 2nd day with site walk and physical audit verification. The observations made during the system audit shall be verified and concluded and vice versa.
- While examining and assessing each audit element, the Auditor shall consider overall compliance and make a quantified evaluation through scoring system

Evaluating the audit findings

The category of findings, element wise & overall audit scoring and Project EHS Performance rating shall be incorporated in the Audit closing Meeting and Audit Report form.

Categorisation of Audit findings

Audit findings shall be categorised based on tabulation given.

Type of finding	Score	Category	Remarks
No evidence of procedure implementation or major breakdown	0	Non-conformity	Unacceptable
Evidence of compliance but no procedures and/or high risk	1		Poor
Procedure implemented with major omissions and/or high risk	2		Needs Urgent Improvement
Procedure implemented with minor omissions/ observations	3	Observation	Average
Evidence of full implementation	4	Good practice	Controlled

Audit Scoring system

The audit checklist shall be used to carry out scoring. Refer the scoring column in tabulation this will be based on the types of findings.

Percentage scoring of each audit element and overall scoring shall be calculated and included in the Audit Report.

EHS Audit Performance Rating System

Based on the overall audit scores the project sites shall be rated as given below.

Overall score	Rating
95% and above	Platinum
90% to 94%	Gold
80% to 89%	Silver
70% to 79%	Average EHS performance
Less than 70%	Below average EHS performance

Develop presentation

Auditor shall develop a presentation for conducting the closing meeting using audit presentation template (refer IM-G-03C).

Audit Closing Meeting

- The audit process shall mandatorily end with audit closing meeting. The auditor and the Project Head shall chair the audit closing meeting. Senior Management, who participated in opening meeting shall participate in closing meeting also. Auditor can request few more participants as deemed necessary.
- The auditor shall present the audit findings to the project team in audit presentation template. The Action plan for compliance shall be agreed with details of responsible person and the timelines for compliance.
- The discussion shall be recorded in EHS Audit Minutes sheet. It shall be signed by Project
- Head and Project EHS In charge.

Issuing Audit Report

The auditor prepares the EHS Audit report in form IM – 24 C. The audit report shall be submitted for review and approval before issuing to project for implementation as per the tabulation given below:

Audit categories	Review by	Approval by	Issue to	Information to
Corporate EHS Audit	Manager - EHS Compliance	IC EHS Head	• Project Head, • Project EHS Incharge	• IC Head • BU Head & Cluster Head • IC EHS Head & Cluster EHS Head
Cluster Cross project EHS Audit	Cluster EHS Head	Cluster EHS Head		• Segment Head • Cluster Head • EHSINFRA@LNTECC.COM
Project EHS Audit	Project EHS Incharge	Project Head	• Concerned Section/ Department Incharge	• Cluster Head & Cluster EHS Head

Audit report shall be issued to project within 7 days of audit completion.

13.4. Audit Compliance

Action Plan

The auditee shall adhere to the recommendation (IM 24 C EHS Audit report, Section 3.2) and / or the auditee shall submit the Action Plan for Compliance within 5 days from the day of receipt of audit report.

Audit Compliance report

- The concerned Project Head is accountable for implementing all the corrective measures outlined in the audit report. He shall guide the project team for timely compliance.
- Audit Compliance Report: The compliance shall be completed and signed by action plan coordinator in IM 24 C EHS Audit report, Section 3.3. It shall be submitted along with evidence (document / photograph) within 21 days of audit completion.
- Notwithstanding to the timelines in certain circumstances the auditor can demand immediate compliance to critical observations within a day.

Review & Closure of Audit report

- The auditor shall review the audit compliance report. Upon satisfactory compliance, the auditor recommends closure of the audit report. The compliance report shall be reviewed by Reviewer and closed by Approver. Refer IM 24 C EHS Audit report, Section 3.4.
- The audit closure report again issued to project as per section 7.9 of this procedure.
- The compliance status of EHS Audit is updated in the respective Monthly EHS report.

13.5. Associated Forms & Templates

- IM 24 A EHS Audit Plan
- IM 24 B EHS Audit Notification
- IM 24 C EHS Audit Report
- IM 24 D EHS Audit Minutes Sheet

L&T Construction Heavy Civil Infrastructure	Environment, Health and Safety Integrated Management System Manual	L&T LIFE Work Incident Free to Live Injury Free Each day

IM Format No. : 24 A

EHS AUDIT PLAN

Entity : Corporate / Cluster Cross project / Project site
Name of the Entity :
Plan Period : From _____ to _____

BU	PROJECT SITE / DEPARTMENT	Month / week no		Month / week no		Month / week no		Month / week no		Month / week no		Month / week no		Month / week no		Month / week no		Month / week no		Month / week no		Month / week no		Month / week no	
		P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C

P – Planned & C - Conducted

Prepared By:

Name :
Designation :

Approved By:

Name :
Designation :

Distribution:

IM Format No. : 24 B

INTERNAL EHS AUDIT NOTIFICATION

General Site Information	
Audit Scope	Write the name of the Project site and mention specific area (if any)
BU / Job No	
Notification to Key Project Person(s)	
Information about the audit	BU Head or Cluster Head IC EHS Head or Cluster EHS Head
Audit Notification	
Audit reference	
Audit Purpose	
Audit criteria	• IMS Manual including recently revised procedure • HSE Manual and Construction EHS Standards • Project specific EHS plans, Customer & Statutory requirements
Name of the Auditor(s)	
Audit date	

Documents for Audit Preparation (Project team shall send the following inputs to Auditor)	
1	Project Scope and present activities. The presentation to address geographical location and site layout, site organization, present activities at project and future activities.
2	Project EHS Plan
3	Project specific requirements – Customer, locals etc.
4	Previous audit compliance report
5	Apart from the scope mentioned in notification, site can also request the auditor to focus on certain system or activity – if any.

Information regarding the audit

SL	Activity	Purpose	Persons to attend
1	Interaction with senior management	To understand the focus areas	Project Head
2	Audit Opening meeting	To introduce the audit process To get a quick introduction of project team To agree upon the audit schedule	Project Head, All Section In-charges, EHS In-charge
3	Quick Site walk with senior Management	To understand the site activities and Initiate action if any Class 1 Risk observed	Project Head & Section Incharge
4	System audit & Physical Audit	Assess the compliance	Concerned section or Site Engineers, contractors & workmen
5	Audit Closing meeting	To share the audit findings and assist the project team to develop action plan for compliance	Project Head, All Section In-charges, EHS In-charge

Signature of the Auditor: _____ Date: _____

IM Format No. : 24 B

AUDIT SCORING CRITERIA

Overall audit scoring can be finalised based on the below criteria & taken out by making the average of below two elements,

- ✓ The lowest of 3 elements out of total elements in Management System Audit(Onsite/Remote).
- ✓ The lowest of 6 elements out of total elements in physical Onsite/Remote audit.
- ✓ If any element score is below 75% the overall audit maximum score will be awarded 84% only.

If any element score is below 65% the overall audit maximum score will be awarded 79% only.

AUDIT FINDINGS CATEGORY

Audit findings shall be categorised based on below tabulation given

Type of finding	Score	Category	Remarks
No evidence of procedure or implementation or major breakdown	0	Non conformity	Unacceptable
Evidence of compliance but no procedures and/or very high risk	1		Poor
Procedure implemented with major omissions and/or high risk	2		Needs Urgent Improvement
Procedure implemented with minor omissions/ or High risk	3	Observation	Below Average
Procedure implemented with minor omissions/ or medium risk	4		Average
Procedure implemented with minor omissions/ or low risk	5		Good
Evidence of full implementation	6	Good practice	Controlled

IM Format No. : 24 C

EHS Audit Report

Audit reference:		Audit report date:
1.1 General Information		
Audit Scope	Write the name of the Project site and specific area, if	Project EHS Audit Performance **e.g. GOLD** Score is **00%**
BU / Job No		
Key Project Persons	Project Head, Project EHS In-charge	
Name of the Auditor(s)		
Audit date		
1.2 Audit Details		
Audit Purpose		
Audit criteria		
Source of Information		

1.3 Executive Audit Summary

The project EHS Performance is rated based on the audit findings.

☐ Platinum	☐ Gold	☐ Silver	☐ Average	☐ Below Average
95% +	90% to 94%	80% to 89%	70% to 79%	< 70%

Audit Elements Scoring 85% and above (3 elements)	Audit Elements Scoring below 85% (3 elements)

Areas requiring immediate management attention:

Class 1 risk activities requiring better control:

Distribution of Audit Report	Request for Action	For information

Request the auditee to submit the audit compliance report latest by ..... (date).

Note: If all NC's are closed within time frame, there will be no change in the audit scoring. If not closed within time frame, 10% will be reduced from the above mentioned audit scoring.

Reviewed by : _____ **Approved by** : _____
Designation : Designation :

1. Audit Summary → 2. Audit Scoring → 3. Audit findings

IM Format No. : 24 C

2.1 Audit Scoring System

Audit Score		
Items Scored	:	
Possible Score	:	
Audit Score	:	
Final Audit % Score	:	**%**

2.2 Individual scores in graph

Insert the graph showing each element scores, highlight low scoring (less than 85%) elements



2.3 Audit Findings, Score, Category:

Type of finding	Score	Category	Remarks
No evidence of procedure or implementation or major breakdown	0	Non conformity	Unacceptable
Evidence of compliance but no procedures and/or very high risk	1		Poor
Procedure implemented with major omissions and/or high risk	2		Needs Urgent Improvement
Procedure implemented with minor omissions/ or High risk	3	Observation	Below Average
Procedure implemented with minor omissions/ or medium risk	4		Average
Procedure implemented with minor omissions/ or low risk	5		Good
Evidence of full implementation	6	Good practice	Controlled

1. Audit Summary → 2. Audit Scoring → 3. Audit findings

2.4 Good Practices

Sl No.	Project's Good practices	Picture

IM Format No. : 24 C

3. EHS AUDIT FINDINGS, ACTION PLAN & COMPLIANCE

SECTION 3.1 – AUDIT FINDINGS		SECTION 3.2 – ACTION PLAN	SECTION 3.3 COMPLIANCE	
Findings & consequence (add photo)	Systemic Gap		Root Cause:	
Issue Ref# & Reference to system requirement:	Finding Category, color code & Remarks:	Action Plan Coordinator: (Name + Designation) Target Completion Date:	Corrective action taken to prevent reoccurrence (Enclose Evidence):	
			Complied Date:	Signature:
Section 3.4: Review remarks:			Closed by:	Date:

IM Format No. : 24 D

EHS Audit Minutes Sheet

Date:		Time :	
Location:		Ref No.	Opening / Closing meeting*
Subject:			

Attended by:

No	Name	Designation	Contact Details	Signature
1				
2				
3				
4				
5				
6				

Minutes of Discussion:

No	Description / Remarks	Action by	Target Date
1			
2			
3			
4			

*Record the discussions in "Audit Findings discussion & Action Plan sheet given in page 02"

Sl No	3.1 AUDIT FINDINGS			3.2 ACTION PLAN			REMARKS & SIGNATURE
	Findings & Consequence	Systemic Gap	Category	ACTIONS	Coordinator & Designation	TARGET DATE	
1							
2							
3							
4							
Auditor: Name : Signature			Project EHS Incharge: Name : Signature		Project Head: Name : Signature		

Sensitivity: LNT Construction Internal Use

14 WORKPLACE EHS INSPECTIONS

The project shall ensure that all unsafe conditions and acts prevalent at site are identified through a systematic inspection process and suitable corrective and preventive actions are implemented within the stipulated time frame.

This section shall address the site arrangement for managing EHS inspections in the workplace. This shall be in line with the IMS procedure 'Workplace EHS Inspections' and address the following:

A. Responsibility to carry out the inspections

Project Head	Project Head shall • Oversee the implementation of EHS Inspection for effectiveness • Plan the Executive EHS Inspection Tour for the financial year and communicate • Conduct Executive EHS Inspection Tour as per the EHS Strategy of current year. • Action for the Executive EHS Inspection Tour report issued by the senior executive and report compliance within 5 days. • Review the compliance and direct actions for prompt compliance to inspection findings • Exercise STOP WORK Authority when any unsafe practices / condition observed.
Project EHS In charge	Project EHS In charge shall • Implement the part of EHS Inspection which is EHS Staff responsibility. • Plan the EHS Inspection for the Quarter covering all sections of project and communicate • Conduct EHS Inspection at the pre-decided part of project site. • Verify the action compliance recommended in the Executive EHS Inspection Tour report issued by the senior Executive and Project Head and report compliance within 5 days. • Analysis the EHS Inspection reports submitted by Project EHS Engineers and present the trends to Project Head and Project EHS Committee • Exercise STOP WORK Authority when any unsafe practices / condition observed.
Project EHS Engineers	Project EHS Engineer shall • Plan the EHS Inspection for the Month covering all sections of project section under his responsibility and communicate • Conduct EHS Inspection at the pre-decided section of project site. • Verify the action compliance recommended in the EHS Inspection report issued by self & Project EHS In charge and report compliance within 5 days. • Review the compliance and direct actions for prompt compliance to inspection findings • Exercise STOP WORK Authority when any unsafe practices / condition observed.
Construction Manager/ Section in Charge Engineer In charge/ Ad	Engineer In-charge is responsible for implementing the recommended actions within his/her responsibility and shall • Participate in the EHS inspections when requested • Take actions to ensure such unsafe practices is prevented from recurrence • Exercise STOP WORK Authority when any unsafe practices / condition observed.

EHS

Inspection by EHS Personnel

Task	Project EHS In charge	Project EHS Engineer
EHS Inspection Plan period	Quarterly	Monthly
Inspection cycle coverage	Cover entire project within a quarter	Cover entire sections under his responsibility within a month
Inspection frequency	Fortnightly	Weekly
Maximum timeline to comply	5 days from the date of inspection	5 days from the date of inspection

B. Relevant Checklists for inspections

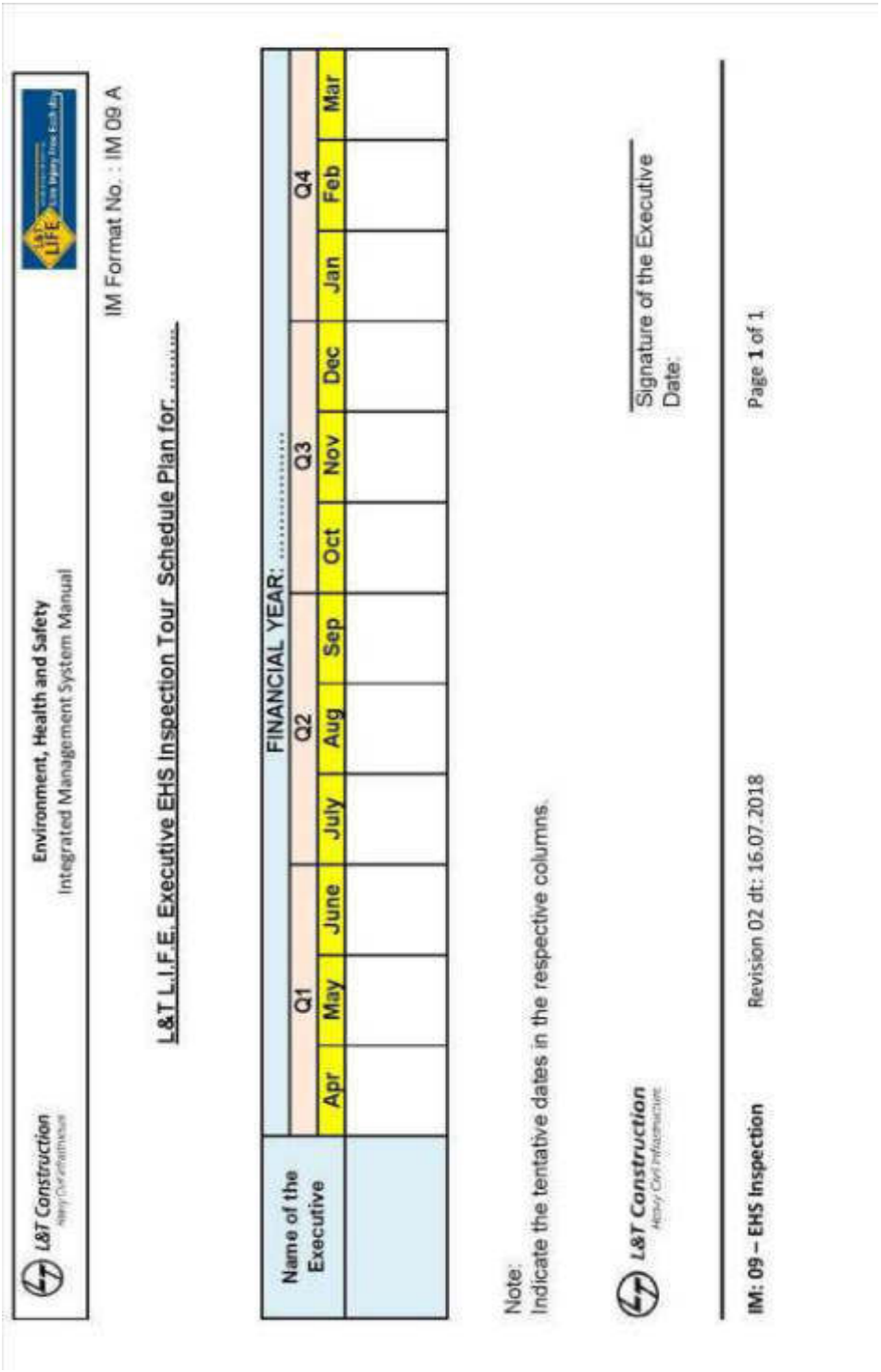
IM 09 An Executive EHS Inspection Tour Plan

IM 09 B Executive EHS Inspection Tour Report

IM 09 C Project EHS Inspection Plan

IM 09 D Project EHS Inspection Report

C. Online Tracking of Inspections Compliance (e-TICS) – L&T Safety Apps



L&T Construction
Environment, Health and Safety
Integrated Management System Manual

IM Format No. : IM 09 A

L&T L.I.F.E. Executive EHS Inspection Tour Schedule Plan for .....

Name of the Executive	FINANCIAL YEAR:												
	Q1			Q2			Q3			Q4			
	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	

Note:
Indicate the tentative dates in the respective columns.

Signature of the Executive
Date:

L&T Construction
Heavy Civil Infrastructure

IM: 09 – EHS Inspection Revision 02 dt: 16.07.2018 Page 1 of 1

15 WORK PERMIT SYSTEM

The work permit systems are designed and intended to specify adequate safety measures in advance against identified hazards and stipulate implementation of the said safety measures to ensure safe execution of the work in designated workplace.
The activities where should be implemented by work permit system are:

Environmental Monitoring Report

Project No. 47101-004
Semi-Annual
January 2022

India: Assam Power Sector Investment Program - Tranche 3

PART E

Prepared by the Assam Power Generation Corporation Limited (APGCL) for the Asian Development Bank.

This environmental monitoring report is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

- Working in confined space.
- Carrying out hot work in specified locations.
- Working at P&M and other power driver equipment's.
- Giving clearance for excavation work.
- Carrying out electrical work (high tension / low tension)
- Carrying out industrial radiography.
- Blasting operations.
- Pants Maintenance.

The rules to apply in the procedure to work permit system (WPS) are:

- Before starting any work covered under WPS the concerned supervisor (permitee) fills work permit form and sends it to the authorized staff.
- The issuing authority inspect the work spot after received the filled form and authorizes the work or no.
- After the completion of the job the permit is brought back by the permitted to the issuing authority.
- The issuing authority inspects the work spot and once he is satisfied that the situation is safe, close the permit.
- A copy of the permit is set to the EHS Engineer for is information when issuing the permit.
- Permit shall be taken for each activity. The formats applicable will be distributed to concerned section in charges / site engineers from EHSD. Work permits to be taken before starting of activity from issuing authority. The permit is valid till the specified time in the format (not to exceed more than 12 hours).
- The work permit system forms for the different activities are attached on the EHS Plan.

EHS Inspection

- As per revised EHS Inspection procedure, all offices project sites and operations shall be carried out
  - Executive EHS Inspection Tour.
  - EHS inspection by EHS staff.
  - Review compliance analyses the trend and present to management and EHS committee for necessary corrective and preventive actions.

- EHS inspection shall review and ensured that EHS system and practices established is implemented and activities are performed at ALARP (As low as reasonably practical) risk level.
  - Top management up to project head demonstrate visible EHS leadership by conducting executive EHS inspection tours at regular intervals and engaged with site team.
  - Project EHS staff plan and conduct EHS inspections at frequent intervals, report findings, track compliances, review compliance and finally present the trend analysis to management and EHS committee for corrective and preventive measures.

Associated Forms & Templates

- IM 09 An Executive EHS inspection
- IM 09 B Executive EHS Inspection Tour Report.
- IM 09 C Project EHS Inspection Plan
- IM 09 D Project EHS Inspection Report
- IM 12 E-Internal & external issue register.
- IM 12 F-Need& expectation of interested parties.
- IM 12 G-Business risk opportunity.

16 PPE & SAFETY DEVICES

Methods of controlling hazards in the workplace fall into three categories: engineering controls, administrative controls, and personal protective equipment (PPE). When engineering and administrative controls cannot eliminate work hazards, PPE must be used to ensure worker health and safety. However, it is the least desirable method of controlling hazards because the hazard still is present in the workplace. Once a company decides on the use of PPE, it should develop a company policy on PPE usage for employees and visitors, select the proper equipment for the existing hazards, implement a training program, and enforce the use of PPE. In selecting the proper equipment, the most important criterion Is the degree of protection that a particular piece of equipment can provide under various conditions. The Safety Equipment Institute helps to ensure objective, fair testing and certification of PPE devices. Workers should be encouraged to use PPE and should receive some type of sanctions if they fail to wear the equipment. Companies can increase compliance by enlisting the aid of line supervisors and managers, letting employees

have some choice in the type of equipment purchased, and establishing a sound training program with consistent enforcement of all rules and regulations.

General guidelines on the type of Personal Protective Equipment to be used.

All the Personal Protective Equipment must follow the general guidelines in respect by the law and the standards for this type of equipment.

Head Protection

All workers exposed to head injury hazards must wear protective headwear to shield them from falling objects, blows, and electric shock and burns. These devices include helmets (classified as A, B, or C); bump caps; and hair protection. Before each use, helmets should be inspected for any defects or signs of wear that can reduce their protective effectiveness. Every 30 days or sooner, headwear should be thoroughly cleaned and disinfected.

The safety helmet must be done by fibre glass HDP etc. should weigh 400 to 450 gms and be moisture shock and fire resistant. It should withstand 20 deg and plus 50 deg. C. If a plumb bob of 500 gms weight with conical steel point is dropped from a height of 3M, there should be no piercing or denting.

The following colour code for safety helmet will be used at site. This shall enable quick recognition of the person.

White		Staff
Blue		Sub – Contractor and their Supervisor
Yellow		Workmen
Yellow with the reflective band		Workmen working U / G
Green		EHS Personnel
Red		Electricians

Note: Everyone in the site shall follow the colour code practice, until the Safety Engineer exempts for any specific reason.

Eyes and Face Protection

Protection of eyes and face from injury is vital in any occupational health and safety program. Protective devices include safety glasses, goggles, and face shields. Face shields alone generally do not provide adequate protection against eye injuries and must be combined with basic eye protective glasses or goggles. Safety glasses and goggles should be large enough to shield the entire eye socket area and should contain lens materials matched to the hazard worker's face, particularly for laser and welding operations. Hoods can provide protection against chemical splashes. Both eye protection devices and face shields must be kept scrupulously clean to avoid contaminating the surface of the eyes or face.

(a) For chippers / grinders / hammer men clear glass 50 mm diameter with shatterproof toughened glass preferable panoramic view. Face shield with headband may also be used.

(b) For welders / gas cutters heat proof unbreakable zero power smoke colour glass of suitable shade according to the type of hob with protective clear glass. The fibre frame should have provision for side ventilation padded cup edge, leather covered nosepiece, fitted with elastic headbands and conformable to use.

(c) Overhead grinding panorama goggles moulded PVC frame, unbreakable flame proof with wide flexible and replaceable plastic highly transparent full view 'O' optically correct visor deep frame to fit overpower spectacle indirect ventilation fitted with elastic headband.

Hearing Protection

Management must evaluate the workplace for hearing hazards and determine the need for hearing protection devices. Daily work in steady noise of more than 85 decibels for eight-hour shifts is considered hazardous noise exposure. Hearing protection devices are given a noise reduction rating that indicates their protective effectiveness, although real world values may be considerably less. Hearing protector's fall into four categories: enclosure (helmets), aural (ear insert formable, custom moulded, moulded). Each hearing protector should be fitted to each worker, and employees must be taught proper insertion techniques and maintenance procedures.

Fall Protection

Fall protection is defined as a means of preventing workers from experiencing accidental falls from elevations. Fall protection systems are either passive (nets) or active (lifelines, harnesses etc.). In selecting the right fall protection system, management should conduct a thorough job survey analysis and establish a fall protection program. Passive fall protection systems include personal and debris nets placed beneath work areas to catch workers or falling debris. These nets can be combined to serve as both personnel and debris nets for the same job. Active fall protection systems include secure anchorage points and the use of lanyards, safety belts, fall arresters and shock absorbers, harshness retracting lifeline devices, horizontal and vertical lifelines, and hardware connectors. Companies must also develop rescue procedures for retrieving a fallen worker from above ground, below ground or confined spaces operations. Fall protection equipment must be inspected, cleaned, and repaired or replaced on a routine basis.

General purpose harness safety belt consists of one body belt and two shoulder straps made from strong closely woven approximately 50 mm wide 6 ply cotton webbing with 3 mm long 12 mm dia tested quality polypropylene rope. All iron fittings be galvanized and joint less cut from solid. A special During to be provided at the back of safety belt and lifeline is directly spliced (minimum 9") from back of D-ring.

Respiratory Protection

To protect workers from airborne health hazards, management must provide respiratory protection equipment against gaseous, particulate and combination contaminants and oxygen deficient environments. Proper selection of equipment depends on the toxic substance encountered, conditions of exposure, individual worker capabilities, and equipment fit. Respiratory protection is evaluated according to a "protection factor" that describes the overall effectiveness of the equipment. Respirators are classified as air supplying or air purifying devices. Air supplying respirators provide a breathing gas to the worker and include

(1) Self-contained breathing apparatus (SCBA).

(2) Supplied air devices and

(3) Combined supplied air SCBA respirators.

Air purifying respirators are classified as either gas/vapor devices (also known as chemical cartridge respirators) or particulate devices. These respirators are available in three configurations: quarter-face, half-face, and full-face models. Each type provides increased protection against higher concentrations of toxic materials. Air purifying respirators must be properly fitted and tested using qualitative, quantitative, negative pressure, and positive pressure tests. All respirators must be routinely inspected, cleaned, and properly stored to ensure their protective effectiveness. The company must establish a complete training and medical surveillance program to make sure that employees know how to use and maintain their equipment and that only physically qualified personnel use respirators.

Foot Protection

Safety footwear includes steel, reinforced plastic, and hard rubber models, depending on the shoe design protective level required. Some jobs require conductive, nonconductive, foundry, or chemical splashes. Footwear must be kept clean and in good repair.

Hand and Arm Protection

There are different types of hand protection:

(a) All leather made of chrome / calf leather 450 mm long with five fingers double stitching for joints. The fit of gloves should be such that the fingers have ample room and the bridge connecting the thumb to the gloves should be sufficiently deep so that the thumb will not cause strain on the palm of the gloves. Stitching should be done with good quality thread.

(b) For Electricians gloves made of rubber 380 mm / 450 mm long tested to 15000 volts.

(c) For material handling leather cum canvas 304 mm long double leather for palm single leather for five finger types, double stitching with stitches spaced 1 mm from each other with good quality thread. The cloth should be of thick cotton canvas. The gloves should be comfortable to use so that fingers have ample room and the bridge connecting the thumb to the gloves should be sufficiently deep so that the thumb will not cause strain on the palm of the gloves. Stitching done should not be too near the edge.

Body Protection

Special protective clothing is used to shield workers form such workplace hazards as heat, hot metal, chemical splashes, weather extremes, and electrical shock or burns. Such clothing includes leather garments, wool and asbestos substitutes, aluminized clothing, flame resistant or flame-retardant materials, aprons kneepads, gloves and hand leathers and arm protectors, imperious materials, heat-stress, and cold weather clothing, and conductive or nonconductive clothing. Specification for safety equipment is

given in annexure – 1. In each technical chapter of part II, whoever required specific personal protective equipment requirements is dealt with.

Safety Devices

There are different types of safety devices, according to the hazard that we want to prevent.

Fall Protection,

Safety net should have 6 mm dia with twin rope inside for 50 mm x 50 mm meshing with provision for intermediate rope of 12 mm dia every 1M and 20 mm dia rope on all four sides, with provision for tying the net at every one meter. All ropes should be made of tested quality polypropylene rope. There should not be any joint in the mesh. The safety net should withstand a load of 500 kg on 2.5 m span. The safety net should pass through a drop test which specifies that the deflection should not be more than 2 M or half the length of shortest side when a sandbag of 140 kg mass is dropped successively three times on to the centre of the net from a height of 50 feet.

