

**Consultancy Services for conducting an Environmental and Social Impact Assessment (ESIA) of Urban Roads (Town roads) and non-urban roads and Major/Minor bridges and preparation of Environmental and Social Management instruments under MITP (World Bank) initiative**

## **ESIA Report of Jowai Town**



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## **1. CHAPTER-I: INTRODUCTION AND PROJECT BACKGROUND**

Meghalaya is one of the north eastern States of India with undulating terrain and sharing international boundaries with Bangladesh at south and west and state boundaries with Assam at north and east. Being landlocked and with difficult terrain there are major challenges of connectivity, be it road, power lines or telecom connectivity. The State is heavily dependent on sustenance agrarian economy and low industrial outputs. The Road Network is the major backbone, yet the density is only about 43.10 Km /100 sq Km (2015).

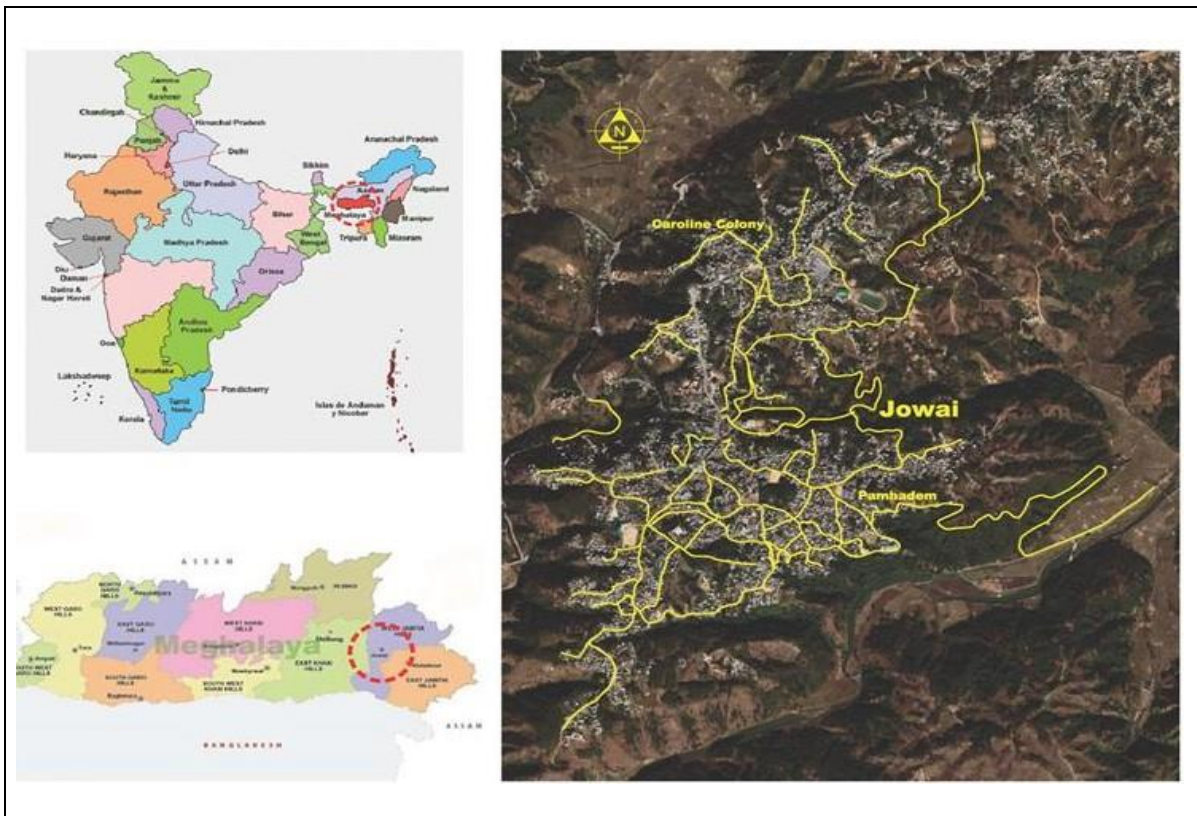
The Government of Meghalaya has taken up initiative for the development of transport infrastructure using financial assistance (loan) from the World Bank (IBRD) under its Meghalaya Integrated Transport Project (MITP). The Public Works Department (PWD) of Meghalaya is the executing agency with given responsibility for planning, designing and, implementing civil works that includes rehabilitation/ up-gradation of existing roads and construction of missing links/ bypasses/ bridges in across the State in phases. Under Phase I, rehabilitation of ten (10) existing strategic road stretches across east and west parts of the State covering mix of state highways, MDRs and bridges have been taken up. Under Phase II, Urban and other Non-Urban Roads have been selected including Jowai Town roads (32.601 km), Nongstoin Town roads (20.915 km) and Williamnagar Town roads (13.989 km) as urban stretches and Nongstoin-Maweit Road (35 km) and Umsning- Jagi Road (40.13 km) as non-urban stretches. This Environmental and Social Impact Assessment (ESIA) report covers only Jowai Town Road..

### **The Project Road (Jowai Road)**

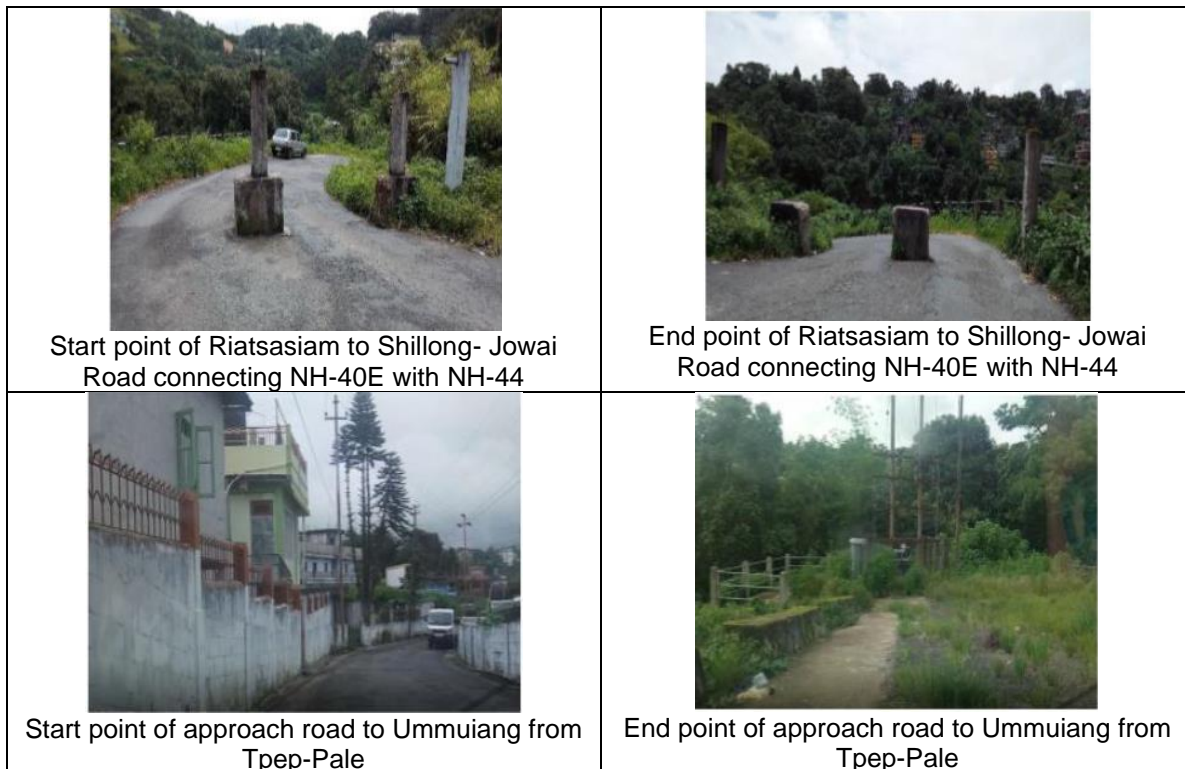
Jaintia Jowai is a municipal town in West Jaintia Hill district of Meghalaya and district headquarter. It is situated 64 km away from the state capital Shillong. It serves as an important business and education hub for the entire district Jaintia .In absence of any Rail or Air links, roads are the only lifeline for Jowai.Jowai Road section has a total length of 32.601 km in the district West Jaintia Hills of Meghalaya state. It connects built up areas like Dulong, Panaliar, Loom Pyrdilongpiah, Loom-iong-Kjam, Loom Kyrwiang, Tpep Pale, Chilliang Raij, Umshyniar, Lumpariat, Ladthadlaboh, Caroline Colony, Dongmihsngi, New Hill, Tyndowapung, Mynthong, Chutwakhu, Moosalynghat, Mooralong, Mookyrdup, Khim-u-sniang, , Mission Compound, Salaroh, Riat Siatsim, Khlieh Myngkrem, Salini Colony, etc.. The project road passes through mainly rolling terrains.

The Project Roads of Jowai Town are shown in the figure below and in trailing photographs.

**Figure 1 Location Map of the Jowai Town Roads**



**Start and End Point of Riatsasiam to Shillong- Jowai Road and Ummuiang from Tpep- Pale Road**



### **Scope of the ESIA Study**

The scope of the ESIA study is: -

- Capturing the baseline condition of environmental and social parameters of the project area;
  - Conducting Initial Impact Screening, Public Consultation and defining the scope of detailed assessment and safeguards instruments required based on outcome of initial screening exercise;
  - Identification of the potential impacts during pre-construction, construction and operation phases;
  - Defining mitigation measures for avoiding, minimizing and mitigating adverse impacts;
- Preparing Environmental and Social Management and Monitoring Plan.

### **Project's Area of Influence**

The effects of the Project activities on a particular resource or receptor will have spatial (distance) and temporal (time) dimensions. Some activities would impact a larger radius than other identified impact sources. Thus, impacts were assessed both within area of impact of 50 meter either side of the alignment and project's area of influence up to 10 km. This area of influence encompasses project associated facilities, construction camps, labour camps, access roads, borrow pits and disposal areas.

**Corridor of Impact (Col):**The project RoW on either side of the proposed road centreline is considered as the corridor of impact. This area is more vulnerable to the project's direct impacts.

### **Approach for Environmental and Social Assessment**

To identify the possible environmental and social issues arising out of the project road's planning, designing, and construction, the environmental and social conditions along the project's ROW were assessed. During these visits, consultations through group discussions with local communities, road users and panchayat/ village members were conducted as follows:

#### **Task 1: Field Reconnaissance Survey and Review of Earlier Studies:**

The field reconnaissance survey was carried out to understand salient environmental and social features that are likely to be exposed to adverse impacts during construction and operation of project road. The salient feature includes the topography of the land, road geometry, environmental features like trees, any forest area, water bodies like ponds, rivers, etc. The social and physical features like settlement pattern, its density, typology of buildings, especially the presence of cultural, religious, and educational buildings, medical facilities land use, etc.

#### **Task 2: Review and Assessment of Applicable Environmental and Social Regulations:**

The various rules/regulations and guidelines applicable to the project roads vis-à-vis central (GoI) and state (GoM) statutory requirements and World Bank policies were reviewed and referred to for assessing current environmental and social impacts that are likely to emanate.

#### **Task 3: Assessment of Baseline Environmental and Social Conditions:**

This task comprises a collection of baseline data for the project road locations primarily based on physical, biological and socio-economic conditions. The secondary source of information was utilised for giving a generic snapshot of socio environment features. In addition, existing environmental and social quality/features along the project roads were assessed based on a walk-through survey, public consultations, FGD's and discussions with line department officials.

#### **Task 4: Public Consultations/ Focus Group Discussions:**

To cover a wide range of stakeholders in the study area, corner meetings were conducted at selected places with women groups, men and road users to understand the people's perception about the project as well as their issues and concerns. Overall project features, social safeguards, issues related to women's safety and security, environmental safeguards, and enhancement measures that would be implemented in the project was also discussed with the public.

#### **Task 5: Preparation of ESIA Report including Impact Identification, Mitigation Planning and preparation of ESMP.**

Identified likely impacts that would arise due to the construction of project roads, through changes in the physical, biological or socio-economic baseline environment. The impacts were also analysed with respect to pre-construction, construction and operation phases and were categorised in terms of magnitude and significance. The assessment considered both positive and negative impacts at different stages of implementation, i.e., pre-construction, construction and operation stages of the project roads.

A comprehensive Environmental and Social Management Plan (ESMP) was prepared which included mitigation measures for all the negative impacts of sub-projects and enhancement measures for the positive impacts.

#### **Task 6: Preparation of Environmental and Social Management Budget:**

Based on environmental and social mitigation and monitoring plans a suitable budget has been estimated for enhancing the positive impact, implementing the mitigation plan, train the relevant staff and contractual employees on importance of Safeguards Measures, World Bank's Safeguards Requirement and Implementation of ESMP and last but not least implementation monitoring.

#### **Task 7: Environmental Safeguard Clauses in the Bid Document:**

Suitable safeguard clauses have been prepared based on the ESIA, the prepared clauses shall form part of the bid document either in the General conditions or Specific conditions of the contract agreement/ bid document. The prepared ESMP shall also be part of the bid document.



## 1 CHAPTER-II: PROJECT DESCRIPTION

The proposed road section has a total length of 32.601 km in the West Jaintia Hills district of the state of Meghalaya. It built up areas like Dulong, Panaliar, Loom Pyrdilongpiah, Loom-iong-Kjam, Loom Kyrwiang, Tpep Pale, Chilliang Raij, Umshyniar, Lumpariat, Ladthadlaboh, Caroline Colony, Dongmihsngi, New Hill, Tyndowapung, Mynthong, Chutwakhu, Moosalynkat, Mooralong, Mookyrdup, Khim-u-sniang, , Mission Compound, Salaroh, Riat Siatsim, KhliehMyngkrem, Salini Colony, etc. The project passess through mainly rolling terrains.

### Need for the Project

The project stretch has bitumen surface throughout. 70% of the road stretches are poor in condition. The safety provision of road is also inadequate. Therefore, it is imperative to upgrade this road section to standard configuration with adequate safety measures in order to enhance traffic operational efficiency and to ensure safety to road users, so that the objective of improving the connectivity of the roads to the others parts of the district and state is realised.

Many settlements are located close to project road, which further make the roads narrow and congested. Poor road conditions and geometry of the project road results in slow economic growth and poor infrastructure facilities in the area. Therefore, rehabilitation and upgradation of the project road is needed with proper traffic engineering along with enforcement of rules and regulations on the road, so that there should also be a marked reduction in road traffic accidents and smooth flow of traffic is ensured.

### Project Location

All the project roads come under West Jaintia Hills district and are within Jowai town. 58 no. of road stretches are part of this project road having a total length of 32.601 Kms.

The project is located in the Universe Transverse Meter (UTM) zone 46. The height of the dissected Meghalaya Plateau is 150 meters - 1961 meters above sea level. Location map of the project roads is given in **Error! Reference source not found.**

### Existing Features of the Project

The existing project features are given below.

Sl. no	Project Component	Details
1	Location of Project	Jowai Town, West Jaintia Hills, Meghalaya
2	Administrative locations	West Jaintia Hills
3	State	Meghalaya
4	Length of the project section	
5	Terrain	Hilly
7	Land use	Land adjacent to the road stretches are mostly forest area along with few agricultural land and built-up areas
8	Forest area	75% of the land adjacent to the road stretches are forest area
9	Bridge	2 no. of minor bridges
10	Road Configuration	
11	Pavement condition	70% of the road stretches are poor in condition
12	High embank road stretches	

## Right of Way (RoW)

The average carriageway width of the existing road varies from 2.85 meter to 6.6 meter. As the project involves only overlay in the existing road, no additional RoW is required for the project. The improvement will be carried out within the existing ROW.

## Proposed Land Acquisition

As the Proposed improvement is well within the existing Right of Way, so there is No New Land is required and thus No Land Acquisition.

## Pavement Condition

The summary of the visual pavement condition survey (carried out in October 2021) of the project roads are given below:

**Table 1: Pavement Condition**

Sl. No.	Name	Pavement Type	Overall Visual Conditions in terms of Good, Fair, Poor and Very Poor	Road Distresses	Overall Road Width (km)	Remarks
1	Lulong College Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	4.846	-
2	Mission Hospital to Lulong College Road	Bituminous	Fair	Ravelled surface, 4 Potholes, 5 Patches, Cracking, Undulations etc.	0.440	-
3	Approach Road to Mission Hospital	Bituminous	Fair	Ravelled surface, 3 Potholes, 3 Patches, Cracking, Undulations etc.	0.500	Hospital Road
4	Lulong College to Luti Longshylla	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.375	
5	Approach Road to Pakyntein Caroline Colony	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.390	Very Congested Area
6	Ladthalaboh to Khliehmulein	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.296	Very Congested Area
7	KynrudSaphlang to JBRC road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.200	Very Congested Area
8	KynrudSaphlang to Khliehumkor road	Bituminous	Fair	Ravelled surface, 2 potholes, Cracking, Undulations etc.	0.050	Very Congested Area
9	Ladthalaboh to Lulong College Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.500	Very Congested Area
10	Extension of Ladthalaboh to Lulong College Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.304	Very Congested Area
11	KynrudSaphlang to Tpep-pale including Main Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	2.190	Very Congested Area
12	Ladthalaboh to	Bituminous	Poor	Ravelled surface, Lots of	0.950	Heavy Traffic

Sl. No.	Name	Pavement Type	Overall Visual Conditions in terms of Good, Fair, Poor and Very Poor	Road Distresses	Overall Road Width (km)	Remarks
	Kynrudsaphlang Road			potholes, Cracking, Undulations etc.		
13	Approach to Circuit House	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.586	Very Congested Area
14	Road from Thluwania to meet Approach to Circuit House	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations, Edge Brakes, etc.	0.320	Very Congested Area
15	Approach Road to Jail Complex	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.680	Jail Road
16	Approach Road from JBRC road to Tyndo-Wapung	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations, Edge Brakes, etc.	0.435	-
17	Approach road from JBRC road to Stadium	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.325	Very Congested Area
18	Approach road from JBRC road to Mookyrdup	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations, Edge Brakes, etc.	0.265	Very Congested Area
19	Approach road from JBRC road to Lumpariat	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.422	Very Congested Area
20	Approach road to Mookyrdup to meet Lulong College Road	Bituminous	Fair	Ravelled surface, 8 potholes, Cracking, Undulations etc.	0.707	Very Congested Area
21	Mission Compound to Civil Hospital Road	Bituminous	Fair	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.969	Very Congested Area
22	Approach road to Lumiongkjam	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.300	Very Congested Area
23	longpiah Pohdaikhoo to Civil Hospital via Panaliar	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.450	Very Congested Area
24	Kiang Nangbah Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	12.00	Very Congested Area
25	Dulong longpiah Road	Bituminous	Fair	Ravelled surface, 3 potholes, Cracking, Undulations etc.	0.280	Very Congested Area
26	Approach road to Ummuiang from Tpep-Pale	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.550	Very Congested Area
27	Shri M.Pariat to Ummuiang	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking,	0.500	Very Congested Area






Sl. No.	Name	Pavement Type	Overall Visual Conditions in terms of Good, Fair, Poor and Very Poor	Road Distresses	Overall Road Width (km)	Remarks
				Undulations etc.		
28	Dulong to Panaliar Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.330	Very Congested Area
29	Meghalaya Studio to Chutwakhu	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.280	Very Congested Area
30	Approach road to Mynthong Presbyterian Church	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.250	Very Congested Area
31	D.C. Court to Jrisalein	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.480	Heavy Traffic
32	MynthongPohkse Road	Bituminous	Poor - Fair	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.680	Very Congested Area
33	Mission Compound to Chutwakhu Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.480	Very Congested Area
34	lawmusiang to Mission Compound	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.500	
35	LarsingKhyriem road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.770	
36	Chutwakhu to Lumkyrwiang	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.770	Very Congested Area
37	Ummakah-Aitnar Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.525	Very Congested Area
38	longpiahAitnar Road	Bituminous	Fair	Ravelled surface, Cracking, Undulated type surface, Patching etc.	0.122	Very Congested Area
39	KhimusniangUmshangiar Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	1.310	Very Congested Area
40	longpiahLumkyrwiang Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.166	Very Congested Area
41	H.Lytan to Govt.Boy HSS Road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.290	Very Congested Area
42	Civil Hospital to Luti Longshylla	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	3.300	Heavy Traffic
43	Approach road to Kiang Nangbah monument	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.480	Heavy Traffic
44	JrisaleinKhliehlangsharoad	Bituminous	Poor	Ravelled surface, Lots of potholes, Patches, Cracking, Undulations etc.	1.575	Heavy Traffic

Sl. No.	Name	Pavement Type	Overall Visual Conditions in terms of Good, Fair, Poor and Very Poor	Road Distresses	Overall Road Width (km)	Remarks
45	From the House of O.H.Shullai to meet Khimusniang Umshangiar road	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.550	Very Congested Area
46	JrisaleinKhliehshnong	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.635	Very Congested Area
47	Approach road to Khimusniang L.P.School	Bituminous	Poor	Ravelled surface, Lots of potholes, Patching, Cracking, Undulations etc.	5.00	Very Congested Area
48	Approach road to MEECL	Bituminous	Poor	Ravelled surface, Lots of potholes, Patching, Cracking, Undulations etc.	0.200	Very Congested Area
49	Riatsasiam to Shillong Jowai road connecting NH-40E with NH-44	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	3.50	Hevy Traffic
50	Approach to Khimusniang to Crematorium	Bituminous	Poor	Ravelled surface, Lots of potholes, Patching, Cracking, Undulations etc.	0.190	Very Congested Area
51	Khimusniang Internal road (opposite Khimusniang Presbyterian Church)	Bituminous	Poor	Ravelled surface, Lots of potholes, Patching, Cracking, Undulations etc.	3.20	Very Congested Area
52	Branch of Khimusniang Internal road (opposite Khimusniang Presbyterian Church)	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.370	Very Congested Area
53	NH-40 E junction towards S.P.Office	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.160	Very Congested Area
54	Road from D.C. Office to Taxi Stand at lawmusiang	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.342	Very Congested Area
55	LarsingKhyriemrd to meet NH40E	Bituminous	Poor	Ravelled surface, Lots of potholes, Cracking, Undulations etc.	0.650	-








## Culvert









**Table 2: The details of culverts observed along the project stretches**

:



S.No	GPS Coordinate		Type of Structure	Span arrangement		Width of culvert (m)	Condition	Remark	Picture
	Latitude	Longitude		No. of pipe / Span	Diameter / Span				
<b>1. Lulong College Road</b>									
A	25.442541	92.205613	PIPECULVERT	1	x1.00	7.30	good	Overall condition of the culvert is good.	
B	25.442467	92.204628	PIPECULVERT	1	x1.00	7.30	good	Overall condition of the culvert is good.	
<b>11. Kynrud Saphlang to Tpep-Pale Main Road</b>									
A	25.44383	92.198974	PIPECULVERT	1	x1.00	7.30	good	Overall condition of the culvert is good.	
B	25.443881	92.19585	PIPECULVERT	1	x1.00	6.50	good	No distressed found in the culvert. Overall condition of the culvert is good.	
<b>17. Approach Road to Jail Complex.</b>									
A	25.461713	92.211191	PIPECULVERT	1	x1.00	4.00	Fully Choked	The Existing Culvert is fully choked and in distressed condition. Needs replacement.	



B	25.461735	92.211212	PIPE CULVERT	1	x 1.00	4.00	Burried	The Existing Culvert is Burried not visible.	
<b>22. Approach Road to Mookyrdupto Meet Lulong College Road</b>									
A	25.455215	92.205069	PIPE CULVERT	1	x 1.00	6.30	good	The Existing Culvert is in good condition.	
<b>23. Mission Compound to Civil Hospital Road</b>									
A	25.435288	92.201381	PIPE CULVERT	1	x 1.00	6.30	good	The Existing Culvert is in good condition.	
B	25.436154	92.205544	PIPE CULVERT	1	x 1.00	6.30	good	The Existing Culvert is in good condition.	
<b>24. Approach Road to Lumiongkjam</b>									
a.	25.43564	92.20261	Slab Culvert	1	x 1.50	6.00	Good	The Existing Culvert is Burried not visible.	
<b>26. Kiang Nangbah Road</b>									
a.	25.43672	92.20261	Pipe Culvert	1	x 1.00	5.90	good	The Existing Culvert is in good condition.	
<b>41. Khimusniang Umshangiar Road</b>									
a.	25.432442	92.193567	Slab Culvert	1	x 1.00	6.50	Distressed	The Existing Culvert is in distressed condition. Needs replacement.	
<b>44. Civil Hospital To Luti Longshylla</b>									

A	25.438507	92.214691	PIPE CULVERT	1	x 1.00	6.30	good	The Existing Culvert is in good condition.	
<b>46. Jrisalein Khlielang sharoad</b>									
a.	25.431918	92.191135	SLAB CULVERT	1	x 1.00	7.20	good	The Existing Culvert is in good condition.	
b.	25.431484	92.190207	PIPE CULVERT	1	x 1.00	7.00	good	The Existing Culvert is in good condition.	
<b>51. Riatsasiam toshillong Jowai road connecting NH-40E with NH-44</b>									
a.	25.443879	92.18985	PIPE CULVERT	1	x 1.00	6.50	Burried	existing Culvert is burried type. Needs Replacement.	
<b>53. Khimusniang internal road.</b>									
a.	25.43367	92.19218	PIPE CULVERT	1	x 1.00	4.50		The Existing Culvert is in good condition.	
b.	25.433351	92.190369	SLAB CULVERT	1	x 1.00	4.50		The Existing Culvert is in good condition.	
<b>54. Branch of Khimusniang internal road.</b>									
a.	25.433314	92.191145	PIPE CULVERT	1	x 1.00	4.75		The Existing Culvert is in burried type, not clearly visible.	
<b>58. Jowai Intermediary Bypass</b>									
a.	25.454653	92.193084	PIPE CULVERT	1	x 1.00	6.80	good	The Existing Culvert is in good condition.	



59.Roadfrom MoosalynkathroughlowersalarohomeetNH-44atsabahMuswangincludingleederroad									
a.	25.451071	92.205593	PIPE CULVERT	1	x 1.00	6.90	good	The Existing Culvert is in good condition.	
68.BehindD.CBunglowMynthong									
a.	25.43979	92.19157	SLAB CULVERT	1	x 1.00	4.50	Chocked	existing Culvert is buried type. Needs Replacement.	

### Bridges



First minor bridge in Lulong college road



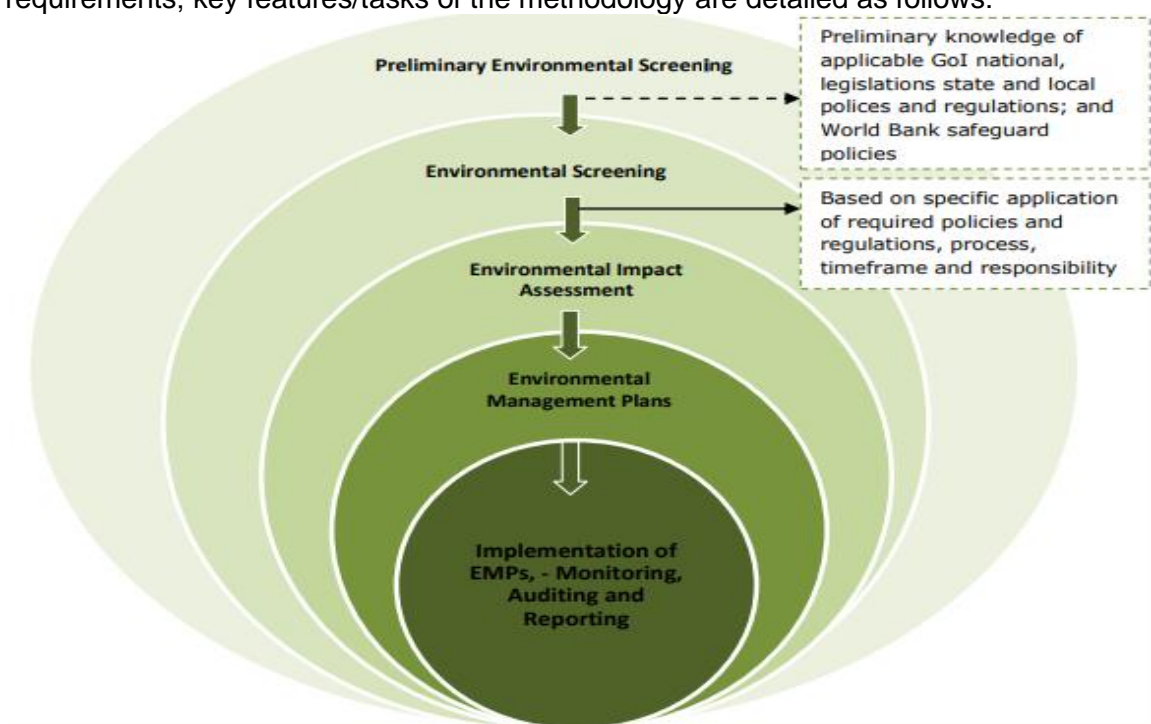


## 2 CHAPTER-II: NEED OF ENVIRONMENT & SOCIAL IMPACT ASSESSMENT

The project road has been assigned category “B” in accordance with World Bank’s Operational Policy OP 4.01 (Environmental Assessment) and mandate the preparation of project-specific Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP). Similarly, in accordance with World Bank’s Operational Policy OP 4.12 (Involuntary Resettlement), this project mandates the preparation of the Social Impact Assessment (SIA) and Resettlement Action Plan (RAP). Accordingly, detailed assessments of the environmental and social impacts have been carried out following a suitable methodology.

This ESIA shall cover, the environmental and social impacts due to the project, concerning construction-related environmental impacts, infringements with natural habitats and places of cultural heritage also in the context of ‘chance-find’, and impacts on local population/ community. The findings of ESIA will guide the effective development of the specific ESMP and facilitate the implementation of safeguard measures appropriately.

The approach followed for conducting ESIA study of the Project. To identify the environmental and social issues arising out of the current practices adopted for planning, design, and construction of the project roads, the environmental and social conditions along the project roads were assessed. During these visits, consultations through group discussions with local communities, road users and panchayat/ village members were contacted to understand their perceptions and needs. A standard methodology was adopted for fulfilling the ESIA requirements; key features/tasks of the methodology are detailed as follows:



**Task 1: Field Reconnaissance Survey and Review of Earlier Studies** The field reconnaissance survey has been carried out along the project roads to understand salient environmental and social features that are likely to cause adverse impacts, sensitive environmental and social issues vis-à-vis proposed project interventions. The salient feature includes □ The topography of the land, road geometry □ Environmental features like trees, any forest area, water bodies like ponds, rivers, etc. □ A social and physical feature like settlement pattern, its density, typology of buildings, especially the presence of religious buildings, land use, etc.

**Task 2: Review and Assessment of Applicable Environmental and Social Regulations** Various rules/regulations and guidelines applicable to the project roads vis-à-vis center (GoI), state (GoM) and World Bank statutory requirements were reviewed and referred to for assessing current environmental and social impacts that are likely to emanate.

### **Task 3: Delineation of Study Area for Assessment**

In road projects, while the influence area may vary via-a-vis size of the road, location of the road, type of road, etc., hence, the study area was fixed based on the proposed interventions including the road sections undergoing widening and strengthening, RoW availability, structural works (culverts and bridges), presence of sensitive areas, etc. In addition to this, the project influence area (10 km buffer from the center line on either sides) for impact assessment is also considered in those areas that are directly or indirectly influenced by the project activities during construction or operation of the proposed road work such as Hot Mix plants, sand quarries, source of raw material and material transport, etc.

**Task 4: Assessment of Baseline Environmental and Social Conditions** This task comprises a collection of baseline data for the project road locations primarily on physical, biological and socio-economic conditions. The secondary source of information was utilised for giving a generic snapshot of socio environment features. In addition, existing environmental and social quality/features along the project roads were assessed based on a walk-through survey, public consultations, FGD's and discussions with line department officials.

**Task 5: Public Consultations/ Focus Group Discussions** To cover a wide range of stakeholders in the study area, corner meetings were conducted at selected places with women groups, men and road users to understand the people's perception about the project as well as their issues and concerns. Overall project features, social safeguards, issues related to women's safety and security, environmental safeguards, and enhancement measures would be implemented in the project was also discussed with the public.

**Task 6: Prediction of Environmental and Social Impacts** The task identified likely impacts that would arise due to the construction of project roads, through changes in the physical, biological or socio-economic environment. The assessment considered both positive and negative impacts at different stages of implementation, i.e., pre-construction, construction and operation stages of the project roads.

**Task 7: Preparation of Environment and Social Management Plan (ESMP)** A comprehensive Environmental and Social Management Plan (ESMP) was prepared which included mitigation measures for all the negative impacts of sub-projects and enhancement measures for positive impacts.

**Task 8: Preparation of Resettlement Action Plan (RAP)** Based on the updated DPR there will be no Land Acquisition and all improvements are well within the existing RoW, which is free from all encroachments and encumbrances. Thus, as per the World Bank norms only ESIA shall be prepared to specify the procedures it will follow and the actions it will take to properly resettle/compensate affected people and communities. There will no requirements of ARAP or RAP.

### **Task 9: Preparation of Environmental and Social Management Budget**

Based on the impact assessment for the environmental and social components a suitable budget has been estimated to compensate for the temporary and permanent impacts that are likely during the project implementation. As part of the project implementation monitoring, budgetary provision has been allotted for ESIA implementation and environmental monitoring. The budget also includes compensatory afforestation measures for the loss of avenue trees due to road widening.

### **Task 10: Environmental Safeguard Clauses in the Bid Document**

Suitable safeguard clauses have been prepared based on the ESIA, the prepared clauses shall form part of the bid document either in the General condition or Specific conditions of the contract agreement/ bid document. The prepared ESMP shall also be part of the bid document.

### 3 CHAPTER: III- LEGAL FRAMEWORK

The Ministry of Environment, Forest & Climate Change made it mandatory for introducing environment assessment into the planning process of road projects as well as environmental impact appraisal as per Environmental Protection Act, 1986. The MoEFCC have assigned all central and State authorities to develop policies towards protection of environment for any infrastructure development activities as per the act. The Ministry of Environment, Forest & Climate Change (MoEFCC) has overall authority for the administration and implementation of government policies, laws and regulations. In the present project the environment acts, policy guidelines of both State and Central Government will be applicable. As these acts/regulations have varying procedures, requirements depending on type of project, a detailed discussion is required in this report to study the extent of applicability, procedures and requirements to be met by the implementing authorities. The following subsections summarized the legislative framework in which the present project will be addressed with respect to the environment including social issues.

#### Institutional Setting

The primary responsibility of administration and implementation of the Government of India's policy with respect to environmental management, conservation, ecologically sustainable development, and pollution control rests with the Ministry of Environment, Forest & Climate Change (MoEF& CC). The MoEF& CC has a number of agencies and institutions to implement the environmental policies. Such as: Central Pollution Control Board (CPCB), MoEF& CC Regional Offices, State Pollution Control Board (SPCB) & State Department of Environment & Forests.

The Government of India through specific legislations regulates the environmental management system in India. The Ministries / Statutory Bodies responsible for ensuring environmental compliance by project proponents include:

- The Ministry of Environment & Forests and Climate Change (MoEFCC)
- Central Pollution Control Board (CPCB)
- Meghalaya Pollution Control Boards (MPCB)
- Ministry / Department of Environment in the States

#### Acts & Regulation

The Government of India has laid down various policy guidelines, regulations, acts and legislations pertaining to sustenance of environment. The following table shows the relevant environmental legislations and implementing agencies.

**Table 3:Applicable Acts & Regulations**

Sl.	Act/Regulations	Main Objective	Applicability to thisProject	Implementation Agency
1.	Air (Prevention and Control of Pollution) Act, 1981	To control airpollution & Controllingemission of airpollutants asper the Prescribedstandards.	This act is applicable for construction phase to control stack/fugitive emissions and to manage ambient air quality at project site and ancillary activities like crusher plant, hot mix plant, concrete batch mix plant, WMM Plants, DG Set etc., for the road The	Contractor to: a) obtained COE (consent to establish); b) maintain pollution level below prescribed limit; This will be taken by the contractor during construction period.

Sl.	Act/Regulations	Main Objective	Applicability to this Project	Implementation Agency
			<p>NAAQ standards (CPCB) for Ambient Air Quality have been promulgated by the MoEF&amp;CC for various land uses.</p> <p>For establishment and operation of Hot Mix/ Stone crusher/ Batching Plants during construction, etc.</p> <p>Batch Type Hot Mix –            PM (mg/ Nm<sup>3</sup>) – 150            SO<sub>2</sub> (mg/ Nm<sup>3</sup>) – 250            NO<sub>x</sub> (mg/ Nm<sup>3</sup>) – 200</p> <p>Consent to Establish (CTE) and Consent to Operate (CTO) for hot mix plant, batching plant and WMM Plants, DG sets, etc.</p> <p>Agency in Charge – State Pollution Control Board (SPCB)</p>	
2.	The Water (Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of liquid pollutants as per the prescribed standards.	<p>Yes, For establishment and operation of Hot Mix/ Stone crusher/ WMM/ Batching Plants during construction, etc. (Construction Stage). This act is applicable for construction phase of the road to manage to liquid effluent discharges from worker camp concrete batch mix plant, etc.</p> <p>Consent to Establish (CTE) and Consent to Operate (CTO) for plants and workers camps, etc.</p> <p>Agency in Charge – State Pollution Control Board (SPCB)</p>	<p>Contractor to:</p> <p>a) obtained COE (consent to establish);            b) maintain pollution level below prescribed limit;            This will be taken by the contractor during construction period.</p>
3.	Motor Vehicles Act, 1988 and its subsequent amendments	Empowers State Transport Authority to enforce standards for vehicular pollution. From August 1997 the "Pollution Under Control Certificate" is issued to reduce vehicular emissions	<p>Yes.</p> <p>These rules will be applicable to the contractors during construction phase, all vehicles used for construction will need to comply with the provisions of this act.</p> <p>Agency in Charge - Motor Vehicles Department, Govt. of Meghalaya.</p>	This will be taken by the contractor during construction period.
4.	The Forest Conservation Act, 1980 and	To check deforestation by restricting conversion of forested areas into	The project area does not pass through any forest area. 166 no. of tree felling is	PIU

Sl.	Act/Regulations	Main Objective	Applicability to this Project	Implementation Agency
	The Forest Conservation Rules, 2003	nonforested areas.	required as per primary survey and site visit report. Permission for felling of trees from non-forest areas or in homesteads and farms may be sought under the provisions of the Meghalaya Tree (Prevention) Act, 1976 wherever applicable, and in areas outside purview of the said act, the permission shall be obtained as per Rule 6 of the Meghalaya Tree Felling (Non-Forest areas) Rules, 2006. The application along with the required documents shall be submitted to Divisional Forest Officer (Territorial Division) or Chief Forest Officer of the respective Autonomous District Council. Agency in Charge - Forest Department GOI and Government of Meghalaya & MoEF & CC	
5.	National Forest Policy, 1988	The principal aim of National Forest Policy, 1988 is to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium which are vital for sustenance of all life forms, human, animal and plant.	Applicable Agency in Charge - Forest Department GOI and Government of Meghalaya	PIU
6.	Wild Life (Protection) Act, 1972 and amendments thereof	Protection of Wildlife Sanctuaries and National Parks	No. The proposed alignment is neither passing through nor falling within 10 km radius of any areas protected under Wildlife (Protection) Act, 1972. Agency in Charge – National Board for Wildlife, State Board for Wildlife and MoEF & CC	-
7.	Environment Protection Act, 1986	To protect and improve the overall environment	Yes. It is umbrella legislation. Various notifications, rules and schedules are promulgated under this act.	PIU

Sl.	Act/Regulations	Main Objective	Applicability to this Project	Implementation Agency
			Ensure applicable standards for ambient air quality. Ensure emission limit standards for new DG Sets, Ensure stack height standards requirement for DG Sets. Agency in Charge - Dept. of Environment and Forest, Meghalaya.	
8.	Ancient Monuments and Archaeological Sites and Remains Act, 1958	The Act designates areas within 100 meters (m) of the "protected monument/area" as "prohibited area" and beyond that up to 200 m as "regulated area" respectively. No "construction" is permitted in the "prohibited area" and any construction activity in the "regulated area" requires prior permission of the Archaeological Survey of India (ASI).	Not applicable as no such monuments within the project corridors. Applicable for any "chance find" would be Notified / surrendered to the competent authority. Agency in Charge – Archaeological Survey of India (ASI).	-
9.	EIA Notification, September 14, 2006	The EIA Notification of 2006 set out the requirement for environmental assessment in India. Environmental Clearance is required for certain defined activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence.	Not Applicable as project activity does not attract provisions of EIA notification 2006 and its amendment till date. Because, neither is the alignment any new National highway nor is it any expansion of a National Highway greater than 30 km involving additional RoW greater than 20m involving land acquisition and passing through more than one State (Category A). Also, the alignment is not a state highway project or state highway expansion project in hilly terrain (above 1000 m AMSL) and or ecologically sensitive areas (Category B). It is a Major District Road Agency in Charge - Ministry of Environment, Forest & Climate Change (MoEF& CC)	-
10.	National Environmental	An Act to provide for the establishment of a	No. The Act is not applicable	-



Sl.	Act/Regulations	Main Objective	Applicability to thisProject	Implementation Agency
	Appellate Authority Act, 1997	National Environment Appellate Authority to hear appeals with respect to restriction of areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards under the Environment (Protection) Act, 1986 and for matters connected therewith or incidental thereto.	because the said project does not involve any industries, operations or processes or class of industries, operations or processes. Agency in Charge - Ministry of Environment, Forest & Climate Change (MoEF& CC)	
11.	Solid Waste Management Rules 2016	Responsibility of Solid Waste Generator (i) segregate and store the waste generated in three separate streams namely biodegradable, non-biodegradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorized waste pickers or waste collectors as per the direction or notification by the local authorities from time to time.	This rule is applicable to all forms/types of solid waste generated at construction activities, camp site, plant sites, etc. Agency in Charge - State Pollution Control Board	Contractor to follow all the rules during construction works.
12.	Construction and Demolition Waste Management Rules 2016	Safe disposal and management of construction and demolition wastes	This rule shall be applicable to generation of wastes resulting from demolition of structures and scarifying of surface of existing road and from road construction activities. Agency in Charge - State Pollution Control Board	Contractor to follow all the rules during construction works.
13.	Hazardous and Other Wastes (Management, And Transboundary Movement) Rules, 2016 and amendments	Protection to the general public against improper handling and disposal of hazardous wastes	The rules will be applicable to used oil generated from construction equipment/ machinery during construction works. The rule includes storage, handling, transportation procedures and requirements for safe disposal of hazardous wastes.	Contractor to follow all the rules during construction works.