Lifelines should be secured to permit as little slack as possible. In case of obstruction for free fall, shock absorbers should be provided for the lifeline. PP or nylon rope of 12 mm diameter is suitable for use as lifeline. Steel cables are not suitable for use as lifeline in case where a free fall is possible unless shock absorber is provided.

Air Measurement

Different types of gas detectors can be used. Point gas detector is a type that shall be located near the potential source of gas leaks to give early warning by raising audio visual alarm when the gas level reaches the set limit in the atmosphere. The personal gas monitor shall be carried by the individuals who may be exposed to toxic gas. Drager tube, it is a handheld pump with colour indicating tubes which can be used to detect gas. Multi gas monitors, it is handheld electronic instrument, which can be used to detect gases and can be also used to measure the volume of gases.

During the project those are some of the safety devices that shall be used, however the application of the engineer and administrative controls are essential sources to prevent all the hazards.

List of Job Specific Personal Protective Equipment to be used

The following PPE would find application during execution of road, bridge, and other structure works.

Surveying	Helmet, Gumboot & Rubber Hand gloves of electrical grade while working near overhead power lines.
Clearing	Safety Helmet, Gumboot, Cotton Hand gloves.
Excavation & Filling	Safety Helmet, Protective Footwear, Cotton Hand gloves.
Hot works (Laying of DBM, BC & handling of hot asphalt)	Safety Helmet, Miners Safety Shoe with Rubber Sole or Gumboot, Cotton Hand gloves, Reflective Jacket.
Height Works in Bridge	Safety Helmet, Full Body Harness, Protective
Welding & Gas Cutting	Safety Helmet, Face Shield with suitable filter, Leather Gloves, Safety Shoes.
Concreting Works	Safety Helmet, Gumboot & Rubber hand gloves.
Grinding & Chipping Works	Safety Helmet, Face Shield / Goggles, safety Footwear, Cotton / Leather Hand gloves.
Flagmen	Safety Helmet, Reflective Jacket with L&T Logo, Protective Footwear. He should be provided with Red Flags, Slow & Stop Paddles.
Work over Water	Safety Helmet, Full Body Harness & Lifeline for preventing fall, Life Jacket (ordinary or self-activating type), Lifebuoy and Protective Footwear.
Work at Night	Safety Helmet, Reflective Jacket with L&T Logo & Protective Footwear. Apart from the above, sufficient lighting, Blinkers / Flashlights to be provided on both the ends.

PPE Matrix

Category \ PPE	Head Protection	Safety glass	Face shield	Welding helmet	Foot Protection	Safety harness	Hearing protection	Hand Protection	Body Protection	Respiratory Protection	Shoulder Pad
Executives / Supervisors	✔				✔					✔	
Foreman	✔				✔					✔	
Unskilled workmen	✔				✔					✔	
Formwork	✔				✔			✔		✔	✔
Scaffolding	✔				✔			✔		✔	✔
Masonry works	✔	✔			✔			✔		✔	
Bar bending works	✔	✔			✔			✔		✔	✔
Grinding / Polishing	✔	✔	✔		✔			✔		✔	
Rigging	✔	✔			✔			✔		✔	
Welding / Cutting	✔	✔	✔	✔	✔			✔	✔	✔	
Handling corrosive liquid	✔	✔	✔		✔			✔		✔	
Painting	✔	✔	✔		✔			✔		✔	
Liquid bitumen work	✔	✔	✔		✔			✔		✔	
Sand blasting	✔	✔	✔		✔		✔	✔	✔	✔	
Insulation work	✔	✔			✔					✔	
Roof work	✔	✔			✔	✔		✔		✔	
Workshop (P&M, Carp)	✔	✔			✔			✔		✔	
Work at heights above 1.8 M.	✔				✔	✔		✔		✔	

17 COMMUNICATION PARTICIPATION AND CONSULTATION

Project shall Establish a procedure for communication, participation, consultation with employees, customers, sub-contractors, workmen, visitors & external interested parties.

SL	Procedure	Responsibility	Records
1	Internal Communication Establish internal communication through channels like Circulars, Minutes of Meetings, Inspection reports, Incident Investigation reports, EHS Display boards and Toolbox Talks.	EHSO	Communication Records
2	Communication with Customers Seek and record customer feedback. Submit the EHS performance details to customer as per the contract requirements.	EHSO	IM-18-A
3	Communication & Consultation with Sub-contractors Communicate EHS requirements through Subcontractor EHS Code of Practice. Communicate & Consult through Monthly Sub-contractor EHS meetings.	Planning In-charge EHSO	EHS Code of practice, Minutes of Meeting
4	Communication, Participation & Consultation with Employees & Workmen Ensure employees and workmen participation & consultation through Discussion through EHS Induction, Toolbox Talks, Training programmes. Participation in EHS Inspections, EHS Campaigns Involving them in EHS Risk Assessment, Incident Investigations	EHSO	IM-12-A, Induction records, Training records, Campaign reports
5	Communication with external interested parties Provide EHS policy to external interested parties on request. Participate in seminars, conferences, meetings of industrial bodies like NSC, RLI, CII, MCC, SEA etc as directed by HOD-EHS. Receive & maintain a database of the EHS concerns raised by interested parties (if any). Solve the EHS issues raised by interested parties and communicate to the concerned interested party and HOD-EHS.	EHSO	Participation records IM-06-B
6	Communication with Visitors Ensure all visitors are communicated on project EHS rules through EHSO before allowing them to enter project sites. Arrange necessary safety gadgets for the visitor and accompany him throughout the site visit.	PM Concerned Staff	Visitor Induction Register
7	External Communication of significant environmental aspects Communicate significant environ significant environmental interested parties only on request or to comply with legal requirements.	EHSO	-

18 EHS CAMPAIGN & MOTIVATIONAL ACTIVITIES

A procedure has been established to highlight the importance of EHS in the workplace through special campaigns, competitions, and other motivational means.

SL	Procedure	Responsibility	Records
1	Organize Safety Month celebration during the month of January every year and • Organize necessary promotional materials • Conduct special trainings & awareness programmes • Conduct competitions such as quiz, painting etc	EHSO	Campaign reports

	• Motivate all personnel to actively participate in the month-long events • Recognize & reward the winners / participants of competitions suitably		
2	Organize special campaigns during the following days of national / international importance, • March 4 – National Safety Day • April 28 – World Day for Safety and Health at Work • June 5 – World Environment Day	EHSO	Campaign reports
3	Organize Housekeeping campaign once in a quarter.	EHSO	Campaign reports
4	Organize activities pertaining to Corporate Social responsibility as deemed appropriate by PM & EHSO.	EHSO	Campaign reports
5	Prepare reports on campaigns organized and send to CEHSM.	EHSO	Campaign reports
6	Devise suitable motivational scheme such as awarding "safest staff, safest worker of the month" etc.	PM	Copy of certificates
7	Identify defaulters through EHS Inspections, Incident investigations and during day-to-day activities at workplace and report repeated non- compliances to PM, CH & CEHSM.	EHSO, Site Engineer	IM-19-B, Internal communication
8	Reprimand conspicuous deficiencies appropriately.	PM	Internal communication

19 DOCUMENT CONTROL

Project shall establish a procedure for the management of documents related to EHS Management system.
IMS documentation shall include:

- EHS Policy & Objectives
- Description of the scope and main elements of the IMS and their interaction, and reference to related documents
- IMS Manual (which defines & describes the EHS Management system)
- EHS Manual (which provides guidance for integrating EHS in work practices)
- Documents including records required to be maintained as per IMS manual
- Legal requirements, other reference standards & codes

MR level

SL	Procedure	Responsibility	Records
1	Approve & issue the IMS manual.	MR	IMS Manual
2	Distribute IMS manual to CEHSMs & EHSOs and maintain a list of controlled copy holders.	MR	IM-03-A
3	During revision of IMS manual, • Indicate the issue number on the recipient page. • Indicate the revision status in the Index. • Indicate the changes in amendment record sheet. • Indicate revision status & date of last revision on each document page.	MR	IMS Manual
4	Maintain documents in electronic medium by • Ensuring Security and Access control by system of passwords. • Ensuring uninterrupted power supply by UPS system and back up facilities exists in the centralized system. • Ensuring protection against virus by scanning any new discs	MR	Electronic medium

	/ drives to be used prior to its use.		
5	Maintain & update a master list of documents possessed.	MR	Master list of documents
6	Arrange for incorporation & distribution of the document changes after approval of the document change request.	MR	Amendment record sheet
7	Destroy obsolete documents promptly and if retained are identified as such.	MR	IMS Manual

CEHSM / EHSO level

SL	Procedure	Responsibility	Records
1	Maintain documents in electronic medium by • Ensuring Security and Access control by system of passwords. • Ensuring uninterrupted power supply by UPS system and back up facilities exists in the centralized system. • Ensuring protection against virus by scanning any new discs / drives to be used prior to its use.	EHSO	Electronic medium
2	Maintain & update a master list of documents possessed.	EHSO	Master list of documents
3	Destroy obsolete documents promptly.	EHSO	IMS Manual
4	Request for a change in IMS procedure through a document change request form, if scope for improvement is identified.	EHSO	IM-03-B

20 OCCUPATIONAL HEALTH & HYGIENE MANAGEMENT

The construction sector is a complex environment as both the workplace and the workforce are non-static. Nonetheless, there are common requirements of Health and Safety legislation and objectives for occupational disease. L&T concerned with these matters implement in all the job sites a control measure to prevent the occupational diseases.

For this Project should be observed some of the most typical occupational diseases from this sector, like:

- Musculoskeletal disorders.
- Noise.
- Vibrations.
- Skin disorders.
- Respiratory disease.

To prevent and control all occupational diseases the health surveillance should be a procedure to implement regularly. During the Project, the activities that must be implemented are:

- Follow the hierarchy of controls to eliminate or reduce the risks by substitution, engineering, or administrative control measures when possible.
- Check all the activities and the use of PPE when the unique recourse is available to protect the workers.
- Regular check up from the workforce and Staff during the execution of the project.

Pre-Employment Medical Examination

SL	Procedure	Responsibility	Records
1	Ascertain medical fitness of all company employees before confirming their employment and maintain medical records.	P&OD	Medical records
2	Ascertain medical fitness of all workmen before confirming their employment and maintain medical records.	IRO	IM-26-D

Pre-Employment & Periodical Medical Examination for Specific Categories

SL	Procedure	Responsibility	Records
3	Drivers & Operators of Cranes, Hoists: Arrange pre-employment and periodical medical examination as per stipulated criteria once in two years up to the age of 40 & once in a year thereafter.	IRO	IM-26-D Medical Records
4	Cooks / foods handlers. Arrange pre-employments and periodical medical examinations per the stipulated criteria once in a year.	IRO	IM-26-D medical records
5	Other Categories Arrange pre-employment and periodical medical examination for other categories of workmen, if necessitated by safe work method.	IRO	IM-26-D medical records

Occupational Health & Hygiene Inspection

SL	Procedure	Responsibility	Records
6	Conduct Inspection at least once in a month	EHSO & IRO	IM-26-A IM-26-B
7	Identify all conformities & non-conformities in respect of physical condition & practices and give suitable remarks.	EHSO & IRO	IM-26-A IM-26-B
8	Submit inspection report to PM and administration In Charge	EHSO	IM-26-A IM-26-B
9	Review and follow up implementation of suggested measures.	EHSO	Internal Audit Communication

Health campaign

SL	Procedure	Responsibility	Records
10	Organize the following health campaigns at least once in six months for workmen at projects, • General Medical Check-up camp • AIDS awareness campaign	EHSO	Campaign reports

Health Check-up

SL	Procedure	Responsibility	Records
11	Organize health check-up for workmen at projects by arranging doctors visit at least once in a week.	IRO	IM-26-C
12	Make all concerned aware of the routine health check-up and facilities its implementation.	EHO	Internal Communication

21 ENVIRONMENT MANAGEMENT

A separate Environment Management Plan will be prepared Doc no IM 27 A.

22 FIRST AID MANAGEMENT

By the requirements over every 50 workers a first-aid box shall be provided at work site or at distance of 500 meters. One more box for every additional 100 persons shall also be provided.
First aid boxes available at the job site. Each box is kept inside the containers from the Section In charges and should be used only by workers with first aid training that are present at the working area for each shift.

a.List of Approved First Aider

SL. NO.	NAME	MO. NO.	LOCATION
1.	Manoranjan Jati	9438147250	First Aid @ Subansiri Block
2.	Somaran Bosumatary	9101373923	First Aid @ Subansiri Block
3.	Nabajyoti Bera (EHS Engineer)	7099002556	EHS Office

b. Contents of First Aid Box

The first aid shall be distinctively marked with a red cross on a while background and contain following:

- Band aids (200 Nos.). For local application
- Ointment Thrombhob (10 Nos.) For local application 2/3 times a day
- Ointment Sofraycin (10 Nos.) Local application
- Ointment Multigesic (10 Nos.) Local application
- First aid sprays (2 Nos.) for burn / cuts / bruise etc.
- Savlon lotion (5 Bottles) for cleaning of wounds
- Tincture Benzoin (5 Bottles) for local application
- Bandages all types 1/2/3" (20 Nos. each) for bandage
- Cotton wool (10 Rolls.) For cleaning / use for dressing
- Large size burn dressings (10 Nos.).
- One pair of scissors.
- One pair of adhesive plasters (2.5 cms X 1 Mtr.).
- Johnson & Johnson Eye pads - 15 to 20 Nos.
- Dettol Ointment Silversuphidezine For burns (One Nos.)
- Eye Wash Bottle (One Nos.).
- One copy of first aid leaflet.

c. First Aid Box Locations

SR NO	Location
1.	APGCL Engineer Camp First Aid Centre
2.	Dam Container Office
3.	Powerhouse Container Office
4.	Surge Shaft Container
5.	HRT ADIT Container Office
6.	Store Container Office Near
7.	P&M Container
8.	First Canter
9.	Brahmaputra Block (Main Site Office)
10.	Lanka Office

d. **Ambulance arrangement**

Ambulance will be available at APGCL Engineer Camp. One dedicated ambulance driver will be available for 24 hours. At least one stand by vehicle will be available for all working area. Dedicated mobile number will be provided for ambulance driver. Ambulance number will be displayed for all site office and workmen rest area and notice board.

To move towards a zero-harm vision, there requires a management game changing shift and a complete gradual overhaul of what was done in the past to meet the current L&T business model.

- **L&T L.I.F.E. (Living - Injury - Free - Everyday)** is a program to support the elimination of fatalities & serious injuries from our business throughout all L&T Heavy Civil Infrastructure IC projects & operations globally.
- To enable L&T Heavy Civil Infrastructure IC to meet this vision L&T L.I.F.E Framework and supporting elements has been designed & developed to act as a driver towards this vision becoming a reality.
- L&T L.I.F.E. requires to be driven by leaders & the workforce with a demonstration to 'Commitment to Action'

  "If we don't have a vision or goal, how can we know or convince all our stakeholders when we have arrived"



23 L&T L.I.F.E GOLDEN SAFETY RULES



1. Safe induction and briefing - all employees must complete the safety Induction course and shall also attend safety briefings and tool-box meetings as and when required.
2. Pre-deployment Inspection of the heavy P&M - Conduct pre-deployment inspections for all heavy equipment prior to use at site and only deploy after ascertaining equipment is fit for purpose.

3. Daily pre use inspection - Conduct daily pre-use and periodic inspections for all equipment, vehicles, scaffolds, excavations, access equipment, tools, lifting tackles, portable machines etc.
4. Safe system of work - All work activities must be risk assessed and method statement in place prior to commencing work.
5. Personal Protection Equipment - Wear and use appropriate personal protective equipment (PPE). L&T minimum standard requirement is safety helmet, safety footwear & high visibility jackets.
6. Work permit - No one shall undertake specialized work for which a permit-to-work system applies without the required permit being in place. e.g., confined space, hot work, electrical, excavation works, lifting, etc.
7. Fall prevention - When working at height ensure all the necessary fall prevention arrangements are in place such as edge protection, floor opening protection, suitable harness anchor points are in place etc.
8. Lock out-Tag out (LOTO) - Before starting any electrical work activity ensure that all energy sources are isolated and the Lock Out / Tag Out procedure is implemented. NO LIVE WORKING.
9. Authority to operate electrical equipment - Only undertake electrical work if you are authorized and qualified to do so.
10. Good housekeeping - The site shall always be kept clean & tidy and unobstructed access ways must be maintained. A high standard of personal hygiene shall be maintained, and site welfare amenities shall be respected.
11. Adequate illumination - Maintain adequate area lighting in your workplace.
12. Speed limit - Never exceed the specified speed limit.
13. Drive license - Persons driving vehicles on site shall hold a valid driving license which shall be always carried with them.
14. Incident reporting - Report all accidents and incidents including near miss cases.
15. Unauthorized personnel - No person shall perform any rigging or lifting operations, erect, modify, or dismantle scaffolding or operate any plant or equipment unless authorized and qualified to do so.
16. No smoking - Smoking is prohibited except in the designated smoking areas.
17. No alcohol / drugs - Alcohol or illegal drugs shall not be consumed during work hours or immediately prior to commencing work. If you are on prescription drugs, please inform your line manager.
18. Keep clear of suspended load - Never walk or work under a suspended load.
19. No running or horseplay - Do not indulge in horseplay and running (except in case of emergency). Do not intentionally interfere or misuse any provided safety equipment, PPE, emergency equipment, signage, or any welfare provisions.
20. Restriction on the use of mobile phones - Do not use mobile phones if you are driving, operating equipment, working at height, or generally walking in and around the construction site.

Part B: Project EHS Standards

Part B: Project EHS Standards

This section shall establish the minimum EHS standards to be ensured at all project operations. The project EHS Standards shall be in line with the following requirements,

- L&T HSE Manual
- Risk Assessments & Safe Work Procedure for the activity
- Client EHS Requirements
- Legal EHS Requirements
- National / International Standards
- Industry Best Practices

24 WORKING AT HEIGHT

Any work above 2m height shall be considered as work at height.

24.1 Safe Access

Safe means of access and egress to the work area is provided to ensure the safety of all persons on the project site. Failure to provide a safe means of access exposes people to the risk of slipping, tripping, falling and impalement; the injuries that result from these types of risk are numerous and resulting in fatalities and serious injuries.

- Every single workplace shall be safely accessible. Make access provision nearest to every workplace.
- There shall be more than entry/exit provision for every building/work area.
- Restrict people movement within designated safe access to workplace by providing:
  - Fencing where public is moving,
  - Hard barricade where access is given for general workmen,
  - Hard barricade to separate pedestrians and vehicle movement,
  - Make clear access within workplace to avoid roaming around all work areas,
- Ensure designated access shall be free from any falling material hazard. The floor edges and openings in and the vicinity of access area shall be adequately protected. Other hazards like electrical, flammable storage area, radiation to be minimal etc.
- Protect people from falling material hazard by providing canopy (hard roofing) or 2 levels of safety netting (immediately below the job and 4m from the ground level) at people movement area.
- Safe access shall be designed keeping in view the loads to be handled and number of persons to use these access ways. Use staircases with edge protection, use fenced basic frames or provide safety netting.
- Ensure access is free from obstructions, protruding nails, slippery etc.
- Acceptable & Unacceptable safe access.

Acceptable temporary access ways	Unacceptable access ways
• **Stair ways with all standard components;**	• L&T Scaffolds without step ladders.
• **Ramps (up to 15® slope), with step resting**	• Other scaffolds with transom 1m apart;
• **Fixed ladders with landing at every 9m interval;**	• Climbing on structural members;
• **Portable ladders for height up to 9metres;**	• Portable ladders beyond 9m height;
• **Mobile elevated work platforms (MEWP).**	• Wooden ladders and rope ladders.
Note: **Crane suspended man baskets can be used for emergency or extremely difficult condition with prior approval from Senior Management.**	

24.2 LADDERS

Selection and Maintenance of Ladders

- The ladders used on the project shall comply the standard mentioned in the L&T HSE Manual.
- Insulated type ladders shall be chosen for working on electrical installation or near its vicinity.
- Ladders shall be either ISI certified, or load tested prior to use.
- All ladders shall be visually inspected prior to use. Ladders are inspected by a competent person at periods not exceeding 3 months. Such inspections will check the following:
- That the ladder stiles are not bent and buckled
- That all rungs are in place, equally spaced between 250mm to 350mm, secured to the stiles, free of cracks and other damage
- That any adjustable feet fixed to the ladder stiles are in good condition.
- That all catches on extending ladders are securely fixed and free from damage
- That any extension limiters on extending or step ladders are in place, securely fixed and free from damage
- Portable ladders shall have provision for firm grip like rubber shoes etc.
- Maintain a register or log of all ladders in use within the project. The register shall be made available for review on request.
- Any ladder that is found to be defective will be removed from use immediately. Where minor defects are apparent repairs may be made. Where ladders have damaged rungs or stiles they shall be removed or repaired by a competent person.

Usage of Ladders

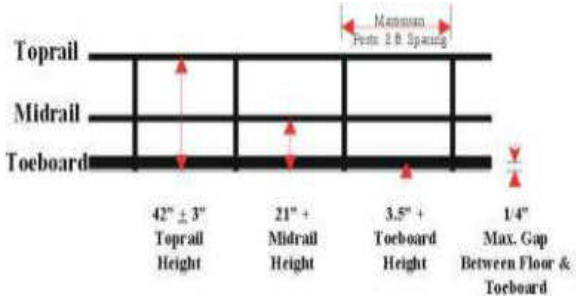
- All personnel required to use ladders are aware of their purpose. The purpose of ladders is to gain access to a workplace, they are not working platforms. Where work is conducted from a ladder a means of fall prevention or arrest will be provided. Only inspections or short duration work of less than 30 minutes shall be performed on ladders.
- Portable ladders shall be placed on a firm footing or secured to prevent them slipping or sliding during use.
- Straight ladders are positioned at an angle of 72o (1: 4 ratio) from horizontal to minimize the risk of
- Sliding or falling backward. The ladder rails shall be extended at least 01 meter above the top landing to ease moving on to surface.
- Metal rungs shall be cleaned frequently to prevent accumulation of materials which may destroy non – slipping properties.
- The rungs of the ladder shall be corrugated, knurled, dimpled, coated with skid resistant materials, or otherwise treated to minimize slipping.
- Where any ladder is used in a vertical plane a means of fall prevention or fall arrest will be provided. A harness and double tail lanyard will be used on open ladders extending more than 6 meters.

24.3 Stairs

- All temporary stairs towers used on the project shall be designed & manufactured by L&T
- Formwork or meets equivalent standard. Stairs shall be erected as per design only.
- Stair towers shall have outside mesh or fitted with safety net to prevent falling material hazards.
- Handrails on both sides of flight and landing platforms and mid-rails fitted.
- Stair towers shall be regularly inspected by competent scaffolding inspector and Scaff tagged in accordance with scaffolding procedure.
- Stairwells and stair towers within the project are kept free of rubbish and materials.
- Cables and leads are not allowed to cross stairs as they pose a potential trip hazard.

24.4 Ramp / Gangways

- Ramps shall be built to provide strength equal to that specified for scaffold structures and shall not unduly rag under the corresponding dead or moving loads.
- If the ramp or runway is 1m or more above the ground or floor level, by standard railings and toe boards.
- The slope of the ramp shall not exceed 2 in 3. Where the slope is more than 1 in 4, proper foot holds shall be provided by means of stepping laths of minimum size 50 X 30mm at intervals not exceeding 45 cm.



24.5 Work Plate forms

No worker shall be allowed to stand on pipes or other structural member. A Working Platform shall be designed to support the intended weight with minimum factor of safety 4. The safe working load of work platform shall be mentioned.

- Only Workmen - 600 mm
- Men, tools & materials - 900 mm
- Men, tools, material, and wheelbarrows -1200 mm

Working Platform shall be fully decked with scaffold boards. Scaffold boards shall be secured to prevent displacement and prevent over hanging more than 150 mm.
Every Working Platform shall be provided with a ladder or any other safe means of access. Edges of the platform shall be provided with guardrail. Height of the top rail shall be from 1000 mm to 1200 mm. The mid-rail shall be provided halfway between the platform and the top rail on the inside of the posts. Toe guard shall be of minimum 100mm height. Posts and rails shall be capable of withstanding a force of at least 75kg (200 lb) applied at any point or withstanding any load likely to be applied Barriers shall be provided on open edges, holes, and openings in the platform.

24.6 OPENING PROTECTIONS

Never create or open any opening without provision for protection. Develop site specific openings protection method and implement. Typically, any opening created, shall be

- Immediately protected in temporary manner like, entry restrictions, warning tapes and warning signs.
- Provide rigid protection before completing the current shift. Provide hard barricade, opening protection cages, safety netting.
- Also, no opening & floor edge protection shall be removed without alternative protective measure.

24.7 LEADING EDGE PROTECTIONS

- Develop site safety system to demarcate all the openings in drawing for effective monitoring.
- Develop inspection programs to ensure all the openings & floor edges are effectively protected and none it left.
- Establish specific method of opening and edge protection scheme applicable to site. Include specific methods in Safe Work Methods and display posters on opening protection.
- Permit to open manholes / opening protection only when alternative protection is erected.
  Catch nets shall be installed as per the guidelines.

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 1.5m	2.4m
1.5 to 3m	3m
More than 3m	4m

Safety net shall be tied not more than 6m below the point of work.
Hard roof structures shall be installed directly under the height works.

24.8 PERSONAL PROTECTIVE EQUIPMENT

- Safety harness shall be worn to go any place where potential of fall 2m and more and the fall prevention arrangements are inadequate.
- Safety harness shall meet specification as given in IMS - IM 16 and shall be of approved make and procured from approved vendors only. Project Stores keeper shall accept PPEs only after quality inspection by Project EHS In-charge and he/she certify for its good quality.
- Safety harness shall carry serial number and issued to individual or group of workers and recorded.
- The condition of safety harness is checked on monthly basis & record and damaged harness shall be discarded immediately.

24.9 Fall arrest system

Fall arrest system shall be installed for vertical climbing more than 6m height.
IC approved fall arrest equipment shall only be used.

1. Rope grape type fall arrestor shall be attached to climb ladders with suitable sized
2. Polyamide or wire ropes as per the recommendation.
3. Retractable type fall arrestors are suitable for specific approvals like getting into

4. Lower work platforms, trenches, and manholes.

24.10Static lifelines

Horizontal static lifelines are widely used to move or carry out works in longitudinal way example:
Beam construction.

1. The static lifeline shall be designed to take at least 2.24 Tons of breaking load for each person added.
2. Refrain usage of Polypropylene (PP) rope as it deteriorates quickly in hot weather.
3. It recommended to use 12mm wire ropes always.
4. Anchor point shall be carefully chosen to ensure strongest
5. and rigidity.

24.11Administrative Controls

Screening & selection of workforce for working at height

1. Height pass system

Height pass is mandatory for all workers who will be permitted to work at height. The worker physical and medical fitness shall be examined and certified by registered medical practitioner and worker ability to climb and work at height shall be assessed practically.



2. Physical Assessment

Worker shall be asked to walk on the typical structure shown in the picture with Safety harness anchored above his head. The blood pressure is measured before and after climbing. Upon no increase in BP level after this exercise, they will be declared fit for work at height and height pass is issued.

3. Height work permit

Height work permits are mandatory for carrying out works at height. Refer: Integrated Management System manual IM 14 for details.

25 WORKING WITH PLANT & MACHINERY

25.1 General Mandatory

All P&M major equipment such as Dumper, Transit mixers, Roller, Tyra mounted crane, etc. must go through inspection and check once in a month by safety department accompanied by P&M personnel.

- Only authorized driver must drive the vehicle and he should have valid driving license.
- During the selection of driver, driving policy set for IC to be followed
- Note-Special temporary relaxation has been given for our project by the EHS Head (IC) as below
- All potential local drivers should be monitored and tested to determine their capability and only the drivers that demonstrate safe driving skills in the local difficult terrain shall be kept on working for L&T.
- All local drivers should have internal training on safe driving methods, L&T golden safety rules and site-specific safety inductions delivered by the project management team.
- All local drivers for the first 3 months must be shadowed and monitored preferably by our competent L&T drivers, any drivers that consistently do not meet L&T standards should be released from their driving roles.
- All the above controls to be updated in the project risk register and a SOP developed and communicated to all stakeholders, also update in the project EHS plan as a change. (This will be checked at the next HQ EHS audit)
- This is just a short-term relaxation not a change in IC policy so continue to identify competent drivers through advertisements in newspapers, engaging recruitment agencies and references from IC P&M / Cluster P&M agents etc.
- In 3 months', time Delhi Cluster EHS Head Ashok Prasad, MVR, and NK Singh to review status and agree to extend if required.
- EHS HQ Audit will be arranged where all the above conditions will be verified for compliance as part of the audit process.

- Identity cards / Photo Pass shall be compulsory for driving the vehicle at site.
- Emergency Stop / Pull Card switches are must for the plants.

25.2 Batching Plant

The equipment's are deployed after obtaining the 'Equipment fitness certificate' from the P&M engineer and the EHS engineer (Refer PM-31-B Equipment fitness report for vehicle and earth moving equipment).

Safety during normal operation of batching plant

1. The plant to be operated, only if all safety devices and safety-related equipment such as removable guards, emergency stops, sound insulations are in the right position and operative.
2. The operator shall check the machine/plant, once at least per shift, for externally perceptible damage and defects.
3. Notify to the P&M Engineer immediately of any changes (including any deviations from the normal performance in service).
4. If any changes / deviations are found, the plant shall be stopped immediately, and necessary repair works to be carried out.
5. In case of malfunction, stop immediately and safeguard the machine/plant. Have the malfunction immediately cleared.
6. Starting and stopping procedures, control devices / signals shall be followed according to the manufacturer's guidelines as mentioned in the operating instruction manual.
7. Before starting the machine / plant, it shall be ensured that nobody is endangered by the starting machine/plant.
8. Nobody shall be allowed to step enter in the danger area of skip. The surrounding area shall be cordoned off when the skip is in operation.
9. All openings and cut-outs shall be properly covered or adequately guarded. All wire ropes shall be inspected at regular intervals and replaced if required.

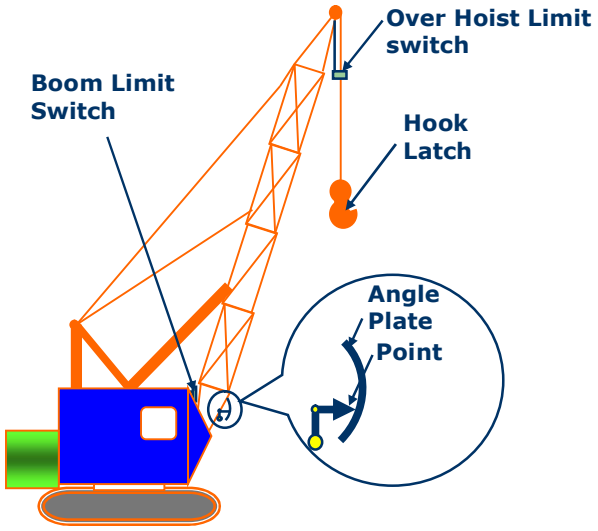
Maintenance and clearing of Malfunction during Work

1. Only authorized P&M technicians are allowed to carry any repair, maintenance work, and replacement of parts in the Batching plant.
2. On and off positions / procedures shall be observed in accordance with the maintenance guidelines as indicated in the manufacturer's instruction manual / handbook.
3. Work Permit System shall be implemented for all repair and maintenance works carried out in the Batching Plant. (Refer "Permit to Work on Plant, Machinery & Other Power-Driven Equipment PM20F'')
4. P&M Engineer executing the maintenance work shall obtain the above work permit from the Issuing Authority (P&M In charge) before starting the work.
5. The plant shall be de-energized, fuses shall be removed and kept under the custody of Issuing authority, and information shall be displayed informing that, maintenance work is under progress".
6. After completion of the maintenance work the issuing authority shall check for the following points,
7. All tools and tackles have been removed.
8. Whole of the area has been cleared and equipment fit for operation
9. If all the above points are checked and found O.K. the equipment shall be energized, and normal operation shall be started.
10. During replacement, individual parts and large and/or heavy structural components must be carefully attached to lifting appliances and safeguarded to avoid a possible source of danger. Only appropriate lifting equipment or lifting appliances with sufficient carrying capacity shall be used. Nobody should be allowed to stay or work underneath suspended load.
11. Slinging of loads, signalling to crane operators and the whole lifting operation shall be done under the supervision of authorized P&M Technician only.
12. For any work above body height, use appropriate ladder and/or working platforms. Do not use machine parts as ascending equipment! For maintenance work in larger height use safety device against falling.
13. Keep all handles, steps, side rails, platforms, stages, ladders free from dirt, oil spillage and any other slippery material.

Electrical Safety in Batching Plant

Any work at the electric appliances or operating material should be performed only by an authorized electrician. The electric equipment of a machine/plant shall be inspected/checked in regular intervals by an electrician or P&M Engineer with EHS representative. Defects like loose connections and scorched cables if found shall be repaired immediately.

25.3 Crane Operations



1. Operator of valid license is permitted to operate the crane.
2. He should always have his valid license and the certificate of the equipment he operates.
3. Certified crane only is deployed for the job.
4. Third party inspection to be done.
5. Assembling, maintenance and disassembling on the equipment are done as per the manufacturer's manual.
6. Overloading shall never be allowed at site.
7. The operator should ensure the area is good enough for the crane before marching or parking it.
8. Crane shall be stationed on a firm level ground.
9. Proper boom angle and radius shall be followed to lift the load. Refer the load chart given in the crane manual or fixed inside the crane cabin.
10. Cranes should not be parked near the edges of pit or excavations.
11. Limit switch of cranes should be tested frequently for ensuring its proper functioning.
12. The swinging area of the crane body to be cordoned. No trespassers to be allowed in this vicinity.
13. The operator should have a clear view of the operation throughout the hoisting period.
14. A trained signalman should give the standard signal for crane operation.
15. 15. A competent rigging gang does material handling.

25.4 Hydraulic Excavators / Earth Moving equipment

1. Operator should always have his valid license and the certificate of the equipment he operates.
2. No person should enter the radius of action of Earth-moving equipment when in operation.
3. No Earth-moving equipment / Excavator should be started up until all workers are away from the operating radius.
4. The cab of Earth-moving equipment should be kept at least 1 m (3 ft 3 in) from a face being excavated.
5. Earth-moving equipment should not travel on bridges, viaducts, embankments, etc. unless it has been found safe for it to do so.
6. Adequate precautions should be taken to prevent Earth-moving equipment being operated in dangerous proximity to live electrical conductors.
7. Dusty haulage roads and tracks should be watered to maintain good visibility.
8. Earth-moving equipment should not be left on a slope with the engine running.
9. No adjustments, maintenance work or repairs should be made on equipment in motion.
10. Deck plates and steps should be kept free from oil, grease, mud, or other slippery substances.

25.5 Dozers

1. Operator of valid license is permitted to operate the equipment.
2. He should always have his valid license and the certificate of the equipment he operates.
3. Before leaving a Dozers, the operator shall,
4. Apply the brakes
5. Lower the blade
6. Put the shift lever in neutral
7. At the close of work dozers should be left on level ground.
8. When a dozer is moving uphill the blade should be kept low.
9. Dozer blades should not be used as brakes except in an emergency.

25.6 Transit Mixer

1. Operator of valid license is permitted to operate the equipment.
2. He should always have his valid license and the certificate of the equipment he operates.
3. A driver shall follow the indications given by traffic signs (e.g. - Speed limit, Sharp turn etc.)
4. Reverse Horn to be provided and frequently checked for its proper functioning. It shall also be equipped with first aid kit and a fire extinguisher.
5. Before sending the workmen inside the drum for cleaning, the rotation of the drum shall be arrested. Drum cleaning should be done under the supervision of the P&M Engineer. (Permit to Work on Plant, Machinery & Other Power-Driven Equipment permit system if applicable. Ref: PM-20-F)
6. While moving in the public roads the driver shall comply with all local traffic regulations.
7. No person shall be allowed to stand between the transit mixer and concrete pump. (Refer safe procedures in concreting)
8. Use clear and concise hand signals for reversing, stopping, unloading concrete and other operations. While working near excavated pits and trenches the transit mixer shall be stopped well ahead of the edge of the trench / pit.

25.7 Tipper / Trailer

1. Operator should have valid license to operate the equipment.
2. He should always have his valid license and the certificate of the equipment he operates.
3. A driver should follow the indications given by traffic signs (e.g. - Speed limit, Sharp turn etc.). Reverse
4. Horn should be provided and frequently checked for its proper functioning.
5. Tipper should also be equipped with first aid kit and a fire extinguisher.
6. While moving in the public roads the driver should comply with all local traffic regulations.
7. In case of loading or transporting of long materials, such as built-up columns or MS rods the projection beyond the sides and end of the bed should be kept minimum.
8. Suitable precautionary measures such as flags etc. should be provided.
9. Materials loaded should be lashed before starting the trailer.

25.8 Wheel Loader

1. Before starting operations, place must be properly observed (obstructions / overhead power lines / marks for underground cabling).
2. While idling, loaded bucket should be rested on ground.
3. After stopping the machine release all hydraulic pressure in system.
4. Workmen should not be carried in W-20 buckets.

25.9 Road Roller

1. Safety instructions shall be followed according to the manufacturer's guidelines as mentioned in the operating instruction manual.
2. All Lights should be checked for working condition.
3. Reverse horn, all gauges must be checked for working condition.
4. A red flag shall tie in the side of the machine
5. Roller should not operate beyond 500 mm from the edge of the high embankment. Proper guidance shall be provided to the operator by fixing flags / pegs. Roller should not vibrate while crossing the bridge.

25.10 Maintenance of Plant and Equipment

The maintenance on plant or equipment is one of the aspects more important to avoid incidents or accidents and to ensure that the equipment is working effectively.
Maintenance may be part of a planned programmed or may have to be carried out at short notice after a breakdown. It always involves non-routine activities and can expose those involved to a range of risks.
A correct and programmed maintenance will make plant and equipment more reliable. The breakdowns aren´t so frequents what means less dangerous contact with machinery is required, as well as having the cost benefits of better productivity and efficiency.

More hazards can occur when machinery becomes unreliable and develops faults. Maintenance allows these faults to be diagnosed early to manage any risks. However, maintenance needs to be correctly planned and carried out. When the maintenance isn´t correctly done the number of fatalities and serious injuries grow up.
Before start with the maintenance, it is important verify some aspect:

- Never make maintenance from plant or equipment if the person is not prepared or is competent for this specific job. It is necessary define if the maintenance should be done by specialist contractors, the staff must be competent and use the appropriate equipment.
- Before starting the work, it is important plan carefully and follow the manufacturer´s maintenance instructions and produce a safe system of work.
- Try make the maintenance during the stops of the production (before start-up or during shutdown periods).
- Provide safe access and workplace for the workers.
- Take measures to ensure the safety of others who may be affected by the maintenance work. Install signs, barriers and when necessary, put workers at the key points.
- Verify if the moving parts are stopped and isolate electrical and other power supplies. When the work is made overhead electrical conductors cut the power off first.
- Adopt the procedure lock-out tag out when necessary. Ensure that the machinery or equipment is de-energized and do not have any stored energy.
- Support parts of plant that could fall.
- Place mobile plant in neutral gear, apply the brake and block the wheels.
- Safely clean out vessels containing flammable solids, liquids, gases, or dusts, and check them before hot work is carried out to prevent explosions.
- Avoid entering tanks and vessels where possible. This can be very high-risk work. If necessary, use the procedure to work in confined spaces.
- Clean and check vessels containing toxic materials before work starts.

After plan and programmed maintenance, the next step is implementing the system, for this reason during the activities and when necessary, apply the procedure of maintenance ensure:

- Maintenance is carried out by competent person (with skills, knowledge, and experience to make the work safely).
- Maintain plant and equipment regularly according to the manufacturer´s maintenance instructions in particularly if there are safety critical features.
- All the workers must report damaged or faulty equipment.
- Provide the proper tools for the maintenance workers.
- Schedule maintenance to minimize the risk for all the workers that are involved in this activity and for the others that can be affected by the maintenance.
- Ensure the moving parts isolated or locked and that flammable explosive toxic materials are dealt with properly.
- Never ignore maintenance, the reports of damaged or unsafe equipment and do not use faulty or damaged equipment.

The moving machinery can cause injuries in many ways, for this matter before start using any machine the workers must to think about the risks that can occur and how these can be managed. Before start to use the machine verify:

- If the machine is complete, with safeguards and without any defect.
- Produce a safe system of work for using and maintaining the machine. Maintenance may require the inspection of critical features where deterioration would cause a risk. Also look at the residual risks identified by the manufacturer in the information/ instructions provided with the machine and make sure they are included in the safe system of work.
- Ensure every static machine has been installed properly and is stable.
- Use the correct machine for the job, do not use a machine that is not proper to make the work.
- Make sure that the machine is safe for any work that must be done when setting up, during normal use, when clearing blockages, when carrying out repairs for breakdowns, and during planned maintenance.
- Is properly switched off, isolated or locked-off before taking any action to remove blockages, clean or adjust the machine.

To use the machine in a safe way the worker must adopt measures to prevent access to dangerous parts and in some cases, it may be necessary to use a combination of measures:

- Use fixed guards whenever practical. When is not possible use other methods like trip systems such as photoelectric devices, pressure-sensitive mats or automatic guards may be used if other guards are not practical?

- Where guards cannot give full protection, use jigs, holders, push sticks, etc.
- Give the necessary information, training, and supervision for the operator to use the equipment in a safe way.
- If the machines are controlled by programmable electronic systems, changes to any programmer should be carried out by a competent person. Keep a record of such changes and check they have been made properly.
- Ensure that the control switches are clearly marked to show those function.
- Install stop controls where necessary.
- Make sure operating controls are designed and placed to avoid accidental operation and injury, use two-hand controls where necessary and shroud start buttons and pedals.
- Do not let unauthorised, unqualified, or untrained people use machinery.
- Adequate training should ensure that those who use the machine are competent to use it safely. This includes ensuring they have the correct skills, knowledge, and experience.
- Supervisors must also be properly trained and competent to be effective.
- Ensure the work area around the machine is kept clean and tidy, free from obstructions or slips and trips hazards, and well lit.
- Make sure you are wearing the appropriate protective clothing and equipment required for that machine, such as safety glasses, hearing protection and safety shoes.
- Use a machine or appliance that has a danger sign or tag attached to it. Danger signs should only be removed by an authorised person who is satisfied that the machine or process is now safe.
- Wear dangling chains, loose clothing, rings or have loose, long hair that could get caught up in moving parts.
- Do not distract people who are using machines.
- Do not remove any safeguards, even if their presence seems to make the job more difficult.

26 WORKING WITH ELECTRICITY

The electrical woks can make several injuries and kill people, like also cause damage to property. To work near, with electricity or electrical equipment the workers must follow some preventive measures.
Before the workers start to their job, they must ensure that:

- An assessment has been made for all electrical hazards.
- The risk assessment should take into consideration the type of electrical equipment used, the way in which it is used and the environment that it is used in.
- The electrical installation and the electrical equipment are suitable for its intended use and the conditions in which it is operated. The only use for its intended purpose.
- In wet surroundings, unsuitable equipment can become live and make its surroundings live too. Fuses, circuit-breakers, and other devices must be correctly rated for the circuit they protect. Isolators and fuse-box cases should be kept closed and, if possible, locked.
- Cables, plugs, sockets, and fittings must be robust enough and adequately protected for the working environment.
- Ensure that machinery has an accessible switch or isolator to cut off the power quickly in an emergency.

All the electrical equipment and installation are maintained to prevent danger occurrences. To keep in a safe condition the job site the workers must follow these rules during the maintenance:

- Before start to use electrical equipment, including portable appliances, the workers must carry out visual checks. All the equipment with problems, should be removed immediately to be repair or replaced.
- Repairs should only be carried out by a competent person (electricians).
- All the equipment with more likely to become damaged (ex: portable electrical tools, electrical cables, equipment that is regularly moved or used in arduous environments) should be more frequently inspected then the others electrical equipment (ex: lights on the roof of the workshop, electrical installation from the colony, etc.).
- Competent person must decide for inspecting and testing fixed wiring installations, the circuits from the meter and consumer unit supplying light switches, sockets, wired-in equipment (e.g., cookers, hairdryers) etc., to be carried out regularly so there is little chance of deterioration leading to danger.

To use the electrical power and work with electrical equipment the workers must respect these generic rules:

- Ensure that workers know how to use the electrical equipment safely.
- Provide enough sockets to be used during the works. Check that socket outlets are not overloaded by using unfused adaptors as this can cause fires.

- Ensure that the cables are organized and no trailing cables that can cause people to trip or fall.
- Switch off and unplug appliances before cleaning or adjusting them.
- Signalize electrical wires, cables, or equipment. Put signals on the job site to warning about the dangers from electricity, or any other hazard. Remember that electrical cables may be inside walls, floors, and ceilings (especially when drilling into these locations).
- Give training for the workers and ensure that they understand and has sufficient knowledge to work with electricity (incorrectly wiring a plug can be dangerous and lead to fatal accidents or fires).
- All the equipment with defect should not be used. During the work, if something happen that make a damaged on the electrical equipment stop using the equipment immediately.
- Inspect all the electrical tools before using them.
- Consider using a residual current device (RCD) between the electrical supply and the equipment, especially when working outdoors, or within a wet or confined place.

In the job site there are also some activities that maybe can involve the risk to work near some electrical installations, like overhead electric lines or underground cables. In those situations, it is important that the workers respect some basic rules:

- Beware of the dangers of working near or underneath overhead power lines. Electricity can over flash from them, even though machinery or equipment may not touch them.
- Respect a safety distance for the power lines. Do not work under them when equipment (ex: ladders, a crane jib, a tripper-lorry body, or a scaffold pole) could come within a minimum of six meters of a power line without getting advice. Speak to the line owner (ex: electricity company, railway company or tram operator) before any work begins.
- In the underground works or excavations, always assume cables will be present when digging in the street, pavement and or near buildings.
- Consult local electricity company and service plans to identify where cables are located.

27 TRAFFIC MANAGEMENT

This plan gives the detailed guideline for traffic management in most of the common situations at our Road Projects.

27.1 Traffic Control Devices

Traffic control devices used to regulate the traffic in Road Construction Zones include,

1. Road Signs
2. Delineators
3. Barricades
4. Cones
5. Pylons
6. Pavement Markings
7. Flashing lights.

27.1.1 Road Signs

Road signs are classified in to three major categories:

27.1.1.1 Mandatory / Regulatory Signs

These signs impose legal restriction on traffic and violation of these signs is an offence. These include all signs, which give notice of special obligations, prohibitions, or restrictions with which the road users must comply. Regulatory signs are mostly circular in shape.

27.1.1.2 Cautionary / Warning Signs

These signs are used to warn road users of the existence of certain hazardous conditions either on or adjacent to the roadway, so that the motorists are cautious and take the desired action. Cautionary signs are triangular with red border and black symbol or message on white background.

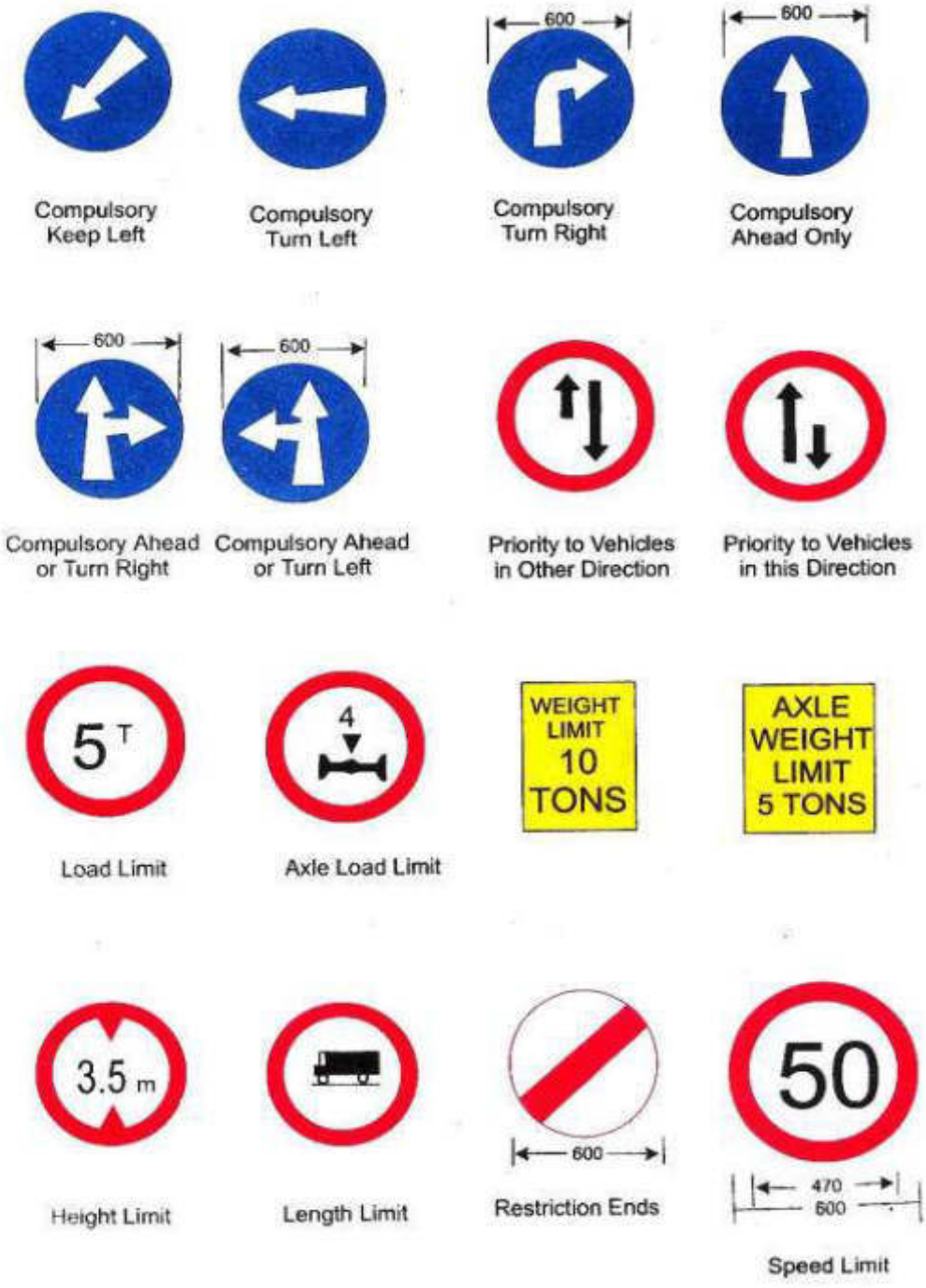
27.1.1.3 Informatory Signs

These signs are used to guide road users along routes, inform them about destination and distance, identify points of geographical and historical interest, and provide other information that will make the road travel easier, safe, and pleasant. They are usually rectangular in shape.

Table: 1 MINIMUM SIGHTLINE DISTANCES AND THE MINIMUM SIZE OF THE SIGNS

Average Speed (Km/h)	Distance of first sign in advance of the first channelizing device (m)	Size of Warning Sign (mm)	Minimum no of signs in advance of the hazard
Under 50	100	600	3
51 – 60	100 – 300	750	3
61 – 80	120 – 300	900	3 or 4
81 – 100	300 – 500	1200	4
Over 100	1000	1200 to 1500	4

Mandatory / Regulatory Signs



Cautionary / Warning Signs



Two Way Traffic Ahead



Men at Work



Narrow Road Ahead



Left Lane Diverted



Right Lane Diverted





Lane Closed (Two Lane Road)



Lane Closed (Three Lane Road)



Lane Closed (Four Lane Road)



Median Closed



Diversion to Other Carriageway



Traffic Signal Ahead



Two Way Traffic



Un Even Road



Slippery Road



Loose Chippings



Divided Road



Divided Road Ends



Informatorily Signs



In case of divided carriageways, the signs should be provided both adjacent to the shoulder and on the central median to be visible from all lanes.

27.1.1.4 Delineators

Delineators are devices or treatment which outlines the roadway or portion thereof. They include Safety Cones, Traffic Cylinders, Tapes, Drums, painted lines, Raised Pavement Markers, Guideposts, and Post-mounted Reflectors etc. They are used in or adjacent to the roadway to control the flow of traffic. Delineators are basically driving aids and should not be regarded as a substitute for warning signs or barriers for out-of-control vehicles.

27.1.1.5 Guidepost

They are intended to delineate the edges of the midway to guide driven about the alignment ahead, particularly where it might be confusing. Guideposts can be of metal, concrete, cut stone, timber, or plastic. The posts can be made of Circular, Rectangular or Triangular Cross-section but the side facing traffic should be at least 10 cm wide.

27.1.1.6 Safety Cones

Safety cones are 500 mm, 750 mm, and 1000 mm high and 300 mm to 500 mm in diameter. They are usually made of plastic, rubber, HDPE, PVC and have retro reflectorized red and white bands. Safety cones would be displaced or blown unless their bases are anchored or loaded with ballast. This can be avoided by,

- Using sandbag rings to provide increased stability.
- Using heavier weighted cones.
- Using cones with special weighted bases.
- Doubling the cones to provide added weight.

27.1.1.7 Barricades

Barricades are intended to provide containment without significant deflection or deformation under impact and to redirect errant vehicles along the barrier. Barricades can be used to,

- Prevent traffic from entering work areas, such as excavation, material storage area.
- Provide protection to workers.
- Separate two-way traffic.
- Protect construction such as false work for culverts and other exposed objects.

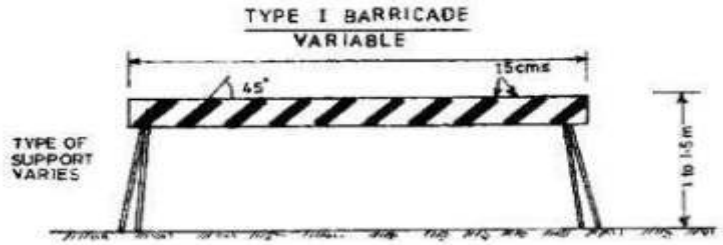
Barricades can be permanent or portable. Portable barricades should be stable under adverse weather conditions and appear substantial but not so much as to cause excessive damage if a vehicle strikes. (Refer Fig 7 & 8) Three types of typical barricades generally used in road construction zones, with recommended dimensions are given below.

Table No: 2 - BARRICADE CHARACTERISTICS

Type / components	Type – I	Type - II	Type - III
Width of rail	200 – 300 mm	200 – 300 mm	200 – 300 mm
Length of Rail	2 m – 2.5 m	1 m – 1.2 m	2 m – 2.5 m
Width of Strip	200 mm	200 mm	200 mm
Type of Frame	Heavy “A” Frame	Light “A” Frame	Fixed, Demountable
Flexibility	Essentially movable	Portable	Essentially Permanent

Type I and Type II Barricade

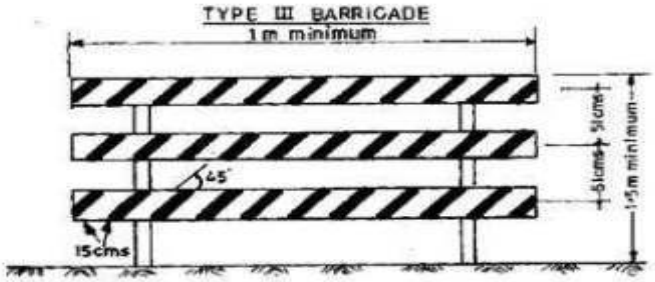
These barricades shall be used when traffic is redirected in a road. These barricades can be used interchangeably and more suitable for repair, maintenance, and other temporary works. As these barricades are susceptible to overturning in wind, their stability can be improved through ballast.





Type III Barricade

This is a permanent type of barricade and can be erected at the point of closure when a road section is closed to traffic for construction works. They may extend completely across a roadway and its shoulders or from kerb to kerb with a small gate or movable section for the entry of construction workmen and vehicle.



27.1.1.8 Flagmen

A qualified personnel at least average intelligence, be mentally alert and good in physical condition be selected, since flagmen are responsible for public and workmen safety.
Flagmen should be equipped with yellow helmet with green reflective sticker fixed around and reflective jacket along with hand signalling devices such as flags and sign paddles. The typical specifications are given below,

Red Flag	Minimum size 600 X 600 mm (Polyester cloth advisable) securely fastened to a staff of length approx. 1 m
STOP Sign Paddle (Light in weight)	Shape – Octagonal Width - 600 mm with rigid handle Background Colour – Red, Letter Colour – White
SLOW Sign Paddle (Light in weight)	Shape - Octagonal Width - 600 mm with rigid handle Background Colour – Yellow, Letter Colour – Black Border Colour – Black.

Flagmen need to maintain the flow of traffic continuous past a work zone at relatively reduced speeds by suitably regulating the traffic. He shall stop the traffic for a short while whenever required (e.g., For entry and exit of construction equipment in to work zone).
Flagman should be positioned in a place where he is clearly visible to approaching traffic and at a sufficient distance to enable the drivers to respond for his flagging instructions. A flagman never leaves his post until properly relieved,
The standard distance shall be maintained at 60 – 100 m but can be altered depending upon the approach speed and site conditions. In urban areas this distance shall be taken as 20 m to 50 m.
Standard Signals to be given by Flag men are depicted in the Fig 9. They should undergo special task training program through safety department.