Sl.	Act/Regulations	Main Objective	Applicability to this Project	Implementation Agency
	thereof		Agency in Charge - State Pollution Control Board	
14.	Notification for use of Fly ash, 3rd November 2009 and its amendment on 25 <sup>th</sup> January 2016	As per the notification of MoEF&CC, it is mandatory to use fly-ash in the construction of road or flyover embankments within a radius of 300 km of a thermal power plant.	Yes. The NTPC Thermal Power Project in Dolaigaon, Assam, Bongaigaon Thermal Power Project lies at a distance of 215 km (aerial distance) from the project site. The site is located at a distance of 365 km by road from the project site.	PIU
15.	Noise Pollution (Regulation And Control) Act, 1990, 2010 and its subsequent amendments	The standards for noise for day and night have been promulgated by the MoEF&CC for various land uses.	This act will be applicable for all construction equipment/ plant and machinery including vehicles deployed for construction of the proposed road to regulate ambient noise levels. This act will be applicable to regulate noise nuisance during construction phase. Since the project is located in residential cum commercial area the Ambient Air Quality Standards in respect of Noise are: <b>1.</b> Commercial area: day time – 65dB(A); night time 55dB(A) <b>2.</b> Residential area: day time – 55dB(A); night time – 45dB(A) Agency in Charge - State Pollution Control Board	Contractor to follow all the rules during construction works.
16.	The Explosives Act (& Rules) 1884 (1983) its subsequent amendments. The Explosive Rules, 2008	Sets out the regulations as to regards the use of explosives and precautionary measures while blasting & quarrying	If contractor opens stone quarry and uses explosive for quarrying and storing of Diesel/ Petrol in the camp site Agency in Charge - Petroleum & Explosives Safety Organization (PESO)	PIU
17.	Guidelines to regulate and control ground water extraction in India, 2020	Regulate and control ground water extraction for various purpose.	Yes, NOC for establishing bore wells for abstraction of ground water for use of construction as well as domestic use. Agency in Charge – Central Ground Water Authority	PIU
18.	Public Liability	Protection to the general	Yes.	PIU

Sl.	Act/Regulations	Main Objective	Applicability to this Project	Implementation Agency
	and Insurance Act, 1991	public from accidents due to hazardous materials.	Hazardous materials like Bitumen shall be used for road construction Agency in Charge - Labour Commissioner / District Magistrate	

### Clearance Requirement

During the construction stage, some of the key statutory requirements that need to be obtained by the Contractor as part of mobilization have been listed in the table given below:

**Table 4: Applicable Acts & Regulations (Construction Phase)**

S. No.	Clearance Required for	Statute under which clearance is required	Statutory Authority
1	Hot mix plants, Crushers, Batch Mix Plants & DG Sets.	Air (Prevention and Control of Pollution) Act, 1981 and Noise Pollution (Regulation and Control) Rules, 2000	Meghalaya State Pollution Control Board
2	Storage, handling and transport of hazardous materials.	Hazardous Waste (Management and Handling) Rules, 1989 and Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989.	Meghalaya State Pollution Control Board
3	Location/ layout of workers camp, equipment and storage yards	Environment Protection Act, 1986 and Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989	Meghalaya State Pollution Control Board
4	Quarries (Aggregates, Sand & Earth)	Environment Protection Act, 1986	MoEF&CC
5	Permission for withdrawal of groundwater and for construction purpose.	Environment Protection Act, 1986	CGWB
6	Disposal of bituminous wastes	Hazardous Waste (Management and Handling) Rules, 1989	As per state norm/ Local Civic Body
7	Pollution Under Control Certificate	Central Motor and Vehicle Act 1988	Department of Transport, State Government.
8	Storage of fuel oil, lubricants, explosives, diesel etc. at construction camp.	Manufacture, storage and Import of Hazardous Chemical Rules 1989	Meghalaya State Pollution Control Board & PESO.

### MORTH & IRC Specifications

All road works in India are to be in accordance with the MoRTH specifications for Road and Bridge works and guidelines of Indian Roads Congress (IRC). The MoRTH specifications have special provisions towards protection of environment under Clause 501, Annexure A and the contractor is to satisfy the provisions. Apart from the Annexure A to clause 501, there are

provisions for control of erosion, drainage, dust suppression, borrow area and haul road management under relevant sections. Provisions of clause 501 Annexure A, cover the environmental aspects as:

### Environmental Standards and Code of Practices

All the construction work will be carried out as per the Environment standards and guidelines of MoEFCC, CPCB & code of practices of IRC. Some of the codes used during the construction phase are listed below.

- Guidelines for use of Fly Ash in Road Embankments (IRC: SP: 58-2001)
- Guidelines on Preparation and Implementation of Environment Management Plan (IRC SP 108-2015)
- Guidelines on Landscaping and Tree Plantation (IRC: SP-21-2009)
- Report containing recommendations of the IRC regional workshops on Highway Safety IRC: SP: 27-1984
- Recommended practice for Borrow pits for Road Embankments constructed by Manual operation IRC: 10-1961
- Road accident Forms IRC: 53-1982
- Guidelines for Use of Construction and Demolition Waste in Road Sector (IRC 121-2017)
- Proceedings of International Seminar on sustainable development in 8.10.2001
- Road Transport Highway Safety Code IRC: SP: 44-1996
- Guidelines on Safety in Road Construction Zones IRC: SP: 55:2001
- Guidelines on Skill Development of Workmen in Road Sector (IRC 127-2018)
- Guidelines of WB& ADB.

### Other Applicable Policies (Social Security & Labor Welfare)

Environmental and labour welfare issues during the construction stage generally involve equity, safety and public health issues. The different applicable policies are:

**Table 5: Applicable Policies**

Applicable Codes	Concerns	Remarks
The Code on Social Security, 2020	It consolidated The Employees' Compensation Act, 1923, The Employees' State Insurance Act, 1948, The Employees' Provident Funds and Miscellaneous Provisions Act, 1952, The Employment Exchanges (Compulsory Notification of Vacancies) Act, 1959, The Maternity Benefit Act, 1961, The Payment of Gratuity Act, 1972, The Cine Workers Welfare Fund Act, 1981, The Building and Other Construction Workers Welfare Cess Act, 1996, Unorganised Workers' Social Security Act 2008, The Constitution (Eighty-Ninth Amendment) Act, 2003, Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, PESA, Vishaka Guidelines, Equal Remuneration Act, 1976, The Child and Adolescent Labour (Prohibition and Regulation) Act, 1986, The Immoral Traffic (Prevention) Act, 1956, Sexual Harassment of Women	State Government, District Authorities, Ministry of labour and Employment

Applicable Codes	Concerns	Remarks
	at Workplace (prevention, Prohibition and Redressal) Act, 2013 and POSCO Act,2013	
The Occupational Safety, Health and Working Conditions Code, 2020	It amalgamated The Factories Act, 1948, The Plantations Labour Act, 1951, The Mines Act, 1952, The Working Journalists and other Newspaper Employees (Conditions of Service and Miscellaneous Provisions) Act, 1955, The Working Journalists (Fixation of Rates of Wages) Act, 1958, The Motor Transport Workers Act, 1961, The Beedi and Cigar Workers (Conditions of Employment) Act, 1966, The Contract Labour (Regulation and Abolition) Act, 1970, The Sales Promotion Employees (Condition of Service) Act, 1976, The Inter-State Migrant workmen (Regulation of Employment and Conditions of Service) Act, 1979, The Cine Workers and Cinema Theatre Workers Act, 1981, The Dock Workers (Safety, Health and Welfare) Act, 1986 and The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.	Ministry of labour and Employment
The Code on Wages, 2019	It consolidated the provisions of four labour laws concerning wage and bonus payments and makes universal the provisions for minimum wages and timely payment of wages for all workers in India. The Code repeals and replaces the Payment of Wages Act, 1936, the Minimum Wages Act, 1948, the Payment of Bonus Act, 1965, and the Equal Remuneration Act, 1976.	Ministry of labour and Employment
Corporate Social Responsibility- Companies Act, 2013	Section 135 of the Companies Act introduces mandatory Corporate social responsibility (CSR) contributions for large companies, making it the only mandatory CSR law in the world. According to the bill, all firms with net worth above 5 billion rupees or ₹5 billion (approx. \$75 million), turnover over 10 billion rupees or ₹10 billion (approx. \$150 million), or net profit over 50 million rupees or ₹50 million (approx. \$750,000) are required to spend at least 2% of their annual profits of the preceding year. The law requires that all businesses affected establish a CSR committee to oversee the spending.	Ministry of Corporate Affairs

### 3.1.1 World Bank Operational Policies

The World Bank policies and directives on environmental and social safeguards have adhered to the project roads. The applicability of the relevant policies of the project roads that are undergoing up-gradation (strengthening and widening) are summarized in the following table

**Table 6:Applicable World Bank Operational policies**

OP 4.01 Environmental Assessment	<p>The objective of this policy is to ensure that Bank financed projects are environmentally sound and sustainable. Help to ensure the environmental and social soundness and sustainability of investment projects. Support integration of environmental and social aspects of projects in the decision-making process. <b>OP 4.01 is applicable in this project.</b></p> <p>MITP Project is a “Category A” project as the sub-project sites are located in the hilly areas with fragile ecosystem, abutting forest and eco-sensitive zones as well as Wildlife Sanctuaries. <b>Thus, by default the sub-project “Category is A”.</b></p>
OP 4.04 Natural Habitats	The policy recognizes that the conservation of natural habitats is essential for long-term sustainable development. Promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions. This

		<p>policy may be triggered to improvement activity of road requiring forest/wildlife lands, locating close to the natural habitats with the potential to cause significant adverse impact or degradation of natural habitats whether directly (through construction) or indirectly (through human activities induced by the project).</p> <p>The project does not pass through reserved forest or natural habitat of wild animals therefore this operational policy is not applicable in this project.</p>
OP 4.36 Forestry		<p>Aims to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively for sustainable economic development and protect vital local and global environmental services and values of forests.</p> <p>No tree felling is envisaged as the proposed road network will follow the existing ROW.</p>
OP 4.09 Pest Management		<p>The objective of this policy is to promote the use of biological or environmental control methods and to reduce reliance on chemical pesticides. This policy is not applicable in this project.</p>
OP 4.12 Involuntary Resettlement		<p>Avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing before the beginning of project implementation, whichever is higher.</p> <p>This policy OP 4.12 is not applicable in this project as the project does not involve any land acquisition. The existing ROW is encumbrance free.</p>
OP 4.10 Indigenous People		<p>Design and implement projects in a way that fosters full respect for indigenous peoples' dignity, human rights, and cultural uniqueness so that they i. Receive culturally compatible social and economic benefits, and ii. Do not suffer adverse effects during the development process.</p> <p>This OP 4.10 regarding Indigenous People is applicable only if any persons belonging to Indigenous community impacted by this project as Meghalaya is largely tribal state with more than 86% ST population. Hence, this policy will be triggered</p>
Physical Resources (PCR)	Cultural	<p>OP 4.11 Assist in preserving PCR and in avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, religious (including graveyards and burial sites), aesthetic, or other cultural significance.</p> <p>There are no PCR impacted under this project. Therefore OP.411 is not triggered.</p>

**Table 7:Applicable Social Legal Framework for the entire Project**

Sl.	Name of Act/ Rules	Purpose	Applicable/ Not Applicable	Description	Responsible Agency
1.	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act -2013.	Fair compensation for (i) acquisition of land and other immovable assets; (ii) economic rehabilitation of all those who are affected due to land acquisition. The Act also covers the Lease Holders, Sharecroppers and Tenant.	Not Applicable	This Act will be Applicable if in future there is any land required to be acquired during implementation.	Revenue Department under the respective project Districts of Meghalaya



Sl.	Name of Act/ Rules	Purpose	Applicable/ Not Applicable	Description	Responsible Agency
2.	The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act	Grants Legal recognition to the rights of traditional forest dwelling communities.	Not Applicable	This Act is Applicable not applicable as there is no land acquisition. Thus, the rights of the forest dwelling schedule tribes & other traditional forest dwelling communities will not be impacted.	Ministry of Tribal Affairs, GoI and Department of Tribal Welfare of State Government
3.	The Minimum Wage Act, 1948	Payment of minimum rate of wages as fixed and periodically revised by the State Government	Applicable	Construction/daily wageworkers are involved and was involved in the project	District Labour Commissioner.
4.	Workmen Compensation Act, 1923	It provides for payment of compensation by Employers to their Employees for injury by accident i.e. personal injury or occupational disease.	Applicable	The Insurance Policy covers the compensation, hospitalization and transportation of workers /employees	District Labour Commissioner
5.	Inter-state Migrant Workers Act, 1979	It protects workers whose services are requisitioned outside their native states in India. Contractor who employs or who employed five or more Inter-State migrant workmen need to obtain registration under this act	Applicable	Construction workers involved in the project may or may not be from the neighbouring state. Presently the construction workers are from within the state of Meghalaya.	District Labour Commissioner/ Govt. Of Meghalaya
6.	The Child Labour (Prohibition & Regulation) Amendment Act, 2016	It prohibits employment of children in certain specified hazardous occupations and processes and regulates the working conditions in others.	Applicable	No Child worker should be involved in the project.	District Labour Commissioner
7.	Building and Other Construction Workers Welfare Cess Act, 1996	An Act to provide for the levy and collection of a Cess on the cost of construction incurred by employers.	Applicable	Project involves employment of construction workers	District Labour Commissioner
8	The Sexual Harassment of Women at	Vishakha Guidelines are to be followed	Applicable	This act specially protects the rights of the women workers against	District Women Commission /Project

Sl.	Name of Act/ Rules	Purpose	Applicable/ Not Applicable	Description	Responsible Agency
	Workplace (Prevention, Prohibition, and Redressal) Act, 2013			any kinds of sexual harassment at the project, both at office and sites.	Proponent
	Immoral Traffic in Women and Girl Act, 1956 (as amended upto 1986) Act, 1956	To be prevent trafficking of young women in disguise of job offers	Applicable	The Act aims to mitigate violence against women and children by prohibiting trafficking and sexual exploitation for commercial use	District Women Commission and Local Authority
9	The Equal Remuneration Rules, 1976	Equal Remuneration for identical works	Applicable	Project should not discriminate between sex, race, caste or creed in payments to the employees	District Labour Commissioner
10	The Trade Union Act, 1926	Right to form Trade Union at the Workplace	Applicable	No trade union formed within the organization	District Labour Commissioner
11	Public Liability Insurance Act 1991	Provides immediate relief to the persons affected by accidents, occurring while handling any hazardous substance	Applicable	Project has been adhering to all the relevant provisions made under the act	District Labour Commissioner
12	World Bank OP/BP 4.12 – Involuntary Resettlement	The project does not involve land acquisition though, at a very low scale widening, realignments, junction improvements, bypasses etc. might adversely affect non-titleholders structures used for various purposes, livelihood of people (mainly earning their livelihood by means of petty shops and providing various services).	Applicable	Many of them have been operating from the government land and would be affected temporarily during actual civil construction for few days. Thus, the non-title holders would be compensated as per the provision of the ESMF.	PIU/Implementing Agency
13	Indigenous Peoples OP/BP 4.10	In the context of India Indigenous Peoples may be referred to "scheduled tribes". As per the Census of India, 2011 about 86% of the Meghalaya state belongs the Schedule Tribe. The population is	Applicable	The policy on Indigenous People is triggered as the presence of tribal groups with close attachment to land in the project area is not established.	PIU/Implementing Agency



Sl.	Name of Act/ Rules	Purpose	Applicable/ Not Applicable	Description	Responsible Agency
		distributed across 11 districts of Meghalaya.			
14	Bank Policy – Access to Information	The policy governs the public accessibility of information in the Bank's possession.	Applicable	The Bank allows access to any information in its possession that is not on a list of exceptions. Documents such as ESIA was disclosed both by the borrower and Bank.	PIU/Implementing Agency

### 3.1.2 Social Categorization:

#### Social Categorization:

All activities under the sub-projects are limited to the available RoW, thus no land acquisition and resettlement and rehabilitation are envisioned for these activities. The activities in this project will impact the tribal population as Meghalaya is largely tribal state with over 86% of the population belonging to the Schedule Tribes (ST) communities. The project will have positive impact on the tribal population Further the tribal community in Meghalaya have collective attachment to the land. Anticipated impact on livelihood of vendors is not there; however, there would be minor impacts on some structures which will be reconstructed by the Contractor upon completion of work. Thus, a separate Abbreviated Resettlement Action Plan (ARAP) will not be required for this sub-project. Apart from this, there would be some access restrictions to the structures along the road for 2-5 days and mitigation measures to address the access restriction issues has been suggested in ESMP.

## 4 CHAPTER: IV- DESCRIPTION OF ENVIRONMENT

The present chapter describes the baseline environmental and social conditions within the project influence area of 10 Kms of the project road. The baseline information on biophysical (air quality, water quality, noise, soil, ecology & biodiversity), social and economic aspects along the project roads has been collected applying primary surveys and referring to secondary sources.

### Topography:

#### Meghalaya:

The dominant part of the state is located in Meghalaya plateau. The highest point in the state is the Shillong Peak with an altitude of 1961 meters. The state can, broadly, be divided into three physiographic zones, namely:

- a. Central Plateau Region comprising the Khasi Hills and has the highest elevations between 900-2000m
- b. Sub-montane region in continuation with the Central Plateau below 900m which gradually merges with the plains in the West and North, namely the Jaintia Hills, and
- c. Border region which stretches south-wards abruptly from the Central Plateau to the plains in Bangladesh, mainly the Garo Hills region, and is nearly plain.

#### Jaintia Hill District:

The district is an undulatory one, comprising dissected plateau, denudational high and low hills with deep gorges. The district represents a remnant of ancient plateau of Indian Peninsular shield uplifted to its present height due to tectonic activities in the past and deeply dissected suggesting several geotectonic and structural deformities that the plateau has undergone. The southern parts form a platform on which Tertiaries were deposited in the post- cretaceous period. Topography varies from gently rolling type to highly undulating type. The highest point of 1627m above MSL is observed at Maryngksin, in eastern part and the lowest point is 76m above MSL at Dawki. Broadly, the district can be differentiated into four major geomorphic units:

- Alluvial plain in the southern part of the district bordering Bangladesh.
- Area having denudo-structural hills and highly undulating topography.
- Area showing more or less flat topography with rolling mounds representing plateau
- Area containing denudational hills and less dissected topography.

(Source: CGWB Report, Jaintia Hills District). The topographical map of the project district is shown below.

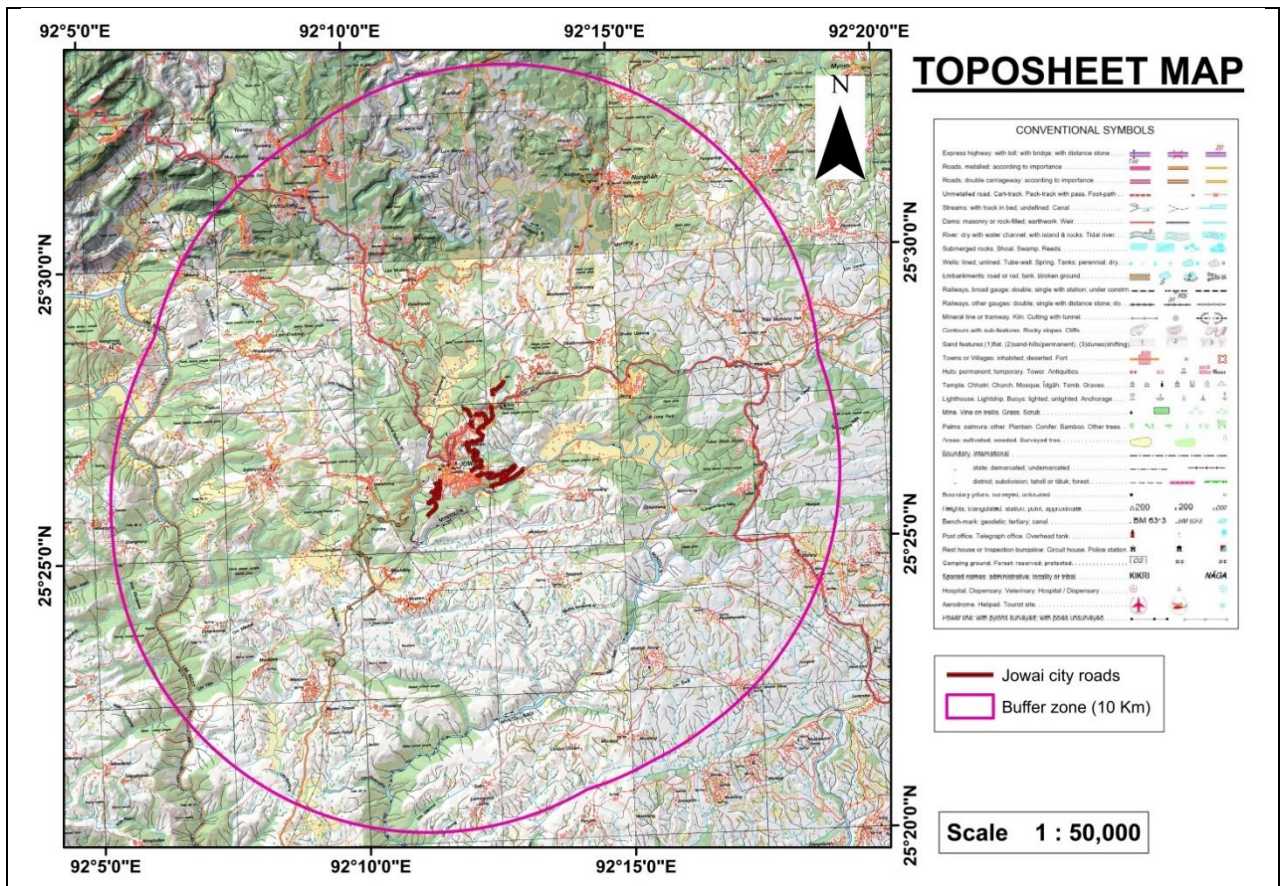


Figure 2 Toposheet map showing the Project road stretches

**Topography of project site:**

The project road stretches passes through rolling terrain. The figure below is showing the level of road stretches varies from 1230-1355 meter and few of them are within the range of 11105-1230 meter above sea level. Digital elevation map of the project area is given below.

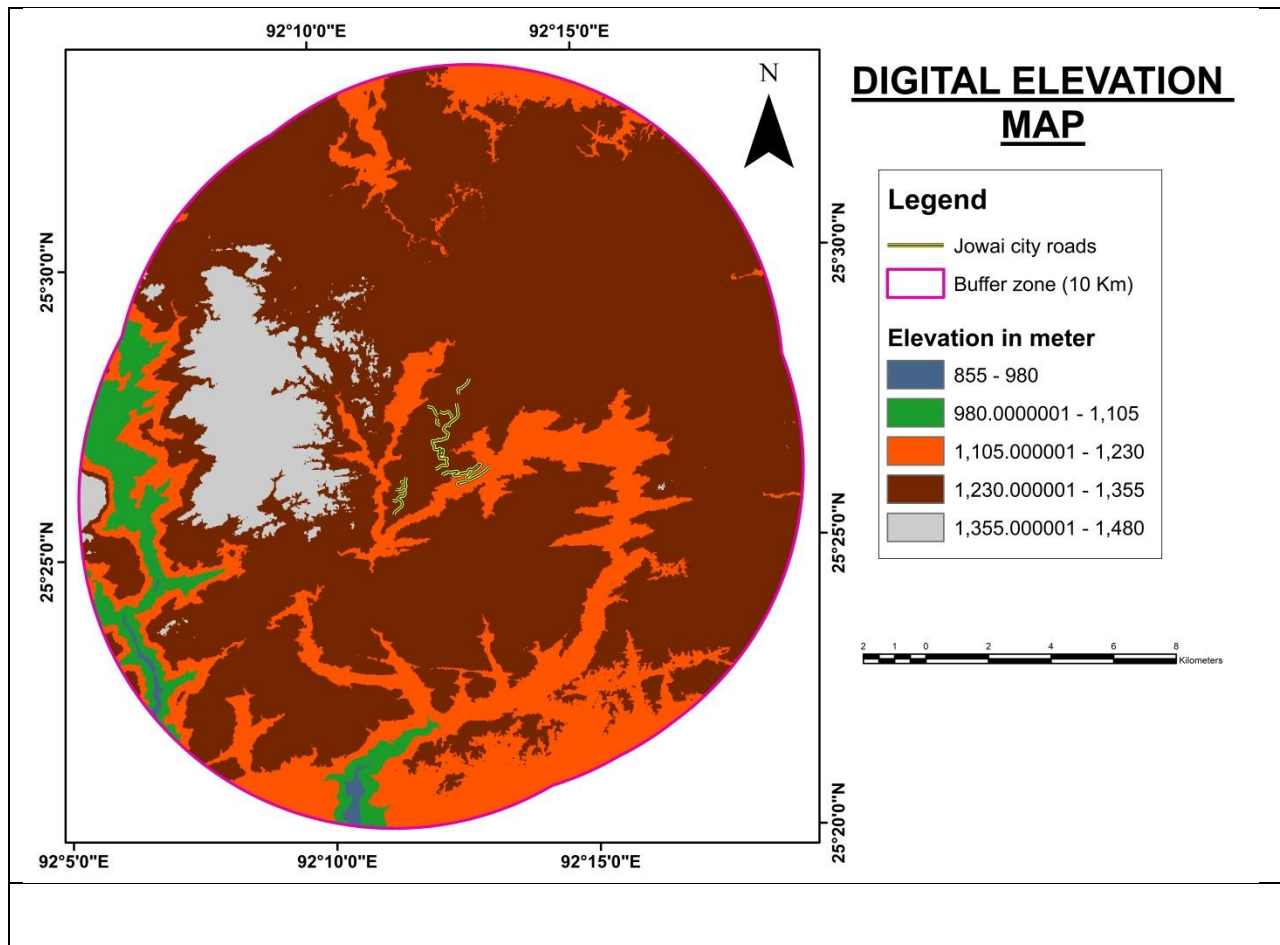
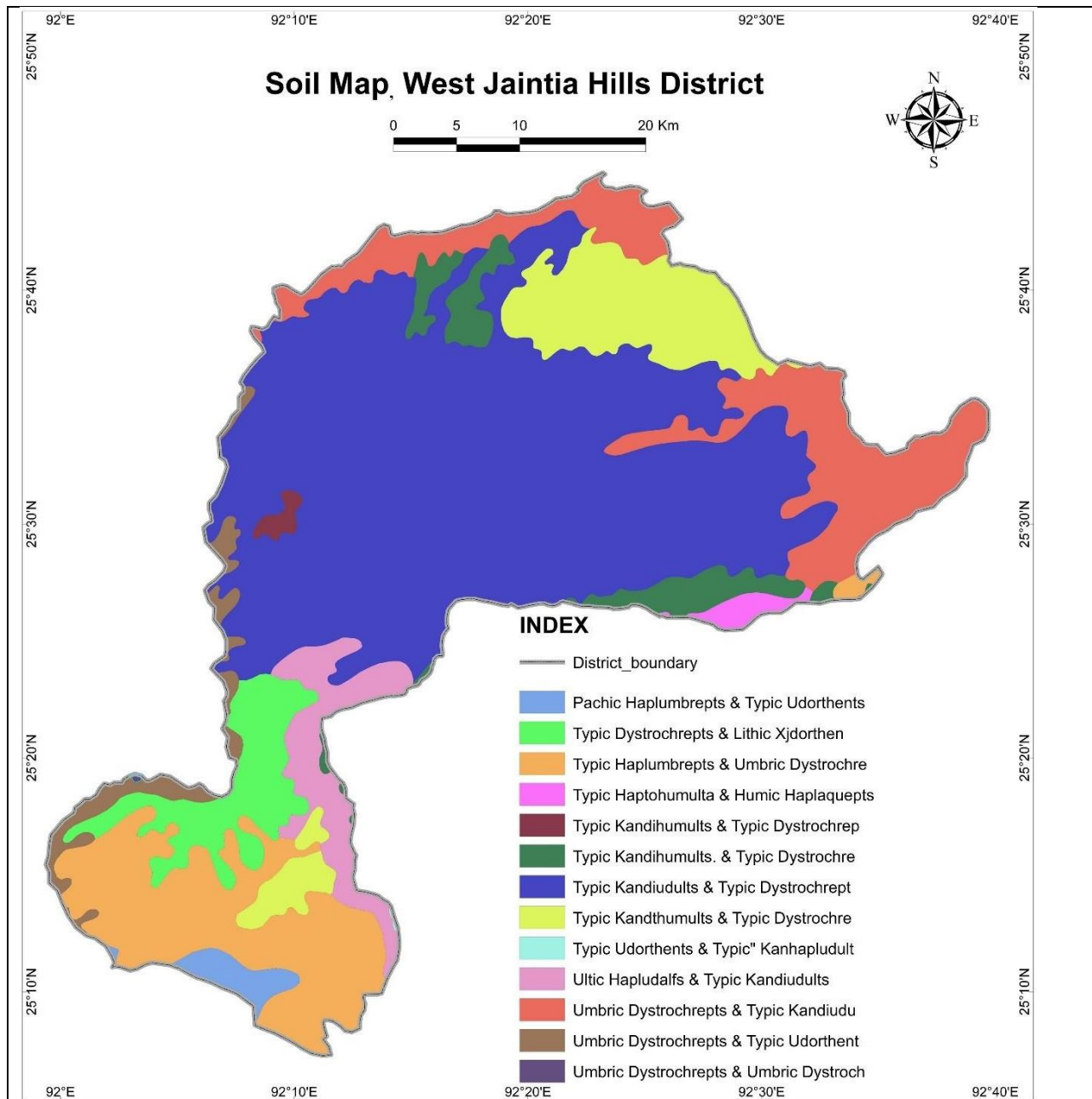


Figure 3 Digital Elevation Map of Project Road

**Soil & Geology:**

High rainfall, humid subtropical climate and favourable topography have resulted in the formation of soil profile (1-10 m) in the study area. The soil in the study area is mostly deep brown, black soil, red soil, alluvial soil, sandy soil and acidic soil. The acidic character is due to leaching of bases caused by high rainfall. The district shows different types of soils as the provenance differs widely. The loamy soil is the most prevalent one. They vary from sandy to clayey-loam in Jowai and Nongbah. Alluvial soil occurs in the southern periphery of the district e.g., Dawki, Muktapur, Lakroh etc. The soil is acidic in nature, with low percentage of phosphorous and high organic carbon. The soil classification has been conducted by the Regional Center of National Bureau of Soil Survey and Land Use Planning, for the State of Meghalaya. Soil map of the area is given below:





**Figure 4** Soil map of West Jaintia Hills

The improvement work of project road may have some temporary effect upon soil quality; therefore, soil quality monitoring was not conducted for the project stretches.

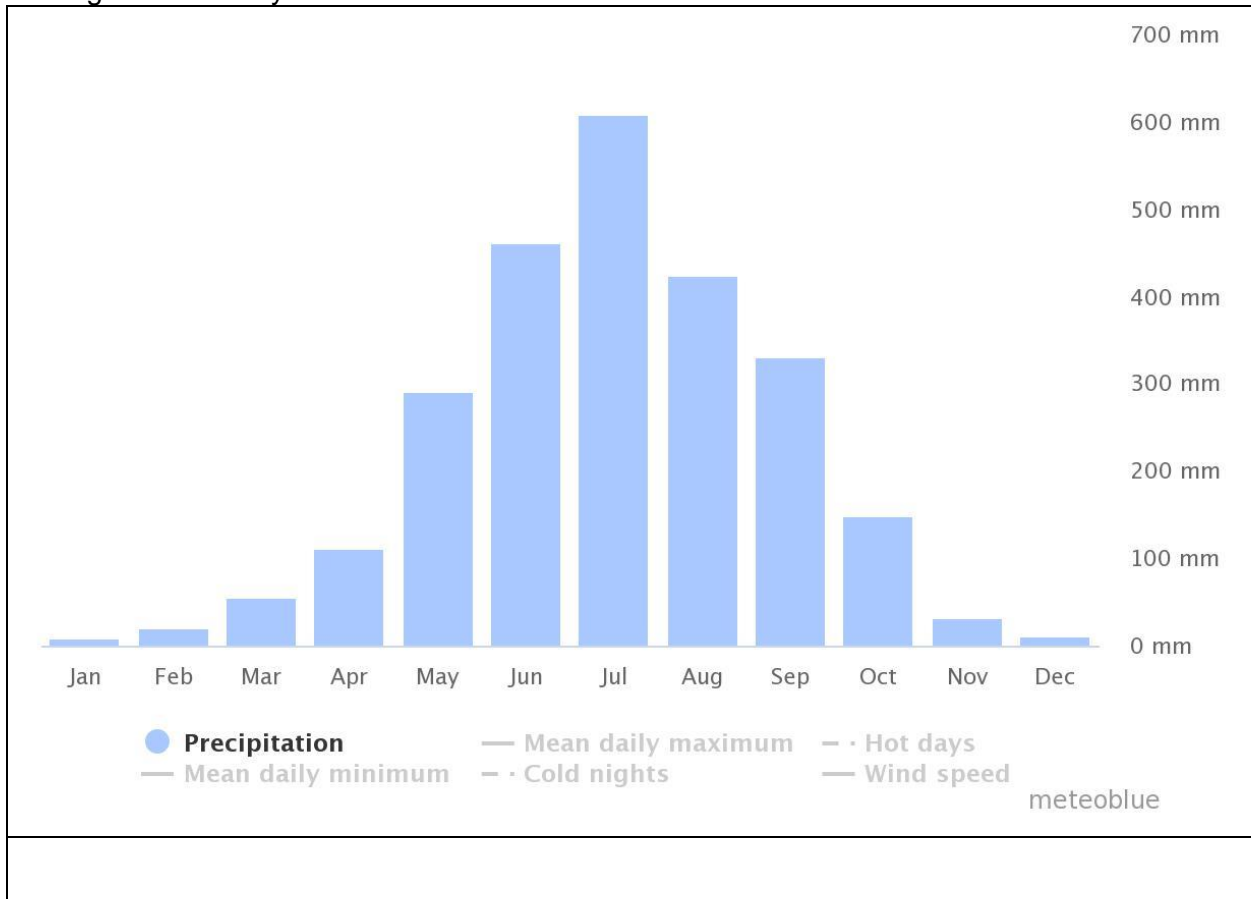
**Meteorology:**

The climate of Meghalaya is generally very humid. It is directly influenced by the south-west monsoon and north-west winter winds. The climatic conditions vary substantially from place to place due to wide differences in altitude. According to the prevailing weather condition over the years, the climate can be grouped into four conspicuous seasons namely winter season, pre-monsoon season, monsoon season and retreating season. In some places in Meghalaya, annual average rainfall has crossed the 12000 mm (470 in) and maximum temperature is around 28 °C.

The Climate of West Jaintia Hills District is uniquely pleasant and caressing. The climate shows a variation from the warm, humid tropical in the plains in the eastern and southern part and temperate climate is experienced in the western part around the district headquarter Jowai. (Source: report of CGWB)

**Rainfall**

Jowai has a Humid subtropical, dry winter climate. Jowai typically receives about 541.97 millimeters (21.34 inches) of precipitation and has 254.0 rainy days (69.59% of the time) annually. July is wettest month which receives the highest rainfall i.e. 608mm and January receives the lowest rainfall i.e. 10mm. Due to climate change effect, erratic pattern of rainfall is experienced now a days. Occurrence of water logging and flash flood has been reported during month of July..



**Figure 5 Precipitation in Jowai (Source-meteoblue)**

**Temperature:**

April is the warmest month with the temperature of 23 °C and January is the coldest with the temperature of 16 °C.

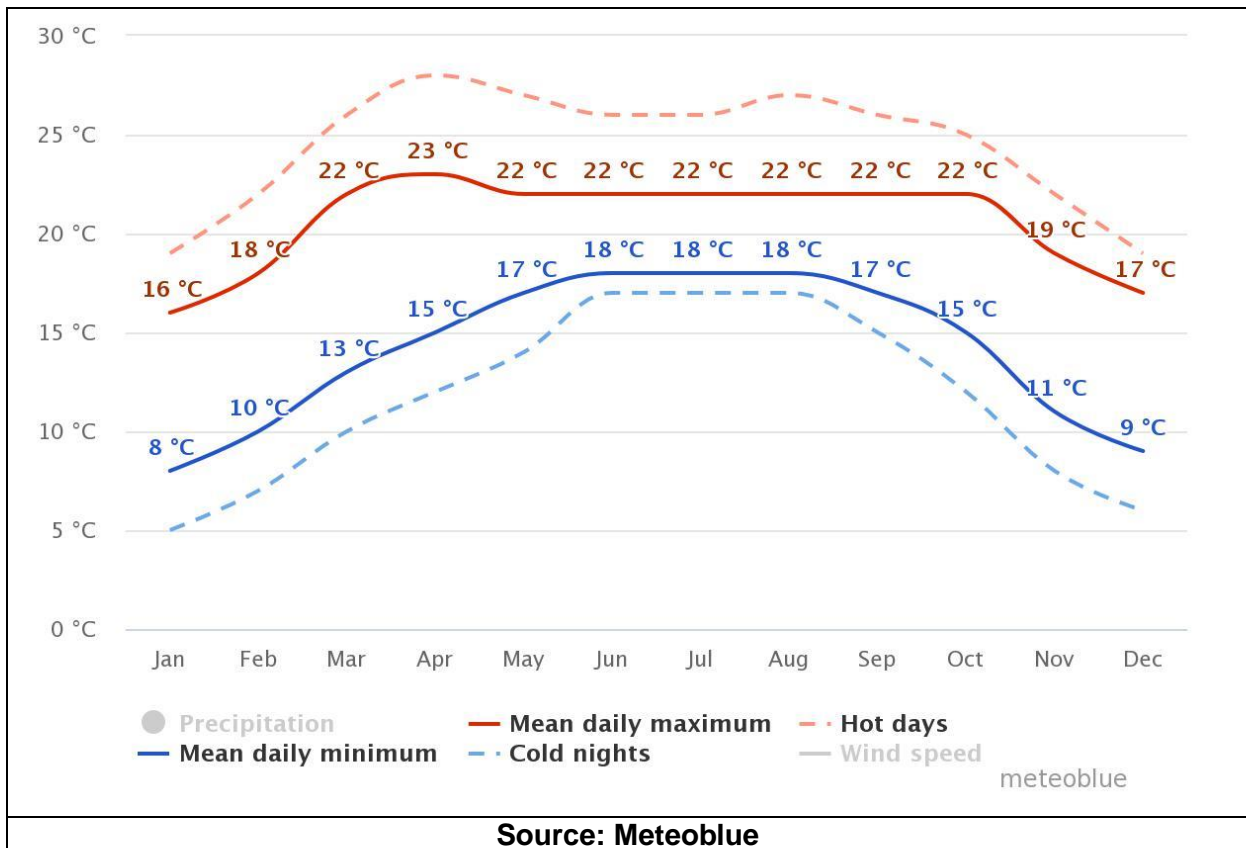
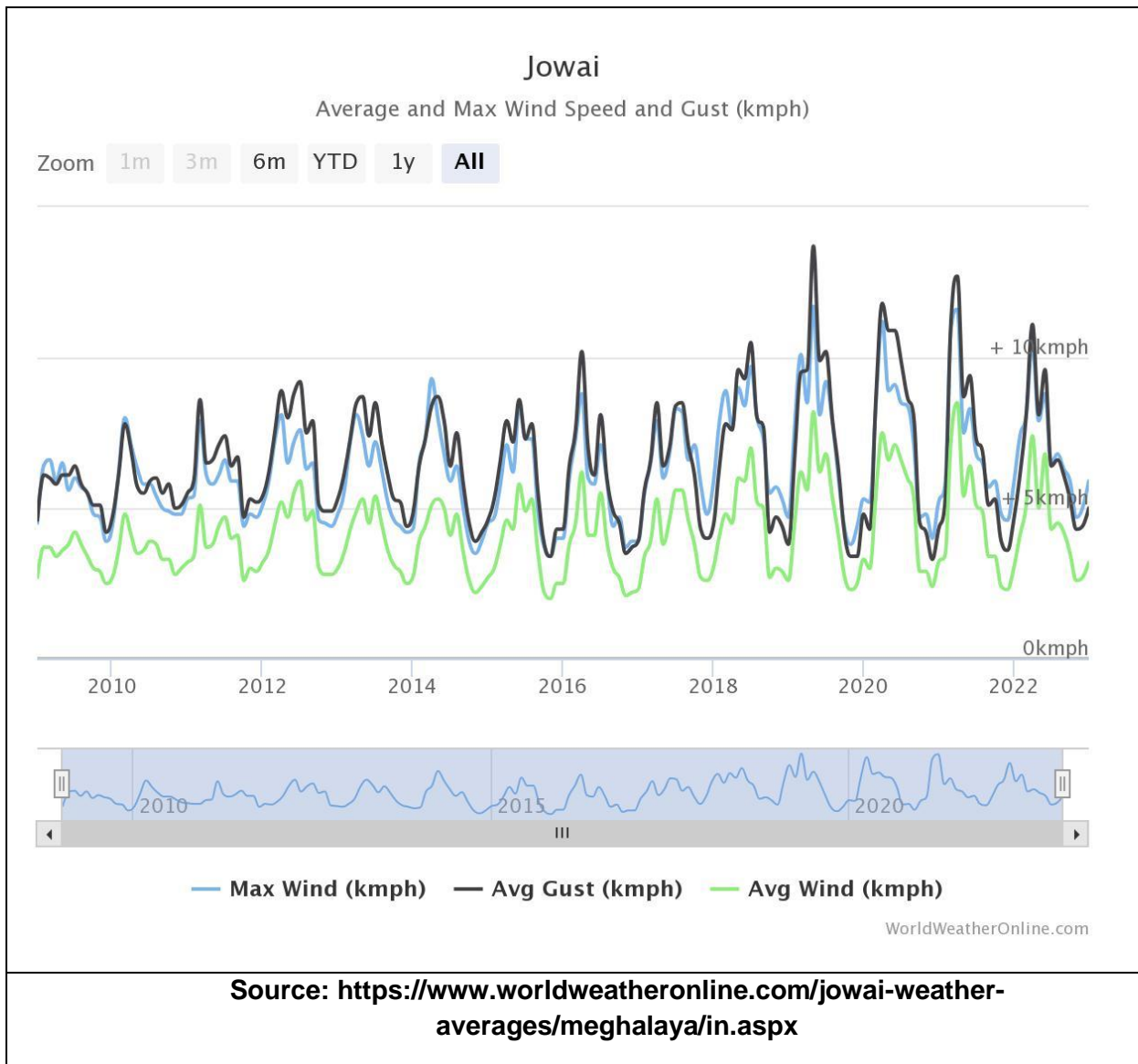


Figure 6 Average Temperature in Jowai

**Wind speed**

The maximum wind speed can be seen in the month of July with the wind speed of 5.5 Km, in this month there is a chance of soil erosion in this area. Potholes can also be created due to continuous soil erosion and water may get logged into the potholes during heavy rainfall which can ultimately led to the destruction of roads. The calmest months are November and December.