28 USING HAND TOOLS AND POWER TOOLS

The power tools when are used incorrectly can produce serious injuries on the workers, for this matter it is very important follow some basic rules:

- Always read, understand, and follow the instruction manual before attempting to use any power tool. Also read the nameplate information and follow the warning labels on the tool itself.
- Always wear safety goggles or safety glasses with side shields. Use a dust mask for dusty operations, and wear hearing protection if you will be using the tool for an extended period.
- Dress right and remember that looks don't count. No loose-fitting clothing, no neckties, no jewellery, no dangling objects of any kind. Long hair must be tied back out of your way. Non-slip footwear is recommended.
- Never use power tools if you are tired, sick, distracted, or under the influence of drugs or alcohol.
- Make sure your work area is neat and clean and free of any debris that might get in your way or be ignited by hot tools, chips, or sparks.
- Make sure your work area has plenty of bright, shadow-free light.
- Before you plug in any power tool, make sure the power switch is off.
- Be sure all appropriate guards are in place and working.
- Always turn off and unplug the tool before you make any adjustments or change accessories.
- Never use any accessory except those specifically supplied or recommended by the manufacturer. They should be described in the tool's Instruction Manual.
- Never use power tools in wet or damp conditions.
- Never use a tool that is damaged or malfunctioning in any way.
- When must use an extension cord, make sure it's a heavy-duty cord and don't use indoor rated cords outside?
- If the tool has a three-pronged plug, make sure you use a three-pronged extension cord plugged into a three-pronged outlet.
- Make sure cutters or blades are clean, sharp, and securely in place. Never use bent, broken, or warped blades or cutters.
- Never overreach when using a power tool. Stay firmly planted on both feet.
- Never rush what you are doing. Always pay close attention. Don't let anything distract you.
- When using hand-held power tools, always keep a firm grip with both hands. Losing control creates a hazardous situation. Do not use any tool that is too heavy for you to easily control.
- Always use the right tool for the right job. No substitutions allowed.
- Always unplug, clean, and store the tool in a safe, dry place when you are finished using it.
- Safety signage and Notice Board

- Illumination at workplace

29 BLASTING

The transportation, storage, handling & use of explosives are governed by Explosives Act and The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Central Rules 1998 (Rules 212 and 213). Strict-compliance of the same should be ensured.
Following three unsafe acts are strictly forbidden while handling explosives:

1. The use or possession of intoxicants on or around the- job
2. Horse play or practical jokes
3. Smoking or use of open lights

Blasting records

Following two records have to be maintained in 'all quarries while handling explosives:

A. A blasting record for each blast indicating
- Date & time of blast
- Number of holes
- Type of explosive used
- Amount of charge per hole &
- firing pattern & sequence

B. An inventory of all explosives received, placed in, always removed from & returned to storage magazines maintained current. Only licensed blasters shall be allowed to handle explosives.

Storage of Explosive at magazine

- Explosives will be store only on approved Explosive Magazine which will located at suitable and safe isolated place.
- The Magazine building shell be kept scrupulously clean, dry, well-ventilated, and fireproof as per Indian Explosives Act. Area of around the magazine for 8 m will be kept clean of all vegetation and combustible matter.
- Explosives, detonator, and fuse coil will be stored in separate hall of the Magazine.
- A record of storage and withdrawal of all explosives will be maintained by Magazine In-Charge/Mining Manager. He will be promptly notified of any loss or theft of explosives.
- Explosives will be issued chronologically to ensure that which one received first that she'll be used first.
- Only authorised persons will be allowed to enter on Magazine i.e., Magazine In-charge/Mining Manager, Blaster, Safety Engineer and Store manager.
- Magazine In-charge/Mining In-Charge shell ensure that the Magazine is well and securely locked. And Key of locked shall no duplicate copy and it shall be kept with him only.
- Magazine will not be allowed open during thunderstorm and no person's shell be remain in the vicinity of the magazine that time.
- 3 No Lighting arrester conductor will be install provided on top of the Magazine Building.
- Two water pit (600 mm x 300 mm) will be fixed near two doors of the magazine. Separate Magazine shoes will be provided. The persons entering inside the magazine shell wear the magazine shoes and will not be carry the shoes outside the Magazine door. Before entering, the persons shell be dipping their feet in water and wear the shoes without touching the foot other else.
- A brush or broom well be kept in the lobby of the magazine for cleaning after every occasion of opened for receipt, delivery, and inspection of explosive.
- No matches, mobile or any electronics device will be allowed inside the magazine. Cautionary signed board will be provided for the same.
- No persons having steel or any metallic part with him will be allowed entering inside the magazine.
- oily cotton rags, cotton waste and any article liable to spontaneous ignition, shall not be taken inside magazine.
- Boxes of explosives shall not be thrown or damaged along the floor and shall be stacked on wooden trestles.
- Packages containing explosives shall not be allowed to remain in the sun.
- Empty boxes or any packing materials shall not be stores in the magazine. Will be sent to store for immediate disposal.
- Blasting cap or Electric Blasting cap shall not be stored inside Magazine.
- A Copy of this Plan, a copy off all explosive rules, A statement showing the stock of Magazine and Magazine Layout will be displayed on Lobby of the magazine.





- Singe board of displaying the massages with symbol “DANGER HIGH EXPLOSIVES”, “PROTECTED AREA” and “NO SMOKING” will be displayed all location of magazine.
- All deteriorated explosives will be return to supplier or send to authorised agency for Disposal.

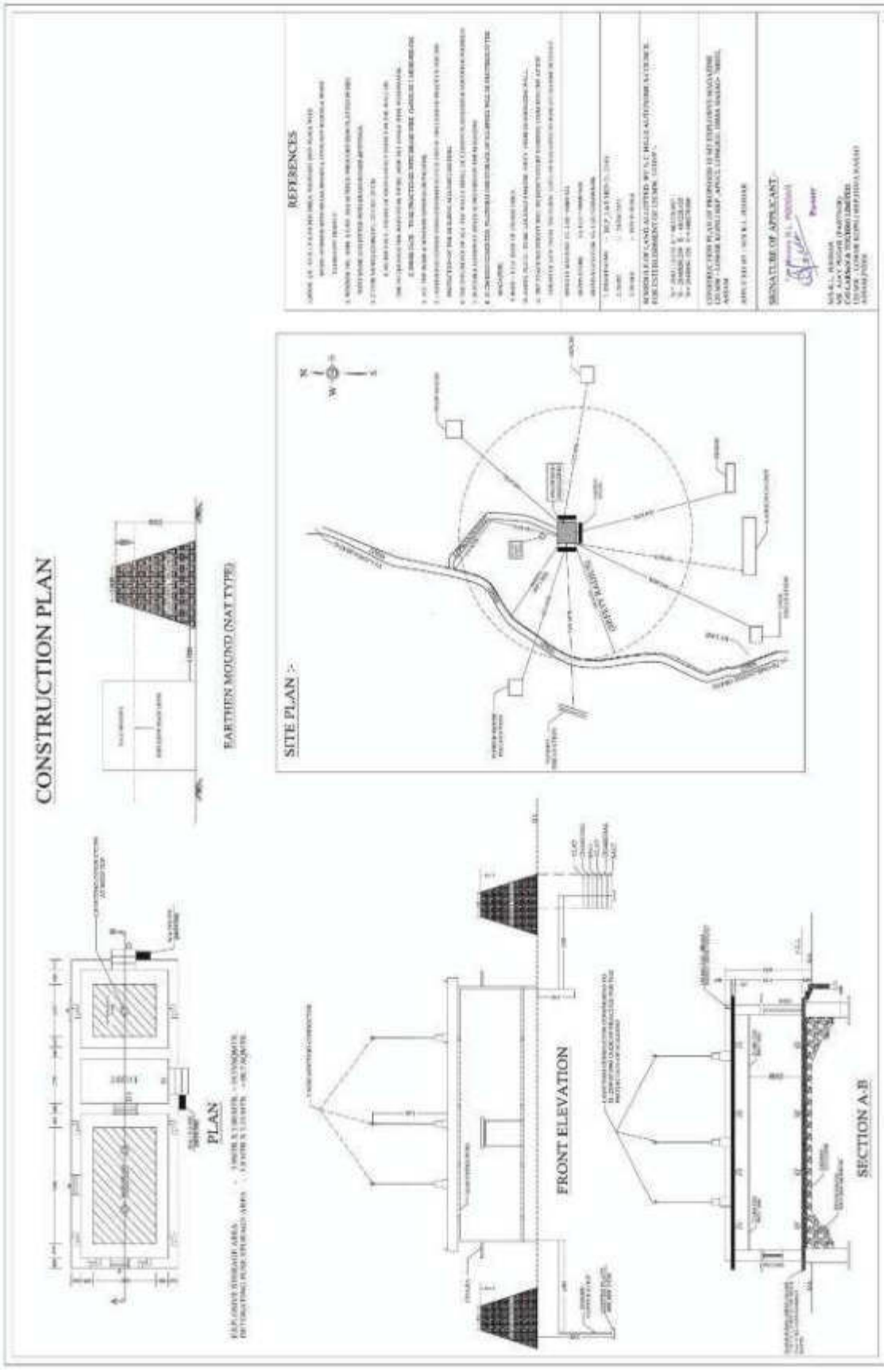
Firefighting Equipment will be installed all location of the Magazine.

SL	Description of Fire Fighting equipment	Location	Nos
1	5 kg DCP Fire Extinguisher	Security Gate of the Magazine	2
2	Sand Bucket	Security Gate of the Magazine	4
3	5 kg DCP Fire Extinguisher	Main Entrance of the Explosive Storage room	4
4	Sand Bucket	Main Entrance of the Explosive Storage room	4
5	5 kg DCP Fire Extinguisher	Entrance of the Detonating room	4
6	Sand Bucket	Entrance of the Detonating room	4
7	2 kg DCP Fire Extinguisher	Lobby	2

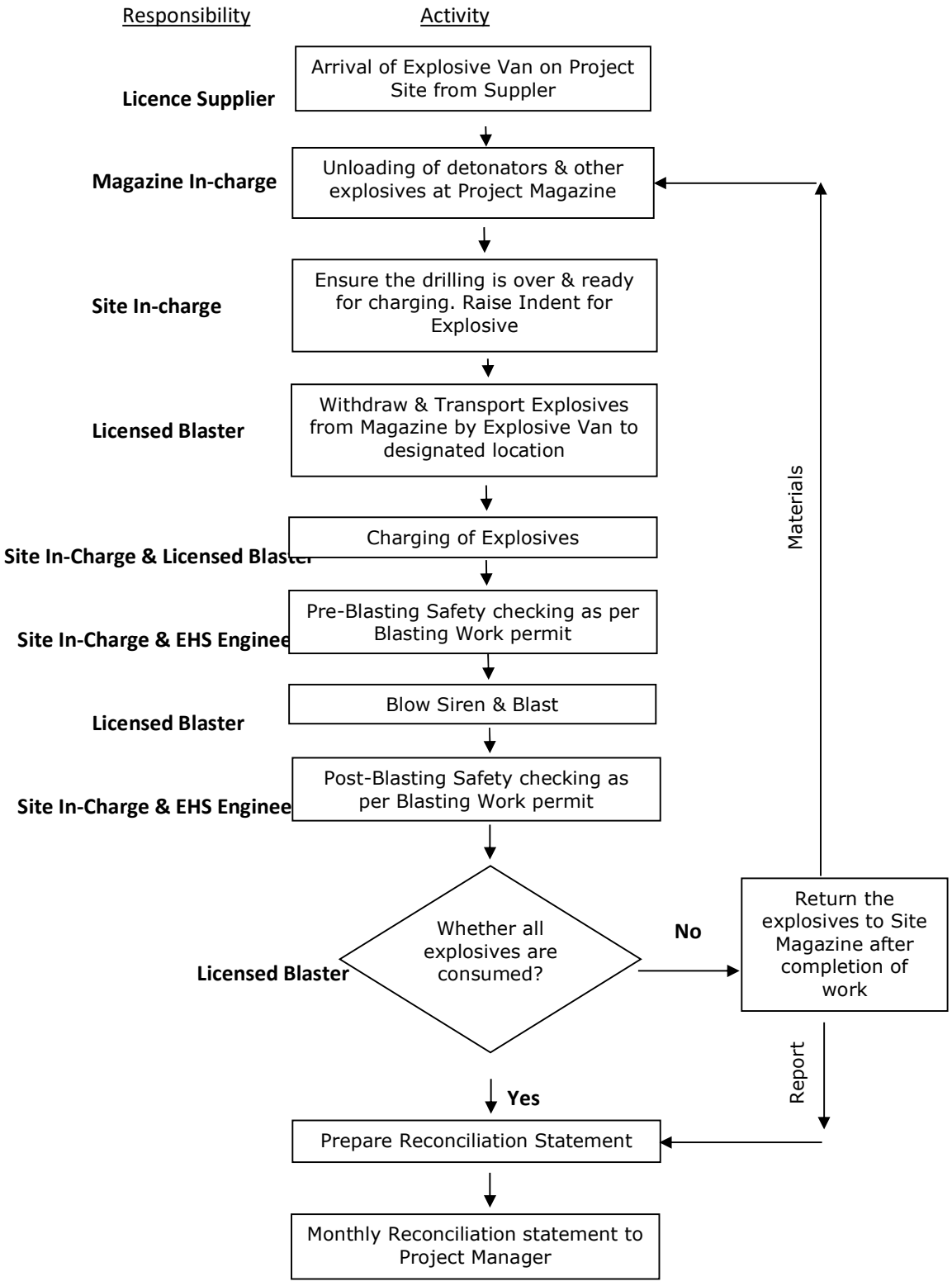
Layout of Explosive Magazine

Explosive Magazine will be constructed as per requirement of Indian Explosives act.

Construction layout of Explosive Magazine in the page 120.


CONSTRUCTION PLAN
EARTHEN MOUND (NAT TYPE)
SITE PLAN :-
REFERENCES
PLAN
FRONT ELEVATION
SECTION A-B

The Flow Chart of Explosive Handing



1.1 Transportation:

- Explosives should not be carried in the same vehicle with detonators unless the detonators are carried in a separate approved container.
- The vehicle should be equipped with a non-sparking metal or wooden floor; the sides should be high enough to prevent the explosives from falling off or it should be equipped with a closed body. If it is an open body truck, a fire & waterproof tarpaulin shall be used to cover the explosives.
- Two fire extinguishers must be provided in the vehicle.
- Congested traffic should be avoided while transporting explosives. Unnecessary parking at hotels, garages, filling stations etc., should be avoided.
- Unauthorized persons or ' flammable & corrosive substances' shall not be allowed in the truck carrying explosives.
- Smoking is not allowed in & around the vehicle carrying explosives.
- Storage
- Explosives should be stored only in approved storage magazines however small the quantity it shall be.
- While taking explosives for actual usage, it shall not be placed near sources of heat or water.
- Smoking or possessing matches, etc. near the magazine is prohibited.
- Manufacturer should be consulted, if nitro glycerine from deteriorated explosives has leaked onto the floor of the magazine. The floor should be de-sensitized with an agent approved for that purpose by the manufacturer.
- Leaves, grass, bush, or debris shall not be allowed to accumulate within 25 feet of an explosive magazine.
- Detonators should NEVER be stored in the same magazine with any other explosives.
- Barrication of the storage area.

1.2 Using explosives:

- Explosive cases should not be opened using metallic tools.
- Replace the cover of the case after the required quantity of explosive is taken out.
- Smoking or other sources of fire are prohibited within a radius of 100 feet from the place where explosives are being handled or stored.
- Only fuse and nothing else shall be inserted in the open end of the blasting cap.
- Explosive caps or fuses 'shall not be carried in the pockets of clothing, etc.
- Children or unauthorized persons are totally prohibited in the blasting area.
- Deteriorated or damaged explosive caps and other accessories shall not be used, and these shall be returned to the manufacturer.
- Quantity of the charge to be used must be well calculated and be safe enough to prevent any damage to nearby structures due to shock & vibration resulting from the explosion. The charge can be covered with blasting mats, used conveyor belts or sandbags to prevent splinters flying off especially in running plants.

1.3 Drilling & loading

- Before drilling is started, possible presence of unfired explosives should be carefully checked. Never drill in the butts of old holes.
- Before loading, the condition of the holes should be checked either with wooden tamping pole or measuring tape or not with hot broken drill bit, etc.
- No. holes should be loaded except those that are to be fired in the next round of blasting. Holes loaded during one shift should be fired on the same shift.
- To avoid misfires, the detonator should be completely inserted length wise in the cartridge, fastened in such a manner that it cannot be pulled out accidentally.
- Cap crimpers of proper design should be used for crimping blasting caps onto fuse - not with one's teeth or a knife.
- The diameter of hole drilled should be at least 3 mm more than the Diameter of the cartridge.
- Blasting should be carried out only during lean hours - say during lunch time, night hours, etc.

1.4 Tamping

- Explosive should not be normally removed from the cartridge, but if this is done, loose explosive should not be tamped.
- Only wooden tamping tool should be used; if metallic parts are used, they should be of non-sparking type. Primer should never be tamped.
- Care should be exercised to avoid injuring fuse, detonating fuss. Or cap wires during tamping.

1.5 Warning signal

A standard warning signal and an all-clear signal should be used before & after firing and inspection. All personnel working in the area and nearby area should be made aware of these established warning procedures. At the same time competent persons equipped with red flags should be posted at all possible approaches to the blasting area to stop traffic and by passers from entering the danger zone.

1.6 Firing

In electrical firing following safe practices are recommended to avoid any trouble.

- All electrical connections should be good & rigid.
- The blasting machine should be in good order and of sufficient capacity to fire all the electric blasting caps connected in the circuit. It may be tested with a rheostat.
- Generator type blasting machine shall be operated few times before making the connections to prepare it for the maximum generation of current. This type of blasting machine should be operated with maximum force.
- Electric detonators or delay electric detonators of different manufacturers should not be used in the same blast.
- The resistance of the circuit should be measured with a Blasting Galvanometer before attempting to fire.
- Radio, television, and radar transmitters create fields of electrical energy which can detonate electric caps. Hence following minimum distance must be maintained between the transmitters & electric blasting caps.

1.7 Transmitter power (watts) Min. distance (feet)

5 - 25 100
25 - 50 150
50 - 100 220
100 - 250 350
250 - 500 450
500 - 1000 650
1000 - 2500 1000
2500 - 5000 1500
5000 - 10000 2200
10000 - 25000 3500
25000 - 50000 5000
50000 - 100000 7000

1.8 For FM Mobile Transmitters

1 - 10 5
10 - 30 10
30 - 60 15
60 - 250 30

1.9 Misfires:

There is no absolute safe method for handling misfires. But misfires can be prevented,

- By proper use of high-grade blasting supplies.
- by testing each electric cap with a blasting galvanometer before loading or
- By testing the complete circuit before firing the blast. However, if a misfire does occur, it should be handled very carefully, only by experienced persons.

The safest way to dispose of a misfire is to re shoot it if throw of rock can be tolerated. When the trouble is caused by faulty connections and if the leg wires are accessible, test the blasting cap with the galvanometer and try to blast it in the usual manner after giving connections properly. If the shot fails again, or if the wires are inaccessible, or if caps and fuses are being used, try to shoot the hole with a fresh primer. If this also fails, the stemming should be removed carefully, a new primer inserted and then fired. Unused, spilled, or deteriorated explosives should not be abandoned. It should be preserved and disposed only by competent and experienced persons. Wood, paper, or fibre used in packing explosives should be burned only in an isolated outdoor location. After the burning has started, no person shall be allowed within 100 feet of the place of burning.

1.10 Document and Records

1. Materials Entry/ Exit Register
2. Vehicles Entry Exit Register
3. Infrared Thermal Screening Register
4. Delivery Callan Receipt.
5. Explosive reconciliation Report
6. Explosive Stock Register
7. Blasting Work permit

30 CONCRETING

General Safety requirements

1. Only authorized operator should work on mixer machine. Nobody should be allowed to work near mixer machine with loose clothing. Moving parts of the machine should be guarded.
2. The access from the point where concrete is supplied to the area to be concreted should be properly made and free from obstructions.
3. Before starting the concrete works the formwork engineer or foreman should check the reliability of the formwork done and give is approval for concreting.
4. Movement of the employees and concreting process should be predetermined and informed to the concreting gang.
5. Cordon the machine placing and working area to avoid personal traffic.
6. Lash the end of the flexible hose to control the swing of the hose.
7. Use the grab handle step to climb on to or off the machine.
8. Never drive the machine with placing boom extended.
9. Never reach into the machine parts when motor is running, or the hydraulic pressure accumulator is charged. Ensure all safety devices are present and in working order.

Concrete Pouring

The concrete pouring is done by the following equipment's:

1. Static line pump.
2. Placer boom.

Static Line Pump Operations

Following precautions should be followed:

1. Pipeline gang workmen should be screened based on experience and medical fitness.
2. Educate the workmen regarding general safety in plant/sites by regular pep talks.
3. Proper supporting and bracing of the structure to be concreted must be ensured well before the pour.
4. During night concreting, ensure proper lighting at pumping area and along the pipeline.
5. Ensure the working condition of pipes, clamps, and rope.
6. Ensure enough PPE and its working condition i.e., safety helmet, safety shoe, gumboots, safety belts, nose masks and hand gloves etc. Pump should be positioned on solid and levelled area.
7. Ensure all workmen including supervisor, pump operators at sites to wear proper PPE.
8. While erecting pipeline vertically in any structure, workmen should wear safety belts and tie the hook.
9. Give proper supports to pipeline by tying the pipeline with nylon rope at span of every six meters and provide extra supports at bends to avoid jerking of shuttering.
10. After completion of the concreting, during passing of the ball by compressed air, provide ball catcher at the pipeline end.
11. Don't open pipeline clamps under pressure.
12. Avoid using of binding wires instead of clamp wedges.
13. During concreting operations, do not allow people to sit on the pipeline.

14. Prohibit dropping of the pipes, clamps, hammers and other tools and tackles from place of concreting to the ground level.
15. Do not allow cleaning the discharge gate while running the pump.
16. Cleaning of concrete pump gate / shaft shall be done only with cleaning rod.

Dos & Don'ts during concreting



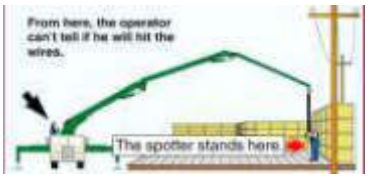
Know Emergency Stops

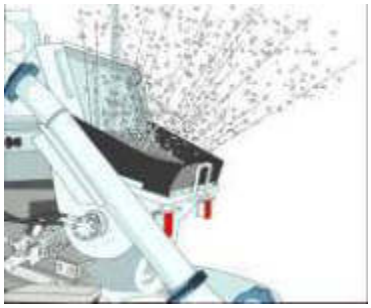


Never stand between Transit Mixer Pumps



Be conscious of Overhead Electrical lines



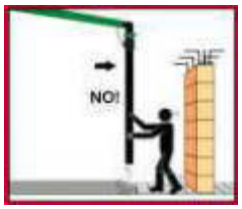


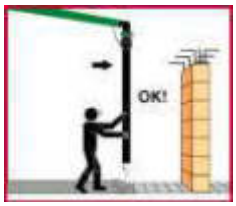




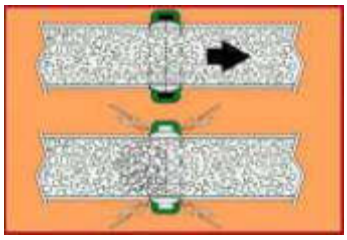
Do not let the level of concrete go below the valve. Stop the pump if air is sucked.

Never hug the hose





Do not walk backwards with hose



Use Gaskets, Leaky joint can cause blockage





Do not remove hopper grating of the Pump

Keep off the Hopper Grating Never put limbs into the machine.



Keep away. Pipeline may swivel



Never open a pressurized Line



Do not sit/stand online



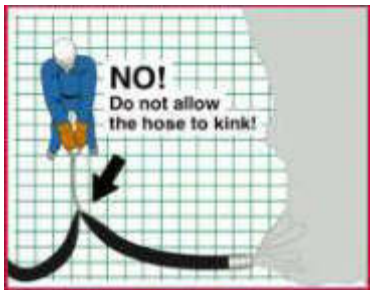
Keep away during starting, restarting or removal of air



Use Ball-catcher for air removal



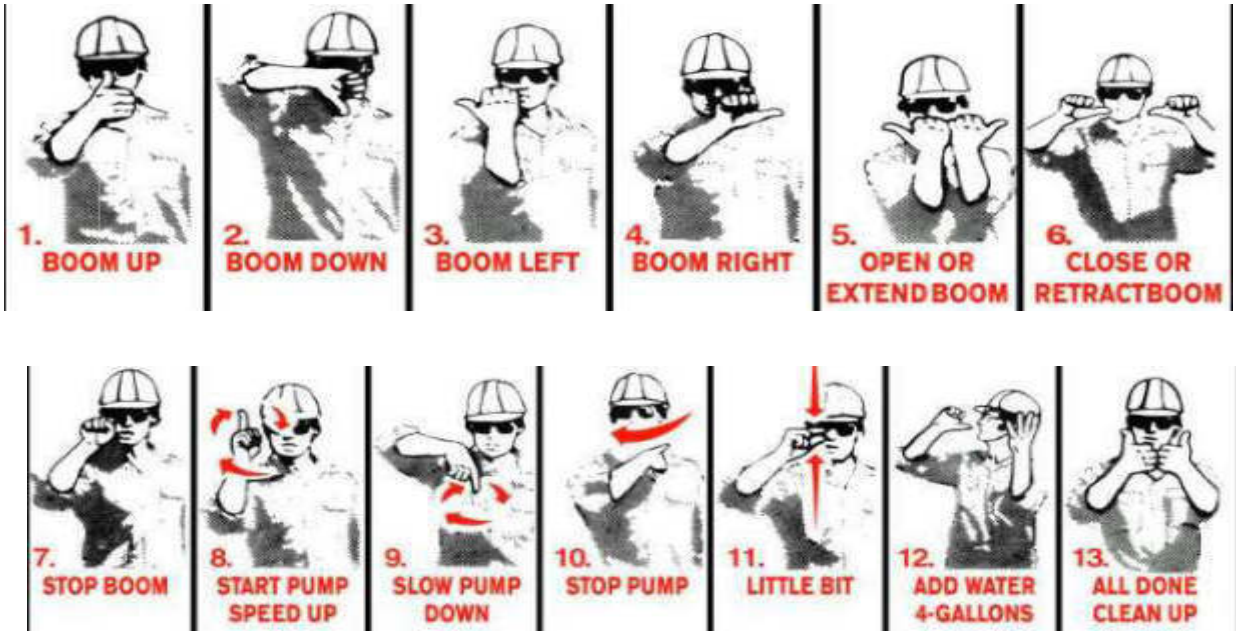
Watch out for pinch points





Never kink hose. Kink increases pressure

Signals for concreting work



De-Shuttering

1. It should be done only after getting clearance from QC that required strength is obtained.
2. Ensure the area is cordoned off.
3. Ensure Signal Man is deputed to stop the unauthorized entry.
4. All workmen should wear PPE. The lifeline is to be provided if required.
5. Ensure materials are lowered by rope. Throwing of material is strictly prohibited. Ensure tools and tackles with test certificate are used.
6. Ensure for bigger load, the tag line is used for guiding the load.
7. Curing
8. Curing creates the environment to promote the hardening or hydration of freshly cast concrete. This is the chemical process that binds cement particles and aggregates into hardened concrete.

Curing Compound

1. Manufacturer's guidelines should be followed for storing the curing compound.
2. Ensure protective clothing to protect skin contact and a goggle to prevent splash in eye is used.
3. Proper working platform should be used for applying curing compound.
4. Ensure proper access to the working platform.

Concrete Vibrator

1. Vibrating unit should be completely enclosed and belt transmitting the power to the unit adequately guarded.
2. Electrically operated vibrators should be totally enclosed and be protected against overloads by suitable overload relays and should be effectively earthed.
3. Be sure that sufficient length of cable is provided to the vibrator.
4. Ensure electric starters are fixed firmly on the stand.
5. While needle is inserted in the vibrator, be sure needle load is' firmly locked. Be sure to lubricate needle inner core.