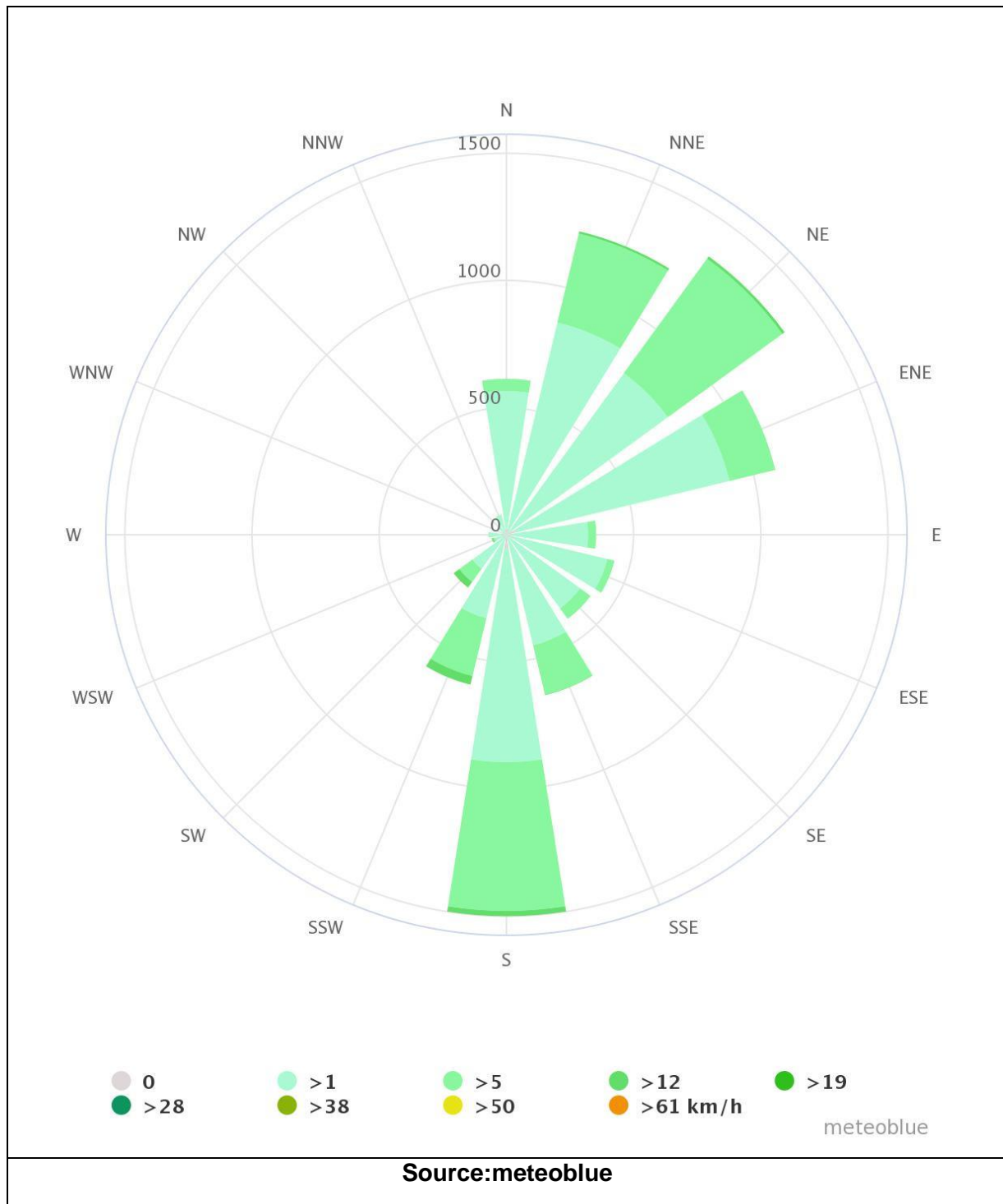


**Figure 7 Average Wind Speed in Jowai**

**Wind rose**

From the wind-rose diagram given below, it is evident that, the dominant wind direction is towards south and north east direction in Jowai.

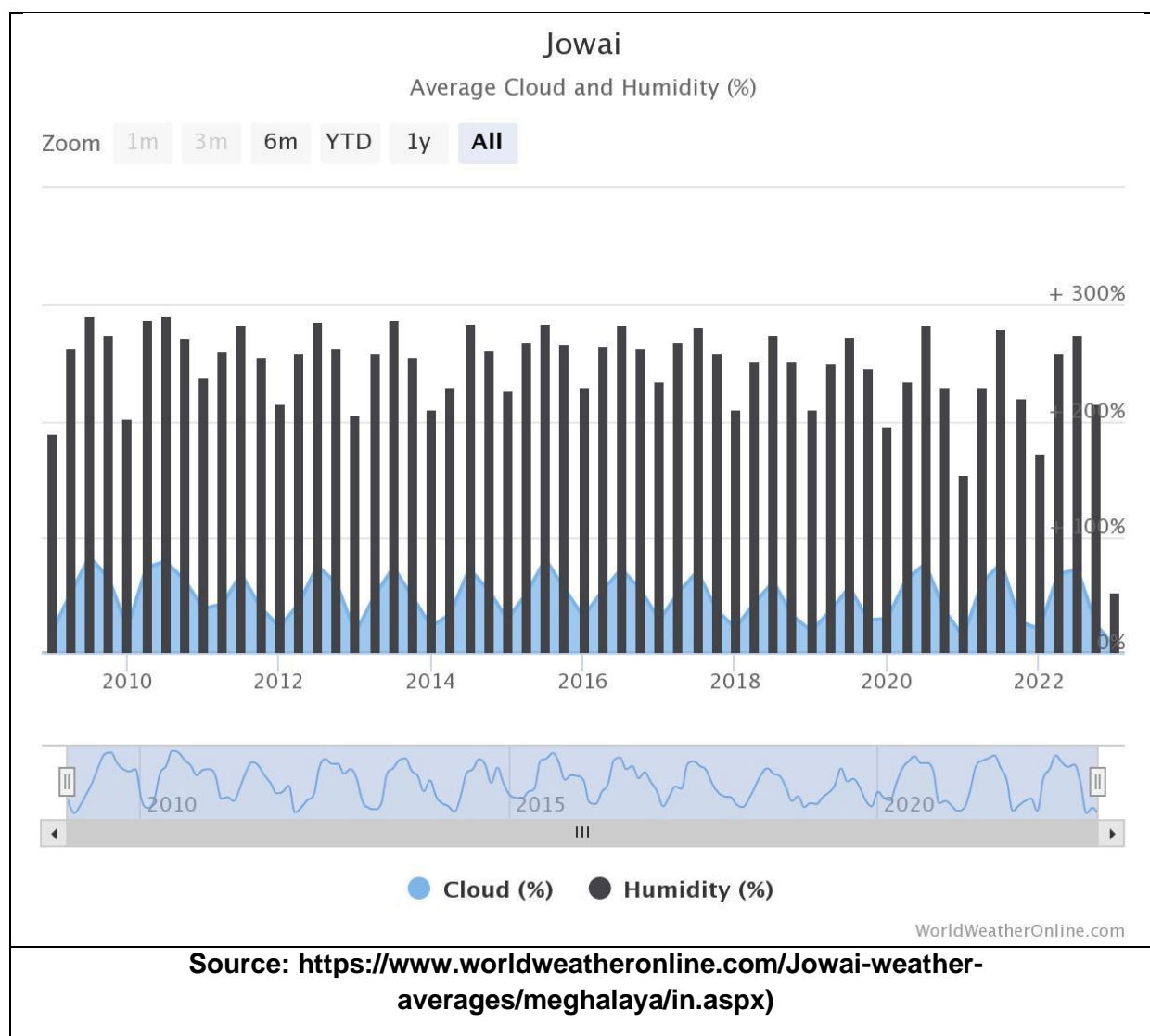




**Figure 8 Wind Rose Diagram For Jowai**

**Relative Humidity:**

The air is generally humid in this region during the monsoon reason when the maximum relative humidity was observed to be 95%. Similarly, the minimum relative humidity was observed to be 65%. Generally, the weather during other seasons was observed to be dry. The Relative Humidity is often associated with the working capacity of the labour force and shares an inversely proportional relationship. The higher the humidity, the less is the working capacity as the body gets tired and fatigued easily. Hence, construction work will be done more comfortably during the months when the humidity is lower.



**Figure 9** Average Humidity of previous 10 years

**Natural Hazards:**

As the State lies in the seismically active zone, special emphasis should be given to reduce the impacts of earthquake. Moreover, it is also affected by hazards such as floods, flash floods, epidemics, fire, hailstorm, lightning, road accidents, etc.

The State of Meghalaya has witnessed seismic events of ‘8.7 magnitude in 1897’. This region has been identified as a potential site of a future catastrophic earthquake. With the growth of population and infrastructure, seismic vulnerability has increased and previous earthquakes have provided a glimpse of the devastating potential of seismic tremors

**Seismicity:**

Earthquake is a natural disaster so necessary safety measures may be adopted considering the vulnerability to avoid enhanced risk. As per the 2002 Bureau of Indian Standards (BIS) map, the state of Meghalaya falls in a region of high to very high seismic hazard. All districts of the state of Meghalaya lie in Zone V. This state also falls in Zone V. Considering high hazard seismic zone of the project road section area, design standards for structures stipulated in the clause under IRC: 6-2014 has been taken into account.

Both the project district and project area lie over high damage risk zone V. The project area falls in a high earthquake prone zone but no such earthquake was recorded in Jowai town historically. The seismic map of Meghalaya indicating the location of project road stretch is shown in Figure below:

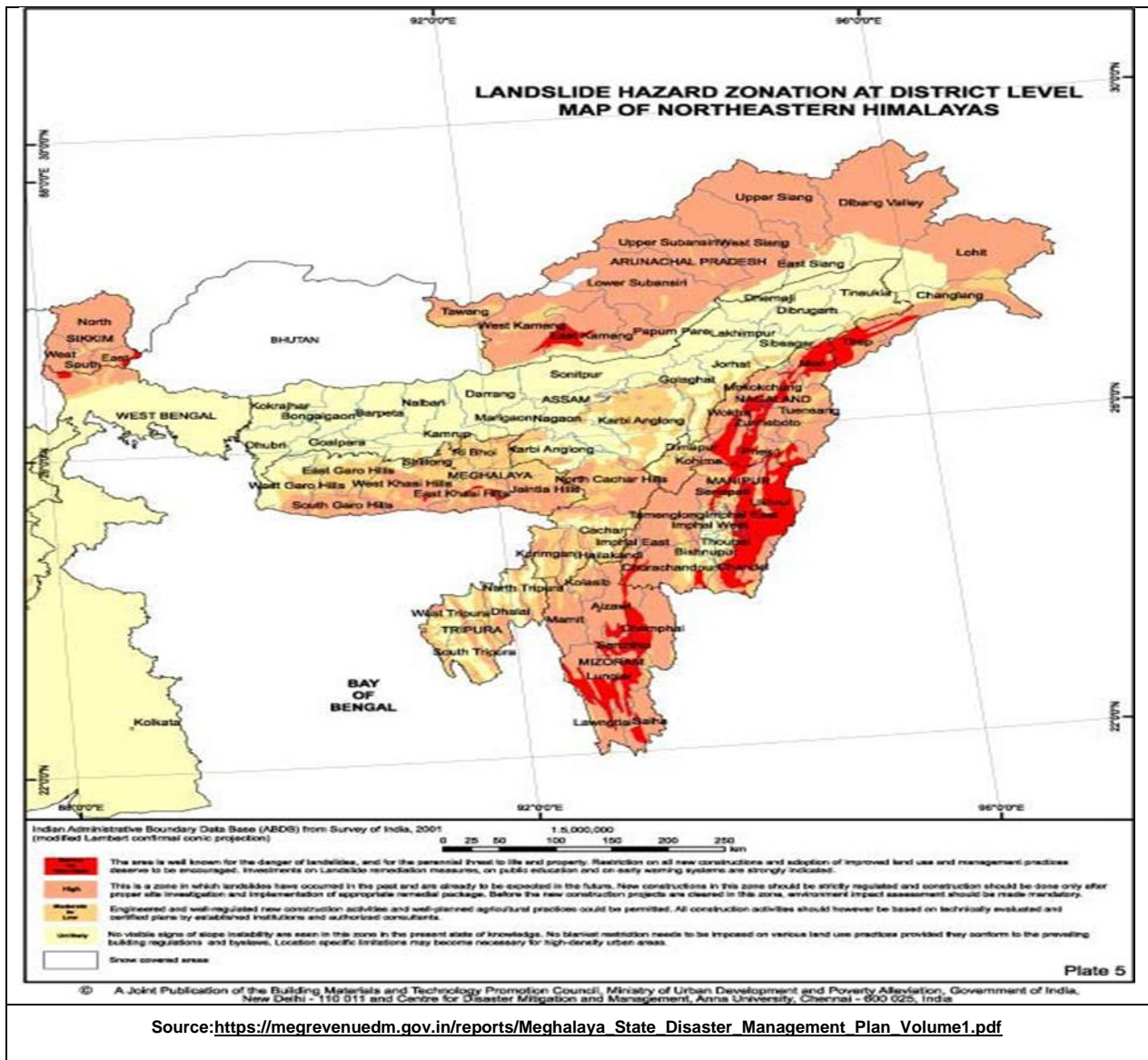






**Landslide Hazard:**

Meghalaya being a hilly terrain is prone to landslides. Every year a number of landslides have been reported from various localities. These cause a lot of miseries to public, resulting in the loss of lives and properties, disruption of communication network, besides causing economic burden on the society. Landslide is primarily attributed to high slope, immature geology, neo-tectonic activity, heavy rainfall, unplanned and improper land use practice in the State. Landslides generally occur during heavy rains, that is during the months of June to October, in Meghalaya. The existing road section comes under high landslide zones. Jowai road stretches are passing through mostly rolling terrain which is not prone to landslides. The landslide map of Meghalayas given below.



**Figure 12 Landslide Map of North-Eastern Himalayas**

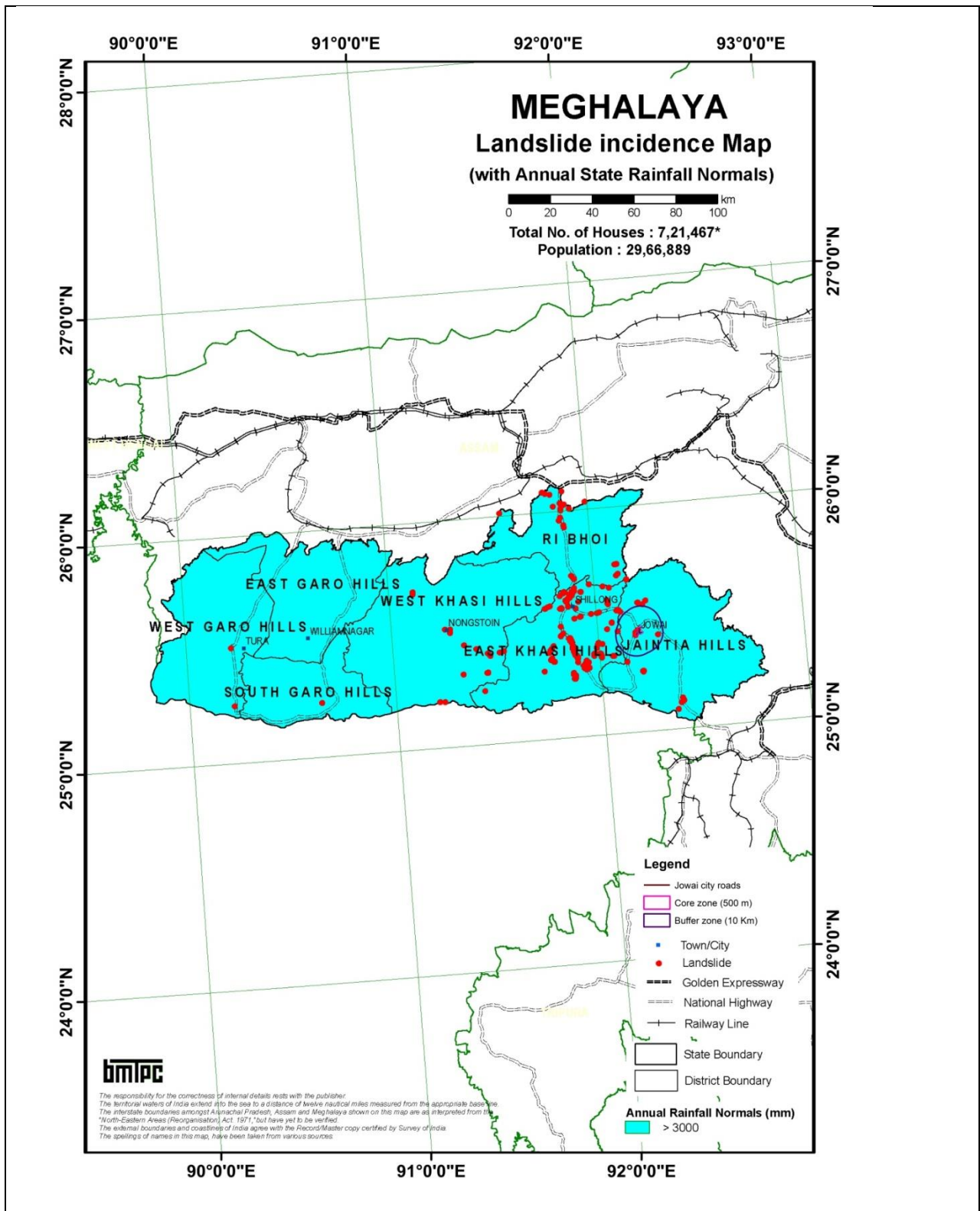


Figure 13 Landslide prone zones of Meghalaya

### Cyclone

Meghalaya is situated in the north eastern direction of Bangladesh which is highly prone to cyclone. Yearly, approx. 60% percent of the state is affected by cyclone in Bangladesh. The Districts close to Bangladesh like South West Garo Hills, South Garo Hills, South West Khasi Hills, West Khasi Hills, fall in very high cyclonic zone due to close proximity to Bay of Bengal (which is a cyclone basin). During April – May, various parts of Meghalaya observe cyclone. It has detrimental impacts on society and environment.



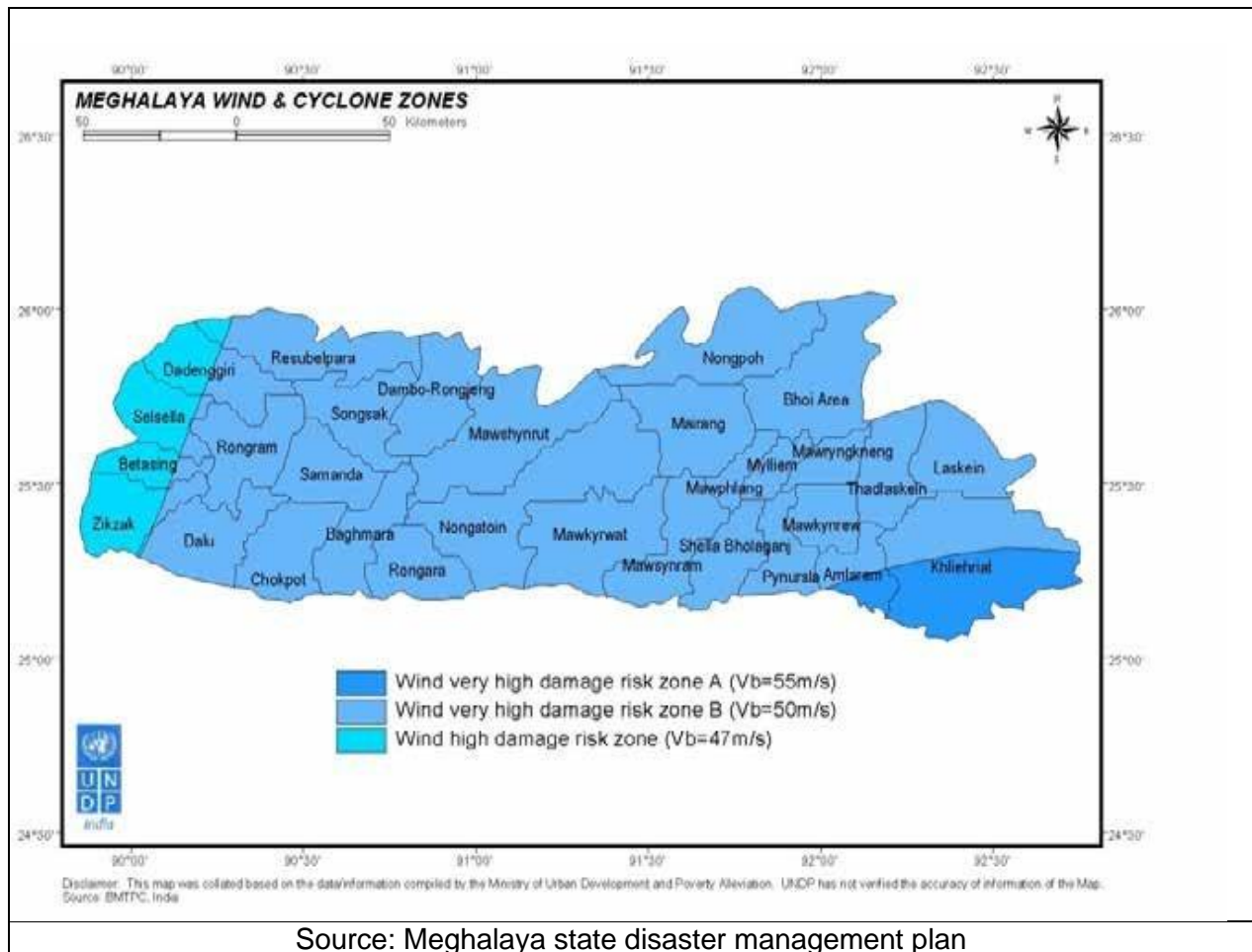


Figure 14 Map of Wind and Cyclone Zone in Meghalaya

**Land Use Pattern:**

Land utilization statistics provide detailed information of the land use pattern in the area. Mainly the project road stretches are passing through built-up area, few agricultural area and 15% land is covered with forest. The area of distribution of land utilization and the land use type the project area is given below:

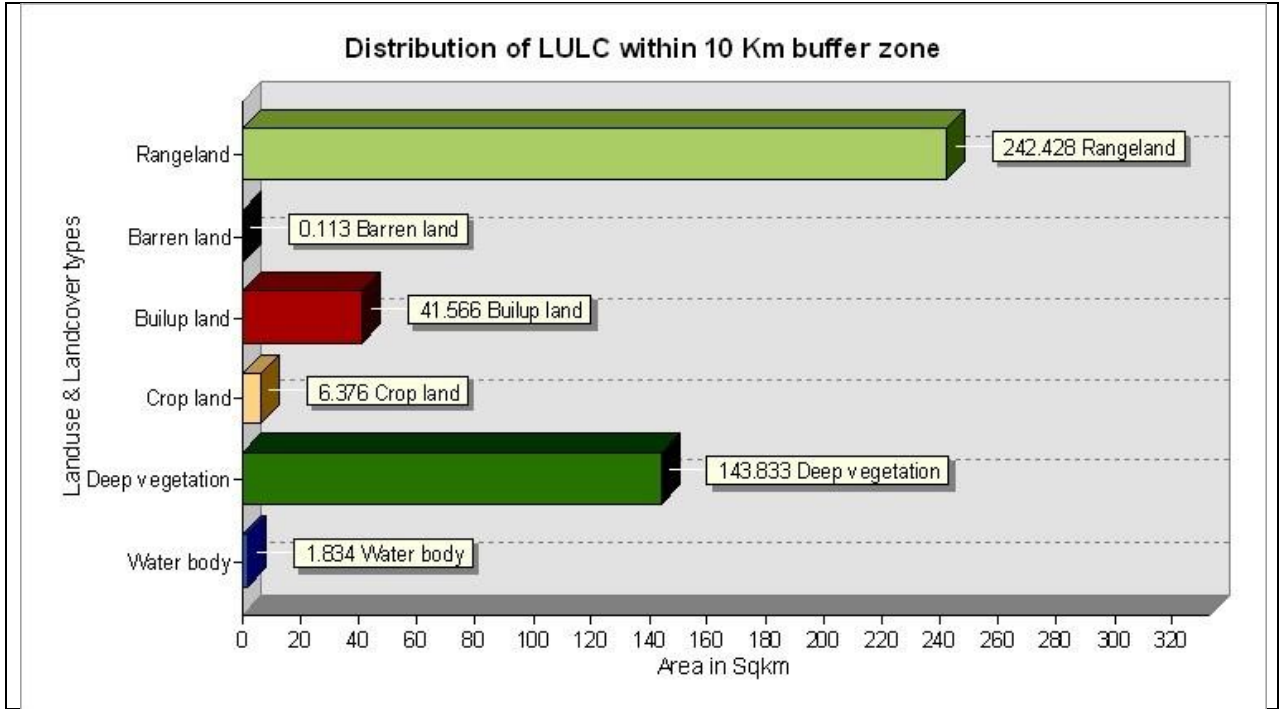


Figure 15 Distribution of LULC within 10Km Buffer Zone

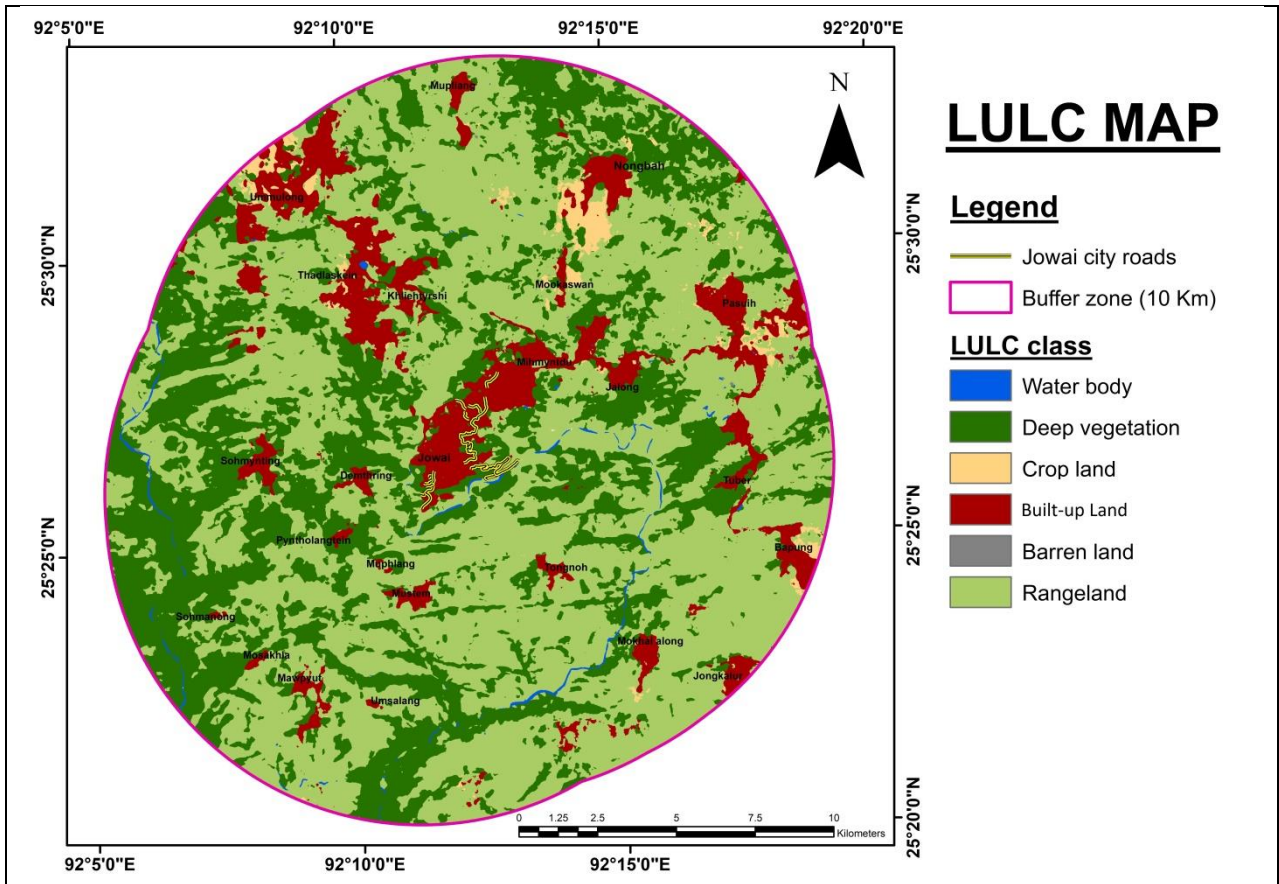


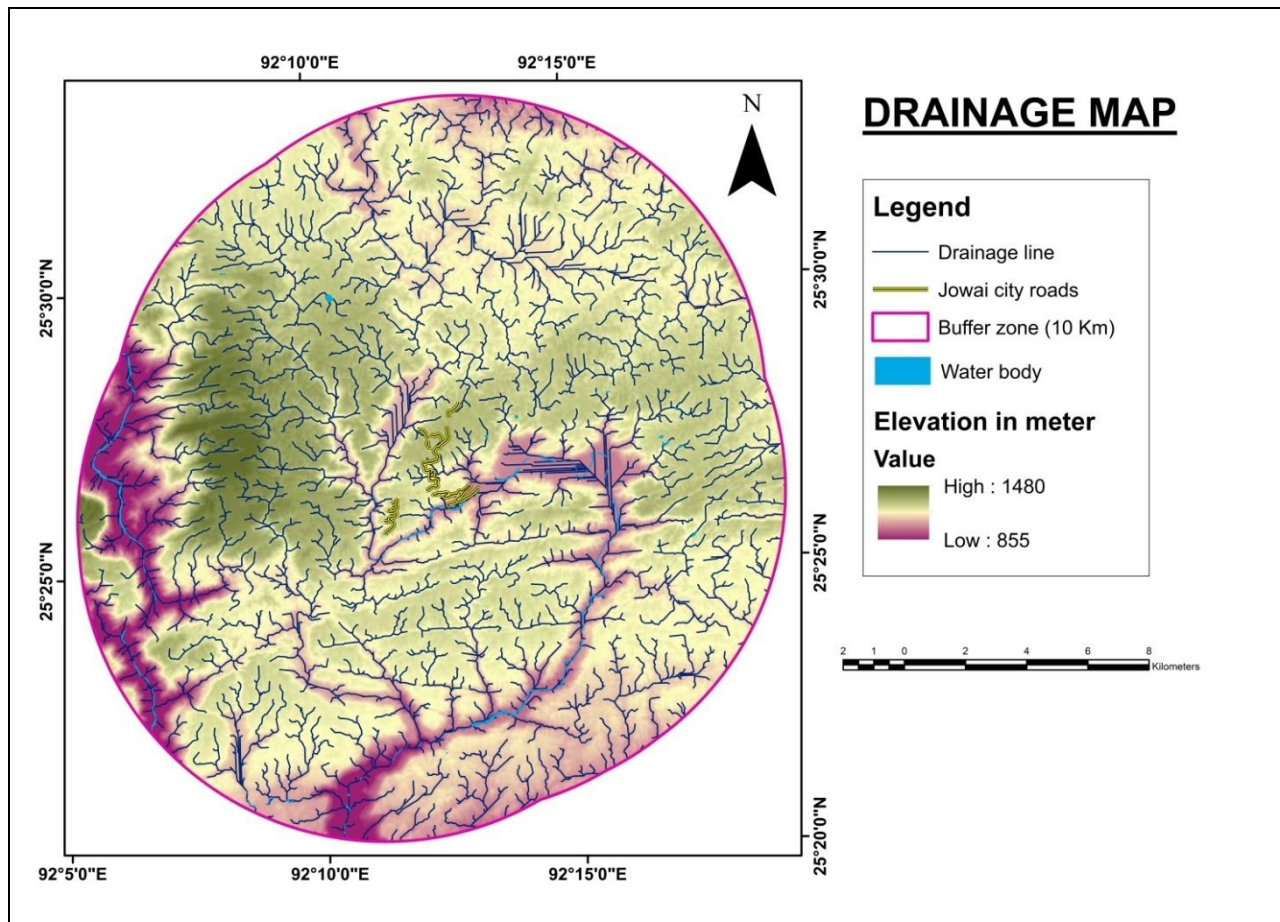
Figure 16 Land use map along the project area



### Water Environment:

There are few water bodies along the project road. Myntdu River is flowing south to the project area. River SyntuKsiar and one small stream is flowing along the project road stretches. The Myntdu river originates at a place called MihMyntdu, adjacent to Jowai town. This river encircles Jowai on three sides excluding the northern part of town. The river flows across Jowai town. The drainage map of project area is given below:





**Figure 17 Drainage map along the project road**

To understand the baseline environmental condition, the secondary information has been collected from **Revised Action Plan for Rejuvenation of River Myntdu** Prepared by River Rejuvenation Committee Government of Meghalaya for the year 2019 ([https://megspcb.gov.in/documents/Revised\\_Action\\_Plan\\_of\\_Rejuvenation\\_of\\_Myntdu\\_River2020.pdf](https://megspcb.gov.in/documents/Revised_Action_Plan_of_Rejuvenation_of_Myntdu_River2020.pdf)).

**Table 8: Water Quality Data of Myntdu River at Jowai (January – December 2019)**

Months	pH	DO Mg/L	BOD Mg/L
January	6.9	6.4	4.5
February	6.7	6.1	4.8
March	6.7	6.3	4.0
April	6.8	6.5	3.8
May	6.7	6.6	3.8
June	6.9	6.9	3.5
July	7.1	7.0	3.3
August	6.8	7.2	3.0
September	7.0	7.4	3.2
October	6.8	7.0	3.3
November	6.8	7.2	3.2
December	6.9	7.4	3.2

The sources of pollution of the rivers include both point and non-point sources. Point sources of pollution are from the dry latrines located along the river and its tributaries, effluents from hotels, restaurants, automobile workshops, slaughter houses, vegetable, meat and fish markets, hospitals, diagnostic clinics, situated in the catchment areas. Non-point sources of pollution include indirect discharge of untreated sewage, municipal waste water, dumping of

solidwastes,agricultural runoffs. However, there are no direct impact on river due to construction activities, as there is no river crossing.

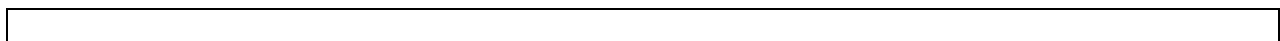


### Ground Water Quality Monitoring

The Ground water monitoring data is collected from the CPCB report for the year 2021 ([https://cpcb.nic.in/wqm/2021/NWMP\\_DATA\\_2021.pdf](https://cpcb.nic.in/wqm/2021/NWMP_DATA_2021.pdf)).

**Table 9 Ground water Monitoring Locations**

Sampling Location	Name of place	Source	Distance (Km)	Coordinates	
				Latitude	Longitude
1	Good Shaphard Parish in Ladrymba	Borewell	22.99	25°22'54.58"N	92°19'37.81"E
2	Shangpung	Spring	13.73	25°28'52.65"N	92°20'57.43"E



**Figure 18 Groundwater monitoring locations**

**Table 10 Water Quality Result**

Sl.	Parameters	Unit	Limit (as per IS:10500-2012)		Result		WHO Drinking Water Standard (Fourth Edition 2011)
			Desirable Limit	Permissible Limit	GOOD SHAPHAR D PARISH IN LADRYMBA	SHANGPUNG	
1	pH	-	6.5-8.5	No Relaxation	6.8	5.7	8.2-8.8
2	Fluoride (as F)	mg/l	1	1.5	0.2	0.2	1.5
3	Nitrate (as)	mg/l	45	No	0.63	6.40	50

Sl.	Parameters	Unit	Limit (as per IS:10500-2012)		Result		WHO Drinking Water Standard (Fourth Edition 2011)
			Desirable Limit	Permissible Limit	GOOD SHAPHARD PARISH IN LADRYMBA	SHANGPUNING	
	NO <sub>3</sub> )			Relaxation			
4	TDS	mg/l	500	2000	139	113	-
5	Electrical Conductivity	Micromhos/cm	-	-	202	118	-
6	Total Coliform	mg/l	Nil	Nil	2	2	Absent
7	Fecal Coliform	mg/l	Nil	Nil	2	2	Absent
8	BOD	Mg/L	-	-	1.6	1.4	
9	Arsenic	Mg/L	-	-	0.001	0.001	

From the above table it is found, pH ranges from 5.7-6.8, and TDS ranges from 113 to 139. Other parameters are well within permissible limits.

### Air Environment:

Air pollution is caused due to both natural and manmade processes. The main source of air pollution is human induced/manmade, which includes industrialization and its by products, burning of timber, heat and light, rapid urbanization, vehicular pollution, plastics, burning of polymers and processing of various materials emitting obnoxious gasses, generation of smoke, dust and fine respirable particles due to construction activity and rapid burning etc. Vehicular emission is the major source of air pollution now-a-day. Presently some patches of the study area are in the locality of heavy traffic movement particularly at congested places i.e. at major market areas, which may impact the ambient air quality of the area. During construction stage of the project, temporary air pollution arises due to movement of construction vehicles, operation of plants & machineries, dust emission due to excavation and demolition etc.

### Monitoring Parameters and Standards

The Environmental monitoring of the parameters involved and the threshold limits specified are discussed below: -

#### 4.1.1 Ambient Air Quality Monitoring

The air quality parameters viz. Sulphur di-oxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), Carbon Monoxide (CO) and Particulate Matter (PM<sub>2.5</sub> & PM<sub>10</sub>) shall be regularly monitored at identified locations from the start of the construction activity. The air quality parameters shall be monitored in accordance with the National Ambient Air Quality Standards.

The ambient air quality with respect to the study area forms the baseline information. The prime objective of the baseline air quality study was to assess the existing air quality of the area. This will also be useful for assessing the conformity to standards of the ambient air quality during the construction and operation phase. However, as the project has only temporary impact on air quality during the construction phase, no primary monitoring has been conducted for the project road.

The ambient air quality data is taken from CPCB report of 2021 (<https://cpcb.nic.in/displaypdf.php?id=bWFudWFsLW1vbml0b3JpbmcvTG9jYXRpb25fZGF0YV8yMDIxLnBkZg==>) as the state of Meghalaya is reportedly considered to be located in same airshed.