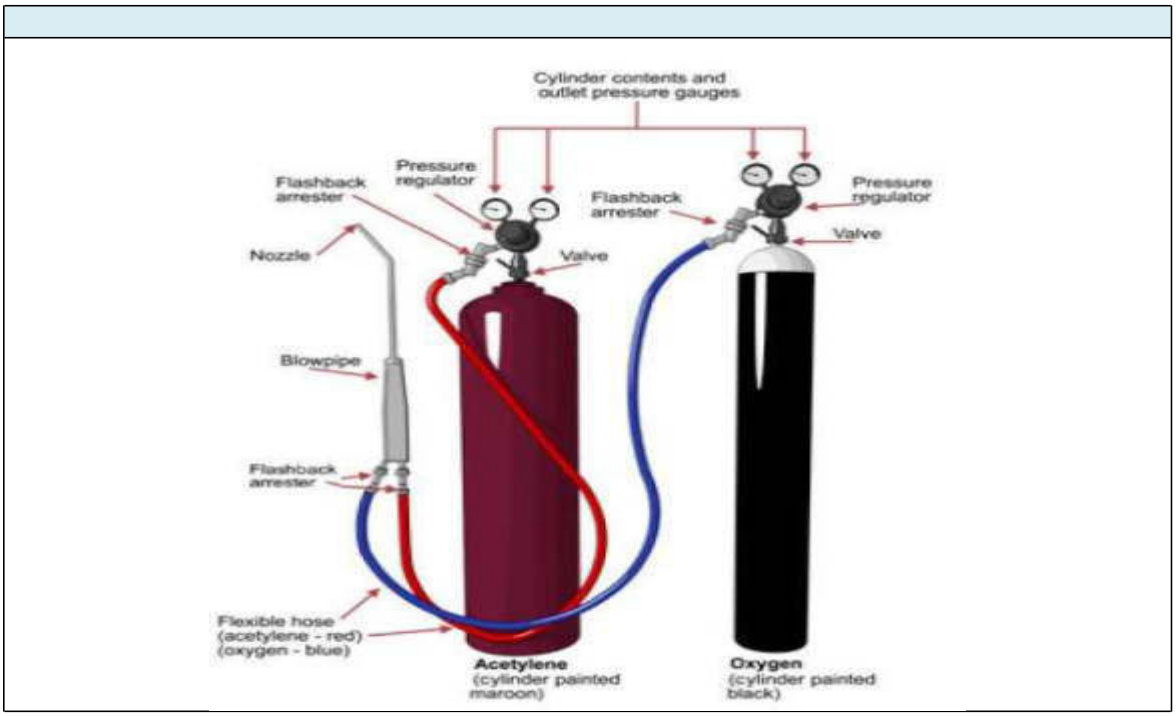
31 SAFETY IN HOT WORKS

31.1 SAFETY IN GAS CUTTING

31.1 Gas cylinders

- The pressure in the acetylene cylinder is 250 psi and volume of 8.5 cubic meters. The acetylene gas in the cylinder is dissolved in acetone which is absorbed by the porous mass. Colour code for acetylene cylinder is maroon.
- Oxygen is supplied in the cylinders pressurized to 2200psi. Colour code for oxygen cylinder is black.
- Liquefied Petroleum Gas (LPG) industrial purpose cutting gas is best suited for heating and cutting purpose. The pressure inside an LPG cylinder is dependent upon the temperature – i.e., higher the temperature, higher the pressure.

31.2 Gas cutting accessories:



Regulators

- Use double stage regulators only with sturdy gauges.
- Connections on regulators should be inspected for leaks using soap water before use.
- Oxygen gauges shall not be tested with oil, return regulators to the supplier for repairs, calibrations, or adjustments.
- Regulators with broken gauges, knobs and loose fitting shall not be used.

Hose

- Strictly adhere to colour coding. Use red colour hose for acetylene & other fuel gases while blue or black for oxygen hose.
- Hose shall be braided, double insulated, and designed to withstand pressure and temperature.
- Hose connections shall be made braided fittings and clamped or otherwise securely.
- Hose should not be crimped or kinked and hoses having joints, cracks and cuts shall be removed from the work.

Blow Pipes (Torch)

- Blow pipe shall be fitted with individual flash back arrestors for both fuel and oxygen lines and provided on both sides i.e., cylinder side and torch side.
- Appropriately sized nozzle shall be used based on thickness of metal to be cut. For e.g., Up to 12mm metal 1/32” nozzle size used and 13 to 25 mm metal, 3/64” nozzle size to be used.
- Flash Back Arrestor shall conform to ISI or EN standard - preferably Messer, Esab or other equivalent quality make shall be used.
- All blow pipes and other apparatus dismantled and cleaned internally at the regular intervals.
- Accumulation of slag on the blow pipe tip should be frequently removed. Binding wire must not be used for cleaning the nozzle.
- Torches in use shall be inspected at the beginning of each working shift for leaking shut off valves, hose couplings and tip connections.

Gas Cylinder Set

- Trolley should be used for carrying cylinders.
- Always make sure complete set consisting of all components and number them as a group for traceability.
- A fire extinguisher should be maintained in trolley and given the same serial number for tracking purpose.
- Always keep soap water solution bottle with gas cylinder trolley.

31.3 Storage of cylinders

License Requirement for Cylinder storage

Type of Gas	License not required for possession of cylinders if
Liquefied Petroleum Gas	**The total quantity of gas does not exceed 100 kg at a time.**
Any other flammable but non-toxic gas	**The total number of cylinders containing such gas does not exceed 25 or the total weight of gas does not exceed 200 kg, whichever is less, at a time.**
Any non-flammable non-toxic gas	**The total number of cylinders does not exceed 200 at a time.**
Any toxic gas	**The total quantity of cylinders does not exceed 5 at a time.**
Acetylene gas in dissolved state	**The total quantity of cylinders does not exceed 50 at a time.**

Cylinder Storage - Do's

- Store in a designated area and away from the other storage materials.
- Storage cabins or rooms shall be fully ventilated, secured location, protected from the hot sun and sign boards shall be placed. Keep away from hot work and combustible materials.
- Inventory register should be maintained for the storage of cylinders.
- Floor of the storage area should be firm levelled.
- The oxygen and fuel cylinders should be stored separately. Minimum 10 feet distance shall be maintained between the oxygen & fuel cylinders. Full and empty cylinders to be stored separately.
- All cylinders shall always be stored upright and chained individually to prevent from falling.
- Avoid dead stock of full cylinders, and use cylinders on a 'first in, first out' basis.
- Regularly check for leaks and faults with soap water solution.
- Post "NO SMOKING" signs in the area.
- For Fire protection always keep fire point near storage area.
- Cylinder cap should be used while storing the cylinders.
- The detailed instructions on the individual Material Safety Data Sheets (MSDS) must be followed and displayed and training giving to the workforce.
- Full or empty gas cylinders should be stored in a well-ventilated area with weather protection and order to be checked.
- Always request a permit if cylinders are to be taken inside tunnel or confined space.

Good practice of storage of cylinder



Cylinder Storage - Don'ts

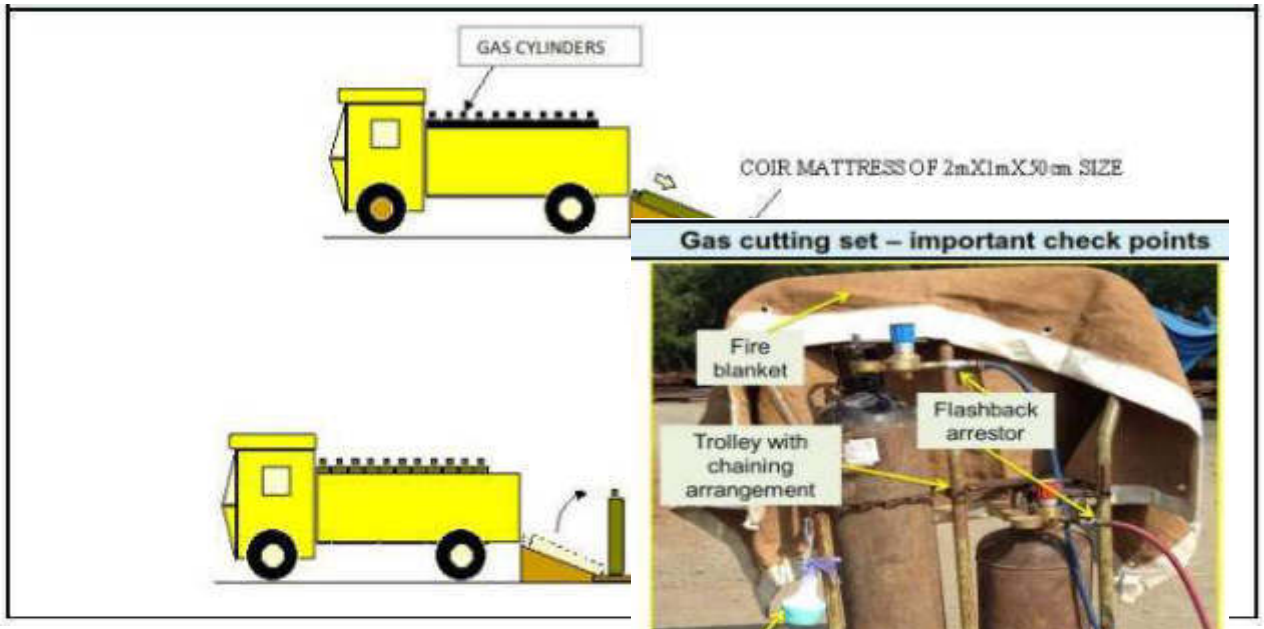
- Do not apply oil / grease on the cylinders & valves. Oil / grease mixed with gas and forms explosive mixtures explosive.

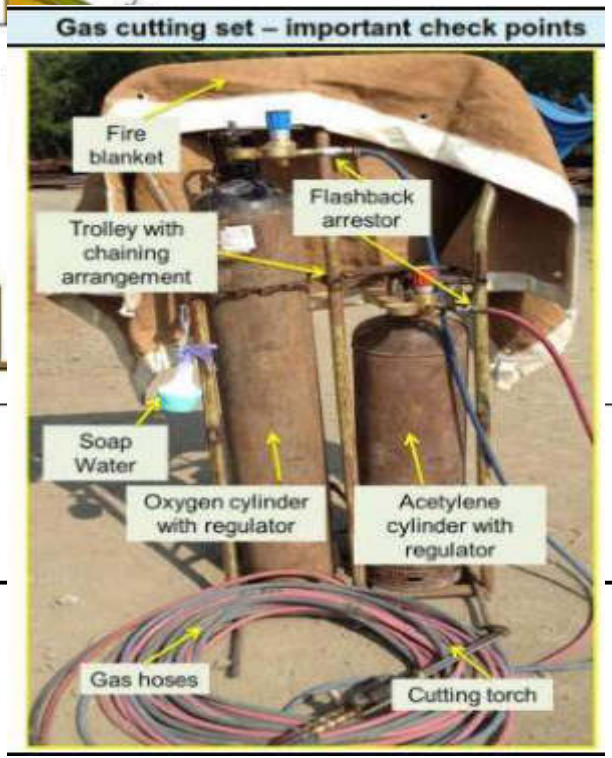
- Do not store empty cylinders longer than necessary.
- Other products like paint, oil or flammable liquids should not be stored in/near the cylinder storage area.
- Cylinders containing oxygen and combustible gases should not be stored in the same room.
- Do not store cylinders in confined spaces.
- Do not store cylinders near heavy traffic and emergency exits.
- Never use force when opening or closing valves.
- Do not allow any hot work activity near the cylinder storage area.
- Do not use Nylon rope to secure the cylinders.

31.4 Handling of cylinders

Do's	Don'ts
• Always check the identity and property of gas cylinder before using it. • Always use mechanical aids for loading and unloading gas cylinders like trolley. • Checklist should be maintained for loading and unloading the cylinders. • Maintenance of trolley to be done i.e., lubrication, cleaning of wheels. • Usage of PPE - safety shoes and hand gloves for handling the cylinders. • Fasten securing bars on the trolley. • Workers shall be trained on handling the cylinders.	• Never push-pull or roll the gas cylinders on the ground. • Do not drop or roll cylinders as a method of transfer or sling it tight with crane. • Never handle the cylinder without cap and never lift the cylinder with its cap, guard, and valve. • Never apply grease / oil on the cylinders. • Never remove or obscure the labelling of the gas cylinder. • Never change the colour / paint the cylinders.

31.5 Use of ramp for cylinder handling





31.6 Gas Cutting Operations

- Work area should be free from combustible materials.

- Always keep firefighting equipment near the activity to be performed.
- Hot work permit must be issued before starting of work. Refer Section 7.5.
- Gas Hose shall not be crimped or kinked. Hose shall not be bent or otherwise deformed to control the pressure.
- Open the acetylene cylinder with the help of the cylinder key to half a turn.
- Adjust the regulator screw on the acetylene regulator to the required pressure and then do the same for the oxygen line.
- Now open the acetylene catagen valve, purge the hose and close it. Then do the similar exercise for the oxygen.
- Close the oxygen line valve on the torch and ignite the torch.
- Adjust the oxygen to the required pressure.
- While closing, close the oxygen cylinder & regulator then the acetylene cylinder & regulator.
- Close the oxygen torch valve then the acetylene.
- Fire watch at least 30 mins after cutting activity is completed.

31.7 Hazards and Controls related to Gas cutting

- Specific Activity Risk assessment to be carried out before starting the work.
- The major hazards related to gas cutting are fire and explosion which are mainly caused due to gas leaks, backfires, flashbacks, heat, sparks or molten metal, fire/burns resulting from misuse of oxygen.
- Fire
- Backfire
- Flash Back
- Leakage of Gas

31.8 Emergency response if the Acetylene cylinder catches fire or gets heated

If an acetylene cylinder catches fire or gets heated due to severe backfire or external heat source, it shall be dealt promptly as follows:

- The valve shall be shut.
- Try to extinguish the fire.
- Regulator or other fittings shall be detached.
- It shall be immersed in water or water shall be applied copiously at the bottom half of the cylinder.
- The valve shall be opened for few minutes and the cylinder, kept cool in water until it becomes empty.
- No one shall stand in the direction of the fusible safety valve fixed in the cylinder.

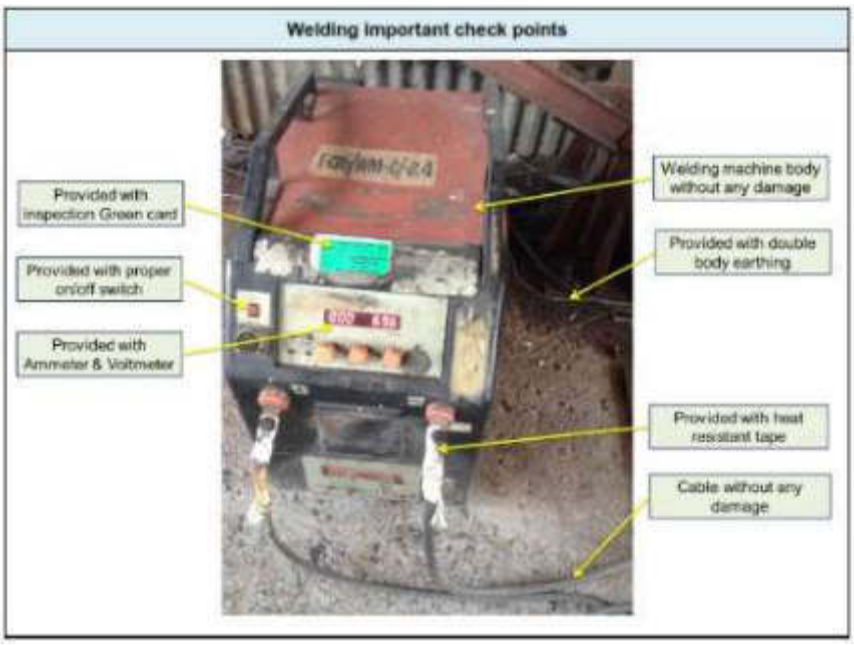
31.2 SAFETY IN WELDING

31.2.1 Welding Accessories

- Lead
- Power source
- Electrode Holder
- Electrode Clamp
- Earth Return

31.2.2 Operation and Maintenance

- Welding equipment should be always maintained in safe working order. Good mechanical as well as electrical condition should be maintained to avoid hazards.
- Periodic inspection should be conducted, and GREEN CARD system should be implemented.
- Printed rules and instructions covering operation and



maintenance of welding equipment supplied by the manufacturers shall be strictly followed.
- The equipment shall be disconnected from the source of power when not in use.
- Commutators shall be kept clean to prevent excessive flashing, only fine sandpaper or commutator polish shall be used.
- If Welding activity is performed in open, shelter should be provided to protect it from inclement (rainy) weather conditions. “No welding in wet conditions.”
- Use movable barriers while carrying welding works to prevent UV exposure to other workers.

31.2.3 Hazards and controls related to welding

- Electric shock
- Fire

31.2.4 COMMON HAZARDS AND CONTROLS FOR HOT WORKS

31.2.5 Fire Hazard and Control measures

Causes of Fire during Hot work	Control measures
• Sparks can fall through cracks and other floor openings, thus starting fires in hidden locations. • Ducts and conveyor systems can carry sparks to distant combustibles. • Hot work done near a partition, wall, ceiling, or roof that has a combustible covering or insulation, or on walls or partitions of combustible can lead to ignition. • Hot work on pipes or other metal that is in contact with combustible walls, partitions, ceilings, roofs, or other combustibles can lead to ignition through conductive heating.	• Hot work permit should be issued prior to the work to identify the hot work-related hazards. • All equipment must be in good operating condition before work starts. • Dry powder fire extinguishers should be used to extinguish gas fire. • Check the work area for combustible materials in structures (like wood, safety net). • Do not keep any combustible materials near working area, if combustibles cannot be moved, use fire resistant blankets or shields. • Protect gas lines and equipment from falling sparks, hot materials, and objects. • Inspect the area work to ensure that wall surfaces, studs, wires, or dirt have not heated up. • Preferably, schedule hot work during shutdown period.

31.2.6 Hot works in Confined space – Hazards & Control measures

- Hot works shall not be carried out inside the confined space.
- Where unavoidable, specific hot work inside confined space activity Risk assessment and safe work method shall be prepared, and the risk controls shall be briefed to workforce daily.
- Hot work permit and confined space working permit should be issued prior to the work to identify and control the confined space & hot work-related hazards.
- Ensure trained and competent workforce, supervisors and managers are engaged for carrying out hot work in confined space. Entry inside the confined space shall be controlled.
- Ensure all necessary equipment for confined space work including Gas detectors, ventilation system apparatus, breathing apparatus, emergency rescue equipment is available at site.

31.2.7 Burns - Hazards & Control measures

Causes of burns during Hot	Controls Measures

• Metal spatters or from touching hot work pieces. • Prolonged exposure to heat from welding to reddening face.	• Wear protective clothing, boots, gauntlets, and eye protection and use of face shield. • Shut off the torch when not in use. • Clamp the work piece, avoid holding it by hand. • Using of welding screen to reduce the amount of dangerous UV light that other workers are exposed to.

31.2.8 Health Hazards & Control measures

Respiratory Disease

Causes of Eye Injury	Controls Measures
• Welding and gas cutting produce gases and fumes, which may result in lung diseases.	• Ventilating the workplace is essential. • Job rotation / reducing exposure. • Periodical medical check-up of welders.

Eye Injury

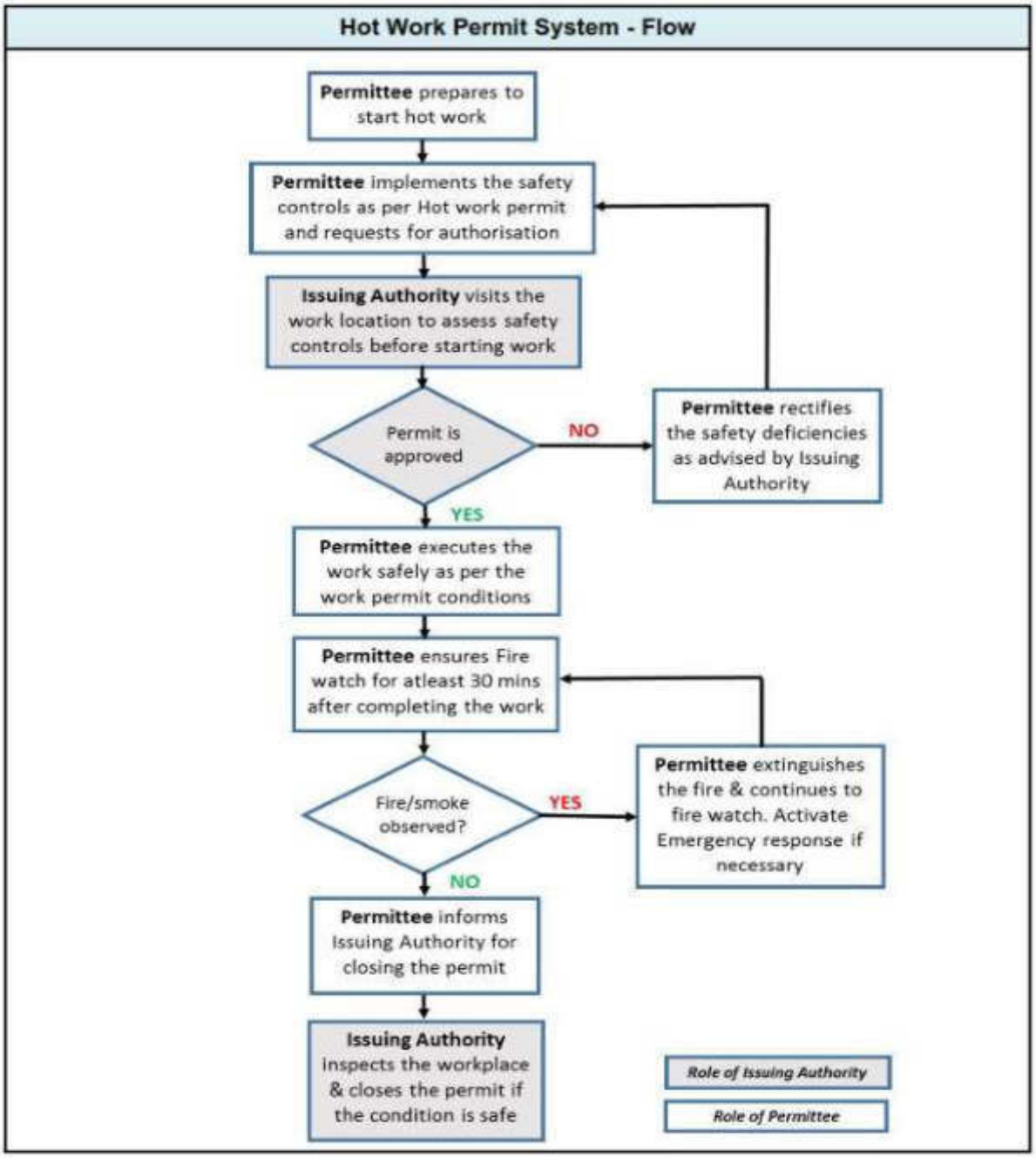
Causes of Eye Injury	Controls Measures
• Arc eye – During the hot work, eyes are exposed to UV rays and penetrated by sparks, spatter, slag, and other foreign bodies.	• Eye damage can be avoided by using welding screen with appropriate filter glass. • The helper also shall use welding screen to protect his eyes from ultraviolet rays.

Heat Stress

Causes of Heat Stress	Controls Measures
• Longer the duration of hot works, hotter the surroundings.	• If heat stress is envisaged, good ventilation shall be provided in the workplace. • Job rotation should be done.

31.2.9 Hot Work Permit System

Hot work permit system shall be followed for all hot works as per IMS procedure IM-14.



31.2.10 Personal Protective Equipment for welding works

- Boiler suit
- Safety Helmet
- Welding shield
- Leg guard
- Safety shoes
- Leather Hand gloves

31.2.11 Inspection / Monitoring

- GREEN CARD system: Monthly inspection and certification of all welding equipment & portable tools by P&M and EHS.
- Daily Prestart verification shall be carried out before starting of the activity. Specific Hot work checklist should be developed based on the Risk Assessment / SWM and followed.

32 SAFETY IN GRINDING ACTIVITY

RISK MANAGEMENT

- The EHS Risk Management shall be implemented by conducting EHS risk assessment to assess the risks involved in carrying out abrasive grinding activities in the project site and the following risk control measures shall be implemented across all project sites.

SELECTION OF ABRASIVE WHEELS

- Wheels shall be chosen based on applications like grinding, cutting, and buffing and one will not suit for other application so at no circumstance wheels shall be used other than intended application.
- The wheels shall carry the information of Dimension, Max permissible RPM and expiry date mandatorily and wheels without labels shall not be used.
- Wheel shall never be used after the expiry date.
- The operating speed mentioned on the wheel should always be greater than the spindle speed of the grinding machine.
- Diameter of the grinding wheel shall not be greater than the size mentioned on the name plate of the grinding machine.
- Ring test shall be conducted before fixing the wheel into the machine.

HANDLING OF ABRASIVE WHEELS

Inspection should be carried out before every operation of the grinding like ring test, visually inspection for chips, cracks, or damage to wheel and if any defect is found during the inspection, it should not be used further.

- Ring test with wooden or plastic handle.
- Wheels should be handled with care to avoid slip, drop.
- If it drops or oil /water spills such wheel shall not be reused.

GRINDING MACHINE SAFETY

ELECTRICAL SAFETY

- Portable grinding machine shall be double insulated having its body made of non-conductive material is preferred. Provide body earthing if metal bodies machine are used
- Power supply for all the portable the machine shall be through ELCB / RCCB of 30 mA sensitivity.
- Always use industrial type plugs with portable machines.
- Repair, maintenance and making joints in the cord shall be done only by the authorized electrician.
- Electrical power tools and machines shall be inspected before putting on use and green card issued to conform FIT FOR USE with one month validity.

WHEEL GUARD

- Wheel Angle guard shall be in position and fixed securely before starting the cutting-off or grinding operation. Grinding machine shall never be used without wheel guard.
- Wheel guard shall be oriented such that it prevents operator getting hit by broken pieces of wheel.

SAFETY WHILE USING GRINDING MACHINE

- Only designated grinder shall be authorized to operate grinding machine and he shall not leave machine unattended leading to unauthorized operations.
- Machine shall be kept under safe & custody and place shall be dry and protected from rain.
- Ensure wheel is correctly fitted and tight enough and do test run the machine keeping away from body. Also ensure work piece is firmly secured,
- Operator shall use mandatory PPE's and task specific PPEs such as eye protection, skin protection, ear protection etc.
- Ensure adequate fire prevention measures taken such us work area is free from combustible materials, electrical cables etc. or moved away from hot work area or these materials is sufficiently protected using fire blankets. Deploy fire watches near the hot work area.
- Ensure firefighting arrangement such as first-aid Fire extinguishers & fire water buckets in next to the hot work area. Obtain necessary Hot Work permits before commencement of work.
- Ensure the workforce surrounding the work area is protected against the spatters released from grinding or cutting.
- Provide suitable work stool for to achieve ergonomics of work.
- Clearance between wheel and tool rest exceeds the 1/8" standard, which allows an object to jam against wheel.
- Replace the wheel if the worn-out is exceed the mark given in wheel and replace even the event of low height fall (say 1m height), wet in drain or oil etc.



PERSONAL PROTECTIVE EQUIPMENTS FOR GRINDING WORKS

Protect eyes from spark.
In addition, depending upon the grinding process, suitable personal protective equipment shall be used, such as:

- **Ear protection** : Use ear muffs or ear plug
- **Hand Protection** : Use leather Gloves
- **Respiratory Protection:** Usage nose mask
- **Body Protection** : Wear overall or Leather apron

- **Head Protection** : Use safety helmet
- **Foot protection** : Wear safety shoe







General Safety Guidelines

- Check cut-off / grinding wheel for damage before use
- Ensure tool speed does not exceed maximum

Grinding wheel use



Part C: Emergency Response Plan

33 EMERGENCY RESPONSE PLAN

1. Objective

Any emergency occurring within project site while carrying out constructional activities may cause injuries or loss of life or damage to property or disruption inside as well as outside the site. The emergency in the project site could be because of abnormal functioning within the site or caused by third parties or by natural factors. Considering the activities carried out in the site and importance of preserving life and property within and outside the site, the LKHEP Management of L&T Heavy Civil Infrastructure IC has set the following as objectives of the Emergency Response Plan.

- Preserving the life, property, and environment from the consequences of emergencies arising within the site.
- Systematically coordination of emergency control action to arrest escalation of emergency, to evacuate personnel within or outside the site where necessary and to rehabilitate them. Restoring normalcy in site operation with minimum loss of time.

2. Scope

It applies to all construction related activities carried out by Larsen & Toubro Limited; This Emergency Response Plan (ERP) is designed to help LKHEP team to respond quickly and effectively to all emergency scenarios that have been identified as possibly occurring in the project site, during construction. Each of the identified risks has a link to a standard emergency response and management system. These are Work Site Injury, Fire & Explosion, Security Breaches, and Civil Disturbance & Natural Disaster.

3. Definition

An emergency is any unplanned event that can cause deaths or significant injuries to employees, customers, or the public; or those can shut down the construction process, disrupt operations, cause physical or environmental damage, or threaten the company's financial standing or public image. An emergency can be broadly categorized into a Minor event or a serious event. The minor and serious events are further broken up into category based on the gravity of the situation.

4. Procedure

To achieve the objects in the Emergency Response, Plan the following Emergency Response Committee, with the following roles and responsibility is formed.

Emergency Rescue Committee

Site Main Controller (SMC)	Mr Santanu Majumdar
Absence of SMC	Mr Dinesh Sharma
Site Incident Controller	Mr Akhilesh Pathak
Site EHS Officer	Mr. Nabajyoti Bera
Plant & Machinery Team Leader	Mr. P K Bayan

5. Responsibilities

The Emergency Rescue Committee and all the workers that are involved in the Emergency Plan must follow their responsibilities.

Site Main Controller (SMC) – Project Director

As a project head and SMS of emergency response committee he is responsible for activating the emergency plan and taking overall command during the emergency. Immediately arrange for an informal on-spot meeting of the members preferably at the emergency control room (That is at the site main office) to take stock of the situation and initiate necessary measures.

Take on-spot decision on the procedure to be adopted based on the type and extent of the emergency.
Authorize committee members and other personnel to carry out the specified tasks as decided in the on-spot meeting.
Arrange all required facilities through accounts & administration for the necessary medical aid, manpower, money, conveyance etc. Communicate the occurrence of emergency and steps being taken to clients (if applicable) and other concerned officials at Headquarters / Regional office.

Site Incident Controller (SIC)
In absence of SMC, SIC will be the Head of Emergency Response Committee and responsible as SMC.
Ensures the resource availability required during emergency.
On receiving information about an emergency try to communicate the same to SMC and other Emergency Response Committee Members.
Attend the on-spot emergency meeting. Ensure necessary first aid facilities are available to meet the emergency.
Ensure necessary arrangements for medical evacuation of injured and shifting to hospitals as recommended by the medical practitioner / first aid attendant.
Coordinate with external agencies such as local police, fire station, district administration etc.

Plant & Machinery Team Leader
On receiving information about an emergency try to communicate the same to Project Head (SMC) and other emergency response committee members and attend on spot emergency meeting.
Make necessary arrangement for plant & machinery, operators and drivers required for rescue operations as decided in the on-spot emergency control meeting.
Arrangement of illumination as required for the rescue and other emergency operations.

Environment, Health & Safety Officer
On receiving information about an emergency try to communicate the same to project head (SMC) and other emergency response committee members and attends on-spot emergency control meeting.
Act as an advisory and leading role for the emergency response committee.
Organizing of rescue team with rescue apparatus like Fire Extinguisher, stretchers etc. (if required).

Section in charge
On receiving information about an emergency try to communicate the same to (SMC) and other emergency response committee members and proceed to control the emergency condition.
Initiate immediate action to withdraw all workmen and staff trapped in the emergency through the previously identified escape routes (if the work faces relate to many accesses) if not feasible, wait for rescue.

Site Engineers
On receiving information about an emergency try to communicate the same to (SMC) other emergency response committee members and proceed to control the emergency condition. As per the instruction of section in charge emergency control measures will be taken.

Time Office Official
On receiving information about an emergency try to communicate the same to (SMC) and other emergency response committee members and proceed to emergency control for emergency condition.
Collect details of manpower working in the area during emergency.
Ensure for first aid facilities and shifting injured as advised by accounts and administration in charge for ensuring that the emergency vehicles and the road is clear to enable the victim to be proceeded to the hospital if required.

Storekeeper

If required arrange necessary materials like tools & tackles for rescue operation as advised by the accounts and administration in charge.
Assist accounts and administration in charge in his operations.

Surveyor
Assist the emergency response committee to identify the exact location of emergency from available drawings and site experience.

Role of the Whole Committee
On receiving information about the disaster / emergency all members shall try to communicate the same to incident controller and other members and proceed to control the emergency.
Attend the emergency meeting under the leadership of project head along with other emergency response committee members.
Shall carry out the works assigned to everyone during the emergency response committee meeting.

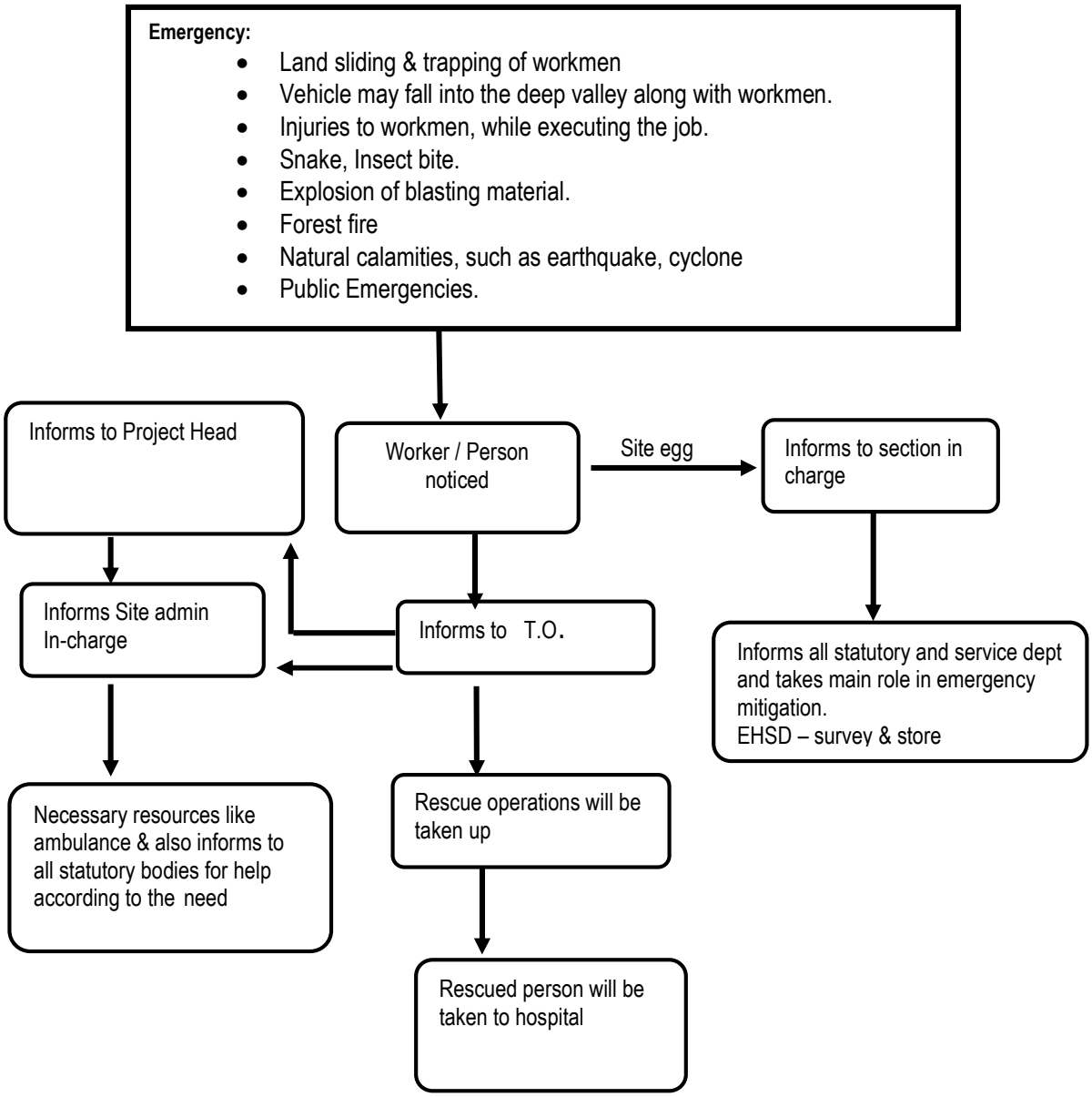
6. Probable Emergencies in the Project

The probable emergencies during the execution from the Project are:

- Land sliding & trapping of workmen.
- Vehicle fall into the deep valley along with workmen.
- Injuries to workmen, while executing the job.
- Snake, insect bite.
- Explosion of blasting material.
- Forest fire.
- Natural calamities, such as earthquake, cyclone.
- Public Emergencies.

7. Flow Chart

The next flow chart represents the emergency response from the Rescue Committee in case of emergency.



8. Contact Numbers

Sl No.	Name	Designation	Mobile
LARSEN & TOUBRO LIMITED			
1	Mr. Santanu Majumdar	Project Manager	8133936212
2	Mr. Dinesh Sharma	Construction Manager	9816866734
3	Mr. Akhilesh Pathak	Administration (In-charge)	9910047134
4	Mr. Jaydeep Acharya	IR Manager	9879511265
5	Mr. Ritupam Barthakur	Planning In-charge	8106478080
6	Mr. Nabajyoti Bera	EHSO	9654600937
PUBLIC FACILITY			
1	First Aid Center	First Aider	
2	Ambulance No	Ambulance Driver	Will provided after deployment

9. Emergency Resources

The emergency resources available at the job site are:

- Ambulances:
    - Ambulance is in the APGCL Engineer Camp and cover the following areas:
        - Dam Site.
        - APGCL Engineer Camp.
        - Powerhouse.
        - Surge Shaft.
        - P&M Workshop
        - Crusher Plant.
        - Quarry Area.
        - Worker Colony
- Firefighting equipment is distributing in all different areas along the job sites and according to the type of products/materials.
    - The firefighting equipment's include:

– Fire extinguishers located in all the working areas, machines, and equipment.

– Sand buckets along the site in the fuel stations and fuel tanks, and all the areas where is required the kind of material to extinguisher an eventual fire.

- First aid boxes.
- Stretchers
- 1 First aid centre.

10. Firefighting Resources

The firefighting resources available at the job site are different types of fire extinguishers (CO2, DCP, foam) that are available in the different working areas.

There also sand buckets where are required like the fuel stations and inside the tunnel.

The distribution of all the firefighting equipment was made according to the class of fire (A, B, C, D) that we can identify at each location and the quantity of flammable materials/products present at that location.

Location of Fire Extengusire at Project sites: We have kept fire extenguisire in following location:

S. N	Location	Type	Capacity (kg)	Nos
1	Surge Shaft Container	CO2	6.5	2
		DCP	1.0	4
2	Powerhouse Container	CO2	6.5	1
		DCP	1.0	3
3	Crusher Plant Area	CO2	6.5	2
		DCP	1.0	3
4	HRT Adit	CO2	6.5	2
		DCP	1.0	3
5	Kopili Block	DCP	1.0	4
6	APGCL Canteen	DCP	6.0	1
7	APGCL Barak	DCP	6.0	2
8	Eco Green Canteen	DCP	6.0	1
9	Lohit Block	DCP	1.0	4

10	Manas Block	DCP	1.0	4
11	Dihing Block	DCP	1.0	4
12	Store Container	DCP	1.0	1
13	P&M Container	DCP	1.0	1
14	Store	CO2	6.5	2
		DCP	1.0	3
		FOAM	6.2	2
		Fire Bucket		2
15	P&M Workshop	DCP	1.0	1
16	Fabrication Yard	DCP	1.0	1
17	Bhupender Singh Container	DCP	1.0	1
18	Workmen Canteen	DCP	1.0	4
19	Diesel Browser	DCP	1.0	2



11. First Aid Resources

By the requirements over every 50 workers a first-aid box shall be provided at work site or at distance of 500 meters. One more box for every additional 100 persons shall also be provided.

There are more than 27 first aid boxes available at the job site. Each box is kept inside the containers from the Section In charges and should be used only by workers with first aid training that are present at the working area for each shift.

Location of first aids at project site :- We have kept first aid box in following location:

1. APGCL camp
2. P&M container
3. Ambulance
4. Staff bus
5. wrokmen bus.

12. Contents of First Aid Box

The first aid shall be distinctively marked with a red cross on a while background and contain following:

- Band aids (200 Nos.). For local application
- Ointment Thrombhob (10 Nos.) For local application 2/3 times a day
- Ointment Sofraycin (10 Nos.) Local application
- Ointment Multigesic (10 Nos.) Local application
- First aid sprays (2 Nos.) for burn / cuts / bruise etc.
- Savlon lotion (5 Bottles) for cleaning of wounds
- Tincture Benzoin (5 Bottles) for local application
- Bandages all types 1/2/3" (20 Nos. each) for bandage
- Cotton wool (10 Rolls.) For cleaning / use for dressing
- Large size burn dressings (10 Nos.).
- One pair of scissors.
- One pair of adhesive plasters (2.5 cms X 1 Mtr.).
- Johnson & Johnson Eye pads - 15 to 20 Nos.
- Dettol Ointment Silversuphidezine For burns (One Nos.)
- Eye Wash Bottle (One Nos.).
- One copy of first aid leaflet.

13. Alarm & Alert Resources

Siren will be installed for Emergency Alarming system. Hand siren also will be available for Portable Alarming system.

14. Assembly Points & Head Count

There are 5 assembly points for all the project where in case of emergency all workers and staff should go and must to wait there until the be made the count by the Head count. Only after his instructions the workers/staff should abandon the place.

LOCATION & WORKING AREA COVERED			
No	**Location**	**Working area covered**	**Picture**
1	Quarry Container Office	Quarry Area	Individual location will be added
2	Crusher Office	Crusher Area	
3	APGCL Engineer Office Gate	APGCL Office Area, Workmen Barak	
4	Powerhouse Area	Powerhouse area, Surge Shaft Area	
5	Dam site area	Tunnel Dam site, Diversion Tunnel, Power Intake Area	
6	Surge Shaft	Surge Shaft	

15. How to act

a. Fire Prevention, Protection & Preparedness

Fires can and do kill, injure, and cause serious human suffering and financial loss. When construction activities are not adequately controlled, the workers and members of the public can be killed or injured and others property adjacent to construction sites put at risk.

It is important that fire safety measures are considered throughout all stages of the procurement and design process and implemented effectively during the construction phase. To do this in the job sites, L&T follow at least four steps:

- Identify the hazards.
- Identify people at risk.
- Evaluate, remove, reduce, and protect from the risk.
- Record, plan, inform, instruct, and train.

Identify the hazards

For fire start there are three things that we need, a source of ignition, fuel, and oxygen, if one of these is missing fire cannot start. On this Project the main potential sources can include:

- Smokers' material (cigarettes, matches, lighters).
- Naked flames (oxyacetylene).
- Plant and equipment (fuel and vehicles exhaust).
- Electrical installations.
- Hot works.
- Lighting equipment.
- Heat sources (gas, cooking equipment).
- Friction generated heat (disc of grinder).
- Static charge from mechanical equipment.

Source of fuel

Anything that burns is fuel for a fire. The stocks of high fire hazard material should be managed to balance production needs with the need to reduce the risk of fire. Some of the most common fuels found on the site include:

- Composite panels and timber.
- Rubbish.
- Paints and varnishes.
- Protective covering.
- Fuel for portable equipment.
- Liquefied petroleum gas.
- Acetylene.
- Portable equipment.
- Fall-arrest bags and rags.

Source of oxygen

The main source of oxygen for a fire is in the air around us. On construction sites this will be natural, the wind or the "chimney effect" can also cause increased oxygen to feed the fire. Additional sources of oxygen can be found like in welding processes and oxidizing agents.

After identifying the hazards, it is necessary identify the people at risk. In this project the people at risk are all the workers, contractors visiting duty holders, members of the public in nearly premises, etc.

But it is necessary special attention to risk situations that include:

- Who work alone?

- People in isolated areas.
- People who are unfamiliar with the site.
- People in vicinity of the premises.

In the job site L&T will apply at least two ways to reduce the risk of fire, one is reducing the risk that fire occurring and other is reduce the risks of people in the event of a fire.

There are 3 ways for the fire start, accidentally, (ex: smoking materials are not properly extinguished or when lights are too close to combustibles), by act or omission (ex: electrical material is not properly maintained) or deliberately (ex: arson attack involving setting fire to external rubbish placed too close to the buildings).

To reduce the sources of ignition we will follow many ways:

- When possible, replace a potential source with a safe alternative.
- Conduct routine hot works.
- Operate a safe smoking policy.
- Restrict the movement of and guard portable heating appliances.
- Separate ignition hazards and combustibles.
- Control, inspect and monitor ignition hazards.
- Ensure the maintenance and protect of electrical, mechanical and gas equipment.
- Control hot permit and check all the areas where this type of work is carried out.
- Ensure that no one carrying out work on gas fittings, which involves exposing pipes that contain or have contained flammable gas.
- Take precaution to avoid arson.
- Turn of equipment when it is not attended or being used.
- Take action to avoid any parts of the site and particular storage areas being vulnerable to arson and vandalism.
- Do not permit bonfires on site.

To reduce the source of fuel we can follow some rules:

- Substitute with less flammable materials.
- Plan to reduce the storage of combustible materials and keep stocks of flammable liquids and gases in use in open areas to a minimum.
- Keep flammable liquids and gases which are not in use dedicated storage areas externally, where only the appropriate staff are allowed to go and keep the minimum required for operation.
- Do not keep flammable solids, liquids, and gases together.
- Keep areas with flammable gases well ventilated.
- Develop a formal system for the control of combustible waste by ensuring that waste materials and rubbish are not allowed to build up and are carefully stored until properly disposed of, particularly at the end of the day or the shift.

- Be aware of the changing flammability of materials as they are used.

To reduce or remove the source of oxygen its important:

- Eliminating or, if not possible, reducing the amount of oxidizing materials and not storing oxidizing materials near or within any heat source of flammable materials.
- Controlling the use and storage of oxygen cylinders, ensuring that they are not leaking, are not used to "sweeten" atmosphere and that where they are located is adequately ventilated.

After the analyses from all elements that can contribute to the fire and who can be involved in one situation of fire in the job site, L&T implement preventive measure for fire prevention:

The preventive measures to reduce the ignition sources are:

Plant and equipment

- The plant and the equipment should be appropriate for the task, and it is important keep in consideration where the site is.
- Prepare a drawing from the plant where is identified principally the storage and equipment location.
- Operate and refuelling should not take place in confined space, no refuelling in scaffolding or escape routes. This should be done in the open air or in well ventilated places.
- Recharging arrangements should be considered for plant and equipment, but not near ignition sources.
- Make sure that electrical equipment is not inadvertently covered, and due care is taken in positioning to ensure that they cannot ignite any combustible materials.
- In areas potentially flammable use equipment certified and keep in a safe distance equipment that is not explosion protected.]

Use of oxy-fuel equipment

- Regulators and hoses should be in good condition and follow the code colour (ex: oxygen-blue, acetylene-red, propane-orange).
- Non-return valves at the torch inlet and flashback arrester at the pressure outlet from the gas cylinders should be provide on both gas lines.
- Make sure that oil or grease do not contaminate the oxygen supply. Only use components in good condition.
- Check always all the equipment before use.
- Gas cylinders should be secured in upright position. Hose length should be kept to a minimum.
- Empty drums should not be used as supports for hot work activities.

Permit Work System

- Clearing the surrounding area of all combustible materials.
- Checking for combustible materials protected which cannot be cleared.

- Having suitable extinguishers at hand and careful watch maintained for fire during the work and following compilation.
- Examining the hot work area thoroughly for some time after the work has finished. In view of the potential risk, it is a sensible precaution for all hot work to stop by a safe period before the end of the day/shift.

Electrical installations

- Do not overloading the sockets. One plug per socket.
- Do not laid the cables near combustible materials.
- Reduce the accumulation of rubbish near electrical distribution boards.
- Install safety devices such as fuses or circuit breakers. Only joint cables with the proper connectors.
- Use hot resistant lass on halogen lamps.

Bonfires

- Only light fires, on an open site, on designated ground and far enough removed so that there is no risk of setting adjoining material, storage areas or structures alight.
- Limit the amount burnt in one go to what can be dealt with in an incinerator.
- Never leave fires unattended until they are completely out, damping down if necessary.
- Attendants should have the correct fire extinguishers or other suitable equipment to hand.
- Material should be checked for dangerous items, such as empty cylinders, aerosol cans and flammable substances, before it is brought to the fire.
- Do not light fires on windy days.
- Do not site bonfires where flames, smoke and any air-borne debris might affect overhead electrical lines.

The fuel sources must be controlled, for this matter on the jobs site the workers must follow some rules such as:

- Changing flammability of materials as they are used.
- Store materials in a proper way according to level of flammability and do not mix materials that can affect others in increase the risk of fire.
- In external storage the area should be shaded from the sun.
- Good ventilation for volatile and highly flammable materials must be provided.
- The cylinders of oxygen must be always stored separately from cylinders of flammable gases such as LPG and acetylene.

The general measures to adopt to prevent fire are:

- The workers shouldn´t smoke or make fire on the forbidden areas (ex: fuel station, etc).
- It is mandatory respect all the safety information present in the job site (signals, labels, etc).
- All the materials should be stored properly and far from the ignition sources. Do not storage all flammable materials together, put them separately in different areas.
- Make a good housekeeping and collect all the waste materials and storage properly until send them to last destination.
- Maintenance should be made for all the equipment and machinery regularly. Install fire extinguisher in the machines.
- Fire extinguishers must be signalizing, accessible to workers in case of fire and installed in the job site on strategic locations, according to the emergency plan. Check and make the maintenance for the firefighting equipment regularly (fire extinguishers, etc) and if necessary, use a fire extinguisher replace the empty immediately.
- Do not let flammable materials like rags, liquids or paper soaked inside the cabin of the vehicles or machinery.
- All electric connections must be isolated. If the electrical equipment is not in use switch off at the mains.
- The workers must receive training about firefighting (ex: how to use a fire extinguisher, etc.).
- Carry out residual heat checks 30-60 minutes after any hot work (like cutting) has been carried out.
- Keep all escape routes free from debris and materials. If necessary, the workers must stay in assembly point.

All the workers in the job site must be active in terms of surveillance of workplace, if was detected a fire hazard they must inform immediately the responsible.

34 WORKERS' OCCUPATIONAL HEALTH AND SAFETY

All components of the workers' camps, including accommodations, sanitation facilities, water supply and other infrastructure, recreation facilities, kitchens and dining areas, and medical facilities, shall adhere to and be maintained at internationally accepted health and safety standards including IFC EHS Guidelines.

The workers and other project personnel shall be provided training in prevention of diseases such as mosquito-borne diseases, intestinal diseases, HIV/AIDS, and other venereal diseases. They shall also be provided training in proper use of sanitary facilities, access and use of portable water, and waste disposal.

Workers and other project personnel shall be trained in work safety measures and practices. First aid teams trained in emergency response shall be assigned at each of the construction sites and medical facilities (first aid kit, medicines, ambulance etc.) capable to deal with emergency incidences shall be provided at each project sites. A doctor shall be available within reasonable distance (within 10 km) from the construction site if an accident occurs or in case of serious illness.

Water and drainage facilities shall be maintained to avoid breeding of mosquitoes. Use of pesticides will be avoided and may be used only if deemed necessary and must follow the following conditions: the pesticides shall have negligible adverse impact on humans, they shall be effective against target species, they shall have minimal effect on non-target species and the natural environment, and they shall be safe for the personnel who apply them. The handling, storage, application, and disposal of pesticides shall be done in accordance with international best practices such as the Food and Agricultural Organization's International Code of Conduct on the Distribution and Use of Pesticides[97].

Following measures are proposed for health and safety of workers.

- The location, layout and basic facility provision of each labor camp will be submitted to SQC prior to their construction. The construction shall commence only after approval of SQC.
- The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner as approved by the EA.
- Adequate water and sanitary latrines with septic tanks attached to soak pits shall be provided.
- Preventive medical care to be provided to workers including a First-Aid kit that must be available in the camp.
- Waste disposal facilities such as dust bins must be provided in the camps and regular disposal of waste must be carried out.
- The Contractor will take all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides hitch should comply with local regulations.
- No alcoholic liquor or prohibited drugs will be imported to, sell, give, and barter to the workers of host community.
- Awareness raising to immigrant workers/local community on communicable and sexually transmitted diseases.

ANNEXURE 1. SAFETY PRACTICES DURING CONSTRUCTION PHASE

1. INTRODUCTION

The information on following aspects pertaining to safety have been presented in this chapter:

- Personal Safety Equipment
- Rescue Team
- Illumination and Earthing
- Maintenance of Traffic and Safety on Public Roads
- Blasting
- Ventilation of Underground Works
- Control of Dust, Silica and Noxious Gases in Underground Works
- Management of Explosives
- Traffic management during construction phase
- Measures to be taken during excavation of earth
- Safety practices during construction phase
- Fire protection in labor camp and staff colonies

2. PERSONAL SAFETY EQUIPMENT

2.1 General

- All the personnel as well as the site representatives and visitors shall be equipped with appropriate personal safety equipment. 'I he use of such equipment shall be compulsory.
- Every person entering the working area in open air or in underground shall wear a protective helmet. Every person entering underground works shall have a battery-operated electric lamp. No one can enter or work underground without the confined spaces training.
- The safety-lock footwear with steel caps and sole plate shall be worn by all employees engaged in work having an inherent danger to the feel. Light footwear such as sandals, canvas or tennis shoes shall not be permitted for construction work.
- During the drilling works and, in the areas, where the employees are exposed to harmful noise levels, car protectors shall be made available and required to wear.
- Employees engaged in work having an inherent danger of eye or face injury1 shall be furnished and required to wear protection glasses, goggles, or masks Where irritant or toxic substances may meet the skin or clothing, employees shall be wearing the protective clothing or shall be required to apply a protective ointment by a competent physician.
- Employees working on sleep slopes or otherwise subject to possible falls from levels not protected by fixed guardrails or safety nets, shall be secured by safety bells and lifelines.

2.2 Requirements for Underground Works

- Emergency material shall be provided at each underground excavation heading. This equipment shall consist of the following, as a minimum:
  a) 3 stretchers
  b) 3 woolen blankets
  c) 2 appliances for artificial breathing
  d) I oxygen flask
  e) 3 explosion-proof lamps
  f) wound dressing and disinfecting material
  g) pain-killing injections

h) gas masks

- At least two members of the Rescue Team as described hereinafter, properly instructed and trained in the rescue procedures, shall be in each crew working underground

3. RESCUE TEAM

- Prior to the commencement of construction, a Rescue Team shall be formed. This Rescue Team shall be capable to render help after accidents caused by flooding, fire, gas explosion, etc.
- The Rescue Team shall be organized in such a way that enough members will be ready for action at any time until the Completion of Works.
- The Rescue Team members shall be instructed and trained for their task by a qualified and experienced person. If required, an outside specialist shall be hired to perform such training. A refresher training for all members of the Rescue Team shall be conducted at least every six months.
- Each Rescue Team member shall be skilled in giving the first aid, dealing with the appliances for artificial respiration, and lire fighting equipment and shall possess a good local knowledge. Adequate equipment for reaching even the remotest working area shall be at their disposal.

4. ILLUMINATION AND EARTHING

4.1 General

- All working sites in the open, transit areas, excavation sites, access to tunnels, etc., shall be adequately illuminated during night work by electrical lights as specified in the Section "Site Installations and Services".
- Illumination of Underground Works
- Each working face shall be brightly illuminated.
- The vaults along the entire length of the tunnel adits and shaft shall be illuminated with electrical light throughout the duration of construction works. The lamps shall be located as follows.
  a) Every 25 m in unlined stretches,
  b) Every 50 m in lined stretches.
  The lamps shall be installed in a particular area immediately after the rock supporting measures have been completed.
- Electrical cables shall be well insulated, protected and firmly fixed to tunnel walls by means of adequate insulators, Lamps shall be well protected against damage.
- Lighting by flame is expressly forbidden in the underground.

4.2 Earthling, Wet Work Areas, Control of Electric Discharges

- All equipment and appliances, which are exposed to lightning, shall be earthedelectrically, and the effectiveness of such earthling shall be periodically checked by the specialized personnel.
- No equipment electrically powered by more than 24 Volts shall be operated by personnel standing in water.
- Only air, battery-powered or hydraulic tools shall be permitted in the wet areas.
- Where electrical blasting will be used, equipment shall be installed to control possible electric discharges in the ground due to storms, electrical motors, etc. As soon as such discharges arc noted, electrical blasting operations shall be suspended, or the detonator type changed.

5. MAINTENANCE OF TRAFFIC AND SAFETY ON PUBLIC ROADS

- All necessary precautions for the protection of the work and the safety of the public on the roads

affected by his activities shall be taken. Where the work will be carried out at the site of, or close to an existing road, the vehicular and pedestrian traffic shall be always maintained safe. If any operations can cause traffic hazards, the repair or fence or any such other measures shall be taken for ensuring safety.

- Roads subject to interference by the work shall be kept open or suitable detours shall be provided and maintained, and all necessary barricades, suitable and sufficient flashlights, flagmen, danger signals, and signs be provided.
- Roads, which will be closed to traffic, shall be protected by effective barricades on which acceptable warning and detour signs shall be placed. All barricades shall be kept illuminated and all lights shall be kept on from sunset to sunrise.
- The temporary passes and bridges shall be provided to give an access to the existing villages, houses, etc., to the satisfaction of the authorities concerned whenever he disturbs such existing way during the execution of the Works.