##### 4.1.1.1 Parameters for Sampling

The baseline data of air environment was monitored for parameters mentioned below:

1. Particulate Matter (PM<sub>2.5</sub>);
2. Particulate Matter (PM<sub>10</sub>);



3. Sulphur dioxide (SO<sub>2</sub>);
4. Oxides of Nitrogen (NO<sub>x</sub>);

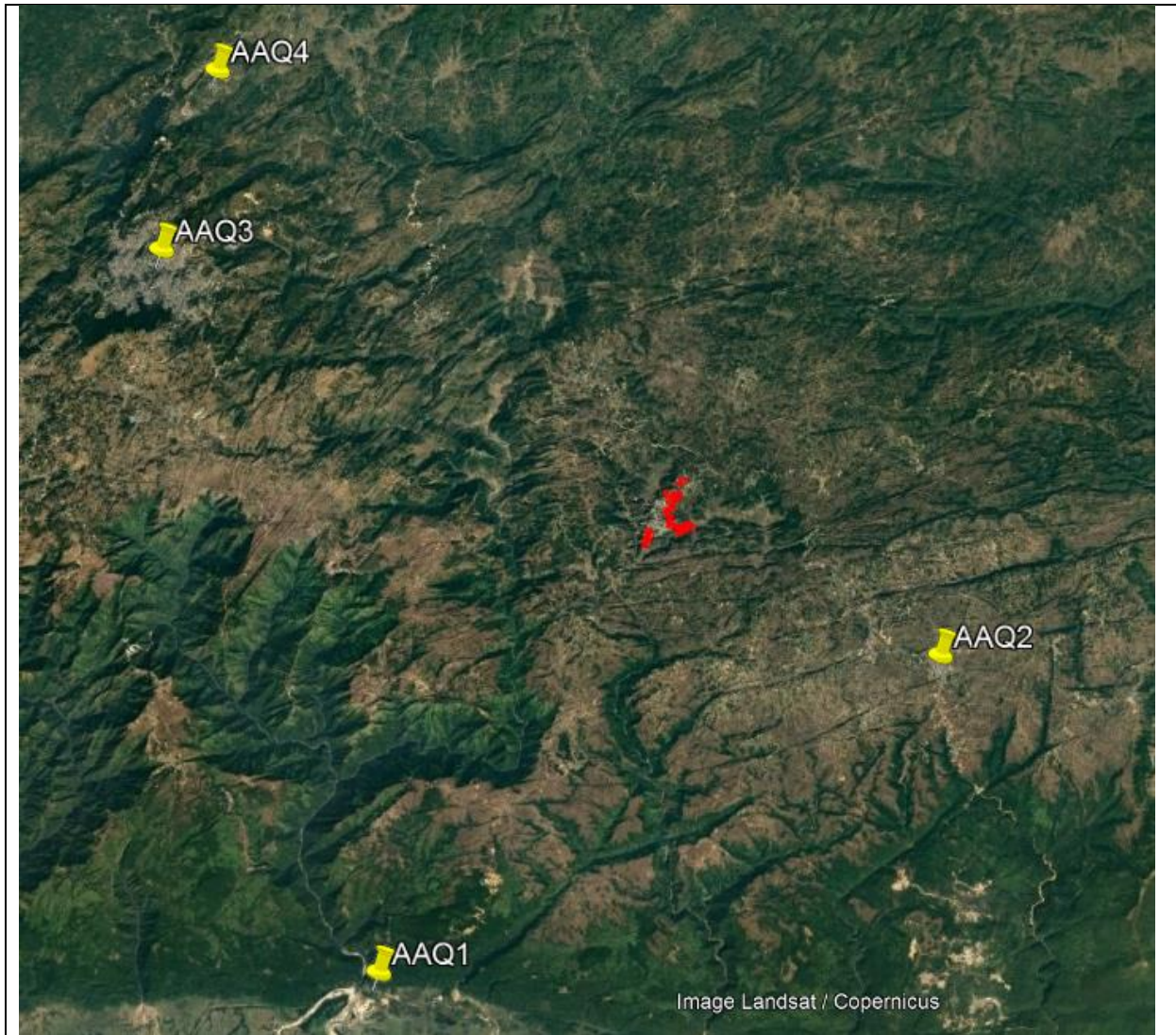
The ambient air quality of 4 locations as shown in **Error! Reference source not found.** below near the project road for particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>); and carbon monoxides (CO) using standard analysis technique is shown in table below

**Table 11 Techniques Used for Ambient Air Quality Monitoring**

Sl.	Parameter	Technique	Minimum Detectable Limit (µg/m <sup>3</sup> )
1.	Particulate Matter (PM <sub>2.5</sub> )	Gravimetric Method	10.0
2.	Particulate Matter (PM <sub>10</sub> )	Gravimetric Method	25.0
3.	Sulphur dioxide	Modified West and Gaeke	5.0
4.	Nitrogen Oxide	Modified Jacob & Hochheiser	5.0

**Table 12 Air Quality Monitoring Locations**

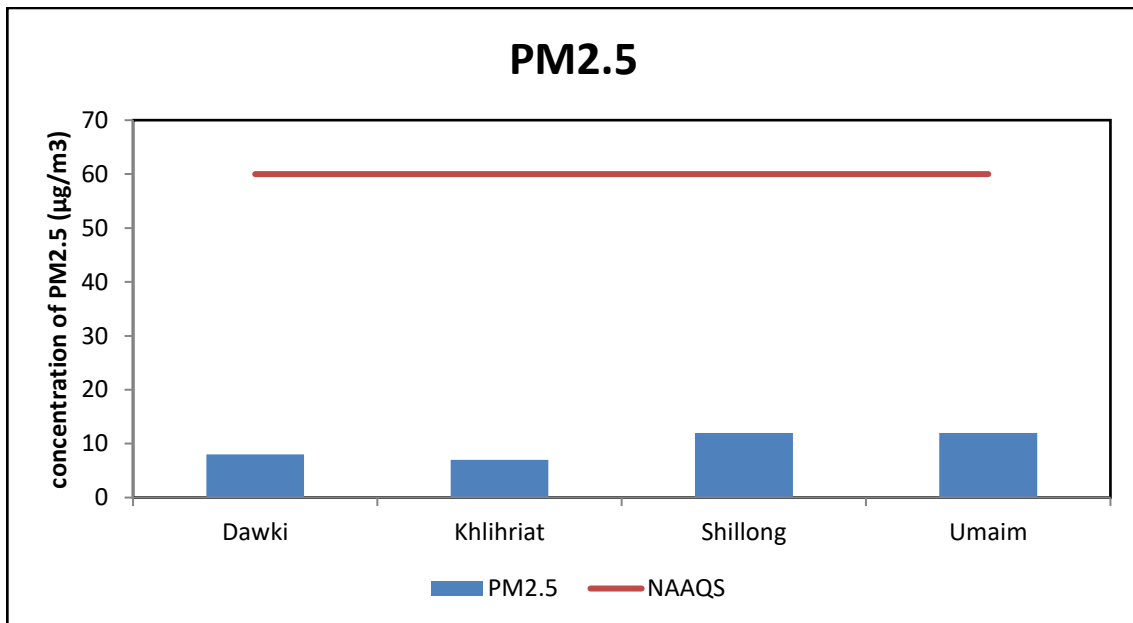
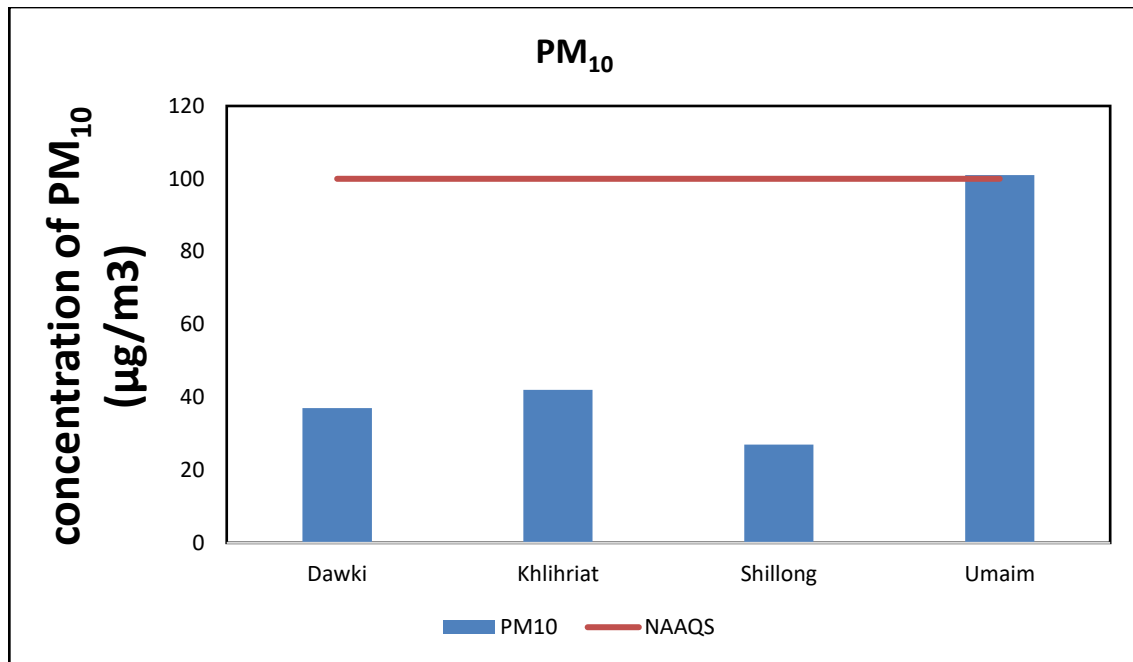
Sl.	Name of place	Distance (Km)	Coordinates	
			Latitude	Longitude
1	Dawki	31.50	25°11'2.49" N	92° 1'29.53"E
2	Khliehriat	17.19	25°21'24.21" N	92°21'50.72"E
3	Shillong	33.70	25°34'43.58" N	91°53'35.71"E
4	Umiam	36.69	25°40'36.50" N	91°55'37.29"E

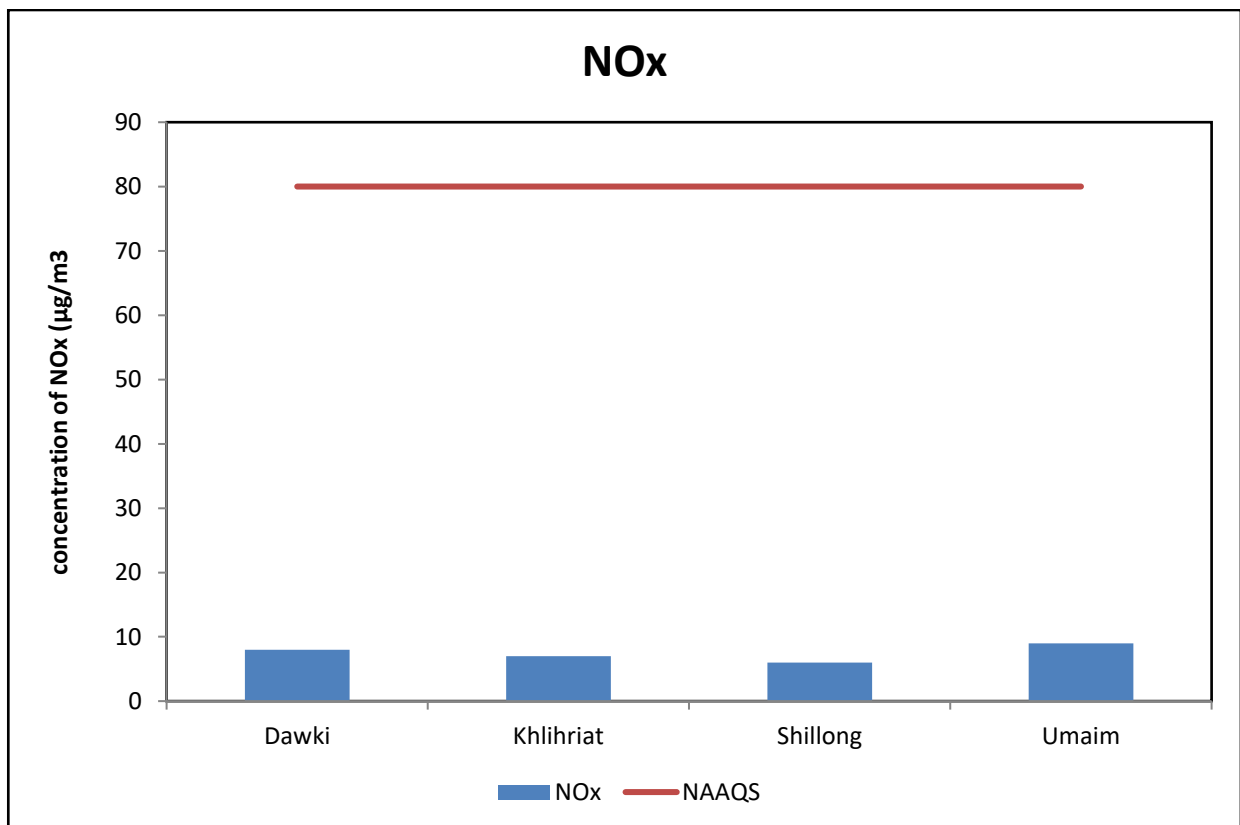
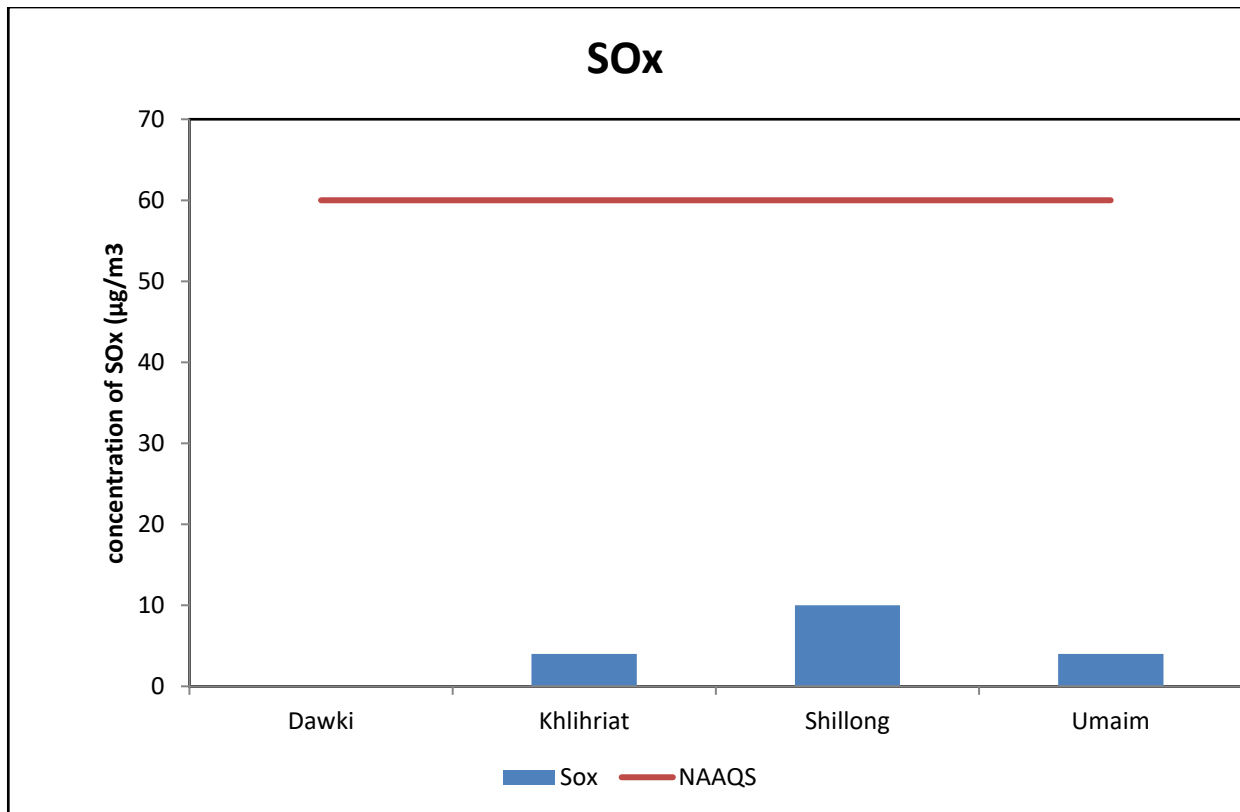


**Figure 19 Air Quality Monitoring locations**

Ambient air quality data for PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, and CO concentrations are given below. The values are compared with National Ambient Air Quality Standards prescribed by Central Pollution Control Board (CPCB).

Sl.	Location	Particulate Matter (PM <sub>10</sub> )	Particulate Matter (PM <sub>2.5</sub> )	Sulphur Dioxide	Nitrogen Dioxide
1	Dawki	37	8	-	8
2	Khliehriat	42	7	4	7
3	Shillong	27	12	10	6
4	Umiam	101	12	4	9





- Concentration of PM<sub>10</sub> varies from 27 to 101 µg/m<sup>3</sup> and its slightly exceed the permissible limit at Umiam.
- PM<sub>2.5</sub> ranges from 8 to 12 µg/m<sup>3</sup> and the level of PM<sub>2.5</sub> are well within the permissible limit at all locations.
- Concentrations of SO<sub>2</sub> and NO<sub>2</sub> are within the NAAQS permissible limit.

## Noise Environment:

Noise can be defined as any sound that is undesirable because it interferes with speech and hearing, and is intense enough to damage hearing or is otherwise annoying. Noise impacts can be of concern during construction and operational phases of the project.

Noise quality is an issue particularly at congested locations due to heavy traffic jams, horns and slow moving traffic. The educational institutions, health care facilities, Court etc. along the project corridor comprise sensitive receptors with respect to noise pollution.

The Ambient Noise Quality Standards with respect to noise have been stipulated by Govt. of India vide Gazette Notification dt.14.02.2000.

**Table 13: Ambient Noise Standards**

Area Code	Category of Area	Limits 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

\* Silence zone is defined as an area up to 100 meters around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent authority;

A separate Environment Management and Monitoring Plan for the safeguard of noise environment have been prepared to mitigate the different impacts caused due to construction activities, which is provided in the subsequent chapters.

### 4.1.2 Noise Quality Monitoring

Noise in general is sound which is composed of many frequency components of various types of loudness distributed over the audible frequency range. Various noise scales have been introduced to describe, in a single number, the response of an average human to complex sound made up of various frequencies at different loudness levels. The noise is measured as dB (A).

This is more suitable for audible range of 20 to 20,000 Hz. The scale has been designed to weigh various components of noise according to the response of a human ear. The impact of noise sources on surrounding community depends on:

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It can be observed that steady noise is not as annoying as one which is continuously varying in loudness;
- The time of day at which noise occurs, for example high noise levels at night in residential areas are not acceptable because of sleep disturbance; and
- The location of the noise source, with respect to noise sensitive land-use, which determines the loudness and period of exposure.

As, the project road stretches passing through built-up area as shown in **Error! Reference source not found.**, noise due to traffic congestion is not found. Mainly there will be noise during the construction work.

### Identification of Sampling Locations

A preliminary reconnaissance survey was done to identify the major noise generating sources along the proposed alignment. Onsite recording of noise level has been done using mobile app. The noise at different noise generating sources has been identified based on industrial, commercial, and residential activities, traffic, and noise at sensitive areas. Sound Pressure Level (SPL) measurements were undertaken at all locations, with an interval of about 5 seconds over 10 minutes per hour for 24 hr. The day noise level has been monitored from 7 AM

to 10 PM and night levels from 10 P.M. to 7 AM at 2 locations. The Details of the monitoring locations are given below.

The monitored values are compared with CPCB Ambient Air Quality Standards in respect of Noise and Guidelines for Community Noise, World Health Organization for residential areas. The monitored levels meet the National as well as WHO standards for the residential area all along the project road.

**Table 14: Noise Monitoring locations**

:

Sampling Location	Name of place	Coordinates	
		Latitude	Longitude
1	At Road no. 49 (start point)	25°26'9.57" N	92°11'31.42 "E
2	At Road no. 49 (end point)	25°26'7.74" N	92°11'28.26 "E
3	At Road no. 44 (end point)	25°26'3.95" N	92°12'34.58 "E
4	At Road no. 1 (end point)	25°27'10.17 "N	92°12'28.49 "E
Source: Mobile app data collected during site visit			

**Table 15: Day and Night Time Leq**

Sl. No	Location	Average Noise Level in dB	
		Day Time	Night Time
	At Road no. 49 (start point)	65.2	54.4
	At Road no. 49 (end point)	55.3	49.7
	At Road no. 44 (end point)	54.6	48.9
	At Road no. 1 (end point)	54.3	50.1

It can be seen from the above table that at all the monitoring locations, the ambient noise levels are well within the permissible limits prescribed by CPCB.

### Biological Environment:

Ecological resources are among the most important resources impacted by the road/infrastructure projects. The detailed baseline study of the ecological resources is essential to estimate the magnitude of potential impacts and to avoid or mitigate any loss caused by the proposed project. The baseline details of the flora and fauna are presented.

Meghalaya falls under the Indo-Myanmar biodiversity Hotspot zone. It is one of the biodiversity rich state of India in terms of diversity of both flora and fauna due to its unique geographical position at the meeting point of Indo-Malayan and Eastern Himalayan bio-geographical regions. Thus, it shares biodiversity elements including flora and fauna from both the regions. Meghalaya also shares rich species diversity containing species from Indo-China and rest of India. The diverse landscape of the state also supports a large array of forest types and species. The flora of Meghalaya comprises about 3,128 species of flowering plants of which a large number of species are endemic. Meghalaya harbours a rich diversity of orchids (Family: Orchidaceae), of which nearly 110 genera and 439 taxa are reported from the state.

Meghalaya is also considered as center of origin for a number of crop plants like rice, and Citrus based on the large number of wild relatives found in the state. True to its name,



'Meghalaya' is an abode of clouds and thus increased moisture conditions prevails. The hills rise abruptly in south, while it is gradual in north. The altitudinal variation range from 50 meters to 1950 meters with the Shillong plateau at the crest. The hills are dissected and drained by numerous rivers and rivulets draining to north and south. The climate is monsoonal with distinct warm-wet and cold-dry periods. The towns of Sohra (Cherrapunjee) and Mawsynram, which are located on the Southern part of the State, receive very heavy rainfall and amongst the wettest spots in the world.

The faunal diversity of Meghalaya constitutes a total of 5538 species recorded so far, of a total 89,451 species known from India. Nearly 35 % of Indian Mammals and 50 % of the birds are represented in the state (. Invertebrates are represented by 2114 genera and 4580 species, of which 3624 species are insects. Among invertebrates, the porifera is the smallest group represented by only one genus and one species. Meghalaya has 139 species of Mammals, 659 species of Birds, 107 species of Reptiles, 55 species of Amphibian and 152 species of Fishes. Of these, 35 species of Mammals are endangered, vulnerable or insufficiently known. Similarly, 10 species of birds and 9 species of reptiles are either endangered or vulnerable. Along with the species diversity, the State has a significant percentage of endemic elements.

#### 4.1.3 Protected Areas of Meghalaya:

The protected area network in Meghalaya occupies 1133.9 Sq. Km area which constitute about 5.06 % of the State's Geographical Area. The Protected Area Network includes 2 national Parks, 4 wildlife Sanctuaries and 1 Biosphere Reserve playing an important role in in-situ conservation of Biodiversity. As per the website of Meghalaya Forest Department, there is no protected area within the district boundary.

#### SyntuKsiar Fish Sanctuary:

The SyntuKsiar Fish Sanctuary is about 5 km from the district headquarters of Jowai and is known for its scenic beauty and rich diversity of fish species. At the heart of the sanctuary's charm lies its captivating array of fish species thriving in the winding rivers and streams that grace its landscape. Among the prominent residents, one can readily spot the catfish, the mahseer, and the elusive golden mahseer.



**SyntuKsiar Fish Sanctuary**

JaintiaJaintia

### Community Reserves:

Community Reserves or Conservation Reserves are special category of protected and it recognizes that local communities can participate in protection of threatened species and natural resources. Meghalaya has a large number of Community Reserves, the largest for any Indian state. The Govt. of Meghalaya has declared 73 private and community lands/forests into Community Reserves, to increase the area under protected networks for protecting flora, fauna and traditional or cultural conservation values and practices. There are 9 (nine) Community Reserve in West JaintiaHills district. All these area are located away from the proposed site.

Sl. No.	District	Name of Community Reserve	Area (Ha)	Distance from the site
1	West JaintiaHill District	KhlooBlaiChyrmang Sein Raij KongwasanChyrmangKmai Community Reserve	7.00	3.63 km
2		Ka KhlooLangdoh Kur Pyrtuh Community Reserve	15.4	7.69 km
3		KhlooAmrawan Community Reserve	128.75	16.82 km
4		KhlooBlai Ka Raij U Langdohlonglang Community Reserve	15.12	5.34 km
5		Ka Lum LuweCommunity Reserve	14.1	
6		Ka Wah Umpatho Community Reserve	31.864	
7		Ka KhlooThangbru Sula Lynter Sein Raij Mynso Community Reserve	3.293	
8		Ka KhlooBlai Lyngdoh Sein Raij Mynso Community Reserve	0.852	
9		Ka KhlooBlaiLangdoh Ka Kur LyngdohRaijRaliang Community Reserve	3.51	
<b>Grand Total</b>			<b>219.889</b>	

### Sensitive Ecological and cultural attributes:

The table below gives the ecological profile of the project area indicating the critical ecological, Historical and cultural features -

Ecologically/Culturally significant feature	Availability within project area
Wildlife Sanctuary	No
National Park	No
Ramsar Site	No
Biodiversity Heritage Site	No
Biosphere Reserve	No
Important Bird Area	No
Key Biodiversity Area	No
Wildlife Corridor	No
Elephant Corridor	No
Tiger Reserve	No
Reserve Forest	No
Elephant Reserve	No
Community Forests	Yes, 9 No.
Sacred Groove	No
Archeological Sites	No

Ecologically/Culturally significant feature	Availability within project area
Unprotected / Non Classified Forest	Yes
Major River	No
Fish Sanctuary	Yes, SyntuKsiar Fish sanctuary
Surface water bodies	Yes. Small ponds mostly used for fishery.

## Biodiversity Profile of the project area

### Vegetation

Jaintia Hill district has the biggest forest cover in the state. According to 1991 census, the total forest cover is about 37.6% of the total area of the district. The natural vegetation of the District is sub-tropical. The large scale un-scientific land use practices have resulted in the depletion of primary forest and colonization of the degraded sites by *Pinus kesiya*, which grows well to develop into secondary forests. Besides, the forest floor is covered with the species like *Eupatorium adenophorum*, *Lantana camera*, *Rubus* species, *Paspalum orbiculare*, *Isachnehimalaica*, *Globba clarkia* etc. being located in the urban areas, there is no such protected category vegetation are found. (Reference: Dept. of Agriculture, Govt. of Meghalaya).

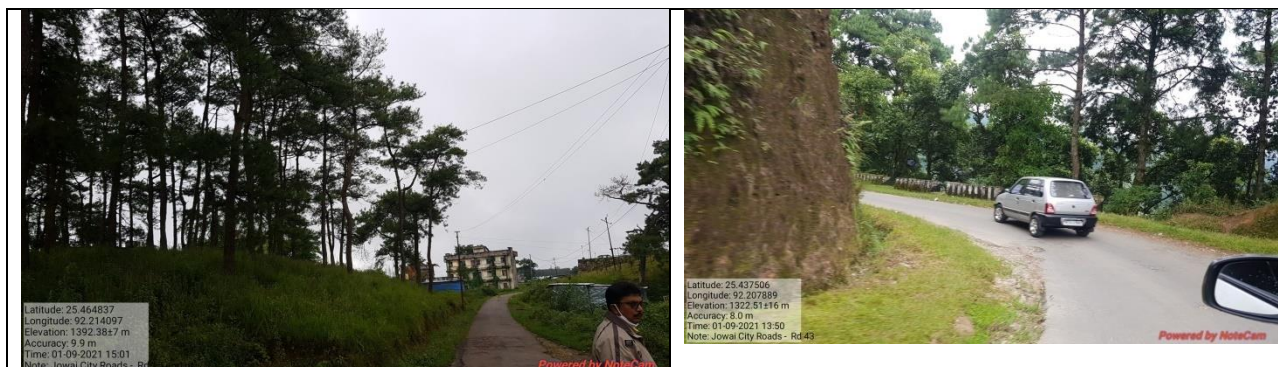


Figure 20: Plant species along the project road

### Fauna in Study Area:

On the basis field observations, there is no major wildlife as there are no forest areas in and around the project road alignment. Primary field surveys are conducted through random observation in the study area and also information collected from elderly persons of the area, forest officials.

### Educational Institutions/ Commercial Buildings

2 No. of schools, 2 No. of colleges and 3 No. of commercial structures are there along the project road stretches.





Office of the Jowai Municipal Board



Sports Hall



Jowai Polytechnic



Police Public Secondary School



Kiangnangbah Govt. College



School



Commercial Building

## Religious Structures

1 no. of Cemetery and 1 Church is located along the project road stretches .



## Socio-Economic and Health Environment

The project road falls under West Jaintia Hills districts of Meghalaya state.

### Social Environment

#### 4.1.4 The State Profile of Meghalaya

The State of Meghalaya was carved out of Assam as an autonomous State in April 1970 and was declared a full-fledged State in January 1972. Meghalaya, situated in the north eastern region of India is a narrow stretch of land, running between Bangladesh on the South and West and Assam on the North and East, Meghalaya lies between 24° 58' N to 26° 07' N latitudes and 89° 48' E to 92° 51' E longitudes. It covers an area of 22,429 sq. km. The State has most of its land covered by hills interspersed with gorges and small valleys. Endowed with dense forests and rivers cascading down undulating terrain, this region is one of the most scenic of the North Eastern States.

Thus, out of the total forest area of 15,657 sq. km in the State only 1,027.20 sq. km is under the control of State Forest Department, which constitutes only 4.58 % of the total geographical area of the State and 6.56 % of the total forest area of the State. Rest of the area is either private or clan /community owned and is under the indirect control and management of the Autonomous District Councils.

The population of Meghalaya is predominantly tribal, the main tribes are the Khasis, the Jaintias and the Garos besides other plain tribes such as Koch, Rabhas and Bodos etc The Khasis and the Jaintias predominantly inhabiting the districts towards eastern part of Meghalaya, belong to the Proto Austroloid Monkhmer race. The ESIA Study Proposal of Roads lies under West Khasi, RiBhoi, South West Khasi, Jaintia, East Garo Hills respectively.

#### 4.1.5 District Profile:

West Jaintia Hills is an administrative district in the state of Meghalaya in India. The united district (Jaintia Hills District) was created on 22 February 1972 and occupied an area of 3819 km<sup>2</sup> It had a population of 270,352 (as of 2011). The district is part of the Meghalaya



subtropical forests ecoregion. With the bifurcation of the erstwhile Jaintia Hills District into East and West Jaintia Hills Districts, West Jaintia Hills District came into existence on 31 July 2012 with its headquarters at Jowai. Jowai is the host of all the heads of important governmental offices and establishments, educational institutions, hospitals, banking institutions, etc

Jowai is a Municipality city in district of West Jaintia Hills of Meghalaya. It is situated 64 km away from the state capital Shillong. It serves as district headquarters and is an important business and education hub for the entire district. As per 2011 India census, Jowai had a population of 28,430. Climate of Jowai is pleasant, neither too hot in summers nor too cold in winters. The rain profile is very high during the south west monsoon. During the last few years, the intensity of rainfall in the district has registered a rising trend. The district's most popular modes of transport are Maruti, Alto and private Taxi. In absence of any Rail or Air links, Roads are the only lifeline for Jowai.

#### 4.1.6 Demographic Profile

As per the Population Census 2011, there are total 4,942 families residing in the Jowai city. The total population of Jowai is 28,430 out of which 13,675 are males and 14,755 are females thus the Average Sex Ratio of Jowai is 1,079.

**Table 16: Demographic Profile of West Jaintia Hills District**

Description	Total	Male	Female
Total Population	28430	13675	14755
Children	3,857	1,958	1,899
Literacy	91.10%	78.70%	78.80%
Scheduled Caste	102	60	42
Scheduled Tribe	25,941	12,249	13,692
Illiterate	6,043	2,915	3,128

Source: Census 2011

**Table 17: Distribution of Rural and Urban Population**

Description	Urban	Rural
Population (%)	92.80 %	7.20 %
Total Population	366,694	28,430
Male Population	182,610	13,675
Female Population	184,084	14,755
Sex Ratio	1008	1079

Source: Census 2011

#### 4.1.7 Schedule Castes and Schedule Tribes

The social stratification of the project area shows of Schedule Tribe population with 91.2% households. The second stratum of the social grouping in the area is of Schedule caste population of 0.4%.



#### **4.1.8 Literacy Rate**

The total literacy rate of Jowai was 91.1% in 2011 which is greater than average literacy rate 74.43% of Meghalaya. Population-wise, out of total 22,387 literates, males were 10,760 while females were 11,627. Also, the male literacy rate was 91.83% and the female literacy rate was 90.44% in Jowai.in the PIA.

#### **4.1.9 Employment Pattern**

Economic backwardness is the leading problem of the state as majority of the population is below the poverty line. Although the state is rich in mineral resources, the industrial linkages are virtually absent and government is the major source of employment in the organized sector. Activities like animal husbandry, fishery, poultry and horticulture have not been targeted as a major source of employment. Therefore, agriculture forms the only option for the people to seek gainful employment. This too is influenced by impediments such as shifting agriculture, poor productivity, land tenure system and traditional methods of cultivation. All these factors have resulted in poor land and labour productivity.

As unemployment and poverty are correlated, it becomes necessary to understand the occupational pattern of labour force and status of employment to analyse the development in the state.

#### **4.1.10 Economic Development**

Meghalaya has predominantly an agrarian economy with a significant commercial forestry industry. Meghalaya's gross state domestic product for 2012 was estimated at 16,173 crore (US\$2.5 billion) in current prices. The state is geologically rich in minerals. The state has about 1,170 km of national highways. It is also a major logistical centre for trade with Bangladesh. Meghalaya has an ideal location advantage for South East Asia Market. The neighbouring countries of India viz Bhutan, Bangladesh, Myanmar has been involved with the state for business and commerce. It has a huge potential to reach other South Asian countries as well. Meghalaya is also geographically rich in minerals and has the potential for industrial setups based on these mineral resources. Above all the Meghalaya Industrial Policy is framed for the ease of doing business and increase trade and commerce. The added advantage being the climate in Meghalaya is good for the development of electronics chips.

Different types of Industry that can be ideally formed in the state are Mineral based Industry, Horticulture and Agro-Based Industry, Electronics and Information Technology, Export Oriented Units, Tourism and besides these the recent development in the state has seen many upcoming service sectors on customer service, real estate's etc. The State Government also provides various types of Central and State Incentives for the established Industrial Setups which includes Transport Subsidy, Income Tax Exemption, Excise Exemption, Capital Investment Subsidy, Special Incentives for Food Processing, Subsidy on Comprehensive Insurance, Power Subsidy, Subsidy on Power Line (33 K.V. and above), Employment Subsidy, Refund of Central Sales Tax.

#### **4.1.11 Road Network**

Meghalaya has a road network of around 7,633 km, out of which 3,691 km is black-topped and the remaining 3,942 km is gravelled. The state has couple of national highways running through it viz NH 40, NH 44, NH 51 and NH 62.

#### **4.1.12 Railway**

Meghalaya has a railhead at Mendipathar and regular train service connecting Mendipathar in Meghalaya and Guwahati in Assam. Guwahati is the nearest major railway station connecting the north-east region with the rest of the country through a broad-gauge track network.

#### **4.1.13 Aviation**

The state has an airport at Umroi which is at a distance of 30 kilometres from Shillong. There is also a helicopter service connecting Shillong to Guwahati and Tura. Baljek Airport near Tura became operational in 2008. Other nearby airports are in Assam, Borjhar, Guwahati airport, about 124 kilometres (77 mi) from Shillong. Newly operational Rupsi Airport is also near to Tura.

#### **4.1.14 Agriculture and Cropping Pattern**

Jaintia hills district has a total cropped area of 36479 Hectares out of which only 412 hectares (1.12%) is sown more than once or under double cropping and the rest under single or mono cropping system. About 70 percent of the total cultivated area is under rain fed condition and is used mainly for cultivation of ICAR-ATARI-III, Umiam Page 8 Kharif crops like Rice, Maize, and Soybean etc. Land utilization for Rabi crops is very less. The district experienced steep decline in the cropped area due to coal mining activities. The major crops are rice (occupying an area of 49%), maize (13%), Spices (7%), Arecanut (7%) and vegetables (8%). Maize cultivation both kharif and rabi are taken up by the farmers of the district as maize not only provides source of income but also provides feed for animals. In the past, farmers grow paddy once a year but now the farmers have come forward to cultivate this type of Boro Paddy, as it increases the crop production. In the lower altitude areas, boro paddy cultivation is taken up. In mid altitude and high altitude, multiple cropping was taken up in areas where irrigation is assured with a view to increase the cropping system, also converting mono cropping into double cropping system like growing potato and vegetables in paddy field. This was done after harvesting of paddy and then followed by potato or vegetables in the same areas and it was observed that production is more from both paddy and vegetables.

#### **4.1.15 Animal Husbandry**

Animal husbandry and Agriculture are related with the overall socio – economic conditions of rural tribal people of Meghalaya. Besides there is one Cattle Farm at Khliehtyrshi, one Poultry farm at Jowai one Pig Farm at Thadlaskein, one Sheep and Goat Farm at Saitsama for rearing of improved breeds of livestock for producing pedigree stock for distribution to the interested breeders. There is one Fodder & Seed production Farm at Saitsama for raising of fodders and fodder seeds production for distribution and one Dairy Milk Plan at Jowai for Pasteurising of Milk procured from the Dairy Co-operative Societies / Farmers. The present livestock population in the district is 637275. Out of which 58 % are Poultry, 23% cattle, 14% Pigs and 4% Goats.

#### **4.1.16 Fishery**

The PIA has unique topographical condition. The district is backward in Fishery with 1453 number of culture ponds and a total fish production of 282.2 metric tonnes. There are 2 fish seed farm FRP and one Eco hatchery. With the introduction of the Aqua mission scheme, there has been development of existing water bodies and creation of additional water area for large scale fish production, including reclamation of marshy and swampy lands.

#### **4.1.17 Hospitals**

The PIA has 1 hospital, 2 dispensaries, 8 primary health centres, 3 community health centres, 27 sub centres, 1 leprosy control unit, 1 set centre, 1 ayurvedic dispensary and 3 homeopathic dispensaries. Para medical personnel registered within 1km during the year for the service of the people of the district.

## 5 CHAPTER-V: ANALYSIS OF POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS & MITIGATION- MEASURES

During Planning and Design phase the road alignment, construction details, materials of construction etc. ultimately decide the impacts during later phases are evaluated. Most of the impacts are occurred during construction and operation phase. While some of the construction phase impacts are temporary, others are permanent. Operation phase impacts are continuous in nature. The important criteria for identification of impact are the identification of the impact zone. For ESIA study, a direct Corridor of Impact (COI) within 500 m road alignment has been considered.

Environmental parameters are broadly classified into three groups.

- a) **Physical Environment includes:** Water Resources, Water Quality, Air Quality, Noise and Land environment etc.
- b) **Biological Environment includes:** Terrestrial and aquatic biodiversity and Roadside Plantation etc.
- c) **Social Environment includes:** Demography, Employment, Agriculture, Housing, Culture etc.

### Environmental & Social Impacts and Mitigation Measures

The assessment of potential environmental impact consists of comparing the expected changes in the environment with or without the project. The analysis predicts the nature and significance of the expected impacts. The detail of potential impacts & mitigation measures are mentioned below.

#### 5.1.1 Impacts During Design/ Pre-constructional Phase

The project envisages only overlay on the existing road network and thereby extending its service life. No additional RoW is required for the project. No land acquisition or tree felling is envisaged. Therefore, the project has minimal or negligible impact during Design and Pre-construction phase.

##### 5.1.1.1 Impacts on Physiography

The project section is already existing road and located on hill and plain terrain. The same alignment will be followed for improvement from existing single lane with earthen shoulder to standard single lane configuration with paved shoulder and geometric correction at few locations. The existing ground profile will be followed with minor profile corrections at few locations without significant alteration of existing vertical profile, except for improvement of geometrics and road safety. The rehabilitation and widening will be generally restricted within the existing ROW. The entire project lies over flat land. The project will not have any impact on the topography/ Physiography within the project influence area and hence does not require any mitigation measures.

## Ambient Air Quality

Impact to air environment during pre-construction stage will be limited to activities such as setting of construction camp, unloading of materials, exhaust from Diesel Generators, etc.

### Mitigation Measure:

- Consent to Establish for emission/continuation of emission under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 should be obtained for Diesel Generator Set (s) of >15 KVA for Non-Industrial use from SPCB
- LPG should be used in the labour camps for cooking purposes instead of wood.

### **5.1.1.2 Felling of Trees**

No tree felling is envisaged for the proposed road network as it passes through existing RoW. The project road is not passing through any reserved or protected forest. Hence does not require any mitigation measure.

### **5.1.1.3 Impacts on Fauna**

There is no wildlife habitat located along the project area nor any migratory route/ animal crossings in the project area. So any risk or impact on wild animals or incidence of habitat fragmentation or disturbances to the wildlife migration route due to project is not anticipated in any of the project sections.

### **5.1.1.4 Impacts on Ecologically Protected Area**

There is no ecologically sensitive or protected areas such as Wildlife Sanctuary, National Park or any other notified sensitive area located in any Eco-sensitive zone. Further no movement of wild animals has been reported near the project alignment. So, any impact on such feature due to the project is not envisaged.

## **5.1.2 Impacts during Construction Phase**

Most of the adverse environmental impacts are related to construction works which are inevitable but are manageable through certain environmental friendly practices. The negative environmental effects can be taken care of at an early stage through proper engineering designs and by adopting suitable mitigation measures.

The standard road construction works involve site clearance, excavation, filling of earth materials and sub grade materials, laying of bituminous mixtures, handling of hazardous materials like bitumen, diesel, etc., dumping of unusable debris materials, transportation of materials from production site to construction site, and other constructional activities and associated works like mobilization of constructional equipments, setting up of different construction plants, setting up of workforce camps, quarrying, material storage etc. These activities have certain impacts of various magnitudes on different components of environment. The anticipated impacts due to all these activities have been described below:

### **5.1.2.1 Compaction and Contamination of Soil**

Contamination of soil during construction stage may happen primarily due to construction and allied activities. The sites where construction vehicles are parked and serviced are likely to be contaminated because of leakage or spillage of fuel and lubricants. Contamination of soil during construction might be a major long-term residual negative impact. Unwarranted disposal of construction spoil and debris will add to soil contamination. This contamination is likely to be carried over to water bodies in case of dumping near water bodies.

### Mitigation Measures:

- Construction equipment/vehicles should be routinely maintained to prevent leakage of fuels/ lubricants;
- Construction equipment/vehicles should be parked and maintained in designated areas on hard stand having perimeter drains to collect spilled liquids;
- Fuels and other liquid chemicals should be stored in designated storage areas with drip trays to collect leaked materials, if any.



- The Contractors shall ensure the use of a relatively new, well maintained hot mix plant (batch type) and maintenance of hot mix plants and batching plants should be regular and periodic to prevent any kind of oil leakage on soil surface.

#### 5.1.2.2 Soil Erosion

The removal of roadside vegetation will cause erosion, and increased run-off would in turn lead to erosion of productive soil. The direct impact of erosion is the loss of embankment soil and danger of stability loss for the road itself. This impact is generally restricted to the ROW. The project has taken care of this issue at the engineering design stage itself, as at design gradients of 1:2, the slopes of the embankments are perceived to be stable for all stretches of road. These sections of the road embankment would need stone pitching or any other suitable turfing.