6. BLASTING

6.1 General

- All blasting shall be carried out in a workmanlike and safe manner by a competent, licensed, and experienced blasting engineer or foreman. No blasting shall be done without his approval.
- Blasting will be permitted only after adequate provisions have been made for the protection of persons, the Works, and public or private property. Responsibility for the safety of persons and property shall be ensured. All claims resulting from personal injury and damage to property and equipment that may resulting from its blasting operations shall be taken care of. Any damage done to the Works or property by blasting shall be repaired.
- Blasting in the open air shall be carried out only at certain hours of (he day in accordance with a schedule. Barriers shall be erected, and warning shall be given to the workers at the Site and to the public immediately before blasting, so that no person will enter the danger zone until blasting is finished.
- Upon completion of blasting, an "all clear" signal shall be given by the responsible blasting engineer after he has satisfied himself that all charges loaded have detonated and that no delay-explosions or misfiring arc to be expected.
- Such methods of blasting shall be employed that shock and vibration are minimized.
- No blasts involving charges larger than 200 kg shall be carried without at least one hour prior to the blast.
- No blasting shall be permitted within 25 m of any concrete placed within the previous 7 days, except backfill concrete behind steel ribs. After 7 days. Blasting will not be permitted within 10 m of structures or installations vulnerable to damage by blasting.
- No charging and firing will be permitted during thunderstorms and other electrical disturbances.
- Mats or rubber tires tied together with rope shall be used as protection from flying debris to cover the charges where blasting may expose persons or properly to injury or damage.

7. Underwater Blasting

- Only water-resistant blasting caps and detonating cord shall be used in underwater blasting operations.
- Loading tubes and casings of dissimilar metals shall not be permitted because of possible electrical transient current from galvanic action.
- When more than one charge is placed underwater, a float device shall be attached to an element

of each charge in such manner that it will be released by the firing.

- No drilling, digging, or excavating shall be permitted until all misfires have detonated or the explosives are removed from the missed holes.

8. VENTILATION OF UNDERGROUND WORKS

7.1 General

- Installation and operation of ventilating systems for underground construction sites, shall be done. Calculations of fresh air supply volume, type of ventilation scheme, duct diameters, materials and equipment and position of ventilators and dust arrestors shall be performed. Description of the working cycle including number of persons employed, number and capacity of diesel-powered equipment working at one time at each tunneling face shall also be included.
- All parts of the Works shall be maintained in a slate which will not be injurious to the health of the personnel. The air in underground shall contain no less than 20% oxygen and shall not contain a concentration of gases, vapors, or dust greater than is safe for the health of workmen.
- If requited, the ventilating system shall be kept in operation also after breakthrough in tunnels, galleries, and shafts to maintain the fresh air volume requirements staled hereafter
- Intermediate fans attached to the main duct line shall be provided as required to ensure satisfactory removal of contaminated air. All ventilation ducts shall be maintained in an airtight condition.
- Ventilation ducts shall be firmly fixed to the vault in such position that a minimum clearance of 200 mm remains between the duct and the extremities of train or vehicular traffic employed in the underground.
- Should the volume of fresh air at the heading face not reach the required amount and quality, the whole duct system shall be pressure-and-volume tested in portions not exceeding a few hundred meters. Measuring stations shall be located not closer than 10 times the duct diameter from any fan or other flow disturbance within the duct.

7.2 Ventilating System

- The ventilating system shall be of such efficiency that the average air velocity in the largest excavated profile is not less than 0.3 m/s. In case the presence of methane gas is detected or suspected this value shall be increased to 0.5 m/s.
- Furthermore, the main ventilating system shall ensure that both of the following minimum fresh air volume requirements are always satisfied:
- 3.0 m^3/min for each person employed underground at one time
- 6.0 m^3/min for each metric horsepower (PS) of diesel-powered equipment at work underground at one lime. This value may be reduced to 3.0 m^3/min providing the equipment is using diesel oil low in Sulphur content (max. 0.2% of Sulphur by volume).
- These fresh air volumes shall be cumulative and the design calculations for the maximum number of persons and diesel-powered equipment working in the underground at any one time. Any estimated losses, e.g., due to the leaks in the ducts, shall be added to the figures stated above.
- The ventilating system in the underground excavation performed by drilling and blasting shall consist of two parts:
  a) Main ventilating system,
  b) Secondary ventilating system.
- The main ventilating system shall be designed to allow the flow to be reversed and shall be operated as follows:
  a) Prior to the blasting, the system will be put in the exhaust mode of operation. Blasting fumes

shall be extracted as close as possible to the excavation face. Exhaust air and blasting fumes shall be discharged in such a way that they can neither escape in any other working place nor be re-circulated in the fresh air supply system.

b) Prior to the commencement of mucking and removal of material the system will be put in the forced mode of operation which will continue till termination of mucking.

- The secondary ventilating equipment of the forced type shall be installed to provide adequate ventilation of the area between the heading face and the air intake/outlet of the main system. This system shall be switched on prior to the blasting and shall be operating until the main system has been put into forced mode of operation. The air intake shall be located at a sufficient distance from the heading face to ensure that blasting fumes do not permeate into this area and cause a recycling of blasting fumes. The outlet of this duct shall be located so close to the heading face that the driving of the blasting fumes and dust away from the face into main system is ensured. The minimum capacity shall be at least 70% of the main system capacity. The end diameter of the duct shall be such that the air discharge velocity is not less than 20 m/s.
- Re-entry to the heading face and resuming of the work may not occur earlier than IS minutes following each blast.

9. CONTROL OF DUST, SILICA, AND NOXIOUS GASES IN UNDERGROUND WORKS

8.1 Dust and Silica

- To reduce the amount of dust, only wet drilling will be allowed and during mucking, muck tips shall be kept constantly damp by sprinkling with water. The use of high-pressure water jets for this purpose will not be permitted.
- The concentration of fine dust shall be measured and content of silicon dioxide (SiO_2) in all dust-producing underground operations by an approved method.
- Air samples shall be taken within 10 days of commencing underground excavation, and at 90-day intervals thereafter. Samples shall be taken from actual working areas. The sampling and testing shall be performed by a qualified person or laboratory.
- Should the concentration of fine dust exceed the limits, such necessary measures shall be undertaken and install such additional equipment which will ensure that the dust concentrations are within the specified safe hygienic limits.

8.2 Noxious Gases

- Use of internal combustion engines, other than approved mobile diesel-powered equipment will not be permitted in underground construction sites.
- Concentrations of other flammable gases shall not exceed 40% of the lower explosive limit at the heading face and 20% of the lower explosive limit in the general tunnel or shaft atmosphere.
- If concentrations of noxious gases or other flammable gases exceed the permissible limits set forth above, all operations shall be interrupted immediately, and personnel shall be removed to a safe area. AH sources of ignition shall be extinguished or removed. All equipment, except for ventilation equipment, shall be shut down.
- In case of need, an independent consultant experienced in gaseous tunneling shall be engaged. Re-entry and resuming of the work shall be prohibited until such measures are taken.

10. MANAGEMENT OF EXPLOSIVES

9.1 General requirements of responsible persons

- All persons charged with, responsible for or involved in the storage, transportation and handling

of explosives are to have received appropriate training, are to be suitably qualified and experienced and are to be familiar with the details and guidelines of this chapter.

- Persons responsible in whatever capacity for the storage, transportation and/or handling explosives are to be in good health.
- Persons not qualified to store, transport or handle explosives may carry, load, and unload dangerous material into vehicles or storage under supervision of a qualified person, provided they are verbally briefed on safety measures prior to handling explosives.
- All transportation and storage of explosives, temporarily or permanent must be recorded in a logbook showing the number of explosives transported or stored and the number of explosives being used.

9.2 Environmental Requirements

The environmental requirements (temperature, humidity, and vibration) of explosives vary, and are dependent on their intended storage conditions (including shelf life), transportation, handling, and use. The performance of explosives will be unpredictable, and the safety will be reduced if the manufacturers' environmental conditions are not met. In general, explosives should be:

- Kept dry and well ventilated.
- Kept as cool as possible and free from excessive or frequent changes of temperature.
- Protected from direct sunlight
- Kept free from excessive and constant vibration.

9.3 Storage Requirements

The key aspects to be considered while considering the storage site are:

- All storage facilities require adequate ventilation to prevent dampening and heating of stored explosives. Climatic conditions, size of magazine and location will determine the amount of ventilation required.
- Permanent and/or main storage facilities shall be fire-resistant, theft resistant, weather resistant and ventilated.

- Portable storage facilities, such as a skid-mounted container, trailer or semi-trailer shall be theft-resistant, fire-resistant, and weather-resistant. The magazine should be constructed of steel with an interior lining of timber.
- Magazines of less than one cubic meter in size should be fixed to the ground to prevent theft of the entire magazine.
- A day box is used for the on-site storage of explosives required for daily operation and shall be:
  - Weather resistant and able to be locked.
  - Wherever possible or practical it should be of steel construction
  - but can be wooden boxes or other appropriate containers.
  - They shall contain no more than 10 kg of explosives and or (including) appropriate quantity of initiating means to fire the given quantity of explosives.
- Detonators and/or other means of initiation are to be stored and carried in a separate box from explosives.
- Vehicles are not to be left loaded with explosives at any time unless they are under continuous security guard and are not to be used as overnight storage facilities.

The following are the minimum general rules and guidelines for the storage of explosives

- Permanent and/or main storage facilities are to have ventilation, installed in such a way that it cannot be closed, blocked, or allow water to penetrate.
- Permanent and/or main storage facilities are to be fitted with lightning conductors.
- Permanent and/or main storage facilities are to have separate rooms or a substantial barrier for separating explosives and detonators/blasting caps.
- In all circumstances, where possible explosives shall be stored in their original packaging.
- All boxes are to be placed at least 100mm above the floor, e.g., on wooden pallets.
- When boxes are stacked the height will not exceed 1.5 meters. The space between the top of the boxes and the ceiling will not be less than 600mm.
- When stacked on shelves boxes are to be at least 100mm away from the upper shelf, and 500mm away from the walls of the room.
- When stacking boxes, the width of the base is to be bigger than the height of stacked boxes.
- Blasting caps and electric detonators may be stacked only if packed in boxes and on wooden shelves maximum two layers on a shelf. Total height of stacked boxes will not exceed 1.4 meters.
- If portable lanterns or pocket torches of any description are required, they will be switched on before entering the store. The person holding the torch will not handle explosives or detonators or blasting caps.
- Materials used for packaging explosives are to be destroyed and not discarded after use.
- Fire extinguishers shall be available in storage facility.

9.4 Additional Safety Measures for Storing and Handling of Explosives

These following shall be implemented and adhered to by the contractor/ project proponent:

- A trained and qualified person is to be responsible for managing the receipt, storage, guarding and issuing explosives at all levels
- Only authorized persons are to enter any storage facility and where appropriate and relevant to be always escorted.
- All smoking materials, including cigarettes, matches, lighters etc. and any object or item that might cause fire are prohibited from the storage facility. At the entrance to the facility there

is to be a warning sign stating, 'NO SMOKING OR SMOKING MATERIALS ALLOWED BEYOND THIS POINT'**.**

- Clothing and shoes of all workers are to be in accordance with rules on storage of explosives. Shoes are to be manufactured in such a manner as not to cause sparks.
- The storage facility is not to be used for anything other than storing explosives. It should be kept free from any other tools, equipment of items and should always be kept as clean and tidy as is practicable.
- The facility is to be always secured except when it is being ventilated when it should be guarded.
- Facilities are to be constructed in such a way as to provide protection from static electricity.
- If thunderstorms are predicted all work in and around the facility is to stop and personnel are to go to a safe place.
- If the facility repair, all explosives, and explosive accessories are to be removed before repairs are started.

9.5 Requirements when preparing to Transport Explosives

Persons responsible for the transportation of explosives are to ensure:

- That suitable communications systems are available that will allow for communication from the vehicle to the project throughout the complete journey.
- That an appropriate communication plan (covering as a minimum a radio check prior to leaving the start location and informing on arrival at destination) is in place for the journey.
- That a route card is prepared covering the complete journey. That the driver and driver's assistant are aware of all actions to be taken covering all possible eventualities during the journey i.e., breakdown, accident, robbery, etc.
- Explosives will not be transported unless securely packed in appropriate boxes. Boxes or individual packages are to have specific identification marks on them.
- Each box is to be marked with the applicable hazardous classification code.
- Boxes are to be closed and made waterproof to prevent any loss or spilling and moisture ingress during transport. If the vehicle is not a covered vehicle, boxes are to be covered with a waterproof cover.
- Detonators are to be securely packed in a separate metal box from explosives. Boxes containing detonators are to be carried in a separate compartment of the vehicle from boxes containing explosives. UNDER NO CIRCUMSTANCES ARE DETONATORS TO BE CARRIED IN THE SAME BOX AS EXPLOSIVES.
- Detonators and explosives are to be loaded on to the vehicle in such a way that they do not move about during transportation.
- Boxes, pallets, and other packaging for transport of explosives are to be evenly distributed over the whole deck area and can be loaded up to the height of the sides of the truck. All individual packaging and boxes with explosives are to be loaded and fixed to prevent spillage from boxes and turning over or impact inside boxes.

9.6 Requirements of vehicles used for the Transport of Explosives

Vehicles employed to transport explosives are to be roadworthy, well maintained, and in good working order. Persons in charge of the transport of explosives will check the following prior to any movement of vehicles carrying explosives.

- The vehicle is marked appropriately.
- The driver and driver's assistant are briefed about the type of explosives to be transported as well as their destination and the route they are to take. The type and quantity of explosives and conditions of roads to be travelled on are to be considered when deciding the type of vehicle to be used.

- If vehicles carrying explosives are travelling in convoy, then the distance between vehicles is to be a minimum of 100 meters.

All vehicles that are employed for the transport of explosives should also carry the following equipment:

- At least two appropriate fire extinguishers, one for the vehicle engine and one for the load, extinguishers are to be charged with a content that will efficiently extinguish an explosives fire.
- Two hand-torches, two warning triangles for marking the vehicle when stationary on the road.
- Vehicles transporting explosives shall be fitted with an earthing-strap to take away static electricity from the vehicle to the ground.
- No passengers are to be carried in vehicles transporting explosives.
- Vehicle crews are to consist only of a driver and a driver's assistant.
- No material that may cause a fire may be carried in vehicles transporting explosives.
- No repairs that might cause fire by sparking due to impact or violent contact may be carried out.
- No smoking is allowed in the driver's cabin or any other part of the vehicle.
- The vehicle is not to be left unattended.
- The driver will drive with care and at an appropriate speed for the roads and conditions which in all cases shall never exceed 70 KPH or 80% of the highest speed determined for the road whichever is less.
- If the explosives are stolen, the project, contractor or persons transporting the explosives are to take measures to find it and to report the incident to the person in charge of the transport and inform the local authorities.
- Explosives and the means to initiate explosives may be transported
- together only when the quantity of explosives does not exceed 50 kg, and
- 100 detonators. This will only be allowed provided that the detonators are in their originally packed boxes, and that the explosives are packed and loaded separately from the detonators.

11. TRAFFIC MANAGEMENT DURING CONSTRUCTION PHASE

Temporary diversions will be constructed with the approval of the Engineer. Detailed Traffic Control Plans will be prepared and submitted to the Engineer for approval, at least 5 days prior to commencement of works on any section of road. The traffic control plans shall contain details of temporary diversions, details of arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, safety measures for transport of hazardous material and arrangement of flagmen.

The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. He shall inform local community of changes to traffic routes, conditions, and pedestrian access arrangements. The temporary traffic detours will be kept free of dust by frequent application of water.

12. MEASURES TO BE TAKEN DURING EXCAVATION OF EARTH

While planning or executing excavation the contractor shall take all adequate precautions against soil erosion, water pollution etc. and take appropriate drainage measures to keep the site free of water, through use of mulches, grasses, slope drains and other devices. The contractor shall take adequate protective measures to see that excavation operations do not affect or damage adjoining structures and water bodies. The recommended measures are listed as below:

- Ensure unobstructed natural drainage through proper drainage channels/ structures.
- Dispose surplus excavated earth at identified sites. Ensure minimum hindrance to locals.
- All excavations will be done in such a manner that the suitable materials available from excavation are satisfactorily utilized as decided upon beforehand. The excavations shall conform to the lines, grades, side slopes and levels shown in the drawings or as directed by the engineer.

13. FIRE PROTECTION IN LABOUR CAMP AND STAFF COLONIES

It has been envisaged that the fire protection planning shall be taken up in the following manner:

a) **Construction of Camps etc. and placement of fire protection equipment's.**

It has been planned that all facilities to be constructed shall be fully equipped with the fire protection equipment's as per IS standards. The analysis of fire hazard in the construction of labour camps, colonies, and other facilities along with management measures is summarized in Table 1.1.

Table 1.1: Analysis of fire hazard in the construction of labour camps, colonies, and other facilities

S. No	Stage	Potential hazard	Remedial Measures
1.	Construction of Camp/colony	• Fire prevention and firefighting not considered in design • In adequate fire protection measures during construction	**By Project authorities** • While construction of Field hostels, Guest House/office and other facilities owned by the project. • The project proponent shall provide the fire protection system as per IS Standards for Fire code. • Proper housekeeping will also be ensured and maintained during these facilities to protect them from any fire related incidents. • It will be ensured that the firefighting equipment's are placed at common place also including workplace preferably within 15 meters of workplace. **By Contractors** • Clear term of reference will be given to contractor at tendering stage for incorporating fire code as per IS Standard. • Firefighting equipment's will be placed at all common places (within 15 meters of workplace)

b) **Maintenance of fire protection equipment's as the safety measures thorough dedicated EHS Team.**

During construction, it has been envisaged to set up fully fledged Environment Health & Safety (EHS) department reporting directly to Head of Project. This department shall also take care of the adequacy of Fire Safety measures set up in all facilities created either owned by project or any of its Contractors. The analysis of responsibility for this EHS team in respect of Fire protection system is outlined in Table 1.2.

Table 1.2: Analysis of responsibility for this EHS team

S. No	Stage	Potential hazard	Remedial Measures
1.	During Occupation	• Fire incident due to electrical short circuit/LPG Leakage/ Improper handling of flammable liquids/lack of precaution • Improper access to and from the location • In adequate firefighting arrangements • Lack communication • Lack of Knowledge on fighting fire and handling fire equipment • Inadequate Emergency response	• Residential complex will be constructed as per the approved design and will be checked for completeness on fire aspect before allotment to residents • Each Block Colony/ camp will be provided with rated estimated trip off circuit breaker will be installed on each block. • All residents are made aware of fire hazard by training, regular campaigns and by placing posters and signs • LPG Cylinders/Flammable liquids will be stored at designated storage area. The storage will be well protected, ventilated with adequate provision of fire equipment's. • Each bloc of the colony will be provided with 10 kg DCP fire extinguishers. • Additionally, fire point containing fire buckets, CO_2 extinguishers, DCP Extinguisher will be provided at the common place covering four residential blocks in labor Camp. • Placement of written posters of preventive measures in each accommodation block • Regular EHS inspection of the camp site • Placement of placard of emergency numbers to be contacted in case of Emergency • Dedicated phone line will be provided in labor camps for effective communication. • Ensure proper access is maintained around and to the residential blocks • Identification of emergency Muster points at safe distance

RESPONSIBILITY

Project In charge is responsible for implementation of plan through his authorized representative on site. Site EHS Team shall monitor the implementation of plan and report which are non- compliance to site management.

TRAINING AND AWARENESS

Training of employees on fire prevention and firefighting is important to prevent occurrence of fire incident in project area. All employees will be given brief overview of fire prevention, firefighting procedure, and response process at the time EHS Induction training. Project proponent will also carry out regular campaigns on fire prevention around the site. EHS Department is responsible for providing required training.

14. IMPLEMENTATION OF SAFETY PLAN

The implementation of this plan will be mandatory for all contractors involved in the projects. The requirements of this plan will be part of contract agreement; therefore, no cost has been kept under this plan in the EMP.

ANNEX 2: PUBLIC HEALTH DELIVERY PLAN

INTRODUCTION

The construction of dam may involve many diversified activities and require many laborers. The change in population density through immigrants/influx may cause new health problems in this region. People may carry different types of contagious diseases if any and spread in locality. Influx of human work force may also bring stress on available drinking water sources and sanitary facilities. The additional sewage generated may contaminate drinking water sources resulting in spread of various communicable diseases if proper precautionary measures are not taken. As a part of Environmental Management Plan, a detailed plan for development of public health and medical facilities has been prepared which includes diseases such as STDs, HIV, etc. Since project area is malaria prone, specific measures to deal with Malaria are presented below.

1. PUBLIC HEALTH DELIVERY SYSTEM

1.1 Control of malaria

The increase in water fringe area provides suitable habitats for the growth of vectors of various diseases and they are likely to increase the incidence of water-related diseases. Malaria is the water related major vector-borne disease. Thus, malaria control measures which aim at control spread of malaria as well as destroying the habitat and interrupting the life cycle by mechanical or biological or chemical means need to be implemented. Various Primary Health Centers in the nearby villages and Hospital at District Head Quarters can coordinate the anti- malarial operations in association with the project authorities.

The suggested measures are given in following paragraphs:

- Site selected for habitation of workers should not be in the path of natural drainage (1 km away).
- Adequate drainage system to dispose storm water drainage from the labor colonies should be provided (to avoid standing water).
- Distribution of anti-malaria pills among workers.
- Awareness programs.

1.2 Development of medical facilities

A population of about 2,800 is likely to congregate during the construction phase. The labor population will be concentrated at two or three sites. There is no medical facility in the immediate vicinity of the project area (nearest is Urmrangso and Lanka). It is recommended that necessary medical facilities (ambulance and first aid post at each site with central clinic capable of dealing with serious emergency incident) be developed at the project site. It is further recommended that the dispensary should be developed during project construction phase itself, so that it can serve the labor population migrating in the area as well as the local population.

The details of manpower, infrastructure requirement for this dispensary is given as below.

1.3 Proposed Health Facilities at Construction sites and labor camp

It is possible that during the construction work, the technical staffs operating different equipment are not only exposed to the physical strain of work but also to the physical effects of the environment in which they are working. The workers and other technical staff may come up with common manifestations such as insect bites, fever, diarrhea, work exhaustion and other diseases. In addition, they may invariably come up with injuries caused by accidents at work site. Under all circumstances, workers need immediate medical care.
A first-aid post is to be provided at each of the major construction sites (first aid box should be accessible within 1 minute), so that workers are immediately attended to in case of an injury or accident. This first-aid post will have at least the following facilities:

- First aid box with essential medicines including ORS (oral rehydration salts) packets
- First aid appliances-splints and dressing materials
- Stretcher, wheelchair, etc.

1.4 Health Extension Activities

The health extension activities will have to be carried out in the villages situated in the nearby areas. It is important to inculcate hygienic habits of environmental sanitation specially with respect to water pollution by domestic wastes. There would be possibility of the transmission of communicable diseases due to migration of labor population from other areas at the construction site. The doctors from the dispensary shall make regular visits to nearby villages and organize health promotional activities with the active participation of the local village Panchayat, NGOs, and available local health functionaries. The health functionaries would undertake the following tasks as a part of health promotional activities:

- Collect water samples to ascertain the portability of water from different sources to monitor regular disinfection of drinking water sources.
- Maintain close surveillance on incidence of communicable diseases in these villages.
- Maintain close liaison with the community leaders and health functionaries of different departments, so that they can be mobilized in case of an emergency.

1.5 Infrastructure

Dispensary: Considering the number of rooms, staff quarters and open space etc., it is estimated that 465 sq. meter of plot will be required for dispensary, of which about 375 sq. meter will be the built-up land which includes staff quarters, etc.

2 First-Aid Posts: These are of temporary nature and will be created.

1.6 DISPOSAL OF BIO-MEDICAL WASTE

Dispensaries use a variety of drugs including antibiotics, cytotoxic, corrosive chemicals etc. a part of which is generated as a solid waste. With greater emphasis on disposables, the quantum of solid waste generated in a hospital is quite high. As per the Bio-Medical Waste (Management and Handling) Rules 1998, the bio-medical waste has been classified into various categories which are outlined in Table 2.2.

Table 2.2: Categories of bio-medical waste as per the Bio-Medical Waste (Management and Handling) Rules 1998

Waste Category No.	Waste category type
Category No. 1	**Human Anatomical Waste** Human tissues, organs, body parts
Category No. 2	**Animal Waste** Animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood, and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses
Category No. 3	**Micro-biology and Biotechnology wastes** Wastes from laboratory cultures, stocks, or specimens of micro-organisms, live or attenuated vaccines, human and animal cell culture used in research and infections agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes, and devices used for transfer of cultures
Category No. 4	**Waste sharps** Needles syringes, scalpels, blades, glass, etc. that may cause punctures and cuts, including both used and unused drugs
Category No. 5	**Discarded medicines and cytotoxic drugs** Wastes comprising of outdated, contaminated, and discarded medicines
Category No. 6	**Soil Waste** Items contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, lines bleedings other material contaminated with blood.
Category No. 7	**Solid Waste** Wastes generated from disposable items other than the waste sharps, such as tubing, catheters, intravenous sets, etc.
Category No. 8	**Liquid waste** Waste generated from laboratory and washing, cleaning, housekeeping, and disinfecting activities
Category No. 9	**Incineration Ash** Ash from incineration of any bio-medical waste
Category No. 10	**Chemical Waste** Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.

Out of the categories listed in Table-2.2, the biomedical waste categories to be generated in the dispensary proposed to be developed as a part of the project are given in Table 2.3.

Table 2.3: Categories of bio-medical waste to be generated in the dispensary proposed to be developed as a part of the project

Waste Category No.	Waste category type
Category No. 1	**Human Anatomical Waste** Human tissues, organs, body parts
Category No. 4	**Waste sharps** Needles syringes, scalpels, blades, glass, etc. that may cause punctures and cuts, including both used and unused drugs
Category No. 5	**Discarded medicines and cytotoxic drugs** Wastes comprising of outdated, contaminated, and discarded medicines

Waste Category No.	Waste category type
Category No. 6	**Soil Waste** Items contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, lines bleedings other material contaminated with blood.
Category No. 7	**Solid Waste** Wastes generated from disposable items other than the waste sharps, such as tubing, catheters, intravenous sets, etc.
Category No. 8	**Liquid waste** Waste generated from laboratory and washing, cleaning, housekeeping, and disinfecting activities
Category No. 9	**Incineration Ash** Ash from incineration of any bio-medical waste
Category No. 10	**Chemical Waste** Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.

The bio-medical waste must be segregated in accordance with the guidelines laid under Schedule-I of Bio-medical Waste (Management and Handling) rules notified by Ministry of Environment and Forests. The proposed color coding and container for disposal are given in Table 2.4.

Table 2.4: Colour coding and type of container for disposal of Bio-medical waste

Color coding	Type of container	Waste category
Yellow	Plastic bag	Category 1and category 6
Red	Disinfected container/ plastic bag	Category 6 and category 7
Blue/white transparent	Plastic bag/ puncture proof container	Category 4 and category 7
Black	Plastic bag	Category 5, category 9, and category 10 (solid)

The treatment measures recommended for various categories of waste is outlined in Table 2.5.

Table 2.5: Recommended treatment measures of various categories of waste

Waste type	Recommended treatment
Category No. 1 – Human Anatomical wastes	Incineration
Category No. 4 – Waste sharps	Secured landfill
Category No. 5 – Discarded medicines and cytotoxic drugs	Secured landfill
Category No. 6 – Solid Waste	Incineration
Category No. 7 - Solid Waste	Incineration
Category No. 8 – Liquid waste	Treatment through an Effluent Treatment Plant (ETP)
Category No. 9 – Incineration Ash	Secured landfill
Category No. 10 – Chemical waste	Secured land fill

All waste should be appropriately stored and transported by licensed contractor to designated facilities, and all transfers logged.

It is proposed to treat the effluent generated from the dispensary prior to its disposal.

ANNEX 3: PLAN FOR CONSTRUCTION CAMP MANAGEMENT

1. Use of camps

- All workers who are based on the construction site will be basically accommodated by the construction camps.
- Appropriate sanitation facilities will be installed in accordance with Water Quality Management Plan.

2. Disease control, health, and safety issues

- Buildings in Residence camps and sub-camps will be made 'mosquito-proof' as far as possible through ensuring adequate sealing of doors and windows, provision of suitable ventilation and as necessary, installing mosquito-nets and other prevention devices.
- Medical, sanitary and disease prevention measures for each camp will be implemented in accordance with the requirements of Project Personnel Health Program.
- Pesticide use in the camps and sub-camps will be carried out in accordance with the requirements of Project Personnel Health Program and the ADB SPS requirements regarding pesticide use.
- Waste generated at the construction camps will be managed in accordance with the requirements of the Waste Management Plan and IFC EHS Guidelines.
- Construction workers will be trained in health and safety issues relating to the camps in accordance with the requirements Annex 16: Plan for Environmental Training for Workers.

3. Camp access

- In general, access to the camps will be restricted to construction workers and visitors with an authorized access pass.

4. Potable water supply

- All potable water storage facilities will be secured, with access limited to authorized personnel. Local rivers (tributaries only) or underground water will be used as the source of the potable water supply. Regular testing (weekly) of all drinking water sources for staff shall be undertaken to ensure compliance with national water quality standards. The intake for the potable water storage will be located a 100 distance upstream of any wastewater discharge point.
- Water quality monitoring of the potable water storage in camps and sub-camps will be carried out in accordance with the requirements of environmental monitoring plan (weekly).

5. Camp rules and regulations

- A set of rules and regulations applicable to camps and sub-camps will be developed. The rules and regulations will include:

i. Prohibitions on hunting and poaching of wildlife, purchasing wildlife meat, fishing, gathering, and harvesting medicinal or valued plants and trees, and possessing firearms, snares, traps, and other hunting equipment

ii. Access restrictions for non-construction personnel

iii. Housecleaning and waste management requirements

iv. Measures for preserving health and the dissemination of vectors and transmissible diseases

v. Residents of the camps shall be provided with written information and training on camp rules and regulations. Camp rules and regulations will be prominently displayed in the camp areas.

ANNEX 4: PROJECT PERSONNEL HEALTH PROGRAM

Following measures will be implemented to take care of project personnel health.

- The "Health and Safety Manual", which will follow the IFC EHS Guidelines, will be distributed to the personnel attending health and safety training in the language used by the workers during trainings. It contains the following contents:

1. Health

i Anti-malaria precautions
ii Precautions for HIV / AIDS and other venereal diseases iii
Diarrhea precautions
iv Symptoms of other diseases typical of the area (such as dengue fever)
v Recommendations regarding proper disposal of all wastes
vi Use of proper drinking water
vii Use of appropriate toilets

2. Safety

i Use of Personal Protective Equipment (PPE)
ii Use of specific equipment according to the safety procedures
iii Use of appropriate clothing
iv Use of appropriate ladders
v Use of appropriate slinging
vi Attention to signals of danger
vii Attention to suspended weights
viii Attention to unprotected pits
ix Attention to buried cables
x Attention to overhead power cables
xi Attention to all flammable items
xii Procedure for fire extinguishing
xiii Miscellaneous safety issues

- First aid teams will be specifically trained and assigned in groups of two to three persons to the different sites
- Medical facilities, including items such as First Aid kits and bedding for patients, should be provided.
- A doctor should be reached when an accident occurs.
- In the event of a spill of any hazardous material, actions and responses will be taken according to Emergency Plan for Hazardous Materials (Annex 27).
- Vector control of mosquitoes and other pests will be managed in the appropriate manner.
- Solid waste that might attract pests such as domestic rubbish and food waste shall be managed properly.
- The water supply and sewage system, especially in camp sites, will be maintained in good working condition through regular monitoring according to the required standards.
- The use of pesticides to control pests will be limited to only those cases deemed necessary. Use and handling of pesticides will be conducted on the appropriate manners.

ANNEX 5: EMERGENCY PLAN FOR HAZARDOUS MATERIALS

1. Storage of Hazardous Waste

All the fuel and hazardous material storage will be adequately bounded to prevent any spillage problem.

2. Spill Response Procedures

In the event of a spill of any hazardous material, work will be ceased in the immediate vicinity and the area will be cleared of all construction personnel except those involved in the clean-up activities, if necessary.

In the event of a spill of any hazardous material, the following response hierarchy will apply and will be used in the development of the detailed emergency response procedures:

a. Priority is to seek medical attention for any injured personnel
b. Second priority is to prevent further injury to personnel
c. Third priority is to prevent environmental damage
d. Fourth priority is to clean-up spill
e. Fifth priority is to remediate area of spill
f. Sixth priority is to complete reporting requirements

For spills of hazardous materials, appropriate treatment, and disposal methods for the known range of hazardous materials will be applied by trained personnel.

3. Emergency Contact Details

At each construction site, information on emergency response procedures, emergency contact numbers and communication and reporting procedures (to be implemented in case of an emergency) will be clearly displayed.

4. Training of Personnel

At each construction site where hazardous materials are used and where there exists a potential for a spill, there will be always at least two employees on-site who are trained in appropriate emergency response procedures and communication and reporting procedures to be implemented in case of an incident (refer to Environmental Training for Workers Plan).

All construction personnel will be trained in basic emergency response procedures including communication and reporting procedures to be implemented in case of an emergency.

5. Emergency Incident Communication Process

In the event of an accidental release or spill of a hazardous material, the following communication processes will be implemented:

a. ESO (Environmental and Social Officer) immediately notifies ESMMU
b. ESMMU immediately notifies emergency response team
c. ESMMU immediately notifies external emergency authorities (if required) Communication will initially be verbal, with written communication as soon as practical.

The communication processes will include the following information in relation to accidental releases or spills:

a. Location of spill
b. Nature of material spilt
c. Amount of material spilt
d. Clean-up processes to be implemented
e. Any injuries to personnel
f. Need for emergency or external assistant
g. Any safety/evacuation requirements to be implemented on the construction site

Within 48 hours of the completion of a spill clean-up, a report will be submitted to the Owner. The report will be used to identify any required corrective or preventive actions and emergency response procedures and training programs will be modified accordingly.

ANNEX 6: MEASURES FOR NOISE POLLUTION CONTROL

1. IMPACTS ON NOISE LEVELS

In a water resource projects, the impacts on ambient noise levels are expected only during the project construction phase, due to earth moving machinery, etc. Likewise, noise due to quarrying, blasting, vehicular movement will have some adverse impacts on the ambient noise levels in the area.

2. MITIGATION MEASURES

The contractors will be required to maintain properly functioning equipment and comply with occupational safety and health standards. The construction equipment will be required to use available noise suppression devices and properly maintained mufflers.

- Careful selection of construction methods.
- vehicles to be equipped with mufflers recommended by the vehicle manufacturer. Prohibiting works vehicles queuing on the public road.
- staging of construction equipment and unnecessary idling of equipment within noise sensitive areas to be avoided whenever possible.
- notification will be given to residents within 300 m of major noise generating activities (1km for blasting). The notification will describe the noise abatement measures that will be implemented.
- monitoring of noise levels will be conducted during the construction phase of the project. In case of exceeding of pre-determined acceptable noise levels by the machinery will require the contractor(s) to stop work and remedy the situation prior to continuing construction.

The following Noise Standards for DG sets are recommended for the running of DG sets during the construction:

- The maximum permissible sound pressure level for new diesel generator sets with rated capacity up to 1,000 KVA shall be 75 dB(A) at 1 m from the enclosure surface.
- Noise from the DG set should be controlled by providing an acoustic enclosure or by treating the enclosure acoustically.
- The Acoustic Enclosure shall be made of CRCA sheets of appropriate thickness and structural/

sheet metal base. The walls of the enclosure shall be insulated with fire retardant foam to comply with the 75 dB(A) at 1 m sound levels specified by CPCB, Ministry of Environment & Forests.

- The acoustic enclosure/acoustic treatment of the room shall be designed for minimum 25 dB(A) Insertion Loss or for meeting the ambient noise standards, whichever is on the higher side.
- The DG set shall also be provided with proper exhaust muffler.
- Proper efforts shall be made to bring down the noise levels due to the DG set, outside its premises, within the ambient noise requirements by proper siting and control measures.
- A proper routine and preventive maintenance procedure for the DG set shall be set and followed in consultation with the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

3. Noise due to crusher

Based on literature review, noise generated by a crusher is in the range of 79-80 dB(A) at 250 ft or about 75 m from the crusher. Thus, noise level at 2 m from the crusher shall be of the order of 110 dB(A). The exposure to labour operating in such high noise areas shall be restricted up to 30 minutes daily. Alternatively, the workers need to be provided with PPEs (ear muffs or plugs), to attenuate the noise level near the crusher by at least 25 dB(A), to bring noise level down to 85 dB(A). The exposure to noise level in such a scenario to be limited up to 4 hours per day.

It is known that continuous exposure to noise levels above 85 dB(A) (IFC EHS standard) affects the hearing of the workers/operators and hence must be avoided. Other physiological and psychological effects have also been reported in literature, but the effect on hearing acuity has been specially stressed. To prevent these effects, it has been recommended by international specialist organizations that the exposure period of affected persons be limited as specified in Table 6.1.

Table 6.1: Maximum Exposure Periods specified by OSHA (IFC guideline is 85 dB (A))

Maximum equivalent continuous noise level dB(A)	Unprotected exposure period per day for 8 hrs./day and 5 days/week
90	8
95	4
100	2
105	1
110	½
115	¼
120	No exposure permitted at or above this level

Measures to control noise due to blasting

Various measures outlined for control of noise due to blasting is given as below:

- Use of backfill cover has the potential to reduce air overpressure levels by 10 dB (A).
- Air overpressure levels may also be reduced by deck loading. In a blast with a significant vertical free face, this reduction may in some circumstances be obtained by deck loading the front row holes fired on the initial delays only, without needing to deck load all the front row holes.
- Rock excavation by blasting shall be done for all solid rock in place which cannot be removed until loosened by blasting, barring, or wedging, removal of all big boulders or detached pieces of massive rock.
- Rock excavation close to the final excavated surfaces shall be performed using controlled blasting methods such as "pre-splitting", "cushion blasting" or “smooth blasting". Line- drilling shall be used to limit the over break and damage of surround rock.
- All excavations shall be performed using methods and techniques that will produce smooth and

sound rock surfaces with minimum over break and fracturing beyond the lines and grades or limits of excavation. Drilling and blasting shall be done in such a manner as to ensure that the rock will break along the desired lines and grades. Rock faces and slopes shall be scaled or cleaned of loose or overhanging rock immediately after excavation.

- Blast holes shall be drilled not exceeding two-third of the depth of rock to be excavated from the elevation at which the hole is started. The holes shall not be larger than necessary to permit easy passage of whole sticks of explosives to the bottom of the holes. As the excavation approaches its final limits, the depth of holes for blasting and the number of charges for the holes shall be reduced progressively.
- Blasting shall be carried out with non-electric detonators only except for the cord/fuse initiation by electric detonators. A separate circuit, independent of power and light circuits, shall be used for blasting.
- Charging, tamping, and firing of drilled holes shall be done by an approved licensed person under his personal direction. Proper signals by siren shall be given before each operation of blasting.
- Blasting shall be permitted only when proper precautions are taken for the protection of persons, work, and property. Any damage done to the work or property by blasting shall be repaired immediately.

A trained professional shall be hired to monitor the technical specifics of the blast, such as size and depth of drilled holes, and the type and amount of explosive used.

ANNEX 7: FIRE PROTECTION IN LABOUR CAMP AND STAFF COLONIES

1. INTRODUCTION

It has been envisaged that the fire protection planning in labour camps and staff colonies shall be taken up. Implementation of this plan will be mandatory for all contractors. Requirements of this plan will be part of contract agreement. The firefighting system in the project area will be suitably built in the contract document which would be executed by specialized vendors, cost for which will be included in the project cost.

2. CONSTRUCTION OF CAMPS ETC. AND PLACEMENT OF FIRE PROTECTION EQUIPMENT

It has been planned that all facilities to be constructed shall be fully equipped with the fire protection equipment's as per IS standards. The analysis of fire hazard in the construction of these camps, colonies and other facilities is given in Table 7.1.

Table 7.1: Analysis of fire hazard in the construction of camps, colonies, and other facilities

S. No	Stage	Potential hazard	Remedial Measures	
1.	Construction of labor camps and staff colonies	• Fire prevention and firefighting not considered in design • Inadequate fire protection measures during construction phase	**BY PROJECT PROPONENT** • While construction of Field hostels, Guest House/office and other facilities owned by project proponent shall provide the fire protection system as per IS Standards for Fire code. • Proper housekeeping will also be ensured and maintained during these facilities to protect them from any fire related incidents. • It will be ensured that the firefighting equipment's are placed at common place also including workplace preferably within 15 meters of workplace. **BY CONTRACTORS** • Clear term of reference will be given to contractor at tendering stage for incorporating fire code as per IS Standard. • Firefighting equipment's will be placed at all common places (within 15 meters of workplace)	

3. IMPLEMENTATION OF FIRE PROTECTION SYSTEM

During construction, it has been envisaged to set up full-fledged Environment Health & Safety (EHS) department reporting directly to Head of Project. This department shall also take care of the adequacy of Fire Safety measures set up in all facilities created either owned by project proponent or any of its Contractors. The analysis of responsibility for this EHS team in respect of Fire protection system is given in Table 7.2.

Table 7.2: Responsibility for this EHS team in respect of Fire protection system

S. No.	Stage	Potential hazard	Remedial Measures
1.	During Occupation	• Fire incident due to electrical short circuit/LPG Leakage/ Improper handling of flammable liquids/lack of precaution • Improper access to and from the location • In adequate firefighting arrangements • Lack of knowledge • Lack communication • Lack of Knowledge on fighting fire and handling fire equipment • Inadequate emergency response	• Residential complex will be constructed as per the approved design and will be checked for completeness on fire aspect before allotment to residents • Each Block Colony/ camp will be provided with rated estimated trip off circuit breaker will be installed on each block. • All residents are made aware of fire hazard by training, regular campaigns and by placing posters and signs • LPG Cylinders/Flammable liquids will be stored at designated storage area. The storage will be well protected, ventilated with adequate provision of fire equipment. • Each block of the colony will be provided with 10 kg DCP fire extinguishers. • Additionally, fire point containing fire buckets, CO_2 extinguishers, DCP Extinguisher will be provided at the common place covering four residential blocks in labor camp. • Placement of written posters of preventive measures in each accommodation block • Regular EHS inspection of the camp site • Placement of placard of emergency numbers to be contacted in case of Emergency • Dedicated phone line will be provided in labor camps for effective communication. • Ensure proper access is maintained around and to the residential blocks • Identification of emergency Muster points at safe distance

RESPONSIBILITY

Project In charge is responsible for implementation of plan through his authorized representative on site. Site EHS Team shall monitor the implementation of plan and report non-compliance to site management.

TRAINING AND AWARENESS

Training of employees on fire prevention and firefighting is important to prevent occurrence of fire incident in project area. All employees will be given brief overview of fire prevention, firefighting procedure, and response process at the time EHS Induction training. Project proponent will also carry out regular campaigns on fire prevention around the site. EHS Department is responsible for providing required training.

ANNEX 8: DISIASTER MANAGEMENT PLAN

1 Status of Emergency

The emergency planning for dam break scenario is devised based on results of dam break analysis mainly the travel time of flood wave to various locations in the downstream stretch of the river. The plan is, therefore, based on such measures, which are purely preventive in nature. The degree of alertness must enhance during high stage of river manifested with sharp increase in discharge. Though there cannot be very sharp edge demarcation between different levels of emergency, yet the following flood conditions have been contemplated and the preventive measures suggested against each as given in Table 8.1.

Table 8.1: Status of Emergency

S. No.	Status of emergency	Water Level	Preventive measures
1.	Normal Flood	Below Full Reservoir Level (FRL i.e., Elevation (EL) 226.0 masl and flood discharge below 7,510 cumecs	Utmost vigil by project proponent observed in regulation of spillway gates. It will not affect downstream properties.
2.	Level –1 Emergency	Rises above EL 226.0 masl but flood discharge below 7,510 cumecs	(1) All gates fully operational (2) All the officials should attend the dam site. Local officials informed and warning system be kept on alert. Downstream properties not yet affected.
3.	Level –2 Emergency	Above MWL i.e. EL 226.0 masl but below top of dam i.e. EL 229.60 and the discharge continues rising above 7,510 cumecs	Communication & public announcement system (refer B.6 below) should be put into operation and flood warning issued to people.
4.	Level –3 Emergency	Top of dam i.e., EL 232.50 masl	(1) All staff from dam site to move to safer places (2) Possibility of dam failure should be flashed to District Administration. (3) Local communities are informed about possible dam failure. (4) Evacuation plan kept on alert.
5.	Disaster	Rising above EL 232.50 masl and the breach appears in any form	District Administration and Project authorities be intimated. Life saving measures should be resorted. Warning and evacuation plan implemented on ground. The nearest riverside communities are located about 20 km downstream from the dam site.

2 Dam Safety and Maintenance Manual

Based on standard recommended guidelines for the safety inspection of dams a manual should be prepared by the project proponents in respect of dam safety surveillance and monitoring aspects. This should be updated with the availability of instrumentation data and observation data with periodical review. The need for greater vigil must be emphasized during first reservoir impoundment and first few years of operation. The manual should also delve on the routine maintenance schedule of all hydro-mechanical and electrical instruments. It should be eloquent in respect of quantum of specific construction material needed for emergency repair along with delineation of the suitable locations for its stocking and identify the much-needed machinery and equipment for executing emergency repair work and for accomplishing the evacuation plan. Dam shall be inspected on annual basis by experts for the entire lifetime of the dam and recommendations on the report shall be implemented on a priority basis.

3 Emergency Action Plan

Once the Emergency situation is foreseen, the Emergency Action Plan may be put in operation, which may include.

- In rural areas warning sirens will be used to communicate with people along with traditional communications.
- Areas likely to be evacuated with priorities to be notified (first riverside communities are located about 20 km downstream from the dam site).
- Safe routes to be used for evacuation. Such routes must be identified, discussed, and planned sufficiently in advance for proper implementation of the Plan.
- Means of transportation.
- Traffic Control.
- Shelters for evacuees.
- Procedures for evacuation of people from hospitals, public places, prisons etc.
- Procedures for care and security of property from evacuated areas from anti-social elements.

Instructions regarding assignment of specific functions and responsibilities of various members of evacuation teams.

4 Emergency Action Committee

The emergency action committee may comprise of:

- District Magistrates of Karbi Anglong and Dima Hasao districts, Assam
- Concerned Chief Engineer of the Project
- Concerned Superintending Engineer of the Project
- Representative of P&T Department
- Representative of State Transport Department
- Representative of Civil Supplies Department
- District Agricultural Officer
- District Health Officer
- District Commandant of Home Guards
- District Publicity Office
- Local MP/MLA
- Special Invitee from Local Social Organization / NGO

5 Public Information System

During a crisis following an accident, the affected people, public and media representatives would like to know about the situation from time to time and the response of the emergency authorities to the crisis. It is important to give timely information to the public to prevent panic and rumours.

The emergency public information can be carried out in three phases.

(i) Before the crisis

This will include the safety procedure to be followed during an emergency through posters, talks, and mass media in local language. Leaflets containing do's/ don'ts should be circulated to educate the affected population.

(ii) During the crisis

Dissemination of information about the nature of the incident, actions taken and instructions to the public about protective measures to be taken, evacuation, etc. are the important steps during this phase.

(iii) After the crisis

Attention should be focused on information concerning restoration of essential services, movement / restrictions, etc. Various tasks of the public information system would include.

- Quick dissemination of emergency instructions to the personnel and public
- To receive all calls from public regarding emergency situations and respond meticulously
- Obtain current information from the Central Control Room.
- Prepare news release
- Brief visitors/media
- Maintain contact with hospitals and get information about the casualties
- Damaged infrastructure (due to dam failure) will be rehabilitated by the project proponent.

6 Efficient Communication System

An efficient communication system is essential to achieve a successful Emergency Preparedness Plan, and this must be finalized in consultation with local authorities and administrative setup as well involving local communities. More often the entire communication facility gets disrupted in a disaster situation. The wireless facility which is comparatively free from general encumbrances of the communication system shall be invariably a part of emergency preparedness plan. The respective department of police, who generally has this facility, must have standing instructions to convey disaster messages effectively in time. In addition, telephone facility shall be available at dam site, vulnerable points, and population centres. Vehicles equipped with sirens and public address system may also be kept ready for densely populated areas (however there are no density populated areas d/w impact zone of the dam. Warning sirens may also be installed in the likely affected population to save warning time (first riverside communities are located about 20 km downstream from the dam site).

7 Special Preparedness before First Filling of Reservoir

Many failures of dams have reportedly occurred at the time of first filling of reservoirs. The period of first filling is a critical period in the life of a dam. Hence special vigilance and precautionary steps are necessary at the time of first filling of the dam to avoid failure of the dam. It is, therefore, necessary to inspect the performance of the dam carefully during this period. The preparedness shall be carried out for the first filling of reservoir as indicated below:

- Before starting the first filling of reservoir, the EAP of the project should be completed and implemented as far as possible.
- The installation of Spillway gates including hoisting arrangement, emergency power supply etc. should be completed and trial operation of gates must be made before it becomes operational.
- The copy of the first filling schedule shall be sent to the District Administration, and State Dam Safety Organization, if any.
- Proper lighting facilities on and nearby the dam area shall be provided before the onset of monsoon to facilitate close vigilance of the dam behavior during the nighttime also. A generator and flood light shall also be provided for emergency purpose.
- The control room of the dam is to relate to the office and residence of officers-in-charge of the dam by telephone or by wireless set. The wireless/telephone stations and telephone lines should be completely out of the flood zone.
- Enough materials such as sand, shingle, rubble etc. should be stockpiled at convenient locations near the dam site.
- Enough filled sandbags should also be kept ready for emergency purposes.
- Machineries like tippers, trucks, excavators etc. along with enough labors are to be kept ready on both the flanks of dam to start remedial measures within a very short notice.
- Access roads along the downstream of the dam as well as on the top of the dam should be established for proper movement of the machines and vehicles.

8 Vigilance during first year of filling of a reservoir

During the first year of filling of dam, careful vigilance needs to be kept at the dam site and in the deepest riverbed portion. The dam should be inspected by the Dam In charge in three phases.

- The first phase inspection is to be carried out just before the onset of first heavy rain.
- The second phase of the inspection will be conducted after the filling of the reservoir to half the height of the dam.
- After the second inspection, if no untoward behavior of the Barrage is observed, third inspection will be made when the reservoir would be filled up to FRL.

When the spillway starts working, the Superintending Engineer should inspect the Barrage periodically during the entire period of overflowing. If any sweat, excessive settlement, leakage, cracking or sloughing of slopes is noticed, it should be brought to the attention of the higher authorities immediately. Daily reports about stage of reservoir filling, condition and behaviour of the dam must be submitted by the Engineer responsible to his immediate superior as a part of the continuous vigilance of the dam.

9 Actions following Discovery of Problems

A close vigilance of the dam by Executive Engineer a competent person is the basic requirement for the Emergency Action Plan. When some distress in the dam is noticed, the nature and potentialities of the problems are required to be identified immediately by the Executive Engineer in charge of dam. Immediately, initiative for remedial measures and further activities for involving the operation of Emergency Action Plan be taken.

The information of any unusual development on the dam should be immediately flashed/ conveyed by the Executive Engineer in charge of the dam to the higher officials in the Department by means of the fastest available communication facilities such as wireless message/ telephone or telegram. In the event of likely failure of dam, any person within the locality shall initiate the actions as described in notification procedure and possible construction repairs depending on the seriousness of the development. Therefore, it is necessary that the staff posted on the vigilance and maintenance of the dam be adequately trained/ experienced to handle various emergent situations.

10 Notification Procedures

Notification procedures are an integral part of any emergency action plan. Separate procedures should be established for slowly and rapidly developing situations and failure. Notifications would include communication of either an alert situation or an alert situation followed by a warning situation. An alert situation would indicate that although failure or flooding is not imminent, a more serious situation could occur unless conditions improve. A warning situation would indicate that flooding is imminent because of an impending failure of the dam. It would normally include an order for evacuation of delineated inundation areas.

Copies of the EAP shall be displayed at prominent locations, in the rooms and locations of the personnel named in the notification chart. For a regular watch on the flood level situation, it is necessary that the flood cells be manned by two or more people so that an alternative person is always available for notification round the clock. For speedy and unhindered communication, a wireless system is a preferable mode of communication. Telephones may be kept for back up, wherever available. It is also preferred that the entire flood cells, if more than one, are tuned in the same wireless channel. It will ensure communication from the dam site to the control rooms. The communication can be established by messenger service in the absence of such modes of communication.

- Using multiple warning channels (police, radio, television, telephone, sirens, loudspeakers, mobiles etc.)
- Using official sources for warning (city civil officials, police, fire fighting etc.)
- Repeat warnings
- Ensuring that warnings are consistent and accurate
- Giving specific instructions about what actions should and should not be taken by people of the area to protect themselves.
- Conveying to the affected persons, possible extent of duration of flood/danger and urgency. However, this should not be overplayed to cause panic.

All departments, which are charged with the emergency preparedness, shall be identified and nodal officer in each department shall be identified from each department in advance. Such officers shall be provided residential telephone/cell phone in addition to their office telephones during the flood season. It is evident that the emergency preparedness plan is an integrated matter requiring technical expertise, specific administrative skill, and spontaneous public participation (if is required) to be practical, pragmatic, and successful.

11 Management after receding of Flood Water

The officer-in-charge of relief camp shall assist in the process of timely evacuation and rehabilitation of the persons likely to be affected, cattle and property. He shall also maintain record of persons/families in the camp and decide for essential items of daily use and ensure reasonable health, sanitation, water supply and street lighting facilities. A daily situation report shall be sent to the control room. Some of the measures which need to be implemented are listed as below:

- Provision of various food items and shelter to the evacuees.
- Provision of fuel for various evacuees.
- Provision of adequate fodder supply.
- Arrangements for potable water supply.
- Commissioning of low-cost sewage treatment and sanitation facilities, and disposal of treatment sewage.
- Expeditious disposal of dead bodies human and livestock.
- Immunization programs for prevention of outbreak of epidemics of various water related diseases.
- Adequate stocks of medicines of various diseases, especially water-related diseases.

ANNEXURE A (REFER SL NO. 16) PPE MATRIX

Category \ PPE	Head Protection	Safety glass	Face shield	Welding helmet	Foot Protection	Safety harness	Hearing protection	Hand Protection	Body Protection	Respiratory Protection	Protection against Dust	Organic mask	Air supplied hood	Reflective jacket			
Executives / Supervisors	*				*			*		*				*			
Foreman	*				*			*		*				*			
Unskilled workmen	*				*			*		*				*			
Formwork	*				*	*		*		*				*			
Scaffolding	*				*	*		*		*				*			
Masonry works	*	*			*	*		*		*				*			
Bar bending works	*	*			*			*		*				*			
Grinding / Polishing	*	*	*		*		*	*		*	*			*			
Rigging	*				*	*		*		*				*			
Welding / Cutting	*	*	*	*	*	*		*	*	*				*			
Handling corrosive liquid	*	*			*			*		*				*			
Painting	*	*			*	*		*		*				*			
Liquid bitumen work	*	*			*			*		*				*			
Sand blasting	*	*	*		*		*	*	*	*	*			*			
Insulation work	*				*			*		*				*			
Roof work	*				*	*		*		*				*			
Workshop (P&M, Carp)	*	*			*			*		*				*			
Work at heights above 1.8 M.	*				*	*		*		*				*			

Note: This is an indicative matrix; it shall be made site specific.

ANNEXURE B (REFER SL NO. 9)

TRAINING MATRIX

Training Topic / TRAINING REQUIREMENT	EHS Induction	EHS Plan Briefing	Abrasive Blasting	Blasting	Concreting	Confined Space	Demolition	Electrical safety	Emergency response plan	Environment	Excavation	Fire prevention & Control	Gas Cutting & welding	Grinding	Handling & Storage of building Materials	Hand tools & power tools	Lighting	Managerial aspects	Material handling	Occupational health	Piling	Plant & machinery	PPE	Radiography	Road works	Safety signs	Structural erection	Wood working machines	Work at height
PM / CM / RE	*	*							*	*																			
Site Engineers	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Site Supervisors & Foreman	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
EHS Officer	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
EHS Supervisors / Steward	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sub-contractor Manager, Engineer & Supervisor	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
P&M Supervisor, Technician & Helper	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Electrician & Electrician Helper	*			*				*	*			*	*	*		*	*		*	*			*			*			*

Training Topic / TRAINING REQUIREMENT	EHS Induction	EHS Plan Briefing	Abrasive Blasting	Blasting	Concreting	Confined Space	Demolition	Electrical safety	Emergency response plan	Environment	Excavation	Fire prevention & Control	Gas Cutting & welding	Grinding	Handling & Storage of building Materials	Hand tools & power tools	Lighting	Managerial aspects	Material handling	Occupational health	Piling	Plant & machinery	PPE	Radiography	Road works	Safety signs	Structural erection	Wood working machines	Work at height
Drivers, Equipment Operators & Helpers	*			*					*	*		*								*		*	*		*	*			
Electrical Workmen	*			*				*	*	*		*		*		*	*		*	*		*	*			*			*
Masonry workmen	*				*				*	*		*			*	*			*	*			*			*			*
Bar bending workmen	*							*	*	*		*		*		*			*	*			*			*			
Formwork / Scaffold Workmen	*				*				*	*		*		*		*			*	*			*			*	*	*	*
Welder, Gas cutter & Fitter	*						*	*	*	*		*	*	*		*	*		*	*			*			*	*		*
Riggers	*								*	*		*		*		*			*	*	*	*	*			*	*		*
Radiographers	*		*						*	*		*		*		*				*		*	*	*		*			
Chemical handling workmen / Painters	*								*	*		*							*	*			*			*			
Security personnel	*								*	*		*											*			*			
Visitor	*								*			*											*			*			