##### Mitigation Measures:

- Good engineering practices should be followed;
- Land clearance should be kept to a minimum (Site Boundary only);
- Areas that have been cleared shall have a dust suppressing system;
- Where practicable, excavated areas should be backfilled at the end of the working day.

#### 5.1.2.3 Borrow Areas and Quarries

There is no borrow area requirement as the project envisages only overlay on the existing road network. Quarry material will be sourced from existing licensed quarries.

#### 5.1.2.4 Ambient Air Quality

Construction stage impacts will have adverse impacts on the workers as well as the settlements adjacent to the road, especially those in the down wind direction.

The adverse impacts on air quality during construction stage are classified and presented in the table below. There are two types of pollution i.e. dust pollution and pollution from harmful gases.

**Table 18: Adverse impacts on air quality during construction stage**

Sl. No.	Impact	Source
1	Generation of dust	Transportation and tipping of cut material - while the former will occur over the entire stretch between the cutting location and disposal site, the latter is more location specific and more intense;
		Transportation of raw materials from quarries and borrow sites
		Stone crushing, handling and storage of aggregates in asphalt plants
		Site levelling, clearing of trees, laying of asphalt
		Concrete batching plants;
		Asphalt mix plants – due to the mixing of aggregates with bitumen;
		Construction of structures and allied activities
2	Generation of polluting gases including SO <sub>2</sub> , NO <sub>x</sub> and HC	Hot mix plants
		Large construction equipment, trucks and asphalt producing and paving equipment
		The movement of heavy machinery, oil tankers etc.
		Toxic gases released through the heating process during bitumen production
		Inadequate vehicle maintenance and the use of adulterated fuel in vehicles.

The impacts are expected to be temporary (limited to construction period) and confined within construction areas.

##### Mitigation Measures:

- Vehicles delivering loose and fine materials shall be covered
- Limiting unnecessary idling of heavy machineries and other vehicles significantly reduce emission of polluting gases.
- Loading and unloading of construction materials in covered area or provisions of water fogging around these locations.

- Storage areas should be located downwind of the habitation area.
- Periodic water sprinkling needs to be done wherever required.
- Regular maintenance of machinery and equipment needs to be done. Vehicular pollution check shall be made mandatory and renewed as per requirement.
- Hot mix plants and other plants should be located at least 1.5 km from the nearest habitation, school, hospital, archaeological site, forest, rivers, streams and lakes, 500 m from ponds, and national highway, 250 m from state highway, unless otherwise required by statutory requirements after securing a No-Objection Certificate (NOC) from the SPCB. Hot mix plant shall be fitted with stack of adequate height as may be prescribed by SPCB to ensure enough dispersion of exit gases.
- Bitumen emulsion and bitumen heaters should be used to extent feasible.
- CTE & CTO for HMP, BMP, crushers & DG sets needs to be obtained.
- LPG should be used as fuel source in construction/labour camps instead of firewood.
- Mask and other PPE shall be provided to all the staffs/workers at construction site.
- Diesel Generating (DG) sets shall be fitted with stack/chimney of adequate height as per regulations (Height of stack = height of the building + 0.2 KVA. Low sulphur diesel shall be used in DG sets as well as machineries.
- Contractor should submit a site specific air pollution management plan.
- Avenue plantation may improve the air quality during operation stage.
- Regular air monitoring will be done to check the ambient air quality of the area.

**Table 19: Impact on Air Environment and Mitigation Measures**

Parameters	Potential Impact	Mitigation Measures Suggested
<b>Air Environment</b>	• Generation of dust	<ul style="list-style-type: none"> <li>• Sprinkling of water                             <ol style="list-style-type: none"> <li>a. Earth handling site</li> <li>b. Borrow area</li> <li>c. Road construction site</li> <li>d. Access road route</li> </ol> </li> <li>• Air pollution control at crusher and Plants                             <ol style="list-style-type: none"> <li>a. PPE for Workers</li> <li>b. Stone crushing units and Plants should be with environment compliance.</li> <li>c. Necessary clearance needs to be obtained prior to operation of the borrow area.</li> </ol> </li> <li>• Regulations of construction timings near sensitive receptors and settlements</li> </ul>
	• Gaseous Pollution	<ul style="list-style-type: none"> <li>• Vehicles and machineries will be regularly maintained to conform to the emission standards.</li> <li>• Asphalt mixing sites and Crusher should be placed 1 km away from residential area and outside forest area.</li> <li>• Asphalt plant will be equipped with pollution control equipment</li> <li>• Use of PPE by workers engaged in construction and application of asphalt mix on road surface.</li> </ul>

#### **5.1.2.5 Noise**

The major source of noise pollution and vibration are use of vehicle for material transport, equipment used for cutting, leveling, dumping, pressing, concrete mixing, welding etc. These vehicles/equipment's when operated by the operator generate noise level depending upon the scale of the construction necessary to upgrade the road. Corresponding slight increase in traffic is also expected. This will also have impact on the sensitive receptors if located nearby, resulting in hearing loss, loss in sleep, and other health related problems to the local nearby. Ambient noise level may increase temporarily in the close vicinity of various construction activities, maintenance workshops, and vehicles and earthmoving equipment. These

construction activities are expected to generate noise levels in the range of 80 – 95 dB(A) at a distance of about 5 m from the source.

Although this level of noise is higher than the permissible limit for ambient noise level for residential/commercial levels but will occur only intermittently and temporarily. This noise level will attenuate with an increase in distance from the noise source, decreasing by 10dB at a distance of about 55m and 20 dB at 180 meters. Impact due to noise during construction activities will be minimal near communities as construction camps are located at least 50 meters away from community areas. Although all the construction related activities are not expected to occur simultaneously at a given location yet Increases in noise due to construction activities are expected.

#### **Control Measures adopted during Construction Phase for Noise Environment**

- Site Controls: Stationary equipment will be placed along un-inhabited stretches as per distance requirements computed above as far as practicable to minimize objectionable noise impacts. These locations should be away from known bird nesting areas.
- Scheduling of Project Activities: Construction activities will be scheduled to coincide with period when people would least likely to be affected. Construction activities will be strictly prohibited between 10 P.M. and 6 A.M. Near sensitive areas like schools', construction activities should be prohibited at the schooling hours. Near residential areas. Noisy operation near known nesting areas should be avoided during winter, typical breeding period of migratory birds.
- Protection devices (ear plugs or ear muffs) will be provided to the workers operating in the vicinity of high noise generating machines.
- Construction equipment and machinery should be fitted with silencers and maintained properly.
- Noise measurements should be carried out along the road to ensure the effectiveness of mitigation measures

#### **Mitigation Measures:**

In view of above, following mitigation measures are proposed:

- All construction equipment used for an 8-hour shift shall conform to a standard of less than 90 dB(A). If required, machinery producing high noise as concrete mixers, generators etc., must be provided with noise shields;
- At construction sites within 500m of human settlements, noisy construction activities shall be stopped between 9.00PM and 6.00AM and near sensitive locations such as schools' construction activities should not be done during the schooling hours.
- Vehicles and construction machinery shall be monitored regularly with particular attention to silencers and mufflers to maintain noise levels to minimum;
- Workers in the vicinity of high noise levels must wear ear plugs and should be engaged in diversified activities to prevent prolonged exposure to noise levels of more than 85 dB(A)per8-hourshift.

#### **5.1.2.6 Surface Water Quality and Siltation**

Construction activities may increase turbidity level increasing the sediment load. Sometimes contamination of surface water may take place due to accidental spills of construction materials, oil, grease, fuel, and paint. Degradation of water quality is also possible due to accidental discharges into watercourses from drainage of workers camps and from spillages from vehicle parking and/or fuel and lubricant storage areas. During construction phase, care would be exercised to control silt so that the water available in the ponds and wells especially those located very near to the ROW may not be contaminated.

The project will utilize river bed materials from existing licensed quarries with all stipulated conditions of above mentioned authorities.

**Mitigation Measure:**

- Construction works near waterways/water bodies will not be undertaken during the monsoon season
- Retaining walls have been proposed to prevent erosion
- Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- No construction camp within 500m of any water body
- Locate all parking, repair and fuel and hazardous material storage area away from any water body. Vehicle parking and maintenance areas will have waterproof floors from which drainage is collected and treated to legal standards.
- Refuel vehicles only in dedicated areas with waterproof floors from which drainage flows to an oil/water separator before discharge
- Collect all waste oil, store in sealed damage-proof containers and dispose it to recyclers.
- All equipment operators, drivers, and warehouse personnel will be trained in immediate response for spill containment and eventual clean-up.
- Temporary retention ponds, interception drains, and silt traps are installed to prevent silt laden water from entering adjacent water bodies/waterways;
- The slopes of embankments leading to water bodies should be modified and rechannelled to prevent entry of contaminants.
- Comply with requirements of the clearance issued by the relevant state authority for mining in rivers

**5.1.2.7 Ground Water Quality**

Water for construction purpose will be sourced mainly through major streams along the project road. Suitable arrangement for drinking in the campsite will be managed by contractor without affecting availability to local community. The area is not classified as critical semi-critical or overexploited by CGWB. However, uncontrolled drinking water abstraction can deteriorate the situation. Contamination of groundwater is not envisaged since all construction camps will have septic tanks or mobile toilets depending on the number of workers in each camp.

**5.1.3 Mitigation Measures:**

- Provision for adequate numbers of septic tank to avoid contamination of ground water.
- Requisite permission will be obtained for abstraction of groundwater.
- The contractor will make arrangements for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected.
- Water harvesting structures shall be proposed for groundwater augmentation in the project area.
- No change in groundwater regime is envisaged hence no mitigation is proposed.

**Construction and Demolition Waste**

Construction and Demolition waste shall be generated during the project construction phase. A certain amount of waste will be generated. Those wastes shall be utilized by the Contractor depending upon suitability. However, Contractor shall dispose unused C&D waste at designated disposal site as per construction and demolition waste management rules 2016.

**Mitigation measures:**

Contractor will use the excavated road side material for construction of road. The rest unsuitable material will be disposed suitably. The lead and lift has been considered in cost estimates. The Contractor will not dispose the excavated unsuitable material generated from hill section to other side (valley side) of the project road. Proper disposal plan will be prepared by the Contractor to dispose the unsuitable material generated from hill cutting/ road excavation.

## Natural Disaster

Flash flood is common during the monsoon in the vicinity of the proposed project road. Hence All CD structures have been proposed to design with anticipated risk of flood. Embankment height along potential flood affected areas shall increase. Lined and unlined side drains have been included in the design to avoid water-logging. Relevant IS codes have been adopted in designing the structures to sustain the highest magnitude of earthquake.

## Disruption of Community Services

Local services, including water supply lines, irrigation line, drainage, ditches, streets are commonly cut during road earthworks. These activities are required by the local people for crop production, drinking water supply and access, and have the potential to damage road work too. These services are often either inadequately reconnected or not reinstated at all.

### Mitigation Measures

- The Contractor will arrange their own source to cater for their water requirement for construction and other activities and will not interfere with the local water supply system
- All irrigation canals, water supply lines and stand pipes, drainage and streets will be maintained during construction or if necessary, temporary services shall be arranged of the owner/ user's permission for temporary cessation will be gained.
- All the Services will be progressively reinstated as soon as road excavation has been completed.

### **5.1.3.1 Diversion of Traffic**

Since the road upgradation works will be on the existing road only, therefore there will be direct interface with the road traffic. The Short term impacts associated with the project will be traffic diversion and management during construction phase. Construction activities will cause hindrance to the existing traffic flow. There is possibility of accident hazards during construction phase of the widening project. There will be requirement for diversion of existing traffic at various construction sites during construction phase. It needs to be mentioned that though there are no direct impacts on the natural environment due to disruption/diversion of such services, but diversion can also lead to adverse impacts if not planned properly. Rapid restoration of diverted services can help in minimizing the severity of impacts arising out due to diversions of existing services.

### Mitigation Measures

- Proper preventive measures will be taken during the construction activities at the construction sites
- Reduce speed through construction zones.
- Construction of bridges/culverts will be carried out prior to construction of new carriageway at the first stage.
- Strengthening/raising of existing two lanes will be done only after the completion of the first stage.
- Proper warning signs will be displayed at construction sites.

## Impacts on Occupational Health & Safety

The Construction workers are continuously exposed to dust and gaseous emission during construction activities. The construction industry falls in hazardous category and there is always a risk of accidents to the labours. However this type of risks of Occupational hazards can be managed with implementation of proper safety at site.

### Mitigation Measures:



- The Contractor will comply with the requirements of the Environmental, Health, and Safety (EHS), Guidelines of the World Bank, April, 2007 and all national, state and local core labor laws on working conditions and safety during construction.
- The Contractor will Develop and implement site-specific Health and Safety (H&S) Plan including SoP for preventing spread of COVID-19 epidemic which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents
- The Contractor will provide adequate good quality Personal Protective Equipment (PPE) to all the workers working at construction zones and Plant sites and will ensure that these PPEs are used by workers at all time during works.
- Safe access to the work site and safe working conditions to be maintained throughout the working period.
- Adequate drainage, sanitation and waste disposal will be provided at workplaces.
- Proper drainage will be maintained around sites to avoid water logging leading to various diseases.
- Adequate sanitation and waste disposal facilities will be provided at construction camps by means of septic tanks, soakage pits etc.
- A health care system will be maintained at construction camp for routine check-up of workers and avoidance of spread of any communicable disease.
- Readily available First Aid kit bearing all necessary first aid items will be provided at all the work sites and should be regularly maintained.
- The Contractor will organize awareness program on occupational health and safety aspects as well as on HIV/AIDS and sexually transmitted diseases (STDs) and COVID-19 on periodic basis through authorized agency.
- Preventive measures require to be followed to avoid or minimize transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour for workers on periodic basis.

## Work Site Safety

Construction site safety is one of the most overlooked things during a construction project. In most workplaces accidents are common due to lack of work site safety. Accidents have the potential to be life-threatening and can be avoided through proper Work site Safety.

Mitigation Measures:

Safe access to the work site and safe working conditions to be maintained throughout the working period

Scaffolding to be used properly.

Avoid entering a trench that is unprotected.

Avoid ladders with metallic components near electrical work and power lines

Use head protective gears, use helmet or body harnesses

Construction workers should wear work boots with slip-resistant and puncture-resistant soles

Hazard communication: Make information accessible to employees at all times in a language or formats

- Check all electrical tools and equipment regularly for defect
- The Contractor will comply with the requirements of the Environmental, Health, and Safety (EHS), Guidelines of the World Bank, April, 2007 and the statutory norms on safety during construction.

### **5.1.3.2 Anticipated Impact on Biological Environment:**

#### Impact on Faunal and Terrestrial Ecology:

Most of the project road stretch passes through human habitation and built-up areas. There is no nearby forest areas or any other National Parks, Wildlife Sanctuaries and other eco-sensitive areas. There is no Endangered/ Schedule - I species reported in the project area confirm by site visit as well as consultation with community and Forest/Wildlife department.

There is a scope of slight impact to local domestic animals, which graze in the area especially after the road is constructed. Increased vehicle movement in the area might lead to accidents involving animals. Apart from this, micro-ecosystems developed on the roadside with the birds, animals and insects using the plantation over the years would be lost due to loss of their habitat.

#### Mitigation Measure

- The Contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal.
- Mandatory / Regulatory sign for entire section of project road for every 2 km at alternate side is proposed.
- The compensatory plantation shall act as the new habitat for the birds, animals and insects species
- If any animal is found near the construction site at any point of time, the contractor shall immediately upon discovery thereof contact authorized wildlife rescuer or Forest Dept for rescue of snakes or other distressed wildlife.

#### Impact on Flora and Mitigation measures:

No tree felling is anticipated for the proposed road project as it passes through existing RoW. Any removal of tree due to project activity shall only be cut after requisite permission from State Forest Department is obtained.

- All necessary measures such as siting of construction establishments away from human habitations; increase of stack height; regular maintenance of construction equipment's and vehicles; etc. shall be taken up to reduce the dust and gaseous emissions during construction activities.

#### Management of Construction Debris/Waste

Construction debris/waste is generated due to demolition of existing structures, scarification of existing pavement and excavation at some section of the subproject road. Improper disposal of scarified bitumen causes decrease in soil fertility and water pollution. Careless disposal of debris can obstruct waterways causing siltation of reservoirs and reduce capacity. Unleaded demolition wastes will cause traffic blockage and dust causing inconvenience and health risks.

#### Mitigation measures

- During the site clearance and disposal of debris, the contractor shall take full care to ensure that public or private properties are not affected; there are no dwellings below the dumpsite and the traffic is not interrupted.

- The Contractor shall at all times ensure that the entire existing canal and drains within and adjacent to the site are kept safe and free from any debris.
- Construction waste debris shall be utilised for backfilling embankments, filling pits, construction of cross roads, approach roads and landscaping before being disposed into disposal pits.
- Debris disposal sites shall be sited away from sensitive locations like settlements, water body, forest areas and any other sensitive locations.
- The debris dumpsites have to be suitably rehabilitated by planting local species of shrubs and other plants so that the landscape is coherent with the local environment.
- Care should always be taken to maintain the hydrological flow in the area and dumping sites do not contaminate the water sources such as rivers and ponds.
- Public perception about the location of debris disposal site has to be obtained before finalizing the location. Permission from the Village/local community is to be obtained for the Disposal site selected.

#### **5.1.4 Impacts during Operational Phase**

During operation stage, the main sources of environmental impacts are the increased traffic volume and speeds. The increase in traffic volume and speed may enhance the safety risk especially in the congested areas. No sudden change in the traffic volume is expected due to this road as the road is already existing one and opened for public traffic. During operational phase this will be enhanced with the activities associated with the maintenance of landscape such as plantation programme etc. Widening will ensure smooth plying of the vehicles and also will help in reducing the congested zone and thus will reduce the emission rate of vehicles. Various impacts during operation phase are discussed below:

##### **5.1.4.1 Impacts on Water Quality and Resources**

During the operation phase, the possibility of degradation of water quality can be expected due to accidental spillage only. However, the probability of such accidents are minimal since enhancement of road safety measures such as improvement of curves and widening of the roads and other pedestrian facilities are taken care of in the design stage. Periodic monitoring of water quality will be done at selective location of proposed project.

##### **5.1.4.2 Impact on Air Quality**

Vehicular emissions are the principal source of pollution during the operation stage. The subproject road being mostly located in adjacent to open agricultural land, adequate dispersion of gaseous pollutants is expected.

Mitigation Measures:

Implementation of stricter emission norms for the vehicles is the only mitigation measure that will have significant influence on the ambient air quality. In the year 2040, if 50% of the total vehicle turns into electric vehicle then the impact will be less. However, implementation of such norms for vehicles plying on the project road is beyond the control of the proponent.

##### **5.1.4.3 Impact on Noise Quality**

Impact due to increased noise level and vibration is anticipated due to heavy vehicular movement upon improvement of existing road condition.

Mitigation Measure

To reduce noise and vibrations, noise barriers in the form of compound wall is proposed. In case of space crunch, the use of concrete screens is also suggested. The noise barrier wall

shall be constructed by excavation of foundation, laying of brick masonry wall up to a height of 2m above ground, plastering and coping as per the direction of the engineer and as laid in the specification. Creepers and paints shall be used in consultation with the affected community to give an aesthetic look. Shade and flowering trees shall be planted within the boundary of the sensitive receptor, between the building line and the compound wall, wherever space shall be available, 5m centre to centre.

The measures adopted for noise attenuation is given below

Plantation within the premises if space available for plantation

Raising of existing boundary wall / construction of new wall up to 2m height

Planting creepers to provide aesthetic view

In urban areas the boundary wall can be painted with posters to provide aesthetic views. The option of posters or creepers shall be agreed by the school / hospital administrator.

### **Accidents Involving Hazardous Materials**

Accidents involving hazardous chemicals will generally be catastrophic to the environment, though the probability of occurrence is low. Prevention of an accident involving hazardous material is a better way of minimising the impacts. The provisions mandated by 'The Hazardous Wastes (Management and Handling) rules, 1989' and "Manufacture Storage and import of Hazardous Chemicals Rules" 1989 under the Environmental (Protection) Act, 1986 will be complied with. Vehicles delivering hazardous substances will be printed with appropriate warning signs.

In case of spillage, the report to relevant departments will be made and instructions will be followed in taking up the contingency measures immediately.

### **Social Impact Assessment**

#### **5.1.5 Projects Impacts**

The urban infrastructures project is associated with some adverse impacts as well as some benefits. The major impacts of the project include temporary loss of livelihood during the actual construction period due to inaccessibility to the commercial enterprise all along the project corridor and in Parking Areas. Socio Economic survey was done September, 2021. Due to the pandemic situation the Socio Economic Survey & Census Survey for the non-title holders who are temporarily affected during actual civil construction work Started from 10<sup>th</sup> November and continued till 20<sup>th</sup> December, 2021. The SES was done in November 2021 and also consultation was done from September to December 2021 which is completed for the present design phase.

#### **5.1.6 Positive Impact**

This sub-project aims to reduce traffic congestion within the Jowai road. The storm water drain improves the existing system of rain water flow as most of the drain chokes due to silting. The new design will make easy cleaning/desilting of the storm water drain and thus prevent the overflow of water on the black top. The footpath over the drain and utility corridor will reduce accident.

- People residing at the Jowai road can easily travel within the area. It will give a major fillip to the quest for all weather good roads for the PIA.
- Lower accident and provide quick accessibility to services like hospital, market, office etc.

### 5.1.7 Impact on Land

As discussed earlier, there is no scope of land acquisition and the RoW is free from all encroachments and encumbrances in the project area. Thus there is no impact on the title and/or non-title holders..

### 5.1.8 Impact on Structures

No structures will be impacted in the proposed developments. During survey

### 5.1.9 Impact on Community Structures

With the updated DPR, no common Properties and Government structure will be impacted in the proposed development.

### 5.1.10 Impacts on Affected Families

As there is no Land Acquisition and/or any impact to the structures also as the proposed development is free from encumbrances and encroachments there is no displaced family.

### 5.1.11 Demography of Families

Socioeconomic survey was carried out for 21 sample families with 101 number of total populations. The sample was selected from the areas where construction work is proposed for the project and such that there is proportional representation of the socio-economic parameters of the PIA. The sample survey data reveals that average family size of the sample family is (4.8).

### 5.1.12 Family Pattern

Socio-economic survey reveals that only 19% of the Surveyed Families are Joint in nature.

**Table 20: Family Pattern of Sample Surveyed families**

Sl.	Family pattern	Numbers	Percentage
1	Joint	4	19%
2	Nuclear	17	81%
Total		21	100%

Source: Census & SES Survey, September 2021

### 5.1.13 Religious Stratification

Christianity is the predominant religion in the primary PIA followed by Other Religions. The detail presence of religion in the PIA is depicted in the Table below

**Table 21: Religious Stratification of sample Surveyed Families**

Sl.	Category	Percentage
1	Christianity	83%
2	Hindu	4%
3	Muslims	1%
4	Others	12%
Total		100%

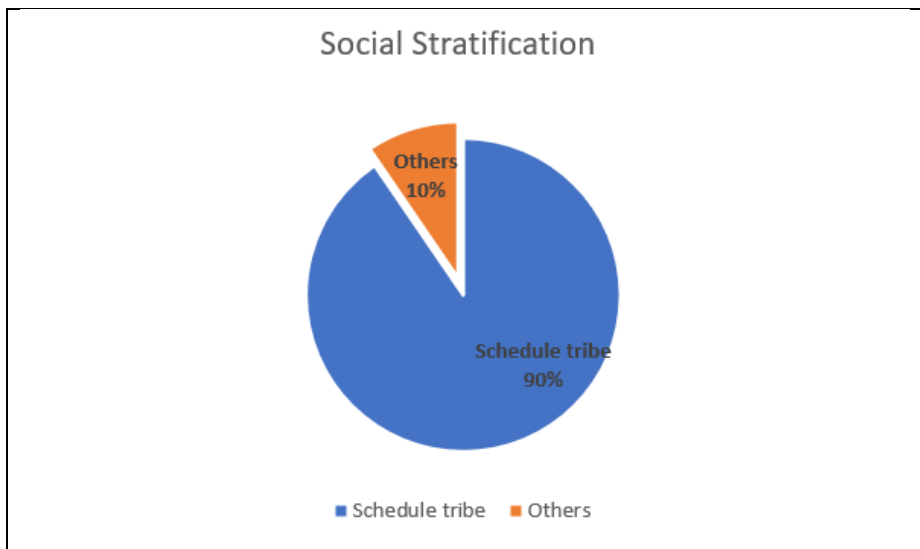
Source: Census & SES Survey, September 2021



### 5.1.14 Social Stratification

The social stratification of the project area shows dominance of ST population with 90% families followed by Other Caste families at 10%. The detail of social grouping in the project area is presented in the Figure below:

**Figure 21 Categories of Surveyed Families along the Project Road**

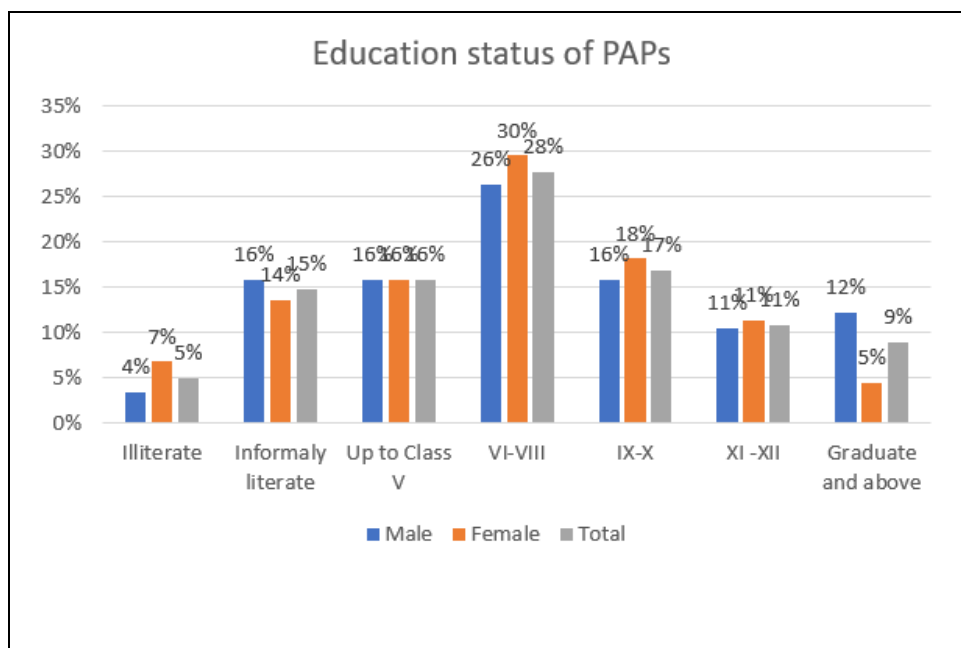


Source: Census & SES Survey, September 2021

### 7.1.1 Educational Status

The educational status of the Sample Population (temporarily/positively impacted), above 6 years of age, reveals that overall scenario of literacy level is not very encouraging in the project area. Out of total 101 sample population the number of child population (0-6 yrs.) is 9 which are kept aside for this category. Only 5% of the population is still illiterate and about 9% sample population are graduates. The educational status is presented in the Figure below

**Figure 22 Educational Status of Sample Population**



Source: Census & SES Survey, September 2021

### 5.1.15 Occupation

The occupational status of sample population (positively/temporarily impacted) reveals that 52% Population are depending on business and this includes the business they are carrying out

along the road, mainly shops and kiosks. About 5% Population are having agriculture as their source of income and no one engaged in government jobs & private Jobs. The details of occupations by the sample population are presented in the table below

**Table 22: Occupational Status of Sample Population (18-60 Years)**

Sl.	Type of Occupation	Percentage
1	Agriculture & Allied Activities	5%
2	Government & Private Services	0%
3	Trade & Business	52%
4	Self Employed	0%
5	Casual Labour	10%
6	Non-Remuneratively Engaged	33%
Total		100%

Source: Census & SES Survey, September 2021

The total number of persons is 101 and the number of persons within the active age group of 15 to 60 years is 58.

#### 5.1.16 Income and Expenditure Profile of Sample Families

All the families sample surveyed have an average annual income more than Rs. 30000/-. About 18% Surveyed Families are having average annual income in the range of Rs. 30000-50000, while 58% of the families are earning between Rs. 50000-100000. It has been observed that about 24% Surveyed Families have annual income more than Rs. 1,00,000. The average income level of sample families in the project area is summarized below

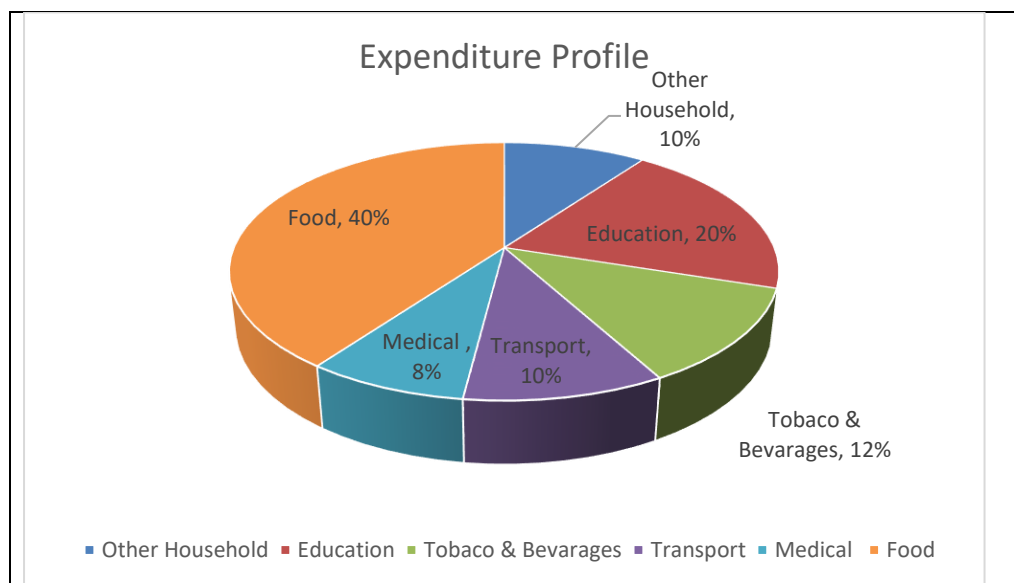
**Table 23: Annual Income Profile**

Sl. No.	Annual Income Categories in (Rs)	% Age
1.	More than 30000 but less than or equal to 50000	18%
2.	More than 50000 but less than or equal to 100000	58%
3.	More than 100000	24%
Total		100.00%

Source: Census & SES Survey, September 2021

The expenditure pattern of the sample families surveyed revealed that about 40% of the average expenditure incurred by the Surveyed Families is on the food items. The detail of the same is presented in graphical format in Figure below. The average annual expenditure is about Rs. 46,254 for the 21 sample families.

**Figure 23 Annual Expenditure Profile**



Source: Census & SESS Survey, September 2021

### 5.1.17 Holding of Agricultural Land (Immovable Assets)

Only 5% of the population owes more than 0.5 acre of land. The detail of the land holding is depicted in the Table below

**Table 24: Agricultural/Homestead Land Holding of Sample Families**

Sl. No	Land owned (area in Acres)	Numbers	Percentage
1	Less than 0.25	18	86%
2	0.25-0.5	2	10%
3	More than 0.5	1	5%
4	No land	0	0%
Total		21	100%

Source: Census & SES Survey, September 2021

### 5.1.18 Possession of Vehicle (Movable Asset)

Majority of the population have two wheelers (52%) as mode of Family transport. The detail of the movable assets holding is depicted in the Table below.

**Table 25: Movable Assets Holdings of Sample Families**

Sl. No	Family assets	Numbers	Percentage
1	2-wheeler	11	52%
2	3-wheeler	0	0%
3	4-wheeler	0	0%
4	2-wheeler & 4-wheeler	9	43%
5	More than one 2-wheeler & 4-wheeler	1	5%
6	No Assets	0	0%
Total		21	100%

Source: Census & SES Survey, September 2021

### 5.1.19 Vulnerability

Vulnerable Families are defined as, who are either: (i) below poverty line (BPL); or (ii) women headed household (WHH); or (iii) differently able households (DAH); or (iv) elderly (60 years and above) living alone; or (v) scheduled tribes (ST); or (vi) scheduled caste (SC). It shall be noted here that though there are multiple categories of vulnerability groups exist in the project road, we have taken single impact of single vulnerable category for the authentication. For example, the number of BPL/DA/Aged Person/WHH mentioned in the below table does not include those who fall under SC and ST category to avoid the repetition of data and vice-versa. Vulnerability is defined on Census Survey data.

The census survey finding reveals that there is 90% surveyed population along the roadside who belong to the ST community and 0% belong to SC category & 5% families are Women headed household. 5% are belongs to below poverty line. The total vulnerable families in the PIA are about 100%.

**Table 26: Vulnerability Status of the Sample Families**

Sl. No.	Category	%Age to total population
1	Schedule Tribe	90%
2	Schedule Caste	0%
3	Below Poverty Line (Excluding ST, SC)	5%
4	Women Headed Households	5%
5	Senior Citizen living alone	0%
<b>Total Vulnerable</b>		<b>100%</b>

Source: Census & SES Survey, September 2021

### 5.1.20 Impact on Gender

In Indian context, irrespective caste, creed, religion and social status, the overall status of women is lower than male and therefore a male child is preferred over a female child. According to 2001 Census in Meghalaya, the sex ratio was 972 females per 1000 male in 2001 but it has increased in 2011 with 989 females per 1000 male which is an indication of social development.

The gender composition of surveyed persons shows that the male accounts for 53% and female accounts for 47%. The gender disparity is not so much visible in among surveyed persons i.e. 870 against state level statistic having 989 but as per census data of India, 2011. The sex ratio of West Jaintia Hills district is 940 females per 1000 males in 2011. The illiterate among the female is slightly higher than of the male counterparts. There is 1 of the Surveyed Family is Women Headed Households. From the SES survey the total Population is 101, of which 54 are males & 47 are females.

### 5.1.21 Migration

The Decadal growth rate of the West Jaintia Hills district and town clearly indicates influx of migrants from the nearby districts and villages. The SES reveals that about 15% of the population has immigrated in the urban in the last 25 years.

### 5.1.22 Impact on Tribal People

#### a. Impact on Land & Structure of ST

No structures are impacted by the proposed project belong to the STs.

**Table 27: Impact of ST**

Sl. No.	Type of Ownership	No of Affected Household Families	No. of Structures
1	Title Holder	-	-
2	Non-title holder	-	-
3	Tenants	-	-
4	Losing land only	-	-

Source: Census & SES Survey, September 2021

#### b. Impact on Socio Economic Profile of ST

The ST population is the majority present in the project area and do not follow customs that are attached to their land.. The proposed sub-project can be viewed as boosting economic growth and poverty reduction, which will bring substantial social and economic development in the region. The ST Surveyed Families have between Rs.50,000 to Rs. 1,00,000 annually. The ST in the project +area is living in the towns and became the part of the mainstream population. Thus, there will be no negative (culturally or socially) impact on the ST population. Again, the STs are yet to foresee any serious adverse impact for the area in general. Being at town within the developed localities, the people in general are accustomed with the probable risk of development, such as spread of HIV/AIDS and STD, drug abuse that can trap the youth and trafficking of women and children. According to the people these hazards are already faced and conquered by them.

#### c. Impact on Community

This sub-project has ensured that the designed and implementation will be in such a way that it fosters full respect for ST identity, dignity, human rights, livelihood systems, and cultural uniqueness as they define them. There is no impact on the community structure or community land of cultural or religious sentiment of the ST Population in the Primary PIA. The proposed project will ensure that STs receive culturally appropriate social and economic benefits, do not suffer adverse impacts as a result of projects, and can participate actively in projects that affect them.

There is no cultural heritage site of the ST which comes in the way of the road alignment. The ST population among the Surveyed Families in the PIA are living in the towns and in the due course of time became the part of the mainstream population. Thus, there will be no cultural or social impact on the ST population.

#### d. Impact on Gender

The tribes of Meghalaya whose societies are organized on matrifocal principles have obtained much greater gender equality than the societies (e.g. Hindu and Muslim) that are organized on the patriarchal principles.

However, it was identified that social and economic benefits for affected which are culturally appropriate and gender and inter-generationally inclusive and develop measures to avoid, minimize, and/or mitigate adverse impact on STs mainly the Gender. Suggestion of noise barrier, reduction of dust, providing employment of the female members as unskilled labourers during construction were the results of the focus group discussions.

Continuous meaningful focus group discussions with the ST women and affected ST communities and concerned ST organizations were carried out and will be carried on to solicit their participation (i) in designing, implementing, and monitoring measures to avoid adverse impacts or, when avoid a one is not possible, to minimize, mitigate, or compensate for such effects; and (ii) in tailoring project benefits for affected ST communities in a culturally appropriate manner. To enhance STs' active participation, projects



affecting them will provide appropriate and gender inclusive capacity development. Establish a culturally appropriate and gender inclusive grievance mechanism to receive and facilitate resolution of the ST concerns.

### 5.1.23 Impact on Access to Services Amenities

#### ➤ Transport facility

Transport facility is considered as the most basic of all civic amenities as this is the life line to access any kind of social services. Most of the clusters in the PIA have adequate road transport facility but it fails to cater its benefit due to bad condition of the road during winter and rainy season. Jowai Town is well connected with the rest of the state. Nearby railway station of Jowai town is Guwahati Railway Station.

#### ➤ Solid Waste Dumping Facilities

The PIA is congested with structures and roads and as it is situated on the hill slope, solid waste dumping is a very sensitive issue in the area. As per the SES it is revealed that more than 95% of the people dispose solid waste by the method of 'door to door' collection by local Authority in the urban area.

#### ➤ Source of Drinking Water

The main source of drinking water in the PIA is river, streams and ponds (nearly 10%).

**Table 28: Source of Drinking Water of Sample Families**

Sl.	Types of drinking Water Source	Numbers	Percentage
1	Tap Water by ULB	18	86%
2	Groundwater/surface water	3	14%
Total		21	100%

Source: Census & SES Survey, September 2021

#### ➤ Distance of Medical Facilities

Medical facilities like government hospital and urban health centres (UHC) are not easily available within 1km for 100% of the population.

**Table 29: Distance of Medical Facilities of Sample Families**

Sl.	Distance of Medical Facilities	Numbers	Percentage
1	Within 1km	21	100%
2	Within 2km	0	0%
3	Within 5km	0	0%
4	More than 5km	0	0%
Total		21	100%

Source: Census & SES Survey, September 2021

#### ➤ Other Services

The proposed project will enhance the standard of living and/or quality of life of the residents of West Jaintia Hills. During the construction there might some temporary restrictions in access which have to be taken care in the ESIA.

There is no permanent impact regarding the limited access to services or amenities are envisaged in the process of development of the proposed project.

### Impacts on Road Safety and Human Health

The planning and designing of the project roads in accordance with the improved safety measures and better health conditions.

The chances of accidents could be minimized by (1) strengthening the pavements, (2) improving upon the curves in road geometrics, (3) grade separators (4) proposing the service lanes in market places and near schools, etc (5) providing proper median, (6) improving upon road crossings (7) putting right signals and signboards, (8) new under passes.

### Mitigation Measures:

The project is likely to bring some negative impacts on the environment and socio-economic structure of the region. While deciding the alignment from environment point of view, some negative potential impacts are unavoidable. In such cases, adoption of mitigation measures is the only solution. Mitigation should be focused on achieving goals within clear timeframes. Use of SMART approach is recommended to evaluate the likely effectiveness of alternative mitigation strategies or measures. The SMART refers to measures that are Specific, Measurable, Achievable, Realistic and Timely.

**Table 30: Impacts and Mitigation Measures**

Potential Impacts	Mitigation
Accidental spots can be reduced by providing proper signs and warnings, improvement of junctions, new under pass, fly-over etc.	<ul style="list-style-type: none"> <li>• Proper provision of service roads, junctions, fly-over, under passes to be provided at appropriate places</li> <li>• Truck parking places</li> <li>• Medical facility to be provided (an ambulance fitted with all medical equipment and a doctor)</li> </ul>
Sexually transmission diseases (STDs)	<ul style="list-style-type: none"> <li>• Detected diseased person to be carried to the nearest city hospital</li> <li>• Preventive measures should be taken to check the spreading of STDs</li> </ul>

## 6 CHAPTER-VI: ENVIRONMENTAL MONITORING PROGRAM

The purpose of the monitoring program is to ensure that the envisaged purpose of the project is achieved and results in desired benefits to the target population. To ensure the effective implementation of the Environmental Management Plan (EMP), it is essential that an effective monitoring program should be designed and carried out. The environmental monitoring program provides such information based on which management decision may be taken during construction and operational phases. It provides basis for evaluating the efficiency of mitigation and enhancement measures and suggest further actions that need to be taken to achieve the desired effect.

### Objective of Monitoring Program

The Objectives of environmental monitoring program are-

- Evaluation of the efficiency of mitigation and enhancement measures;
- Updating of the actions and impacts of baseline data;
- Adoption of additional mitigation measures if the present measures are insufficient; and
- Generating the data, which may be incorporated in environmental management plan in future projects.

### Environmental Monitoring

Environmental monitoring describes the processes and activities that need to take place to characterize and monitor the quality of the environment. Environmental monitoring is used in the preparation of environmental impact assessments, as well as in many circumstances in which human activities carry a risk of harmful effects on the natural environment. All monitoring strategies and program have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in environmental parameters. In all cases the results of monitoring will be reviewed, analyzed statistically and published. The design of a monitoring program must therefore have regard to the final use of the data before monitoring starts.

### Monitoring Plans for Environment Condition

For each of the environmental components, the monitoring plan specifies the parameters to be monitored; location of the monitoring sites; frequency and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities. The monitoring plan for the various environmental condition indicators of the project in construction and operation stages is presented below. Monitoring plan does not include the requirement of arising out of Regulation Provision such as obtaining NOC/ consent for plant site operation.

**Table 31: Environment Monitoring Plan**

Environmental Component	Project Stage	Monitoring					Institutional Responsibility	
		Parameters	Special Guidance	Standards	Location	Frequency	Implementation	Supervision

Environmental Component	Project Stage	Monitoring					Institutional Responsibility	
		Parameters	Special Guidance	Standards	Location	Frequency	Implementation	Supervision
Air	Construction Stage	PM10, PM 2.5, SO <sub>x</sub> , NO <sub>x</sub> , CO	Respirable Dust Sampler to be located 50 m from the plant in the downwind direction. Use method specified by CPCB for analysis	Air (P&CP) Act,1981 and its amendment	Hot mix Plant / Batching Plant. Stretch of the road where construction is in progress at the site.  (Total 03 locations)	Three times in a year for two years  (Excluding Rainy season)	Contractor through NABL approved monitoring agency	Environment Expert-AE/IE/PIU
	Operational Stage	PM10, PM 2.5, SO <sub>x</sub> , NO <sub>x</sub> , CO	Respirable Dust Sampler to be located 50m from the plant in the downwind direction. Use method specified by CPCB for analysis	Air (P&CP) Act,1981 and its amendment	As directed by the PIU  (03 Project locations)	Three times in a year for two years  (Excluding Rainy season)	PIU through NABL approved monitoring agency	PIU
Water Quality	Construction Stage	Parameters as per IS: 10500 and standards of surface water	Grab sample collected from source and analyze as per Standard Methods for Examination of Water quality	Water quality standards by CPCB	01 drinking water sample-Labour Camp and 01 surface water samples in project stretch.	Three times in a year for two years  (Excluding Rainy season)	Contractor through NABL approved monitoring agency	Environment Expert-AE/IE/PIU
Water Quality	Operation Stage	Parameters as per IS: 10500 and standards of surface	Grab sample collected from source and analyze as per Standard Methods for Examination of Water quality	Water quality standards by CPCB	As directed by the PIU  (01 Project locations)	Three times in a year for two years  (Excluding Rainy season)	PIU through NABL approved monitoring agency	PIU

Environmental Component	Project Stage	Monitoring					Institutional Responsibility	
		Parameters	Special Guidance	Standards	Location	Frequency	Implementation	Supervision
		water						
Noise Levels	Construction Stage	Noise levels on dB (A) scale	As per CPCB	Noise standards by CPCB	Hot mix Plant / Batching Plant. Stretch of the road where construction is in progress at the site.  (Total 03 locations)	Three times in a year for two years.	Contractor through NABL approved monitoring agency	Environment Expert-AE/IE/PIU
	Operation Stage	Noise levels on dB (A) scale	As per CPCB	Noise standards by CPCB	As directed by the PIU  (Total 03 locations)	Three times in a year for two years.	PIU through NABL approved monitoring agency	PIU
Soil Erosion	Construction Stage	Turbidity in Storm Water  Silt load in ponds, water courses	----	As per Standard (ICAR)	01 location construction camp and 02 major construction locations.  (Total 03 locations)	Three times in a year for two years	Contractor through NABL approved monitoring agency	Environment Expert-AE/IE/PIU



Environmental Component	Project Stage	Monitoring					Institutional Responsibility	
		Parameters	Special Guidance	Standards	Location	Frequency	Implementation	Supervision
	Operational Stage	Turbidity in Storm Water  Silt load in ponds, water courses	----	As per Standard (ICAR)	As directed by the PIU  (Total 03 locations)	Three times in a year for two years.	PIU through NABL approved monitoring agency	PIU

### Environmental Monitoring Budget:

The environmental monitoring cost is estimated on the basis of the length and existing environmental scenario of the proposed project. Environmental monitoring cost of **7,86,000/-** is estimated for the construction and Operation stages. The details have been presented in Table below

**Table 32: Environmental Monitoring Cost**

Cot of Environment / Migration Plan Description	Unit	Quantity	Unit Rate	Cost
Air quality monitoring at 3 locations for 3 seasons for 2 consecutive years. (Construction Stage)	No.	18	9000	162,000
Air quality monitoring at 3 locations for 3 seasons for 2 consecutive years. (Operation Stage)	No.	18	9000	162,000
Water quality monitoring at 2 locations for 3 seasons for 2 consecutive years. (Construction Stage)	No.	12	7000	96,000
Water quality monitoring at 1 locations for 3 seasons for 2 consecutive years. (Operation Stage)	No.	6	7000	42,000
Noise quality monitoring at 3 locations for 3 seasons for 2 consecutive years. (Construction Stage)	No.	18	3000	54,000
Noise quality monitoring at 3 locations for 3 seasons for 2 consecutive years. (Operation Stage)	No.	18	3000	54,000

<b>Cot of Environment / Migration Plan Description</b>	<b>Unit</b>	<b>Quantity</b>	<b>Unit Rate</b>	<b>Cost</b>
Soil quality monitoring at 3 locations for 3 seasons for 2 consecutive years. (Construction Stage)	No.	18	6000	108000
Soil quality monitoring at 3 locations for 3 seasons for 2 consecutive years. (Operation Stage)	No.	18	6000	108000
<b>Total</b>				<b>786,000</b>

## 7 CHAPTER-VII: ADDITIONAL STUDIES & STAKEHOLDER CONSULTATIONS

Additional Studies has been carried out based on local consultation and discussion. The different additional studies carried out for the project comprising of ESIA study, Safety study, SIA study etc. The study also covers all other aspects within this project location and makes a plan to reduce the issues based on consultation of local community, department and nodal officer's recommendations.

### Local, Public & Other Stakeholders Consultation

These consultations were held at major settlement areas along the project to inform people about the objectives of the project. Such consultations provided a means to get the opinion of the people and their issues of concern. The focused group discussion and interview survey methods were adopted as tools for community level consultations. In each of the consultation, participants were encouraged to give their observations, suggestions and share experiences on various environmental and road safety issues and suitable mitigation.

Public involvement is one of the most important methods for the success of any project. It is useful for gathering environmental baseline data, understanding likely impacts, determining community and individual preferences, selecting the alternative and for designing sustainable mitigation and compensations plans.

The guiding principles include

- (i) Dissemination of information: - The information regarding the proposed project should be disseminated to the project affected people directly and indirectly.
- (ii) Soliciting information: - The basic information regarding various environmental and socio-economic issues is solicited.
- (iii) Consultation: - The consultation involves engaging people in dialogue. There has to be a continuous dialogue between the components of the project and the public.

The public consultations are held at all the stages, namely, inception, screening, feasibility, and EIA preparation.

### Outcome of Consultations

Following are the key issues emerged during public consultations during field Study:

- ☞ The proposed project should have adequate road safety measures including service roads, traffic signal etc. to minimize increasing road accidents.
- ☞ Adequate provision of drainage should be made for catering runoff from surrounding areas as well.
- ☞ Tree cutting should be minimized.
- ☞ Traffic noise is particularly disturbing for schools, residential complex, hospitals located near to project and appropriate mitigation measures are required.
- ☞ Appropriate pollution control measures are required during construction phase.
- ☞ Provision of noise barriers for sensitive noise receptors like school and colleges.
- ☞ Provision of bus stops with kiosk facilities and landscaping.
- ☞ Provision for adequate tree plantation should be made to compensate tree cutting.

### Social Impact Assessment (SIA) And R&R

The Social Impact Assessment study of the project National Highway has been carried out as per terms of reference of NH and guidelines given by the Govt. of India. The study methodology employs a simplistic approach in which the important receptors were identified. Based on the identification, secondary baseline data were collected and then analyzed to predict the impacts

and quantify them. A detailed Social Assessment has been carried out to identify nature and characteristics of losses to individuals and local communities because of the proposed project interventions. The report prepared which gives detailed impacts of the project. A Socio Economic / census survey of Positively impacted person and temporarily impacted persons due to the sub project was carried out along with the Public Consultation. To establish impacts on people and community a resource mapping on strip map and consultation with individuals, communities and other stakeholders were done. Based on the findings of this survey and consultation with project-affected persons and other stakeholders a social impact assessment report is prepared.

## **Introduction**

Public consultations or community participation is an integral part and process of any project which involves resettlement or rehabilitation issues. It helps to incorporate valuable indigenous suggestions and perceptions of development. In the process, stakeholders get the opportunity to address issues, which are resolved after making appropriate changes in design and alternative finalization. The stakeholders become aware of the development schemes and at the same time influence and share the control over these initiatives, decisions and resources. Community consultations also help to avoid opposition to the project, which is otherwise likely to occur.

During the course of the social impact assessment, consultation meetings were held to inform the communities and population about the positive as well as negative impacts of the road improvement scheme. Public Consultations were held along the subproject with the local persons who will be benefitted from the project and other stakeholders of the sub project reveals that each person are interested in early completion of the project which will benefit all the stakeholders.. Focus group discussions were held with the youth's group, women's group, farmers, shopkeepers, tenants, interest groups and organisation. Key Informant Interview took place with the village head men, gram panchayat members, head of households and important personalities. There was special consultation with the individual women, vulnerable affected persons and tribal persons. These meetings were used to get wider public input from both the primary and secondary stakeholders.

## **Stakeholders Identification & Analysis**

The stakeholders are all the people getting affected by the project or are responsible for the project, whether directly or indirectly. Primary stakeholders included those affected negatively or positively by the project, like the project beneficiaries and project implementing agencies. Secondary stakeholders included other individuals and groups, with an interest in the project, viz., the town/urban road users, Government Stakeholders and the line departments.

## **Focus Group Discussion (FGD)**

A focus group discussion is held involving local people to discuss the project. It is a form of qualitative research where questions are asked about their perceptions attitudes, beliefs, opinion or ideas. In focus group discussion participants are free to talk with other group members; unlike other research methods it encourages discussions with other participants. Keeping the present Covid-19 situation in view, it was advised by the Block Development Officer to organize Public Consultation with less than 15 persons at any point of time. The group's composition and the group discussion should be carefully planned to create a non-intimidating environment, so that participants feel free to talk openly and give honest opinions on that particular project. Since participants are actively encouraged to not only express their own opinions, but also respond to other members and questions posed by the leader, focus groups offer a depth, nuance, and variety to the discussion that would not be available through surveys.

Additionally, as FGDs are structured and directed, but also expressive, they can yield a lot of information in a relatively short time. Therefore, FGDs are a good way to gather in-depth information about a community's thoughts and opinions on that specific project.

## **Need and Usefulness of Focus Group Discussion (FGD)**

FGDs involve organized discussion with a selected group of individuals to gain information about their views and experiences on the project. It is particularly suited for obtaining several perspectives about the same topic. Therefore, FGDs help in gaining insights into people's shared understanding of everyday life and the ways in which individuals are influenced by others in a group situation. Moreover, the role of the moderator/convenor is very significant, as good levels of group leadership and interpersonal skill are required to moderate/convey a group successfully.

During FGD, free and open discussion among the respondents results in generation of new ideas that can be very useful for decision-making on that specific project. A focus group is not static. The moderator/convenor can bring any changes, remaining within the Scope of Work, in order to better facilitate the discussion during the group discussion. This dynamism allows better results in terms of information derived by a focus group. Expressions other than those in verbal form such as gestures and stimulated activities can provide researcher with useful insights on that particular project.

## **Objectives**

The community participation programmes in social impact assessment ensured that information is disseminated to all the PAPs and other stakeholders in appropriate ways. The information dissemination has taken place in vernacular, giving details about the main project features and the entitlement framework.

Due consideration has also been given to address the views of the vulnerable groups. The Census/Survey Team carried out preliminary consultations through Focus Group Discussions (FGDs) and meetings with the PAPs as well as the general public in the project area. The local Panchayat leaders were informed through the PIU and the date and venue of the Public Consultation were fixed.

Several informal FGDs were conducted primarily in settlements with problems of traffic congestion, dense informal/squatter settlement, close junctions and road intersections, and concentration of PAPs. During the survey, intensive discussion and consultation meetings were conducted with the individuals in every positively affected locality wherein policy related issues; displacements and other related issues were discussed. Suggestions and comments by PAPs were incorporated in the project road design as well as the policy measures for resettlement management.

Second round of Public Consultations will be conducted at important points, where people could assemble in large numbers. Town Councilmembers will be contacted to inform the people beforehand. The PIU will be informed to organize formal consultations and the consultant team will also organize informal meetings with Town Council member and other distinguished persons, leaders of local level organization /association, trucker's association, and village women's groups.

## **Level of Discussion**

A detailed public consultation was organized with the people's representatives, shopkeepers, businessmen, and others regarding the project benefits and vis-à-vis estimated loss. The main point of discussions were minor realignments to save certain structures, compensation and assistance, road safety etc. It has been observed that the benefits of the proposed project area acknowledged by the local people but they want the Executing Agency to take care of the implementation of the project to bring about promised benefits with proper safety measures.

The information and recommendations gathered from the various stakeholder consultations has been incorporated into the design of the project to ensure that the investments align with local priorities and development plans, and that they will deliver equitable socio-economic benefits to the intended project beneficiaries.

Due to the extreme Pandemic situation in the whole world, the PIA is not an exception. There is lockdown, social distancing and various conditions that are not conducive for Public Consultation. As per the guidelines only five persons could be called for Consultation at



Panchayat Office thus those are the Public Representatives and the Public Consultation is rather Key Informant Interview in Nature. Informal FGDs have been done at the villages, market place and other common places to gather and disseminate information about the proposed project.

Still there might be persons who could not be informed or not satisfied with the present information, for them a special system is introduced by the survey team. One email address and one dedicated mobile number which is shared with the leaflets for satisfying mainly the PAPs and the locals regarding any queries or complain.

**Table 33: Brief Description of some sample Public Consultation**

Date / Place	No of Participants	Major Issues	Agreed upon	Mitigation Measures - Input to technical Design
Place: JrisaleinKhliehlangsha Road, Date: 01/09/2021	Total-2 Male-2 Female-0	The town is basically a trading hub. The cultivators as well as the traders are concern of selling their agricultural and industrial output at proper price Though the town lacks in many infrastructural facilities, but they think that with better communication there would be economic development their prosperity. All other issues would be solved automatically. As this proposed road is the only communication to the outer world, they want the road to be completed within schedule time. Existing Electric pillars on the project road causing hindrance to smooth flowing of traffic.	The road after constructed would have major impact on both the economic and social life of the locals of the area. Utility connections will be look after in the proposed development	The road is expected to be completed by two years& also utility connection like electric poles/pillars will be maintained in the proposed sub0project.

<b>Date / Place</b>	<b>No of Participants</b>	<b>Major Issues</b>	<b>Agreed upon</b>	<b>Mitigation Measures - Input to technical Design</b>
<p>Place: Approach Road to Jail Complex, Date: 01/09/2021</p>	<p>Total-4 Male-3 Female-1</p>	<p>The Temporary livelihood loss of the people who are positively impacted is apprehended. The local people want some jobs of unskilled labour and petty supplier to the Civil Contractor. The local were positive about development. As per the suggestions received through public consultation, the proposed project and its benefits is the only feasible option for development of the area. Upgradation of this earthen portion of the project road is proposed by the local people.</p>	<p>The proposed road project is the only feasible option for development.</p>	<p>The people agreed to cooperate and help in all possible ways for the successful of the project. The PWD assure to provide jobs and petty contract as many as possible to the local people. Some Upgradation proposals by the local people will be taken special attention.</p>
<p>Place: Approach Road to Meecl, Date: 01/09/2021</p>	<p>Total-5 Male-4 Female-1</p>	<p>The existing alignment passes through the town area. It is also a junction town and many Goods vehicles passes through the town. There are both commercial and residential establishments along the alignment. As the proposed road will allure the motorist to drive fast there would be increase in road accident. Squatters have been identified on different places on the project road. All the people along with the road side informed about the probable impact during the construction period.</p>	<p>Combined effort of the local authorities with the Government officials as well as the other stake holders would remove all the obstacles for development. Road Safety will be look after</p>	<p>The local authorities also assured that they would help in development of road project. Road safety awareness campaign should be made at schools. There would ample signage and other road furniture to reduce the accident.</p>

Date / Place	No of Participants	Major Issues	Agreed upon	Mitigation Measures - Input to technical Design
Place: Lulong College Road. Date: 01/09/2021	Total-5 Male-3 Female-2	A Renovation of bridge should be on top of the priority list as urged by the local commuters	The local people had agreed in the view of the proposed road project which will bring some hope to the movement of the heavy vehicles and development of the area but against any damages to the market structures.	The PWD officials had agreed to take special care for bridge safety.
In addition to the above specific public consultations and FGDs the peoples were also consulted. In the villages the impact of social and economic are more. In all the villages the access to the market would increase and based on this the valuation of land and properties would also increase.				

**Table 34: Pictures of First Stage Consultations**

	<p>Existing Electric pillars on the project road causing hindrance to smooth flowing of traffic. Place: JrisaleinKhliehlangsha Road Dated: 01/09/2021</p>
<p>Building materials dumped on the project road resulting in narrowing of the existing road. Place: JrisaleinKhliehlangsha Road Dated: 01/09/2021</p>	



Existing condition of the present road.  
Place: Khimusniang Internal Road (Opposite Khimusniang Presbyterian Church)  
Dated: 01/09/2021

Upgradation of this earthen portion of the project road is proposed by the local people.  
Place: Approach Road to Jail Complex  
Dated:01/09/2021.



Latitude: 25.43644  
Longitude: 92.192638  
Elevation: 1399.0523 m  
Accuracy: 4.8 m  
Time: 01-09-2021 13:17  
Note: Road No 43

Squatters have been identified on different places on the project road.  
Place: Approach Road to Meecl  
Date: 30/08/2021

Renovation of bridge should be on top of the priority list as urged by the local commuters.  
Place: Lulong College Road.  
Dated: 01/09/2021.



Latitude: 25.443106  
Longitude: 92.203557  
Elevation: 1263.4198 m  
Accuracy: 16.0 m  
Time: 01-09-2021 14:37  
Note: Road No 1



## Outcome of the Consultations

People were aware about the improvements proposed for the project road but were not aware about specific details of the PRow, shift in centerline and the method of valuation for land and building, payment of compensation and other rehabilitation and resettlement measures. A detailed public consultation was organized with the potential project temporary impacted persons, people's representatives, shopkeepers, businessmen, and others regarding the project benefits and vis-à-vis estimated loss. The main point of discussions were minor realignments to save certain structures, compensation and assistance, road safety etc. It has been observed that the benefits of the proposed project area acknowledged by the local people but they want the Executing Agency, to take care of the implementation of the project to bring about promised benefits with proper safety measures.

The information and recommendations gathered from the various stakeholder consultations has been incorporated into the design of the project to ensure that the investments align with local priorities and development plans, and that they will deliver equitable socio-economic benefits to the intended project beneficiaries. The salient points of the consultations are summarized in the following Table below

**Table 35: Summary of Consultation Outcome**

Issues Discussed	Outcome
Relocation Options Compensations/Assistance	Residential structures are getting affected temporarily prefer not to get disturbed and if disturbance is not avoidable then they shall be relocated very nearby. Shop owners and workers raised the issue of loss of their livelihood during the resettlement period due to loss of business. During consultation they were convinced that there will be no permanent impact but temporary impact during the active construction period.
What are all the facilities provided through this project and to whom should we approach?	Facilities like bus shelters, rest rooms, pavements, drains etc. would be provided. Officers such as PWRD Engineers, LARR Authority (Town Council) could be approached for grievances.
Safety due to alignment	People expressed their views on the risk if the road is widened at the dense settlement area affecting structures on both sides. During consultation they were convinced that there will be no permanent impact but temporary impact during the active construction period.
Could you inform us the time when our assets be removed?	Would be informed well in advance and compensation will be paid before vacating assets, if required.
Relocation process of CPR	Though there is no impact at any CPRs still the process of CPR relocation were discussed during consultation.
Cross Drainage for alignment	People have shown their concern for the proposed drainage pattern for the alignment of a portion of the project road. In this regard the lined rectangular drains with proper outfall shall be planned as a part of the project design of the main carriageway. Adequate cross drainage structures are planned after study of hydrology of the Survey area.
Utilities and basic infrastructures	People showed their concern about what will happen with the utility lines if the road is widened. Adequate care shall be taken for the shifting of the utilities.
Employment during construction	People were of demand if the local people are given preference for employment during the construction phase of the project. Such options shall be explored to the extent possible and mostly the unskilled worked can be hired from nearby locality.
Why structures at places along the road were not measured?	If and only the structure to be impacted, measurements are required. Otherwise, there is no requirements of measurements of structures.



<b>Issues Discussed</b>	<b>Outcome</b>
What about the loss of livelihood during active phase of construction?	The active phase of construction is planned in such a way that there will be minimum (temporary) loss of access and/or livelihood. If there is any loss or damage of structures or any immovable assets the Civil Contractor will compensate the same in discussion with the affected party. Civil Contractor will minimize the impact of accessibility of the residential structures and the loss of livelihood of the Commercial structures will be minimized by speeding up the civil work and doing the work on one side of the road at a time.

## 8 CHAPTER-VIII: CLIMATE CHANGE IMPACT & RISK

A rapid increase in the number of motor vehicles on road in Meghalaya has been observed over the past decade. Due to the lack of adequate public transport systems where buses comprise only 1% of the total population of vehicles on road, and due to the availability of easy loans, most of the people are aspiring to buy their vehicles. As a result, two-wheelers are 57% of the total vehicle mix in the State, and cars follow suit with a 21% share in 2013-14. The road transport sector is a direct consumer of fossil fuel, emits GHG into the atmosphere. With an increase in population and per capita rise in the number of personal vehicles, GHG emissions are likely to rise. The use of the public transport system needs to control future emissions in the future and to ease off the pressure of vehicles on the roads, hence. This would require policy changes in the way lending is done by banks, enabling fuel mix with biofuels, and behavioural changes of the population whereby they use more and more non- motorized transport at short distances and public transport for long distances.

### Climate Change Mitigation

The Transport Emissions Evaluation Model for Projects (TEEMP) developed by Clean Air Asia was utilized to assess the CO<sub>2</sub> gross emissions with and without the project improvements. The main improvement from the project that was considered for the model are better surface roughness with initially 6 m/km which may deteriorate over a period but not less than 2 m/km and widening of roads from the single/intermediate lane (3.5/5.5 m) to two lanes with paved shoulder (7 m). These were translated into impacts on traffic speed and hence fuel consumption. The model also allows for the inclusion of impacts related to traffic congestion with and without project through provisions for inserting data on the traffic numbers, lane width, number of lanes, and volume/capacity saturation limit.

Information that was fed into the model for projecting the CO<sub>2</sub> emissions were:

- The road configuration will change from an intermediate lane to two lanes with a carriageway width of 7 m with 1.5 m hard shoulder on both sides. The road will have an asphalt concrete surface.
- The surface road roughness is mostly 6 m/km and will be improved to 2.0 m/km, which may further reach up to 3.5 m/km during 5 years of road operations. Resurfacing of the road would be required after 5 years.
- The design life of the road is 20 years.
- Other improvements include the repair or reconstruction and improvement of culverts, longitudinal and cross drains, and removal of irregularities on the existing vertical profile and road safety appurtenances.

**Table 36: Traffic Composition**

Vehicle Type	Traffic Composition
2-Wheeler	0.6%
3-Wheeler	0%
PassengerCar+Mini LCV +Exempted Vehicles	6.1%
Mini Bus	0.2%
Standard Bus	0.2%
LCV	4.7%
2-Axle	74.8%
3-Axle	12.4%
MAV	0%
Tractors-With Trailer	0.9%
Tractors-Without Trailer	0%
<b>TotalMT ( Motorized Traffic)Traffic</b>	<b>100.00%</b>
Bi-Cycle	0%

Vehicle Type	Traffic Composition
Cycle-Rickshaw	0%
Animal-Drawn	0%
Hand-Drawn	0%
<b>Total NMT Traffic (Non-motorized Traffic)</b>	<b>0.00%</b>

Road capacity of 3,496 PCU/lane/day for was adopted for this project based on projection at the end of design year (2043). Emission factors were mostly taken from the CPCB/MOEF (2007) Draft Report on Emission Factor Development for Indian Vehicles, the Automotive Research Association of India, and C. Reynolds et.al (2011) Climate and Health, Relevant Emissions from in-Use Indian for three-wheelers rickshaw as presented in Table below. Emission factors were taken from the CPCB/MOEF&CC (2007) Draft Report on Emission Factor Development for Indian Vehicles, the Automotive Research Association of India, and C. Reynolds et.al (2011) Climate and Health Relevant Emissions from in-Use Indian for three-wheelers rickshaw as shown in table below

**Table 37: CO<sub>2</sub> Emission Factors**

Vehicle Type	Petrol	Diesel	LPG/CNG
2-Wheel	1.37kg/l		
3-Wheel	2.12kg/l	2.58kg/l	3kg/l
Cars/bus	2.24kg/l	2.58kg/l	

1. All 2-wheel vehicles are run on petrol; average fuel economy: 50km/litres
2. All 3-wheel vehicles are run on diesel; average fuel economy: 30km/litres
3. 50% of the cars/bus are run on petrol while the remaining are run by diesel; average fuel economy: 15km/litres

For 45,000 km of road construction would result in emission of approximately 4635 tCO<sub>2</sub>eq. (Source: Greenhouse Gas Emissions Mitigation in Road Construction and Rehabilitation - A Toolkit for Developing). This value is based on estimation of materials required to upgrade /construct of rural road which include cement, steel, gasoline, diesel, and bitumen etc.

**Estimated carbon emissions:**

Construction Phase

The GHG emissions during road construction project involve the following major sources:

- Transport emissions owing to transportation of man and material
- Material emissions owing to extraction/production of construction materials
- Machine emissions owing to consumption of fuel by engines used in construction

A detailed study conducted for the World Bank titled "Greenhouse Gas Emissions Mitigation in Road Construction and Rehabilitation- A Toolkit for Developing Countries" established the typical GHG emission rate in terms of ton CO<sub>2</sub>eq per km of road construction. According to this study, for Rural Road-DBST, GHG emissions due to material production is based on estimation of materials required to upgrade /construct of rural road which include cement, steel, gasoline, diesel, and bitumen etc. are the main contributor.

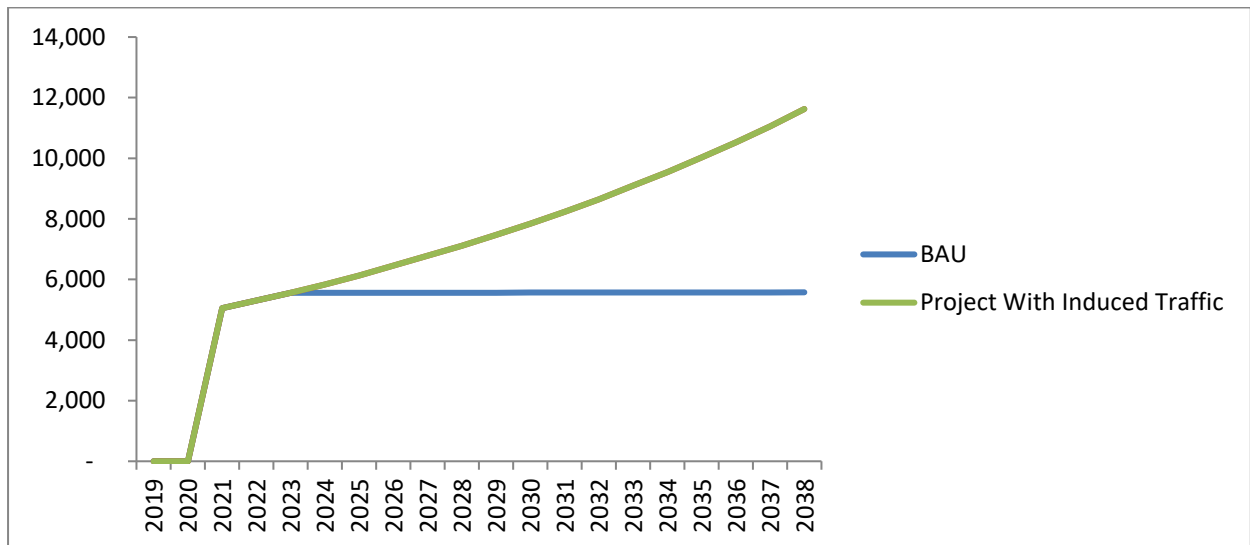
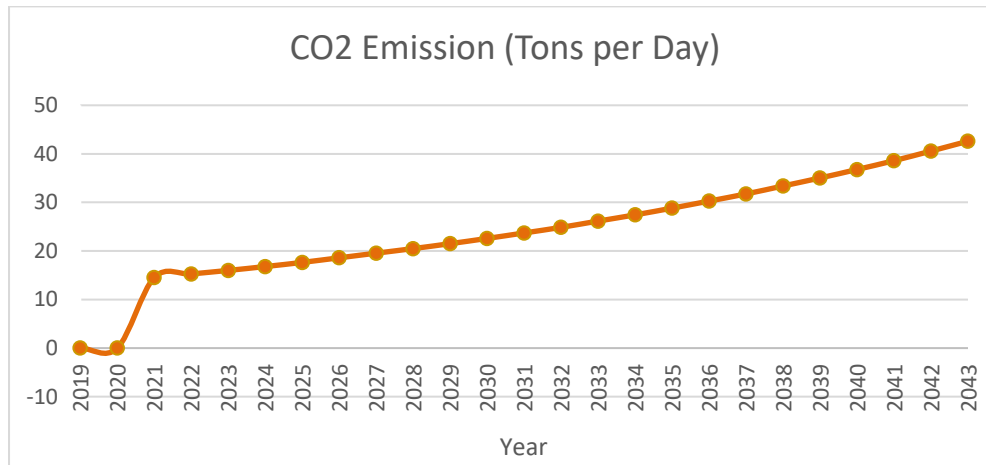
Type of Road	Transport emissions	Material emissions	Machines emissions	Total (t CO <sub>2</sub> eq.)
Rural Road—DBST	26	62	14	103

Source: Green house Gas Emissions Mitigation in Road Construction and Rehabilitation-A Toolkit for Developing Countries

Therefore, for the project road construction would result in emission of approximately 3584.50 tonCO<sub>2</sub>eq.

Operation Phase

The design life of the project road is 20 years. Total annual emission for each year starting from the base year -2019(i.e. without the project) till year 2043 is presented in the figure below.



(Both without and with induced traffic), there will be an increase in the CO<sub>2</sub> emission levels over the time due to the increase in the traffic volume, however, the emissions will be controlled by maintaining the road roughness below 3.0 m/km during the entire project life as well as the enhanced capacity of the road. This will result in annual CO<sub>2</sub> emissions of the project road much below the threshold limit of 100,000 tons/year.

### Climate Change Impacts & Risks

In today's world, climate change is considered the most serious global challenge. Changes in the atmosphere have been detected that could drastically alter the climate system and the balance of ecosystems. Atmospheric changes are linked to an increase in greenhouse gases (GHGs), chiefly on account of anthropogenic releases attributed to fossil fuel consumption, land-use changes, deforestation, etc. Research has established that carbon dioxide (CO<sub>2</sub>) levels in the atmosphere have risen by 35% since the pre-industrial era. Rising CO<sub>2</sub> concentrations increase the energy retention of Earth's atmosphere, leading to a gradual rise in average temperatures and global warming. Sector-specific climate risk screening has been done based on secondary sources to analyze the impact on road components due to likely change in climatic variables, mainly temperature and precipitation.

### Temperature & Precipitation:

Meghalaya is one of the important states located at north east of India. Usually four seasons are observed in this beautiful hilly state. As per the rainfall data from 1989 to 2021<sup>1</sup>, highest rain fall (31% of south west monsoon rainfall) is observed in month of July. Similarly, state experienced 30% of the south west monsoon rainfall in June month. Also, in August and September, 23% and 17% of south west monsoon rainfall were observed in the State. Highest annual rainfall is 5440.8 mm in the year of 1995. Details rainfall variation table is given below:

**Table 38: Mean rainfall (mm) and coefficient of variation (CV) of the state for the monsoon months, southwest monsoon season and annual**

:

	June	July	August	September	June-September (JJAS) rainfall	Annual
Mean	801.5	825.1	612.6	463.2	2702.4	3784.3
C V	33.0	40.2	40.4	46.2	24.9	21.5

Comparing<sup>2</sup> to Eastern part, Western part of this state, especially West Garo Hills and East Garo Hills, small increase of minimum temperature is observed and also, high increase around 1.2 degree centigrade in maximum temperature is noticed in Central part and West khasi hills, South Garo hills and East Kahli hills region. Maximum temperatures during summer and winter seasons are 25°C & 16°C, respectively.<sup>3</sup> Minimum temperatures during summer and winter seasons are 15°C & 4°C.

Increased temperature and precipitation will have the following impacts:

- **High Precipitation Impacting Roads /Bridge /Embankment:** Heavy rains can cause disruption of the road networks, decreased accessibility, erosion of roads and embankments, surface water drainage problems, slope failures, landslides, among others. Increased river flow resulting from precipitation and storminess may result in damages to bridges, pavements, and other road structures. Bridge/culvert capacities are reduced or exceeded, causing upstream flooding to occur.
- **High Temperature Impacting Road Stability:** Extreme heat, combined with traffic loading, speed, and density can soften asphalt roads, leading to increased wear and tear. There would likely be concerns regarding pavement integrity such as softening, traffic-related rutting, embrittlement, migration of liquid asphalt. Additionally, thermal expansion in bridge expansion joints and paved surfaces may be experienced.
- **Earthquake:** All districts of the state of Meghalaya lie in Zone V. Centred across the state border in Assam, much of Meghalaya was severely jolted especially Shillong.
- **Drought:** The Average Annual Rainfall in Meghalaya is 2818 MM (source: rainwaterharvesting.org), whereas, Sohra or Cherrapunjee and Mawsynram in Meghalaya receive the highest rainfall in the world i.e. about 11000 mm annually, but this huge rainfall is concentrated only in monsoon months. 11, 667 sq km of the State drains into the Brahmaputra basin and the rest 10,650 sq km into the Barak Basin (Source: Central Water Commission). In less than

<sup>1</sup>[https://imdpune.gov.in/hydrology/rainfall%20variability%20page/meghalaya\\_final.pdf](https://imdpune.gov.in/hydrology/rainfall%20variability%20page/meghalaya_final.pdf)

<sup>2</sup><https://meghalaya.pscnotes.com/meghalaya-geography/climate-of-meghalaya/>

<sup>3</sup><https://www.mapsofindia.com/meghalaya/geography.html>



12 hours all the rainfall runoff water reaches the plains of Bangladesh and Assam taking along with-it top soil, boulders and logs besides creating flood-havoc in Bangladesh. In contrast during non-monsoon months, most of the rain-fed surface sources and spring sources get dried up, leading to water scarcity, which is a major problem as the people living in these areas with highly variable rainfall, experience droughts like situation and floods and often have insecure livelihoods. In many dire cases people do not even have regular access to water for drinking purposes.

- **Cyclone** Meghalaya is situated in the north eastern direction of Bangladesh which is highly prone to cyclone/ winds. Every year about 60% of the area is affected by cyclone in Bangladesh. The Districts of West Jaintia Hills and East Jaintia Hills may experience a wind speed of up to 55m/s. Occasional cyclones do occur in western Meghalaya their severity being more during monsoon season. The districts close to Bangladesh like South West Garo Hills, South Garo Hills, South West Khasi Hills, West Khasi Hills, fall in very high cyclonic zone due to close proximity to Bay of Bengal (which is a cyclone basin). In this zone wind speed can reach up-to 50 m/s, which can cause large scale damages. The Bay of Bengal accounts for seven percent of the annual tropical cyclone activity worldwide; the recorded frequency of cyclones per year along the Bay of Bengal is four and inevitably one of the four transforms into a severe cyclone causing human and property losses

➤ **Flood:**

The plain areas of Meghalaya adjoining Assam are affected by flood due to the back flow of water from the River Brahmaputra during the flood season between June and October. The tributaries like Krishnai, Jinari, Jingjiram, Rongai, Dudhnoi, Ringgi, Gohai, Dilni etc cause flood in the plain areas of the State.

Key engineering measures taken to address flood risks in the design are:

- Increase in embankment height,
- Construction of new side and lead away drains,
- Construction of new culverts and widening of existing ones and iv) widening of bridges.

Cross drainage structures, embankment, and Roadside drains would have been considered anyway in the conventional design as the issue of flooding is a threat to the sustainability of the road. However, these measures also contribute to the adaptation of the roads for future increases in precipitation. This risk screening and risk identification exercise have helped to ensure that the project road with climate risks have adequate risk mitigation or adaptation measures. Provisions have also been made in the bidding documents for the Contractor to prepare contract package-specific EMP's based on the final detailed design to address a range of issues including climate-related risks and vulnerabilities.

## Possible Climate Events, Risks and Adaptation Measures in Road Transport Infrastructure

The design objective included ensuring that current infrastructure assets are protected from the long term and acute effects of climate change, and wherever necessary upgrading to new infrastructure systems fit for changing climate conditions have been taken into serious consideration. Those adaptive measures to counter possible risks and their likely effects on project road infrastructure are summarized below. It must be noted that all these events either simultaneously or in isolation can generate severe disastrous impacts on road infrastructure.

**Table 39: Possible Climate Events, Risks, and Adaptation Measures**

Sl.	Climate Change Events	Risks to the Road Infrastructure	Adaptation Measures incorporated in Detailed Design of Project Roads
1	Extreme rainfall events	<ul style="list-style-type: none"> <li>i. Overtopping and wash away</li> <li>ii. Increase of seepage and infiltration pass</li> <li>iii. Increase of hydrodynamic pressure of roads</li> <li>iv. Decreased cohesion of soil compaction</li> <li>v. Traffic hindrance and safety</li> </ul>	<ul style="list-style-type: none"> <li>a. Certain critical sections affected by overland flooding of the road raised (vertical alignment, embankment improvement) to be free from the onslaught of flooding events under intense precipitation.</li> <li>b. Road asset survey has considered certain critical road sections where the sub-grade strength and integrity were found to be compromised; the sub-grade strength specification meeting the recent-most IRC specifications has been adopted.</li> <li>c. The highest assessment of design discharge for sizing culverts and bridges from among the several discharge methods as outlined in recent IRC guidelines has been adopted.</li> <li>d. In terms of floodwater conveyance to prevent stagnation, closed concrete drains in settlement pockets have been provided.</li> <li>e. Improved cross-drainage capacities required for the quick conveyance of floodwater by replacing small diameter pipes with box culverts with higher discharge openings has been considered.</li> <li>f. The bottom of the sub-grade has been kept 0.6m above HFL, to avoid over topping, water-logging of the road surface.</li> </ul>
2	Changes in seasonal and annual average rainfall	<ul style="list-style-type: none"> <li>i. Impact on soil moisture levels, affecting the structural integrity of roads, culverts, bridges standing water on the road base</li> <li>ii. Risk of floods from runoff, landslides, slope failures and damage to roads if changes occur in the precipitation pattern</li> </ul>	
3	Increased maximum temperature and a higher number of consecutive hot days (heat waves)	<ul style="list-style-type: none"> <li>i. Concerns regarding pavement integrity, e.g., softening, traffic-related rutting, cracking, fracture, etc.</li> <li>ii. Thermal expansion in bridge expansion joints and paved surfaces Temperature break soil cohesion and increase dust volume which caused health and traffic accidents</li> </ul>	<ul style="list-style-type: none"> <li>a. An adequate binding layer thickness has been proposed to offset the wear, surface fatigue, and rutting under climate stresses.</li> <li>b. In terms of pavement integrity, the choice of viscosity grade VG30 has been maintained.</li> </ul>
4	Extreme wind speed under cyclonic conditions	<ul style="list-style-type: none"> <li>i. The threat to the stability of bridge decks</li> <li>ii. Damage to signs, lighting fixtures and supports</li> </ul>	Business As Usual

## **9 CHAPTER IX TRIBAL PEOPLE'S DEVELOPMENT PLAN**

The Tribal People in India are categorized as indigenous community who often become vulnerable

in development projects because of their cultural autonomy, economic status, and enduring specific disadvantages in terms of social indicators of quality of life, thus usually as subject of social exclusion. Because tribal communities live within varying and changing historical, cultural, political and economic contexts, no precise and coherent term has been found to define them. Under OP 4.10, the determination as to whether a group is to be defined as indigenous peoples is made by reference to the presence (in varying degrees) of four identifying characteristics:

There is no impact on the community structure or community land of cultural or religious sentiment of the ST Population in the Primary PIA. The proposed project will ensure that STs receive culturally appropriate social and economic benefits, do not suffer adverse impacts as a result of projects, and can participate actively in projects that affect them. There is no cultural heritage site of the ST which comes in the way of the road alignment. The ST population among the Surveyed Families in the PIA are living in the towns and in the due course of time became the part of the mainstream population. Presently the impacted ST population does not follow any custom that are attached to their land or natural habitat which will be impacted. Thus, there will be no cultural or social impact on the ST population.

## **10 CHAPTER X GENDER ACTION PLAN AND ROAD SAFETY**

The tribal women in Meghalaya play an important role in the community and family development. Women normally constitute half of the total population. These women mostly work as agricultural labourers and share equal burden with men. Meghalaya being the state with matriarchal society, women are empowered but not necessarily well educated about human and tribal rights. Thus, there is no specific requirement to create an institutional framework to make gender sensitive decisions. Women consulted within project associated villages and together identify awareness programs on “women’s role in development and maintenance of public assets”.

The tribes of Meghalaya whose societies are organized on matrifocal principles have obtained much greater gender equality than the societies (e.g. Hindu and Muslim) that are organized on the patriarchal principles. "Securing equal treatment for men and women in the workplace" is already prevailing in the project area. Thus, Gender Action Plan is not required.

### **Road Side Safety Measures**

Indian Road Congress (IRC) codes will be followed in proposing and designing road safety features. Pavement markings will be done for traffic lane line, edge lines and hatching. The marking will be with hot applied thermoplastics materials. The pavement markings will be reinforced with raised RR pavement markers and will be provided for median and shoulder edge longitudinal lines and hatch markings. Highway lightings including high masts will be provided at intersections in order to improve the night time visibility.

All the urban locations as well as grade separated structure locations will be provided lighting arrangements.

## 11 CHAPTER XI IMPLEMENTATION

### 11.1.1 Implementation Arrangements

The preparation, implementation, and monitoring of the Gender Action Plan (GAP) is the responsibility of the project implementing entities. The Social Development specialist, at the PMU level, will facilitate and supervise this process of preparation and implementation of the Action Plan. All efforts will be made to coordinate and work with associated line departments and other department, more specifically the Women and Child Development department, State Livelihood Mission, Panchayati Raj, and Rural Development department to help dovetailing with their development programs for the socio-economic development of women.

### 11.1.2 Implementation of ESMP

Due to its wide scope, the project activities will be implemented by many agencies: Public Works

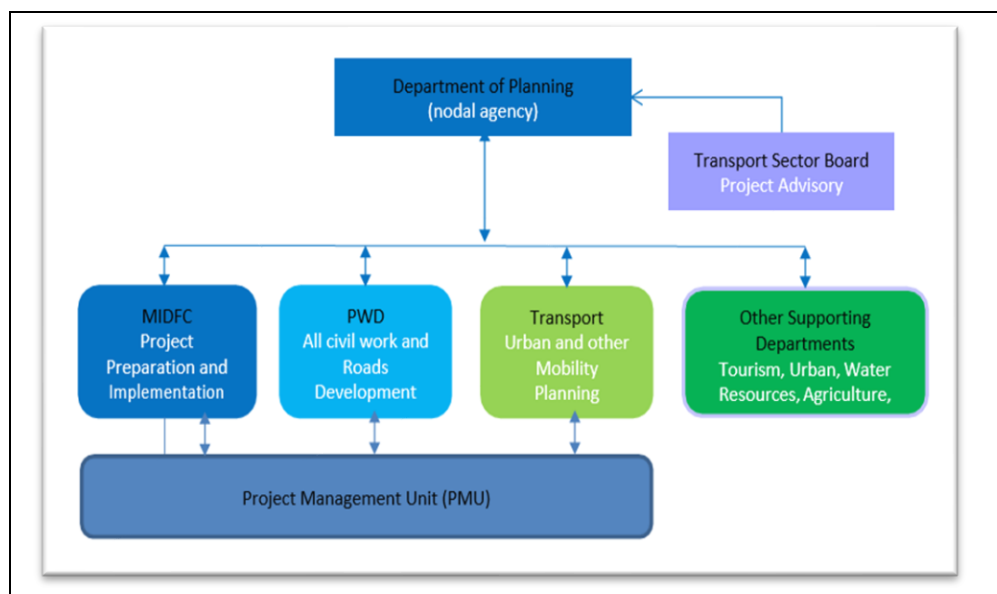
Department (PWD), Urban Affairs (UA) Department, Department of Tourism, Transport Department and Community and Rural Development Department. Each of the mentioned departments, will depute a Project Director (PD) preferably at the level of a Chief Engineer/Superintending Engineer along with the required supporting staff with the overall responsibility for project implementation with the involvement of the various field divisions and other units at the headquarters (HQ – Shillong).

PDs will work under the overall guidance and oversight of a Project Advisory Committee headed by the Secretary of the respective departments. In addition, nodal officers will be deputed from the beneficiary departments like Tourism, Agriculture, Police, Health, Education and C&RD. All civil works component will be implemented mainly by PWD, and involvement UA and Transport departments will be mainly for the technical assistance and pilot projects on improving mobility. When functional, the Transport Sector Board will also be constituted to provide high level policy guidance and oversight for project implementation.

Meghalaya Infrastructure Finance Development Corporation (MIFDC) set up under the Planning Department will be responsible for overall planning, coordination, implementation and monitoring of the project along with various departments. It will also be responsible for mobilizing private sector finance for the development works. The State Planning Department will be the nodal department for the Project. MIFDC will be responsible for overall planning and implementation of the entire project. It will ensure that ESIA is conducted and ESMPs are prepared and that the ESMP is followed during project implementation. Additionally, a project management unit (PMU) will be mobilized under MIFDC to support the implementing agencies during project preparation and subsequent implementation. The overall institutional arrangement for the implementation of the project is outlined in the following diagram.

**Figure 24 Project Implementation Arrangement**





### 11.1.3 Project Management Unit (PMU)

The Project Management Unit (PMU) will engage a consulting firm, as Project Management Consultant (PMC) for providing technical support to the project and facilitate implementation of project framed activities. The experts of the PMC will assist MIDFC in preparing and updating ESIA (including E&SMPs). The PMC will also assist MIDFC in preparing semi-annual safeguards monitoring reports. Specific roles of the PMC with regard to ESMF implementation would include the followings.

#### 11.1.3.1 Preparatory Stage:

- Initial field visit to project sites and assessment of environmental and social aspects of project activities;
- Discussion with different stakeholders, including implementing agencies on safeguard measures and their expected role;
- Preparing / finalizing assessment framework in line with the Environment and Social indicators;
- Finalizing TOR of the contractors incorporating safeguard measures to be taken;
- Facilitate / organize training / workshops on safeguard measures for the stakeholders;
- Designing study / assessment tools for periodic assessment, its piloting and finalization.

#### 11.1.3.2 Implementation Stage:

- Conducting periodic site visits and observe the measures taken as per the safeguard norms;
- On the spot guidance to contractor/s / implementing agencies on safeguards;
- Preparation of site-specific reports and sharing with MIDFC;
- Documentation of learning cases for sharing and dissemination;
- Visual documentation of site-specific safeguard measures;
- Tracking activity specific environmental and social monitoring indicators;
- Organizing / facilitating refresher training courses for stakeholders;
- Monthly and quarterly progress report preparation and submission to MIDFC.

#### 11.1.3.3 Post-Implementation Stage:

- Consolidation of periodic monitoring reports;

- Support in conducting environment and social audit;
- Consolidation of good practice documents and its submission to MIDFC;
- Final sharing workshop on environment and social safeguard practices and its outcome.

#### **11.1.3.4 The PMU shall have following experts for implementation of ESMF and E&SMPs: Social cum Gender Expert**

The Social cum Gender Expert at the PMU level will guide the overall process related to social and gender aspects. The district/sub-district level implementing agencies will execute and monitor the social / gender components in consultation with the said Expert. She / he will be associated in the screening process of such activities that require acquisition of land and/or involvement of women and/or need special focus on tribal involvement. She/he will monitor the social processes followed in execution of the planned activities and realisation of the social / gender inclusion parameters. She / he will be looking after social / gender aspects of the project, including monitoring of social / gender indicators and coordinating with different agencies / institutions. The expert will be guided by the Project Director from MIDFC and reporting to the Project Director directly.

#### **11.1.3.5 Environmental Expert**

The environment expert will look after environmental aspects. She/he will guide the project team on environmental aspects and support in building environmental parameters to be built in the bids. She / he will also guide the contracts and monitor their works from time to time. In case of requirement, she/he will prepare a detail environment management plan for different activities to be executed by the project. The expert will be guided by the MIDFC Project Director and reporting to the Project Director directly.

#### **11.1.4 Capacity Building Strategy**

The concerned officials within the project implementation agencies will be oriented on different social and environment aspects by which they will be equipped well to manage the related issues effectively and efficiently. The capacity building would take in to account the current issues that may influence the project activities, measures that are required to be taken to ensure greater involvement of socially and economically backward families and deprived sections of the society. A capacity building plan on social and environmental aspects to be prepared by PMU in consultation with all implementing agencies.

#### **11.1.5 Institutional Capacity to Manage Social Development Aspects**

##### **11.1.5.1 Autonomous District Councils**

As mentioned earlier, ADCs were established under the Sixth Schedule of the Constitution of India (Articles 244(2) and 275(1)) with a view to preserve and protect tribal institutions. It is a system of local administration to give greater autonomy to tribal societies, to preserve and safeguard tribal groups' traditional practice and to act as a conduit between the formal state government and the informal grassroots tribal institutions. Moreover, the powers for the regulation and management of natural resources have been conferred on the Councils. Despite the fact that the District Councils manage and control the land, water and forest, the management of these resources is a weak link of the Councils. Due to their decisive role in local governance, the project aims to build their capacity in sustainable management and safeguarding of state's natural resources. The project will offer technical assistance, skill-development and financial resources to the ADCs, with the aim to empower them.

There are, at present, three ADCs in the state of Meghalaya, Khasi, Jaintia and Garo Hills Autonomous District Councils. They are constitutional bodies and all laws, rules and regulations made by them are enforceable. The ADC has the right to constitute village councils or courts for the

trial of suits and cases between the parties all of whom belong to Scheduled Tribes within their own jurisdiction and may appoint suitable persons to be members of such village councils or presiding officers of such courts, and may also appoint such officers as may be necessary for the administration of the laws of the Sixth Schedule. They may also act as courts of appeal from the decisions made by village councils. As per paragraph 8 of the Sixth Schedule, the ADC also has the power to assess and collect revenue in respect of all lands within the district except those lands which are in the areas under the authority of regional councils, if any, in accordance with the standard followed by the State government. It also has the power to levy and collect taxes on lands and buildings, and tolls from persons, falling within their jurisdiction. The ADCs also has the power to make laws on matters such as inheritance of property, marriage and divorce as well as on social custom. Notwithstanding the power and authority extended to the ADCs by the Constitution, in the matters as mentioned earlier, they are however, bounded by paragraph 12(A) of the Schedule. This paragraph gives onus to the State laws over that of the laws made by the ADC. It states that if any law made by the ADC is repugnant to any provision of a law made by the State Legislature, then the former's will be void and the State law will prevail.

### **11.1.5.2 Grassroots Institutions**

The third centre of authority is the grassroots tribal institutions and practices. In the Khasi and Jaintia Hills, these are powers that rest at the village level's elected members to govern the village. The members mainly belong to the ruling clan called Ki Bakhrav. The elected members organise themselves into a village council or Dorbar Shnong that is headed by a Chief. The council has significant power and legitimacy rooted in the un-codified customary laws and practices. The primary function of the Dorbar Shnong is to undertake development works and to manage local assets. It also functions as a court trying petty cases such as land disputes. The decisions of the Dorbar are considered legitimate and are usually adhered to. In the Garo Hills, there is the institution of the Nokma. The Nokma holds a-king (clan) land in the village as head of the motherhood. As head, the Nokma is to preserve the customs but the real owner of the a-king land is in his wife's name. The administration of the village is carried out through by the Nokma. In the Garo Hills there are 70 village courts with a laskar. If there is no laskar a member of the village council nominated by the District Council. The laskar of the village is the ex-officio president of the Village Court. The President and Vice-President is elected by the members of the council from amongst themselves by a majority of votes. The Nokmas and the laskar try all cases connected to customary laws. The community led project will provide training and capacity building to all the traditional institutions and stakeholders based on traditional laws and the existing government Acts for the protection and management of land, water and forest.

## **Grievance Redressal Committee (GRC)**

### **11.1.6 Grievance Redress Mechanism**

Effective grievance redressal mechanism gives an opportunity to the organization to implement a set of specific measures to ensure good governance accountability and transparency in managing

and mitigation of environmental and social issues of a particular project. This consists of defining the process for recording/receiving complaints and their redressal in respect of environmental and social matters.

An integrated system will be established with Grievance Redressal Cell (GRCs), with necessary officers, officials and systems at MIDFC. Grievances, if any, may be submitted through various mediums, including in person, in written form to a noted address, e-mail, or through direct calls to concerned official/s. The Social and Environmental Expert within PMU shall be responsible for coordination of grievance/complaints received.

The grievance redress mechanism should be in place at the time of initiating the implementation of R&RAP and civil construction activities in the project area. A platform for grievance redressal should be organized and its regular meetings may be conducted so as to allow people to put forth their

grievances. It will help the appropriate authority to find solutions and amicably address the issues.

The project, apart from web-based mechanism, will have three-tier grievance redressal mechanism, i.e., (1) at the project site level, (2) State level (PMU level) and (3) Judiciary level.

**Web based grievance mechanism<sup>11</sup>:** In case of grievances received through toll free number or web-based system, a person should be made in-charge of screening and resolution of the same/communicating with the concerned divisions for resolution of the same. The person in-charge based on nature of complaint, should forward the same to the concerned official. A ticket or a unique number will be generated for all such complaints. The complainant should follow up based on that unique number. All calls and messages should be responded within 15 days. If response is not received within 15 days, the complaint should be escalated to the Project Director.

**Tier I:** Under this project, the local VECs and community level organizations will serve as the first-tier mechanism to handle complaints and grievances. The local Headman will be the focal point who will receive, address, and keep record of the complaints and feedbacks. The grievance focal point will first review the grievance submitted. If grievances or disputes cannot be solved at the VEC's level within 30 days of the submission of the grievances, the issue will be brought to PMU level for mediation. PMU is expected to inform aggrieved persons or parties to disputes of the resolution in 30 days.

**Tier II:** If the aggrieved person is not satisfied with the verdict of site level grievance cell, he or she can escalate the grievance to state level grievance cell. The tier II cell will be under the Chairmanship of Secretary, Department of Planning. The other members will include Chief Engineer; Project Director and Social Expert of the Project. The second level of grievance cell will provide its view within 30 days of receiving the grievance.

**Tier III:** The aggrieved person if not satisfied with the verdict given by State level grievance cell, will have the right to approach the Judiciary. Project will help the aggrieved person in all respect if person wants to approach the judiciary. This would include the District Commissioner and Legal courts. If the issue cannot be addressed or is outside the purview of the GRC, then it may be taken by the Office of the District Commissioner or a Legal Court.

### 11.1.7 Grievance management through Electronic Mode

A simplified mobile based technology feedback system can be used at community level to capture and feed data into the Management Information System of the PMU. A toll-free Helpline number will also be established to make the mechanism widely accessible and gender friendly.

### 11.1.8 Grievance Redressal Mechanism

There Grievance Redressal Committee (GRC) at the PMU level is in process of formation. Consultation for the formation of GRC for this project at city/ward level is currently being undertaken. Before the start of civil contractor appointment, the GRC at project level will be formed with consultation with the PAPs and Beneficiaries so that the grievances are resolved at the project site only. There should be a Women Cell at the PMU. The contractor and the other stakeholder's office will display the Vishaka Guidelines at their Notice board. The Women helpline Number should be displayed in the Bus Stand, Ticket Counter, all commercial vehicles and any other place as required.

**Table 40: Details of contact for Grievances**

Description	Contact details
Company:	PWD, Meghalaya
To:	Chief Engineer-cum-Project Director
Address:	HV9P+GFJ, Lachumiere, Shillong, Meghalaya 793001
E-mail:	cenhpwd@gmail.com
Website:	<a href="http://megpwd.gov.in/contacts.html">http://megpwd.gov.in/contacts.html</a>
Telephone:	Tel: 0364-2224561
Fax:	-

### **11.1.9 Disclosure of Project Information**

In order to make the ESIA implementation process transparent, salient features of ESIA shall be translated in Khasi and disclosed on the Project Authority's website. The documents available in the public domain will include ESIA (summary in Khasi). Copy of all documents will be kept in PMU for ready reference. As per Access to Information Policy of the World Bank, all safeguard documents will also be disclosed and available at the World Bank's Portal.

## 12 CHAPTER-XII: MONITORING & EVALUATION

The M&E framework of ESMF is designed to assess the progress and achievements against the said management plans—both Environment and Social as well as other plans such as R&R, TPP, and GAP. By providing a feedback loop, the M&E plans enable decision makers to take up mid-course corrections if required. The M&E framework is designed to measure the impacts that have taken place, ensure compliance with the legal obligations, evaluate the performance of the mitigation measures applied, and suggest improvements in management plans, if so required. The M&E is to be undertaken at two levels:

- Monitoring and Evaluation of the ESMF application: i.e. the application and effectiveness of ESMF elements including screening, assessment, formulation and implementation of the ESMPs, monitoring, capacity building and institutional arrangements; and
- Monitoring and Evaluation of E&S management plans at each project site: i.e. to monitor the effectiveness of implementation of the identified mitigation measures, the environmental quality parameters and social management plans relevant to each project activity.

### M&E of the ESMF application

The PMU's Social cum Gender Expert and Environment Expert will undertake ongoing monitoring of the ESMF implementation in order to identify issues, good practices and required actions. Reports based on the monitoring will be prepared by the PMU at least every quarter and submitted to the Project Director. The reports will be shared with the other implementing agencies. The monitoring of the ESMF implementation will cover the following aspects:

Screening of project activities:

- Has the categorization of the project activities been done accurately and/or changed (A to B)?
- Has the Environmental and Social Screening Checklist been used in all applicable activities?
- Has the scoping for further assessment been done comprehensively for all applicable activities?

Monitoring of E&S aspects in project activities:

- Are the contractors and implementing agencies undertaking periodic and regular monitoring of the E&S implementation in the project activities?

Capacity building arrangements for management of E&S aspects:

- What training programs on E&S aspects have been organized for the staff of implementing agencies?
- What training programs on E&S aspects have been organized for the contractors?

### M&E of E&S Management Plans

Monitoring and evaluation of the project is significant for achieving the project development objective (PDO) within the stipulated time period. The key environmental and social aspects, those that have been highlighted in each E&SMPs at site level are to be monitored periodically. The approved E&SMPs will give the direction and indicate the milestones achieved as per the national/state benchmarks/norms. The following specific environmental and social parameters should be quantitatively and qualitatively measured and compared over a period of time to understand the impacts.

The PMU through the respective district level offices of PWD will monitor all projects roads to ensure conformity to the requirements of the ESMF. The monitoring will cover all stages of planning and implementation. The monitoring will be carried out through the safeguard compliance reports



that will form a part of Quarterly Progress Reports (QPR) for all sub projects and regular visits by the Social cum Gender and Environmental specialists of the PMU.

## Concurrent Monitoring

The PMU's Social cum Gender Expert and Environment Expert will undertake ongoing monitoring of the ESMF implementation in order to identify issues, good practices and required actions.

Reports based on the monitoring will be prepared by the PMU at least every quarter and submitted to the Project Director. The reports will be shared with the other implementing agencies.

The PMU will review these reports and identify technical, managerial, policy or regulatory issues with regards to the ESMF compliance. The identified technical issues will be duly incorporated. Policy and regulatory issues will be debated internally by PMU and the need for appropriate interventions will be determined. These interventions could include appropriate revision of ESMF in consultation with the Bank or suitable analytical studies to influence policy or programs of the state, if found necessary / warranted. The table below provides the milestones and process to be followed for monitoring at different stages of project:

**Table 41: Monitoring Protocol**

Milestones	Objectives	Process	Responsibility	Decision/Target / Deliverable
<b>Environment</b>				
<b>Social</b>				
<b>Sub-Project Screening</b>	To approve categorization of proposed sub-projects	a. Discussions with implementing agencies to assess eligibility of project based on project's priorities and identify scope of project report b. Consultants to submit report along with proposed impact categorization	PMU and PIU	<ul style="list-style-type: none"> <li>Decision to proceed or not</li> <li>Identification of impact category</li> </ul>
<b>Sub-Project Appraisal</b>	To ensure satisfactory compliance with SMF	Detailed appraisal (including RAP, GAP and TPP where relevant), including site visits/ investigations, if necessary, assess suitability of site, adequacy of safeguard measures, risk analysis and regulatory clearances). DPR to be submitted for approval	PMU	<ul style="list-style-type: none"> <li>Review report and decide to</li> <li>accept</li> <li>accept with modifications - reject and instruct to resubmit</li> </ul>
<b>Approval</b>	Approvals from PMU	a. PIU to recommend to PMU to review and approve	PIU and PMU	<ul style="list-style-type: none"> <li>Approval of RAP, GAP and IPDP if required</li> </ul>
<b>Implementation of RAP, GAP and IPDP, Monitoring</b>	Ensure implementation of	a. Prepare quarterly progress reports b. Schedule field visits as	PIU, PMU, NGO	<ul style="list-style-type: none"> <li>Quarterly Progress Report</li> </ul>

Milestones	Objectives	Process	Responsibility	Decision/Target / Deliverable
and Review	agreed RAP, GAP and IPDP where applicable)	required Midterm and end term evaluation		

Project monitoring will be the responsibility of the PMU who will submit Quarterly Progress Reports. The reports will compare the progress of the project to targets set up at the commencement of the project. The list of impact performance indicators will be used to monitor project objectives. The socio-economic survey conducted will provide the benchmarks for comparison.

## Periodic Evaluation

An external evaluation of the safeguard implementation prepared for sub projects will also be undertaken twice during the implementation of the project – midterm and at the end of the implementation. During implementation, meetings will be organized by PMU inviting all PIUs for providing information on the progress of the project work.

**Mid-term Assessment Study** – this would be undertaken mid-way through the project to ascertain the progress achieved and any mid-course corrections which need to be introduced. It would include indicators to measure progress towards log frame goals and objectives.

**End-Term Assessment Study** – this will be undertaken at the end of the project period (around the time of project completion) and will assess the achievement of the project during the tenure.

## Arrangements for Monitoring

Monitoring is an integral part of successful implementation of the ARAP activities. Internal monitoring will be carried out by the Social Development Expert, PMU and/or the ULB under the supervision of Project Director/Chairman of ULB. Data collected for monitoring activities shall be suitably analysed for project management's learning and experience. Key progress indicators (indicative) for monitoring ARAP implementation are as given below:

- disbursement of compensation and assistance to PAPs, if any
- establishment of grievance redressal mechanism (including processes and timeline for redressal of grievances),
- consultation meetings with PAPs and communities regarding resettlement and rehabilitation issues,
- MIDFC website will include a link where affected person(s) can register their complaints online. A telephone number will also be on the website of MIDFC and the project sites, so that the general public can register their complaint with the PMU office.
- income restoration of affected persons,
- training of the interested PAPs
- grievance handling mechanism

Project monitoring will be the responsibility of the PMU who will submit Quarterly Progress Reports. The reports will compare the progress of the project to targets set up at the commencement of the project. The list of impact performance indicators will be used to monitor project objectives. The socio-economic survey conducted will provide the benchmarks for comparison.

## Periodic Evaluation

An external evaluation of the safeguard implementation prepared for sub projects will also be undertaken twice during the implementation of the project – midterm and at the end of the implementation. During implementation, meetings will be organized by PMU inviting all PIUs for providing information on the progress of the project work.

**Mid-term Assessment Study** – this would be undertaken mid-way through the project to ascertain the progress achieved and any mid-course corrections which need to be introduced. It would include indicators to measure progress towards log frame goals and objectives.

**End-Term Assessment Study** – this will be undertaken at the end of the project period (around the time of project completion) and will assess the achievement of the project during the tenure

### 13 CHAPTER-XIII: PROJECT BENEFIT

Transportation/Highway projects are generally intended to improve the economic and social welfare of the people and the locality. The broad objective of the present project is providing four lanes facility to accommodate the rapid growth of traffic.

The proposed project would act as the prime artery for the economic flow to this region. It will enhance economic development, provide employment opportunities to locals, strengthen tourist development, ensure road safety and provide better transportation facilities and other facilities such as way side amenities. Vehicle operating cost will also be reduced due to improved road quality.

Overall improvement will be expected in project area in terms of:

- Improvements in the physical infrastructure and road access.
- Improvement in social services due to quicker and safe mode of transport
- Enhanced connectivity between rural & urban population which will benefit the all sections of the society like general population, small-medium-large scale industries, farmers, businessmen etc.
- Reduction in pollution, vehicle maintenance costs, fuel usage due to free flow of traffic
- Employment potential for skilled, semi-skilled and unskilled labour, during construction and operational phases of the project, with specific attention to employment potential of local population as well as necessity for imparting any specialized skills to them to be eligible for such employment in the project
- Over-all development in economy in terms of industry and improved lifestyle
- Minimize road accidents by increasing road widths.
- Minimize the travel time.
- Better connectivity to economic, social and political hubs of Meghalaya.
- Better approach to medical, educational and essential services.
- Faster transportation of perishable goods like fruits, vegetables, and dairy products.
- Better opportunities for transporting, processing and marketing of agricultural products.
- Development of tourism and pilgrimage.
- Opening up of opportunities for new occupations and trade on the route.
- Improved road connectivity helps in better implementation and management of government schemes.
- National highways connect capitals, important places, ports and places of strategic importance of various areas.
- The construction of the project road in the state of Meghalaya will ensure smooth flow of the traffic. Installation of proper road safety system through signage, barricades, and crash barriers will add to be safety to the traffic.
- Vehicle Operating Cost (VOC) will be reduced when the National Highway is constructed. Fuel consumption, wear and tear of tyres, suspension will be benefited when a geometric of the road is improved. VOC consist of the following components.
  - ✓ Fuel consumption
  - ✓ Lubricating oil consumption
  - ✓ Spare part consumption
  - ✓ Tyre consumption
  - ✓ Vehicle depreciation

## **14 CHAPTER-XIV: ENVIRONMENT AND SOCIAL MANAGEMENT PLAN**

The environmental and social management measures shall be implemented during the various stages of the project viz: Pre-construction Stage, Construction Stage and Operational Stage. The environmental and social management plan for the project is described below.

### **Objectives of ESMP**

The Environmental Social Management Plan (ESMP) consists of a set of mitigation, monitoring and institutional measures to be taken during the design, construction and operational phases of the project to eliminate adverse environmental impacts, to offset them, or to reduce them to acceptable levels. The main aim of the Environmental Management Plan is to ensure that the various adverse impacts are mitigated and the positive impacts are enhanced. A description of the various management measures against each activity suggested for construction stage is provided in this chapter.

### **Pre-Construction Stage**

#### **14.1.1 Pre-construction activities by PIU/Independent Consultant**

Prior to the contractor mobilization, the PIU will ensure that a hindrance free corridor is handed over to enable the start of construction work. Clearance involves for the following activities:

- Felling and removal of trees, which should be minimal with due permission.
- Relocation of common property resources and community assets like temples, telephone poles, electric poles and hand pumps etc if required.
- Modification (if any), of the contract documents by the Engineer of the Independent Engineer.

#### **14.1.2 Pre-construction activities by Contractor**

- Pre-construction stage involves mobilisation of the contractor and the activities undertaken by the contractor pertaining to the planning of logistics and site preparation necessary for commencing construction activities. The activities include:
- Joint field verification of EMP by the Environment Expert of the Independent Engineer/Authority Engineer and Contractor.
- Identification and selection of material sources (quarry and borrow material, water, sand etc.).
- Procurement of construction equipment / machinery such as crushers, hot mix plants, batching plants and other construction equipment and machinery.
- Selection, design and layout of construction areas, hot mix and batching plants, labour camps etc.
- Apply for and obtain all the necessary clearances/ NOC's/ consents from the agencies concerned.
- Planning traffic diversions and detours including arrangements for temporary land acquisition (if required).

### **Construction Stage**

#### **14.1.3 Construction activities by the Contractor**

Construction stage is the most crucial stage in terms of activities that require careful management to avoid environmental impacts. There are several other environmental issues

that have been addressed as part of good engineering practices, the costs for which have been accounted for in the Engineering Costs.

#### 14.1.4 Construction activities by the PIU/ Authority Engineer / Independent Consultants

The PIU/Independent Engineer shall be involved in the smooth execution of the project and assisting the contractor during this phase. Their work shall include but not limited to:

- Monitoring and guiding the contractor on adopting good environmental and engineering practices;
- Arranging training to the contractor and other stakeholders according to the needs arising; and
- Implementation of Environment Management and Monitoring Plan.
- Making changes in the design if need so arises.

#### Operation Stage

The operational stage involves the following activities by PIU:

- Monitoring of environmental conditions through approved monitoring agency; and
- Monitoring of operational performance of the various mitigation/enhancement measures carried out.

**Table 42: Environment Management Plan (EMP)**

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
<b>PRE-CONSTRUCTION STAGE</b>					
<b>P1</b>	Alignment,	<ul style="list-style-type: none"> <li>• The alignment as finalized by shifting / adjusting the centerline of the road, adopting of suitable cross-sections and adjustment of the median width to minimize land acquisition, loss of settlements and to avoid environmentally sensitive features compatible with project activities.</li> </ul>	Throughout Corridor	PIU, Revenue Dept. NGOs Collaborating Agencies	-
<b>P2</b>	Land Acquisition	<ul style="list-style-type: none"> <li>• No Land Acquisition is envisaged for the project.</li> <li>• PIU has to ascertain that any additional change of scope of work or alignment is addressed and integrated into the EMP and other relevant documents.</li> </ul>	Throughout Corridor	PIU, Revenue Dept. NGOs Collaborating Agencies	-
<b>P3</b>	Preservation of Trees	<ul style="list-style-type: none"> <li>• No tree felling is envisaged for the project.</li> <li>• All efforts will be made to preserve trees including evaluation of minor design adjustments/ alternatives to save trees.</li> <li>• In the event of design changes, additional assessments including the possibility to save trees shall be made.</li> <li>•</li> </ul>	Throughout Corridor	PIU Forest Department Contractor	
<b>P4</b>	Relocation of Utilities and	<ul style="list-style-type: none"> <li>• No relocation or shifting of CPRs is anticipated for the project as confined</li> </ul>	Throughout Corridor	PIU Concerned	



Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
	Common Property Resources (CPR)	to existing RoW.		Agencies Contractor	
<b>P5</b>	Orientation of Implementing Agency and Contractors	<ul style="list-style-type: none"> <li>The PIU shall organize orientation sessions and regular training sessions during all stages of the project. This shall include on-site training (general as well as in the specific context of the sub-project).</li> <li>These sessions shall involve all staff of Authority Engineer, field level implementation staff of PIU and Contractor. The contractor will ensure that his staff including engineers, supervisors and operators attend the training sessions.</li> </ul>	Throughout Corridor	PIU Concerned Agencies Contractor	
<b>P6</b>	Joint Field Verification	<ul style="list-style-type: none"> <li>The Environmental Expert of AE and the Contractor will carry out joint field verification to ascertain any additional possibility to saving trees, environmental and community resources.</li> <li>The verification exercise should assess the need for additional protection measures or changes in design/ scale/ nature of protection measures including the efficacy of enhancement measures suggested in the EMP.</li> <li>Proper documentation and justifications/reasons shall be maintained in all such cases where deviation from the original EMP is proposed.</li> </ul>	Throughout Corridor	Contractor and Environmental Expert of AE	PIU
<b>P7</b>	Assessment of Impacts due to Changes/Revisions/Additions in the Project Work	<ul style="list-style-type: none"> <li>The Environmental Expert of AE will assess impacts and revise/ modify the EMP and other required sections of the project documents in the event of changes/ revisions (including addition or deletion) in the project's scope of work.</li> </ul>	Throughout Corridor	Contractor Environmental Expert of AE	PIU
<b>P8</b>	Crushers, Hot-mix plants and Batching Plants Location	<ul style="list-style-type: none"> <li>Hot mix plants and batching plants will be sited sufficiently away from settlements or any commercial establishments. Such plants will be located at least 1 Km away from the nearest settlement preferably in the downwind direction.</li> <li>The Contractor shall submit a detailed layout plan for all such sites and approval of Environmental Expert of AE/PMC shall be necessary prior to their establishment.</li> <li>Arrangements to control dust pollution through provision of windscreens,</li> </ul>	Throughout Corridor	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<p>sprinklers, and dust encapsulation will have to be provided at all such sites.</p> <ul style="list-style-type: none"> <li>• Specifications of crushers, hot mix plants and batching plants will comply with the requirements of the relevant current emission control legislations and Consent/NOC for all such plants shall be submitted to the "PIU through Environmental Expert of AE/PMC.</li> <li>• The Contractor shall not initiate plant/s operation till the required legal clearances are obtained and submitted. The engineer will ensure that the regulatory and legal requirements are being complied with.</li> </ul>			
<b>P9</b>	Other Construction Vehicles, Equipment and Machinery	<ul style="list-style-type: none"> <li>• All vehicles, equipment and machinery to be procured for construction will confirm to the relevant Indian Standard (IS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 will be strictly adhered to.</li> <li>• Noise limits for construction equipments to be procured such as compactors, rollers, front loaders concrete mixers, cranes (moveable), vibrators and saws will not exceed 75 dB (A), measured at one meter from the edge of the equipment in free field, as specified in the Environment (Protection) Rules, 1986.</li> <li>• The Contractor shall maintain a record of PUC for all vehicles and machinery used during the contract period, which shall be produced for NH verification whenever required.</li> <li>• Mobile equipment shall be placed at least 100 m away from the nearest dwelling.</li> </ul>	Throughout Corridor	Contractor	Environmental Expert of AE and PIU
<b>P10</b>	Borrow Areas	<ul style="list-style-type: none"> <li>• Finalizing borrow areas for borrowing earth and all logistic arrangements as well as compliance to environmental requirements, as applicable, will be the sole responsibility of the contractor.</li> <li>• The Contractor will not start borrowing earth from selected borrow areas until the formal agreement is signed between landowner and contractor and a copy is submitted to the PIU/Environmental Expert of AE through the Engineer.</li> <li>• Locations finalized by the contractor shall be reported to the Environmental Expert of AE and who will in turn report to PIU.</li> </ul>	Along the Project Influence Area	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<ul style="list-style-type: none"> <li>• Planning of haul roads for accessing borrow materials will be undertaken during this stage. The haul roads shall be routed to avoid agricultural areas as far as possible (in case such a land is disturbed, the Contractor will rehabilitate it as per Borrow Area Rehabilitation Guidelines) and will use the existing village roads wherever available.</li> <li>• In addition to testing for the quality of borrow materials by the AE, the environmental personnel of the AE will be required to inspect every borrow area location prior to approval</li> <li>• The AE will make sure that each such site is in line with IRC and other project guidelines.</li> <li>• Necessary clearances need to be obtained prior to operation of Borrow areas.</li> </ul>			
P11	Quarry	<ul style="list-style-type: none"> <li>• Contractor will finalize the quarry for procurement of construction materials after assessment of the availability of sufficient materials, quality and other logistic arrangements.</li> <li>• In case the contractor decides to use quarries other than recommended by DPR consultants, then it will be selected based on the suitability of the materials and as per established law.</li> <li>• The contractor will procure necessary permission for procurement of materials from Mining Department, District Administration and State Pollution Control Board and shall submit a copy of the approval and the rehabilitation plan to the PIU through Engineer.</li> <li>• Contractor will also work out haul road network and report to Environmental Expert of AE and will inspect and in turn report to PIU before approval.</li> </ul>	Along the Project Influence Area	Contractor	Environmental Expert of AE and PIU
P12	Arrangement for Construction Water	<ul style="list-style-type: none"> <li>• To avoid disruption/disturbance to other water users, the contractor will extract water from fixed locations and consult the Environmental Expert of AE before finalizing the locations.</li> <li>• The contractor will not be allowed to pump from any irrigation canal and surface water bodies used by community.</li> <li>• The contractor will need to comply with the requirements of the State Ground Water Department and seek</li> </ul>	Along the Project Road	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		their approval for doing so and submit copies of the permission to AE and PIU prior to initiation of any construction work.			
P13	Labor Requirements	<ul style="list-style-type: none"> <li>The contractor preferably will use unskilled labor from local communities to give the maximum benefit to the local community.</li> </ul>	Along the Project Area	Contractor	Environmental Expert of AE and PIU
P14	Construction Camp Locations – Selection, Design and Layout	<ul style="list-style-type: none"> <li>Sitting of the construction camps will be selected by the contractor as per the guidelines.</li> <li>Construction camps will not be proposed within 500 m from the nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community.</li> <li>Location for stockyards for construction materials will be identified at least 1000 m from watercourses.</li> <li>The waste disposal and sewage system for the camp will be designed, built and operated such that no odor is generated.</li> </ul>	Along the Project Road	Contractor	Environmental Expert of AE and PIU
P15	Arrangements for Temporary Land Requirement	<ul style="list-style-type: none"> <li>The contractor as per prevalent rules will carry out negotiations with the landowners for obtaining their consent for temporary use of lands for construction sites/hot mix plants/traffic detours/borrow areas etc.</li> <li>The Contractor will submit a copy of agreement to the Environmental Expert of AE. The Environmental Expert will be required to ensure that the clearing up of the site prior to handing over to the owner (after construction or completion of the activity) is included in the contract.</li> </ul>	Along the Project Road	Contractor	Environmental Expert of AE and PIU
P16	Implementation - Information Meetings	<ul style="list-style-type: none"> <li>The contractor will organize at least 2 implementation information meetings in the vicinity of Project Site (minimum one in each section) for general public to consult and inform people about his plans covering overall construction schedule, safety, use of local resources (such as earth, water), traffic safety and management plans of debris disposal, drainage protection during construction, pollution abatement and other plans, measures to minimize disruption, damage and in convenience to roadside users and people along the road.</li> <li>The first Implementation information meeting be conducted within four</li> </ul>	Along the Project Road	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<p>weeks of mobilization. The people should be informed about the date, time and venue at least 7 days prior to meetings. Public shall be informed about the meeting through display of posters at prominent public places (panchayat offices, offices of Market committees, Notice board of religious places etc.) and distribution of pamphlets along roadside communities or in any manner deemed fit.</p> <ul style="list-style-type: none"> <li>• The contractor will maintain a channel of communication with the communities through his designated Environment and Safety Officer to address any concern or grievances.</li> <li>• Periodic meetings will also be conducted during the construction period to take feedback from communities or their representatives to ensure minimum disturbance. The mechanism and contents for disclosure shall be approved by PIU prior to the meetings.</li> </ul>			
<b>CONSTRUCTION STAGE</b>					
<b>C1</b>	Clearing and Grubbing	<ul style="list-style-type: none"> <li>• No vegetation removal or tree felling is envisaged for the project.</li> <li>• Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from the Environmental Expert of AE.</li> <li>• The sub grade of the existing pavement shall be used as embankment fill material.</li> <li>• The existing base and sub-base material shall be recycled as sub-base of the haul road or access roads.</li> <li>• The existing bitumen surface may be utilized for the paving of cross roads, access roads and paving works in construction sites and campus, temporary traffic diversions, haulage routes etc.</li> </ul>	Along the work in progress	Contractor	Environmental Expert of AE and PIU
<b>C2</b>	Disposal of debris from dismantling structures and road surface	<ul style="list-style-type: none"> <li>• The contractor shall identify disposal sites. The identified locations will be reported to the Environmental Expert of AE. These locations will be checked on site and accordingly approved by Environmental Expert of AE prior to any disposal of waste materials.</li> <li>• All arrangements for transportation during construction including provision, maintenance, dismantling</li> </ul>	Along the work in progress	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<p>and clearing debris, will be considered incidental to the work and will be planned and implemented by the contractor as approved and directed by the Environmental Expert of AE.</p> <ul style="list-style-type: none"> <li>The pre-designed disposal locations will be a part of Comprehensive Solid Waste Management Plan to be prepared by Contractor in consultation and with approval of Environmental Expert of AE.</li> <li>Debris generated from pile driving or other construction activities shall be disposed such that it does not flow into the surface water bodies or form mud puddles in the area.</li> </ul>			
<b>C3</b>	Other Construction Waste Disposal	<ul style="list-style-type: none"> <li>The pre-identified disposal locations will be a part of Comprehensive Waste Disposal Management Plan to be prepared by the Contractor in consultation and with approval of Environmental Expert of AE. Location of disposal sites will be finalized prior to initiation of works on any particular section of the road.</li> <li>The Environmental Expert of AE will approve these disposal sites after conducting a joint inspection on the site with the Contractor.</li> <li>Contractor will ensure that any spoils of material unsuitable for embankment fill will not be disposed off near any water course, agricultural land, and natural habitat like grass lands or pastures. Such spoils from excavation can be used to reclaim borrow pits and low-lying areas located in barren lands along the project corridors (if so desired by the owner/community and approved by the Environmental Expert of AE).</li> <li>All waste materials will be completely disposed and the site will be fully cleaned and certified by Environmental Expert of AE before handing over.</li> <li>The contractor at its cost shall resolve any claim, arising out of waste disposal or any non-compliance that may arise on account of lack of action on his part.</li> </ul>	Along the Road	Contractor	Environmental Expert of AE and PIU
<b>C4</b>	Stripping, stocking and preservation of top soil	<ul style="list-style-type: none"> <li>The topsoil from all areas of cutting and all areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles. A portion of the</li> </ul>	Along the Road	Contractor	Environmental Expert of AE and PIU



Sl.	Environmental Issue	Management Measures	Location	Responsibility	
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		<p>temporarily acquired area and/or Right of Way will be earmarked for storing topsoil. The locations for stock piling will be pre-identified in consultation and with approval of Environmental Expert of AE. The following precautionary measures will be taken to preserve them till they are used:</p> <ul style="list-style-type: none"> <li>• Stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and height of the pile is restricted to 2 m. To retain soil and to allow percolation of water, silt fencing will protect the edges of the pile.</li> <li>• Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles shall be covered with gunny bags or vegetation.</li> <li>• It will be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles.</li> <li>• Such stockpiled topsoil will be utilized for -</li> <li>• covering all disturbed areas including borrow areas only in case where these are to be rehabilitated as farm lands (not those in barren areas)</li> <li>• top dressing of the road embankment and fill slopes,</li> <li>• filling up of tree pits, in the median and in the agricultural fields of farmers, acquired temporarily.</li> </ul>			
<b>C5</b>	Accessibility	<ul style="list-style-type: none"> <li>• The contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property accesses connecting the project road, providing temporary connecting road.</li> <li>• The contractor will take care that schools and religious places are accessible to Public. The contractor will also ensure that the work on / at existing accesses will not be undertaken without providing adequate provisions and to the prior satisfaction of Environmental Expert of AE.</li> <li>• The contractor will take care that the cross roads are constructed in such a sequence that construction work over the adjacent cross roads are taken up one after one so that traffic movement</li> </ul>	Along the Road	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		in any given area not get affected much.			
<b>C6</b>	Planning for Traffic Diversions and Detours	<ul style="list-style-type: none"> <li>• Temporary diversions will be constructed with the approval of the Resident Engineer and Environmental Expert of AE for which contractor will seek prior approval for such plans.</li> <li>• Detailed Traffic Control Plans will be prepared and submitted to the Resident Engineer for approval, seven days prior to commencement of works on any section of road. The traffic control plans shall contain details diversions; traffic safety arrangement 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 and The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow.</li> <li>• The contractor will also inform local community of changes to traffic routes, conditions and pedestrian access arrangements with assistance from AE and PIU. The temporary traffic detours will be kept free of dust by sprinkling of water three times a day and as required under specific conditions (depending on weather conditions, construction in the settlement areas and volume of traffic).</li> </ul>	Along the Road	Contractor	Environmental Expert of AE and PIU
<b>C7</b>	Earth from Borrow Areas for Construction	<ul style="list-style-type: none"> <li>• No borrow area will be opened without permission of the Environmental Expert of AE. The location, shape and size of the designated borrow areas will be as approved by the Environmental Expert of AE and in accordance to the IRC recommended practice for borrow pits for road embankments (IRC 10: 1961). The borrowing operations will be carried out as specified in the guidelines for sitting and operation of borrow areas.</li> <li>• The unpaved surfaces used for the haulage of borrow materials, if passing through the settlement areas or habitations; will be maintained dust free by the contractor. Sprinkling of water will be carried out twice a day</li> </ul>	Borrow Areas	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<p>to control dust along such roads during their period of use.</p> <ul style="list-style-type: none"> <li>• During dry seasons (winter and summer) frequency of water sprinkling will be increased in the settlement areas and Environmental Expert of AE will decide the numbers of sprinkling depending on the local requirements.</li> <li>• Contractor will rehabilitate the borrow areas as soon as borrowing is over from a particular borrow area in accordance with the guidelines for Redevelopment of Borrow Areas or as suggested by Environmental Expert of AE.</li> <li>• The final rehabilitation plans will be approved by the Environmental Expert of AE.</li> </ul>			
<b>C8</b>	Quarry Operations	<ul style="list-style-type: none"> <li>• The contractor shall obtain materials from quarries only after the consent of the Department of Mining / SPCB (both the states) / District Administration or will use existing approved sources of such materials. Copies of consent/ approval/ rehabilitation plan for opening a new quarry or use of an existing quarry source will be submitted to Environmental Expert of AE and the Resident Engineer.</li> <li>• The contractor will develop a Comprehensive Quarry Redevelopment plan, as per the Mining Rules of the state and submit a copy to PIU and AE prior to opening of the quarry site.</li> <li>• The quarry operations will be undertaken within the rules and regulations in force in the state.</li> </ul>	Quarry Areas	Contractor	Environmental Expert of AE and PIU
<b>C9</b>	Transporting Construction Materials and Haul Road Management	<ul style="list-style-type: none"> <li>• Contractor will maintain all roads (existing or built for the project), which are used for transporting construction materials, equipment and machineries as précised. All vehicles delivering fine materials to the site will be covered to avoid spillage of materials.</li> <li>• All existing highways and roads used by vehicles of the contractor or any of his sub-contractor or suppliers of materials and similarly roads, which are part of the works, will be kept clear of all dust/mud or other extraneous materials dropped by such vehicles.</li> </ul>	All Roads Used	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<ul style="list-style-type: none"> <li>Contractor will arrange for regular water sprinkling as necessary for dust suppression of all such roads and surfaces with specific attention to the settlement areas.</li> <li>The unloading of materials at construction sites/close to settlements will be restricted to daytime only.</li> </ul>			
<b>C10</b>	Construction Water	<ul style="list-style-type: none"> <li>Contractor will arrange adequate supply and storage of water for the whole construction period at his own costs. The Contractor will submit a list of source/s from where water will be used for the project to 'PIU' through the Engineer.</li> <li>The contractor will source the requirement of water preferentially from ground water but with prior permission from the Central Ground Water Board. A copy of the permission will be submitted to 'PIU' through the Engineer prior to initiation of construction.</li> <li>The contractor will take all precaution to minimize the wastage of water in the construction process/ operation.</li> </ul>	Along the Project	Contractor	Environmental Expert of AE and PIU
<b>C11</b>	Disruption to Other Users of Water	<ul style="list-style-type: none"> <li>While working across or close to any perennial water bodies, contractor will not obstruct/ prevent the flow of water. However, there is no such crossing in the proposed road alignment.</li> <li>The contractor will take prior approval of the River Authority or Irrigation Department for any such activity. The PIU and the Engineer will ensure that contractor has served the notice to the downstream users of water well in advance.</li> </ul>	All Water Bodies Used	Contractor	Environmental Expert of AE and PIU
<b>C12</b>	Drainage	<ul style="list-style-type: none"> <li>Contractor will ensure that no construction materials like earth, stone, ash or appendage is disposed off in a manner that blocks the flow of water of any water course and cross drainage channels. Contractor will take all-necessary measures to prevent any blockage to water flow. In addition to the design requirements, the contractor will take all required measures as directed by the Environmental Expert of AE and the 'Resident Engineer' to prevent temporary or permanent flooding of the site or any adjacent area.</li> <li>To maintain the surface water flow/drainage, proper mitigation measures will be taken along the</li> </ul>	Drainage line along the road	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<p>road, like:</p> <ul style="list-style-type: none"> <li>i. Drainage line will be constructed all along the project road.</li> <li>ii. Good engineering and construction practice should be followed</li> </ul> <p>Use of sediment traps, silt fencing, oil and grease turving etc. to minimize of the soil movement.</p>			
<b>C13</b>	Siltation of Water Bodies and Degradation of Water Quality	<ul style="list-style-type: none"> <li>• There is no requirement of embankment construction for the proposed road project.</li> <li>• The Contractor will not excavate beds of any stream/canals/ any other water body for borrowing earth or any other purposes.</li> <li>• Contractor will construct silt fencing at the base of the embankment construction for the entire perimeter of water bodies (including wells) adjacent to the ROW and around the stockpiles at the construction sites close to water bodies.</li> <li>• The fencing will be provided prior to commencement of earthwork and continue till the stabilization of the embankment slopes, on the particular sub-section of the road. The contractor will also put up sedimentation cum grease traps at the outer mouth of the drains located in truck lay byes and bus bays which are ultimately entering into any surface water bodies / water channels with a fall exceeding 1.5 m. in present case three Sedimentation Cum Grease Trap are proposed, However the item has been kept in case need arises during construction.</li> <li>• Contractor will ensure that construction materials containing fine particles are stored in an enclosure such that sediment-laden water does not drain into nearby watercourse.</li> </ul>	All Surface Water Bodies Along the Road	Contractor	Environmental Expert of AE and PIU
<b>C14</b>	Slope Protection and Control of Soil Erosion	<ul style="list-style-type: none"> <li>• The contractor will take slope protection measures as per design, or as directed by the Environmental Expert of AE to control soil erosion and sedimentation.</li> <li>• All temporary sedimentation, pollution control works and maintenance thereof will be deemed as incidental to the earth work or other items of work and as such as no separate payment will be made for them.</li> <li>• Contractor will ensure the following aspects:</li> </ul>	Along the Roads	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<ol style="list-style-type: none"> <li>1. During construction activities on road embankment, the side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub as per design specifications.</li> <li>2. Turfing works will be taken up as soon as possible provided the season is favorable for the establishment of grass sods. Other measures of slope stabilization will include mulching netting and seeding of batters and drains immediately on completion of earthworks.</li> <li>3. In borrow pits, the depth shall be so regulated that the sides of the excavation will have a slope not steeper than 1 vertical to 2 horizontal, from the edge of the final section of the bank.</li> <li>4. Along sections abutting water bodies, stone pitching as per design specification will protect slopes.</li> </ol>			
<b>C15</b>	Water Pollution from Construction Wastes	<ul style="list-style-type: none"> <li>• The Contractor will take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system. Contractor will avoid construction works close to the streams or water bodies.</li> <li>• All waste arising from the project is to be disposed off in the manner that is acceptable and as per norms of the State Pollution Control Board.</li> </ul>	Along the road	Contractor	Environmental Expert of AE and PIU
<b>C16</b>	Water Pollution from Fuel and Lubricants	<ul style="list-style-type: none"> <li>• The contractor will ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites will be located at least 500 m from rivers and irrigation canal/ponds.</li> <li>• All location and layout plans of such sites will be submitted by the Contractor prior to their establishment and will be approved by the Environmental Expert of AE and PIU.</li> <li>• Contractor will ensure that all 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 interceptors will be provided for vehicle parking, wash down and refueling areas as per the design provided.</li> </ul>	Along the Roads	Contractor	Environmental Expert of AE and PIU



Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<ul style="list-style-type: none"> <li>Oil and grease traps will be provided at fuelling locations, to prevent contamination of water.</li> <li>'Oil interceptors' shall be provided in wash down areas and re-fuelling areas</li> <li>In all, fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the top soil will be stripped, stockpiled and returned after cessation of such storage.</li> <li>Contractor will arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to AE and PIU) and approved by the Environmental Expert of AE. All spills and collected petroleum products will be disposed off in accordance with MoEF&amp;CC and state PCB guidelines.</li> <li>Environmental Expert of AE and Resident Engineer' will certify that all arrangements comply with the guidelines of PCB/ MoEF&amp;CC or any other relevant laws.</li> </ul>			
<b>C17</b>	Dust Pollution	<ul style="list-style-type: none"> <li>The contractor will take every precaution to reduce the level of dust from crushers/hot mix plants, construction sites involving earthwork by sprinkling of water, encapsulation of dust source and by erection of screen/barriers.</li> <li>All the plants will be sited at least 1 km in the downwind direction from the nearest human settlement.</li> <li>The contractor will provide necessary certificates to confirm that all crushers used in construction conform to relevant dust emission control legislation.</li> <li>The suspended particulate matter value at a distance of 40m from a unit located in a cluster should be less than 500 g/m<sup>3</sup>. The pollution monitoring is to be conducted as per the monitoring plan.</li> <li>Alternatively, only crushers licensed by the SPCB shall be used. Required certificates and consents shall be submitted by the Contractor in such a case to the Environmental Expert of AE through the 'Engineer'.</li> <li>Dust screening vegetation will be planted on the edge of the ROW for all existing roadside crushers. Hot mix</li> </ul>	Along the Roads, Construction Site/ Camps	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		plant will be fitted with dust extraction units.			
<b>C18</b>	Emission from Construction Vehicles, Equipment and Machineries	<ul style="list-style-type: none"> <li>Contractor will ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm that pollution emission levels comply with the relevant requirements of SPCB.</li> <li>The Contractor will submit PUC certificates for all vehicles/equipment/machinery used for the project. Monitoring results will also be submitted to 'PIU' through the 'Engineer'.</li> </ul>	Along the Roads , all vehicles used/ Camps	Contractor	Environmental Expert of AE and PIU
<b>C19</b>	Noise Pollution: Noise from Vehicles, Plants and Equipments	<ul style="list-style-type: none"> <li>The Contractor will confirm the following:</li> <li>All plants and equipment used in construction shall strictly conform to the MoEF&amp; CC/CPCB noise standards.</li> <li>All vehicles and equipment used in construction will be fitted with exhaust silencers.</li> <li>Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.</li> <li>Limits for construction equipment used in the project such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB (A) (measured at one meter from the edge of equipment in the free field), as specified in the Environment (Protection) rules, 1986.</li> <li>Maintenance of vehicles, equipment and machinery shall be regular to keep noise levels at the minimum.</li> <li>At the construction sites within 150 m of the nearest habitation, noisy construction work such as crushing, concrete mixing, batching will be stopped during the night time between 10.00 pm to 6.00 am.</li> <li>No construction activities will be permitted around educational institutes/health centers (silence zones) up to a distance of 100 m from the sensitive receptors i.e., school, health centers and hospitals between 10.00 pm to 6.00 am.</li> <li>Monitoring shall be carried out at the construction sites as per the monitoring schedule and results will</li> </ul>	Along the Roads , all vehicles used/Camp s	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		be submitted to Environmental Expert of AE through the 'Engineer'.			
C20	Personal Safety Measures for Labour	<ul style="list-style-type: none"> <li>• Contractor will provide:</li> <li>• Protective footwear and protective goggles to all workers employed on mixing asphalt materials, cement, lime mortars, concrete etc.</li> <li>• Welder's protective eye-shields to workers who are engaged in welding works</li> <li>• Protective goggles and clothing to workers engaged in stone breaking activities and workers will be seated at sufficiently safe intervals</li> <li>• Earplugs to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation.</li> <li>• Adequate safety measures for workers during handling of materials.</li> <li>• The contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress.</li> <li>• The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract.</li> <li>• The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to.</li> <li>• The contractor will not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.</li> <li>• The contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint.</li> <li>• Contractor will provide facemasks for use to the workers when paint is applied in the form of spray or a surface having lead paint dry is rubbed and scrapped.</li> <li>• The Contractor will mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce non-compliance of</li> </ul>	Along the Roads, all vehicles used/Camps	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		use of PPE with zero tolerance. These will be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization and will be approved by AE and PIU.			
<b>C21</b>	Traffic and Safety	<ul style="list-style-type: none"> <li>The contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as proposed in the Traffic Control Plan/Drawings and as required by the Environmental Expert of AE and 'Resident Engineer' for the information and protection of traffic approaching or passing through the section of any existing cross roads.</li> <li>The contractor will ensure that all signs, barricades, pavement markings are provided as per the MOSRT&amp;H specifications. Before taking up of construction on any section of the existing lanes of the highway, a Traffic Control Plan will be devised and implemented to the satisfaction of Environmental Expert of AE and 'Resident Engineer'</li> </ul>	Along the Roads, all vehicles used/Camps	Contractor	Environmental Expert of AE and PIU
<b>C22</b>	Risk from Electrical Equipment(s)	<ul style="list-style-type: none"> <li>The Contractor will take all required precautions to prevent danger from electrical equipment and ensure that:</li> <li>No material will be so stacked or placed as to cause danger or inconvenience to any person or the public.</li> <li>All necessary fencing and lights will be provided to protect the public in construction zones.</li> <li>All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the 'Resident Engineer'.</li> </ul>	Along the Roads	Contractor	Environmental Expert of AE and PIU
<b>C23</b>	Risk Force Measure	<ul style="list-style-type: none"> <li>The contractor will take all reasonable precautions to prevent danger to the workers and public from fire, flood etc. resulting due to construction activities.</li> <li>The contractor will make required arrangements so that in case of any mishap all necessary steps can be taken for prompt first aid treatment. Construction Safety Plan prepared by</li> </ul>	Along the Roads, construction Camps	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		the Contractor will identify necessary actions in the event of an emergency.			
<b>C24</b>	First Aid	<ul style="list-style-type: none"> <li>The contractor will arrange for -</li> <li>a readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone</li> <li>availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital</li> <li>Equipment and trained nursing staff at construction camp.</li> </ul>	Along the Roads, construction Camps	Contractor	Environmental Expert of AE and PIU
<b>C25</b>	Informatory Signs and Hoardings	<ul style="list-style-type: none"> <li>The contractor will provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required as per IRC and MoRT&amp;H specifications.</li> </ul>	Along the Roads, construction Camps	Contractor	Environmental Expert of AE and PIU
<b>C26</b>	Road side Plantation Strategy	<ul style="list-style-type: none"> <li>The contractor will do the plantation at median and/or turfing at embankment slopes as per the tree plantation strategy prepared for the project.</li> <li>Minimum 90 percent survival rate of the saplings will be acceptable otherwise the contractor will replace dead plants at his own cost. The contractor will maintain the plantation till they handover the project site to NHAI.</li> <li>Environmental Expert of AE will inspect regularly the survival rate of the plants and compliance of tree plantation guidelines.</li> </ul>	Along the Roads	Contractor	Environmental Expert of AE and PIU
<b>C27</b>	Flora and Fauna	<ul style="list-style-type: none"> <li>The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal.</li> <li>If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Environmental Expert of AE and carry out the AE instructions for dealing with the same.</li> <li>Environmental Expert of AE will report to the nearby forest office (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials.</li> <li>All efforts during the design stage should be made to minimize the tree felling requirement</li> </ul>	Along the Roads	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<ul style="list-style-type: none"> <li>Compensatory plantation should be started during construction phase parallel to the construction activities.</li> </ul>			
<b>C28</b>	Chance Found Archaeological Property	<ul style="list-style-type: none"> <li>All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation.</li> <li>The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Environmental Expert of AE of such discovery and carry out the AE instructions for dealing with the same, waiting which all work shall be stopped.</li> <li>The AE will seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site.</li> </ul>	Along the Roads, construction sites/Camps	Contractor	Environmental Expert of AE and PIU
<b>C29</b>	Labour Accommodation	<ul style="list-style-type: none"> <li>Contractor will follow all relevant provisions of the Factories Act, 1948 and the building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labor camp.</li> <li>The location, layout and basic facility provision of each labor camp will be submitted to AE and 'PIU' prior to their construction.</li> <li>The construction will commence only upon the written approval of the Environmental Expert of AE.</li> <li>The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the AE.</li> <li>The sewage system for such camps will be properly designed and built so that no water pollution takes place in adjacent canals</li> </ul>	Along the Roads, construction Camps/site	Contractor	Environmental Expert of AE and PIU
<b>C30</b>	Potable Water	<ul style="list-style-type: none"> <li>The Contractor will construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing.</li> <li>The Contractor will also provide potable water facilities within the precincts of every workplace in an</li> </ul>	Along the Roads, construction Camps/construction site	Contractor	Environmental Expert of AE and PIU



Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<p>accessible place, as per standards set by the building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.</p> <ul style="list-style-type: none"> <li>• Testing of water will be done as per parameters prescribed in IS 10500:1991.</li> </ul>			
<b>C31</b>	Sanitation and Sewage System	<ul style="list-style-type: none"> <li>• The contractor will ensure that -</li> <li>• the sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place</li> <li>• separate toilets/bathrooms, wherever required, screened from those from men (marked in vernacular) are to be provided for women</li> <li>• Adequate water supply is to be provided in all toilets and urinals</li> </ul>	Along the Roads, construction Camps/Construction Sites	Contractor	Environmental Expert of AE and PIU
<b>C32</b>	Waste Disposal	<ul style="list-style-type: none"> <li>• The contractor will provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Expert of AE.</li> <li>• Unless otherwise arranged by local sanitary authority, arrangements for disposal of night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Environmental Expert of AE will have to be provided by the contractor.</li> </ul>	Along the Roads, construction Camps	Contractor	Environmental Expert of AE and PIU
<b>C33</b>	Consultation	<ul style="list-style-type: none"> <li>• The Environmental Expert of AE will contact the responsible people with the enhancement drawing of the site for which enhancement has been proposed and take their consent before the start of work.</li> <li>• Accesses to Different Schools along the road will be developed to the satisfaction of 'PIU'.</li> </ul>	Along the Roads	Contractor	Environmental Expert of AE and PIU
<b>C34</b>	Clean-up Operations, Restoration and Rehabilitation	<ul style="list-style-type: none"> <li>• Contractor will prepare site restoration plans, which will be approved by the Environmental Expert of AE. The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. The contractor will clear all temporary structures; dispose all garbage, night soils and POL waste as per Comprehensive Waste Management Plan and as approved by AE.</li> </ul>	Along the Roads, construction Camps	Contractor	Environmental Expert of AE and PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		<ul style="list-style-type: none"> <li>All disposal pits or trenches will be filled in and effectively sealed off. Residual topsoil, if any will be distributed in pre identified approved areas or in places suggested by the Environmental Expert of AE areas in a layer of thickness of 75 mm-150 mm. 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 project will be left clean and tidy, at the contractor's expense, to the entire satisfaction to the Environmental Expert of AE and PIU will certify in this regard.</li> </ul>			
<b>OPERATION STAGE</b>					
Activities to be carried Out by PIU					
<b>O1</b>	Monitoring Operation Performance	<ul style="list-style-type: none"> <li>The PIU will monitor the operational performance of the various mitigation/enhancement measures carried out as a part of the project.</li> <li>The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision, status of rehabilitation of borrow areas and disposal sites,</li> </ul>	Along the Road	PIU	PIU
<b>O2</b>	Maintenance of Drainage	<ul style="list-style-type: none"> <li>PIU will ensure that all drains (side drains, median drain and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding.</li> <li>PIU will ensure that all the sediment and oil and grease traps set up at the water bodies are cleared once in every three months.</li> </ul>	Along the Road	PIU	PIU
<b>O3</b>	Pollution Monitoring	<ul style="list-style-type: none"> <li>The periodic monitoring of the ambient air quality, noise level, water quality, soil pollution/contamination in the selected locations as suggested in pollution monitoring plan.</li> <li>PIU will either appoint PCB or its approved pollution-monitoring agency for the purpose</li> </ul>	Along the Road	PIU through Pollution Monitoring Agency	PIU
<b>O4</b>	Air Pollution	<ul style="list-style-type: none"> <li>Ambient air concentrations of various pollutants shall be monitored as envisaged in the pollution-monitoring plan.</li> <li>Bottlenecks should be avoided for smooth flow of traffic.</li> <li>Plantation of pollutant adsorbing trees, such as Spider Plant, Bamboo Palm, etc.</li> <li>Regular maintenance of the road will be done to ensure good surface</li> </ul>	Along the Road	PIU through Pollution Monitoring Agency	PIU

Sl.	Environmental Issue	Management Measures	Location	Responsibility	
				Planning and Execution	Supervision/Monitoring
		condition			
05	Noise Pollution	<ul style="list-style-type: none"> <li>Noise pollution will be monitored as per monitoring plan at sensitive locations. Noise control programs are to be enforced strictly.</li> <li>According to monitoring results, use of sound barriers / trees will be considered where warranted</li> <li>Signs for sensitive zones (health centers / educational institutions etc.) will be put up where horn should not be blown or traffic speed need to be regulated</li> <li>Pressure Horn must be banned in the project road</li> </ul>	Along the Road	PIU through Pollution Monitoring Agency	PIU
06	Water Pollution	<ul style="list-style-type: none"> <li>Water Quality will be monitored as per monitoring plan</li> </ul>	Along the Road	PIU through Pollution Monitoring Agency	PIU
07	Plantaton (Flora and Fauna)	<ul style="list-style-type: none"> <li>Monitoring of survival of trees should be done at regular interval and suitable mitigation measures should be taken to protect the trees.</li> <li>Efforts will be made for proper maintenance of planted trees, shrubs and grasses to maintain greenery and aesthetics</li> <li>Planted tree should be covered with fence or net</li> </ul>	Along the Road	PIU through Pollution Monitoring Agency	PIU
08	Soil Erosion and Monitoring of Borrow Areas	<ul style="list-style-type: none"> <li>Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankment &gt; 2m. and other places expected to be affected, will be carried out once in every three months as suggested in monitoring plan. In case soils erosion is found, suitable measures should be taken to control the soil erosion.</li> </ul>	Along the Road	PIU	PIU
09	Road Safety and Traffic	<ul style="list-style-type: none"> <li>Road Safety will be monitored during operation especially at location where traffic-calming measures have been proposed.</li> <li>The spills at the accident sites will be cleared immediately and disposed off properly in accordance with Emergency Response Plan</li> <li>Traffic management plan will be developed, especially along congested locations and near sensitive locations</li> <li>Traffic control measures including speed limits will be enforced strictly.</li> <li>Engagement with local community / Awareness Training</li> </ul>	Along the Road	PIU	PIU

## Reporting System

The Monitoring and Evaluation of the management measures envisaged are critical activities in implementation of the Project. The rationale for a reporting system is based on accountability to ensure that the measures proposed as part of the Environmental Management Plan get implemented in the Project.

Project Monitoring Cell will be set up in the PIU, which will act as the Contract Management Unit (CMU) and will be responsible for execution of the Project. Project Execution Units will be set up under the supervision of the Contract Management Unit for the Contract Package.

## Technical set up

It is proposed that an Environmental Management Implementation Unit (EMIU) will be set up within PIU. The EMIU will have an Environmental Expert who will be responsible for monitoring the implementation of the EMP with the assistance of the Environmental Expert/Specialist of the AE/IE and the Contractor. The Environmental Expert will be assisted by two Environmental Engineers. The EMIU of PIU will assist the CMU and the Project Director and will interact with State Pollution Control Board (SPCB), State Forest Dept., NGO & various Committees for addressable of environmental issues. In the PIU, there will be an Environmental Officer within the Project Management Information System Unit who will assist the Project Director on the environmental matters and also interact with the CMU, PIUs and its EMIUs.

## Nonconformity To Environmental Management Plan (EMP)

The Contractor will implement necessary mitigation measures for which responsibility is assigned to him as stipulated in the EMP. Any lapse in implementing the same will attract the damage clause as detailed below:

- Any complaints of public, within the scope of the Contractor, formally registered with the PIU and communicated to the Contractor, which is not properly addressed within the time period intimated by the PIU shall be treated as a major lapse.
- Non-conformity to any of the mitigation measures like unsafe conditions, non-collection of excavated material (during laying of drainage pipes) regularly and other unattended Environment, Health & Safety (EHS) issues, as stipulated in the EMP Report (other than stated above) shall be considered as a minor lapse.
- On observing any lapses, PIU shall issue a notice to the Contractor, to rectify the same.
- Any minor lapse for which notice was issued and not rectified, first and second reminders shall be given after ten days from the original notice date and first reminder date respectively. Any minor lapse, which is not rectified, shall be treated as a major lapse from the date of issuing the second reminder.
- If a major lapse is not rectified upon receiving the notice PIU shall invoke reduction, in the subsequent interim payment certificate.
- For major lapses, 10% of the interim payment certificate will be withheld, subject to a maximum limit of about 0.5% of the contract value.
- If the lapse is not rectified within one month after withholding the payment, the amount withheld shall be forfeited immediately.

**Table 43: Environment Management Plan Implementation Budget**

Sl. No	Cot of Environment / Migration Plan Description	Unit	Quantity	Unit Rate (Rs.)	Amount (Rs.)
	Obtaining necessary clearances, permission, consent from the concerned departments.	Contractors responsibility			
	Water Sprinkling for dust suppression at site (3 trips/ day)				
	Labour welfare as per norms.				
	Environmental Monitoring (Air, Water, Noise & Soil).	--	--	--	900000/-
	Conducting SwachhataPakhwada, EHS awareness program and Training etc	Lump sum	--	200000	200000/-
	Traffic Safety (Sign Boards, Delineators, Barricades, Cautionary tape etc.)	Lump sum	--	500000	500000/-
	Fire Safety, Workers Safety (PPEs), Electrical Safety, Health Safety (First Aid Facility) etc	Lump sum	--	500000	500000/-
	Miscellaneous/CER	Lump Sum		200000	200000/-
<b>Total cost</b>					<b>2300000/-</b>

### **Social Management Plan (SMP)**

The aim of this Social Management Plan (SMP) is to mitigate all such unavoidable negative impacts cause due to the project. This (SMP) Plan will be prepared on the basis of project survey findings and consultation with various stakeholders. The plan complies with PWRD, Meghalaya State Laws, the Municipal Act and Regulations.

Socio-economic mitigation measures will consist of policies and actions taken before the implementation of the project with the intention of minimizing the extent of impact. The first step of such mitigation will be to avoid unnecessary acquisition and then decide about the mitigation for the damage which is unavoidable. Mitigation is a long-term effort for reduction of socio-economic impacts on the affected population. The outcome of SIA will be guided by the Resettlement Framework of the project to prepare Social Management Plan (SMP).

In order to conduct socio-economic mitigation, it is necessary to acknowledge the grievance/ dis-satisfaction among the affected persons, identify the genuine grievances, finding the facts behind the grievances, and finally finding out ways to address those grievances.

The main responsibilities of the GRC at both the levels will be to:(i) provide support to local on problems arising from the proposed work; (ii)record the grievances, categorize, and prioritize grievances and resolve them; (iii)immediately inform the EA of serious cases; and (iv) report to locals on developments regarding their grievances and decisions of the GRC.

## **Recommendation of SIA to be Implemented**

Some key informants and representatives of various organizations have presented some recommendations for implementation of SIA so that the project's adverse impact will be minimized. These are noted below.

- There should be proper awareness campaign at the project sites regarding health and hygiene, awareness about HIV/AIDS, drug and human trafficking with details of the mode of operation, kind of people at high risk and method of mitigation. IEC materials in local language & in picture to be displayed and distributed in the sites, major settlements, Block and ULBs.
- Police administration, health department and block officials should be sensitized to take more proactive role to apprehend any remote chance of human trafficking, particularly of women and girls, drug peddling and risk of HIV/AIDS.
- Civil Contractor will minimize the impact of accessibility of the residential structures and the loss of livelihood of the Commercial structures will be minimized by speeding up the civil work and doing the work on one side of the road at a time.

## **Recommendation of the Vulnerable groups**

- Provision for institutional credit to the roadside vendors and traders.
- Skill development training to the members of the PAFs.
- Linkages of the locals with the available schemes sponsored by the State and the Central Government.

## **Recommendation for Gender Sensitization**

- Implementation of the Vishakha Guidelines as amended as The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 in case of sexual harassment against women should be displayed at the project sites and other important location.
- Earmarked parts of parking bays for women two-wheeler drivers and women car drivers to ensure their security.
- Making Sulabh toilets for women workers, with fittings for pregnant and disabled women at the project site.
- Better maintenance of street lighting and roads, especially near education institutions and workplaces of informal sector workers.
- Provision of quality drinking water and sanitation services, including menstrual hygiene facilities for women workers at the project office and other site offices.
- Safer vending and market places at project sites and by the road side.
- Conduct regular trainings of drivers, conductors, auto-drivers and traffic police on sexual harassment in public spaces and what support systems can be accessed.
- Develop protocols and response systems to address sexual harassment in transport facilities and display police and women's helpline numbers prominently in all project offices, public places and important junctions
- Ensure regular patrolling by PCR vans in highly vulnerable areas.
- Ensure presence of visible security, including CCTV at all important and vulnerable locations. Build trust and confidence among female citizens.



- Ensure effective operation of the women’s helpline and registering FIRs and other complaints.
- Ensure effective functioning of Sexual Harassment Committees in all institutions and Local Complaint Committees at local, district level that can be accessed by women workers in the informal sector.

#### 14.1.5 Budget for Implementation of Social Management Plan (SMP)

The cost related to temporary impacts will be borne by the EA. EA will ensure allocation of funds and availability of resources for smooth implementation of the project SMP activities. In the case of assistance and other rehabilitation measures, the EA will directly pay the money or any other assistance as stated in the RPF to temporarily impacted PAPs. The implementing agency will be involved in facilitating the disbursement process and rehabilitation program. The SMP implementation budget is given below

**Table 44: Summary of SMP Implementation Budget**

<b>I. Impact to NTH</b>			
<b>Loss of Shop/trade/commercial structure</b>			
Subsistence Allowance for 1 month for 21 Temporarily Impacted Persons @ Minimum wage of Semi-skilled Worker for 1 month	12,960.00	21	272,160.00
<b>Subtotal (A)</b>			<b>272,160.00</b>
<b>II. Unforeseen Impacts</b>			
Contingency of 5%	Total of (A to D)	5%	13,608.00
<b>Subtotal (B)</b>			<b>13,608.00</b>
<b>III. Implementation of RAP</b>			
Support for implementation of RAP (lumpsum)	920,000	1	920,000.00
M & E consultant (lumpsum)	80,000	1	80,000.00
<b>Subtotal (C)</b>			<b>1,000,000.00</b>
<b>Total(D) = (A to C)</b>			<b>1,285,768.00</b>

An estimated budget of Rs. **1,285,768.00** or INR 1.28 million will be required for implementation of SMP.

## **15 CHAPTER-XV: CONCLUSION AND RECOMMENDATIONS**

The environmental and the social impact assessment have been conducted as per the approach/ methodology for conducting ESIA study for all the seven project corridors. All the potential impacts were identified in relation to pre-construction, construction, and operation phases. Social impact assessment study has done within the proposed corridor. The proposed project interventions shall not attract Environmental Clearance (EC) from the SEIAA.

Focus Group Discussions (FGD's) were conducted to assess the perception of the people about the proposed project. The stakeholders selected included shop keepers, residents along the road, owners/ workers of local commercial establishments etc. The outcome of the consultations depicts the requirement for the road safety measures; road furniture's (including street lights, additional bus bays, signage's, speed breaker etc.).

In view of the environmental Impact assessment, there will be temporary negative impacts, arising mainly from construction dust and noise, hauling of construction material, waste and equipment on the project corridors (traffic, dust, safety etc.), mining of construction material, occupation health and safety aspects, disturbance to the residents, businesses, safety risk to workers, public and nearby buildings due to road excavation works, access impediment to houses and business, disposal of large quantities of construction waste, etc. These are all general impacts that are likely to arise during the road construction works in the settlement areas, and there are well developed methods of mitigation that are suggested in the ESMP. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported by the contractor to the CSC/PIU.

The prepared ESMP will assist the Contractor, CSC, and the PIU in mitigating the environmental and social impacts, and guide them in the environmentally sound execution of the proposed project. A copy of the updated ESMP shall be kept on-site during the construction period at all times. The ESMP shall be included in the bidding document along with appropriate contractual clauses for safeguarding the environment during the project construction and operation (maintenance period). As per the World Bank policy requirements, the prepared safeguard documents shall be disclosed in the World Bank website.

## Annexure 1

### Details of the Screening Process

#### Urban Roads (Town roads) and Non-urban roads under MITP (World Bank) initiative. Public Works Department (Roads), Government of Meghalaya

##### Social Screening Format

##### General Information:

Name of: Town: **Jowai** Urban/ Rural Area: **Urban**

Tehsil: **Jowai** District: **Jaintia**

- Does the project activity require additional land area? **No**
- If response in above question is yes, then fill information against sl. no. 3, 4 & 5 (as applicable), otherwise skip to sl. no. 6

Details	Unit	Quantity	Classification/ Category of land	Present Usage of land
<b>3. Private land required</b>	Acres			
a. No. of land owners affected	Number			
b. Persons whose livelihood is primarily dependent on land likely to be acquired/required	Number			
c. BPL Families (among a+b)	Number			
d. Total Vulnerable Families (including BPL) (among a+b)	Number			
<b>4. Government Land</b>	Acres			
a. Non-Titleholders – Encroachers Families	Number			
b. Non-Titleholders – Squatters Families	Number			
c. Various other users of this Govt. Land; Families	Number			
d. People losing livelihoods/ access due to loss of Govt. Lands project; Families	Number			
<b>5. Tribal Families affected</b>	Number			

##### 6. Residential structures/buildings (permanently) affected due to project activities:

Details	Unit	Quantity
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Details	Unit	Quantity
a. Total Affected Families	Number	Nil
b. Title Holders	Number	Not Applicable
c. Non-Titleholders – Encroachers	Number	Not Applicable
d. Non-Titleholders – Squatters	Number	Not Applicable
e. BPL Families losing Dwellings	Number	Not Applicable
f. Total vulnerable families (including BPL)	Number	Not Applicable
g. Total Tribal Families	Number	Not Applicable

**7. Commercial units (permanently) affected due to project activities:**

Details	Unit	Quantity
a. Total Affected Families	Number	Nil
b. Title Holders	Number	
c. Non-Titleholders – Encroachers	Number	
d. Non-Titleholders – Squatters	Number	
f. BPL Families losing Commercial Properties	Number	
g. Total vulnerable families (including BPL)	Number	
h. Total Tribal Families	Number	
i. Vendors affected	Number	
j. Petty shop keepers & Kiosk affected	Number	

**8. Common Property Resources (permanently) Affected: (Please give each type by number)**

Description	Unit	Quantity
Religious structure (specify)	Number	Nil
Well	Number	Nil
Waiting Shed/Rain Shelter	Number	Nil
Schools/Educational/ Cultural Structures	Number	Nil
Government/ Community Structures	Number	Nil

**9. Residential and/or Commercial units (temporarily) affected during construction activities:**

Details	Unit	Quantity
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Details	Unit	Quantity
a. Total Affected Residential/Commercial Families	Number	Nil
b. Title Holders	Number	Nil
c. Non-Titleholders – Encroachers	Number	Nil
d. Non-Titleholders – Squatters	Number	Nil
e. Vendors affected (Non- Title holder)	Number	Nil
f. Petty shop keepers & Kiosk affected (Non- Title holder)	Number	Nil

**10. Summary:**

S No	Items	Results
1	Total no of Families (permanently) affected due to proposed project activity (Single or multiple impacts)	Nil
2	Total no of BPL Families (permanently) affected due to proposed project activity (Single or multiple impacts)	Nil
3	Total no of vulnerable Families (permanently) affected (including BPL) due to proposed project activity (Single or multiple impacts)	Nil
4	Total no of Tribal Families (permanently) affected (including BPL) due to proposed project activity (Single or multiple impacts)	Nil
5	Total number of Community Property Resources affected	Nil
6.	Total Number of Families temporarily affected during construction	Nil

**11. Result/ Outcome of Social Screening Exercise**

Output	Outcome	Triggered for the Project
If the number of affected due to scheme/ sub-project implementation is <b>less than equal to</b> 200 persons (all impacts combined together – land, structure, other assets, livelihood, etc) or there is only temporary impact during construction	Abbreviated Resettlement Action Plan (ARAP) required	<b>Not Applicable</b>
If the number of affected due to scheme/ sub-project implementation is <b>more than 200 persons</b> (all impacts combined together – land, structure, other assets, livelihood, etc)	Resettlement Action Plan (RAP) required	Not Applicable
If only govt. land, forest land, other department land is impacted and the number of affected persons is nil (all impacts combined together – land, structure, other	ARAP/RAP not required	ESIA required

Output	Outcome	Triggered for the Project
assets, livelihood, etc)		

**12. Additional information to be collected about the site:**

Sl. No.	Previous usage of site	Response
1	Whether the present site or part of present site ever used for any of the following purposes? Response column whichever is applicable	
	Worshipping sacred trees/ sacred grooves	No
	Burial place	No
	Grazing cattle/ goats	No
	Other small shrines	No
	Other prayers, rituals, annual or seasonal festivals/ rituals	No
	Habitation place of community Gods/ ancestors/ or any other good or bad supernatural forces	No
	Place of offering (animal sacrifice)	No
	Other purposes (e.g. sports, cattle racing, etc)	No
	Sensitive social/ cultural/ historical folk tales or oral history of the site (which may later on influence the project)	No
	Open defecation	No
2	No specific usage/ plain ground/ agricultural	No



## **Annexure 2**

### **Minutes of meeting with the DPR consultant**

Location: Office of CETEST Pvt. Ltd, Kolkata vide Video Conference Mode

Date: 23.12.2021

Time: 4.30 pm

Attendees: Team Leader, DPR with Mr.Swarnava Bandhopadhyay, Environmental Specialist, Mr. Suman Sarkar, Social Specialist and team members of DPR and ESIA Consultant.

### **Agenda items**

#### **Land Acquisition**

As discussed with DPR Consultant, there is no requirement of extra land as the proposed alignment and all the proposed structures are well within the existing RoW and thus there is no land acquisition required for this project.

The DPR Consultant assures that there is no proposal for Land Acquisition.

#### **Consultant Comment:**

No Land Acquired

#### **Demand for all weather road**

The existing pavement condition along the road is very poor. In some portions of the stretch, the existing pavement is damaged with cracks, raveling, rutting edge breaking and potholes and in some stretches it have been observed that the existing bituminous layer is fully damaged and exposed. The overall pavement condition needs to be improvised.

The DPR Consultant has proposed improvement of existing pavement condition by overlaying with BC.

#### **Demand for road lighting**

Provision of street lighting is absolutely necessary as it not only act as a prevention of accidents but also an important source of public security intended to reduce crime. Studies have shown that darkness results in a large number of crashes and fatalities, especially those involving pedestrians; pedestrian fatalities are 3 to 6.75 times more likely in the dark than in daylight. Several decades ago, when automobile crashes were far more common, street lighting was found to reduce pedestrian crashes by approximately 50%. Road Furniture and Road Signage are to be introduced at all proper and suitable places.

The DPR Consultant has proposed street lighting in Civil Hospital to Luti Longshylla Road and Approach Road to Kiang Nangbah Monument. Similarly, road signages have also been proposed as given in the Traffic Signage Schedule in Volume VII-Drawings.

### **Road Safety**

Mirror should be placed in turning point of the roads and by placing these mirrors at a suitable height, they allow you to see vehicles coming. The same applies to sharp corners when you can't see oncoming traffic. A strategically placed convex mirror allows you to see what is around the corner and likewise for the oncoming vehicle, hence reducing the probability of road accidents. Proper signage and road furniture are to be integral part of the design.

The DPR Consultant has proposed road signages as given in the Traffic Signage Schedule in Volume VII-Drawings. Convex mirrors not proposed since no potential black spot detected on site.

### **Storm Water Drain**

The Local People demanded storm water drain as much as possible throughout the alignment. At congested area it should also have cover and use as footpath.

The DPR Consultant has proposed Storm Water Drain at all stretches. These can be seen in the applied cross sections viz. 1-A, 1-B, 1-C, 1-D, 2-A & 2-B.

### **Car Parking Facilities**

There should Car, Public Vehicle and Bus Parking facilities at important Junctions, market place and Schools etc.

The DPR Consultant has proposed car parkings at Civil Hospital to Luti Longshylla Road and Approach Road, Kynrud-Saphlang to Tpep-Pale main road & Kynrud-Saphlang to Tpep-Pale Road link-1.

### **Bus Shelter and/or Rain Shed**

Shelters increase passenger comfort and it's desirable to provide shelters for passengers waiting at the bus stops. They should be designed to accommodate the maximum number of passengers normally waiting, and to provide adequate protection from the weather. Bus Shelter and/or Rain Shed should be proposed at regular intervals.

The DPR Consultant has proposed passenger/public shelter on roads viz. Approach Road to Kiang Nangbah Monument & Approach Road to Civil Hospital.

### **Rumble stick or speed breakers at important junctions, in front of schools etc.**

There should be speed breakers in front of school, church and market place

The DPR Consultant has proposed rumble strips & collapsible traffic barricades which can be referred to in Volume-VII Drawings.

### **Utility Corridor**

There should be utility corridor at underground near the congested place

The DPR Consultant has proposed water pipeline trays which can be referred to in Volume-VII Drawings.

### **Public Urinal**

There should be Public Utility facilities like Toilet, Rest rooms etc. mainly at the Market or Congested Place.

The DPR Consultant has proposed toilet blocks in Civil Hospital to Luti Longshylla Road

### **Public Transport**

There are very few public transports in the total alignment. The frequency of public transport should increase.

As per Clause 2 **Objectives** of the Terms of Reference, increasing the frequency of public transport is out of scope.

**Annexure 3 Picture Plate**









